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PROBLEMS OF ELECTRICAL POWER
PRODUCTION IN THE SOUTHWEST

GOVERNMENT

Storage

MENTS

26 1975

HEARINGS

BEFORE THE

COMMITTEE ON

INTERIOR AND INSULAR AFFAIRS

UNITED STATES SENATE

Pursuant to S. Res. 45

A National Fuels and Energy Policy Study

NINETY-SECOND CONGRESS

FIRST SESSION

ON

ENVIRONMENTAL PROBLEMS ASSOCIATED WITH THE PRO-
DUCTION OF ELECTRICAL POWER BY COAL-FIRED PLANTS
IN THE FOUR CORNERS REGION OF THE SOUTHWEST
UNITED STATES

ALBUQUERQUE, N. MEX.—MAY 24, 1971

LAS VEGAS, NEV.—MAY 25, 1971

SALT LAKE CITY, UTAH—MAY 26, 1971

DURANGO, COLO.—MAY 27, 1971

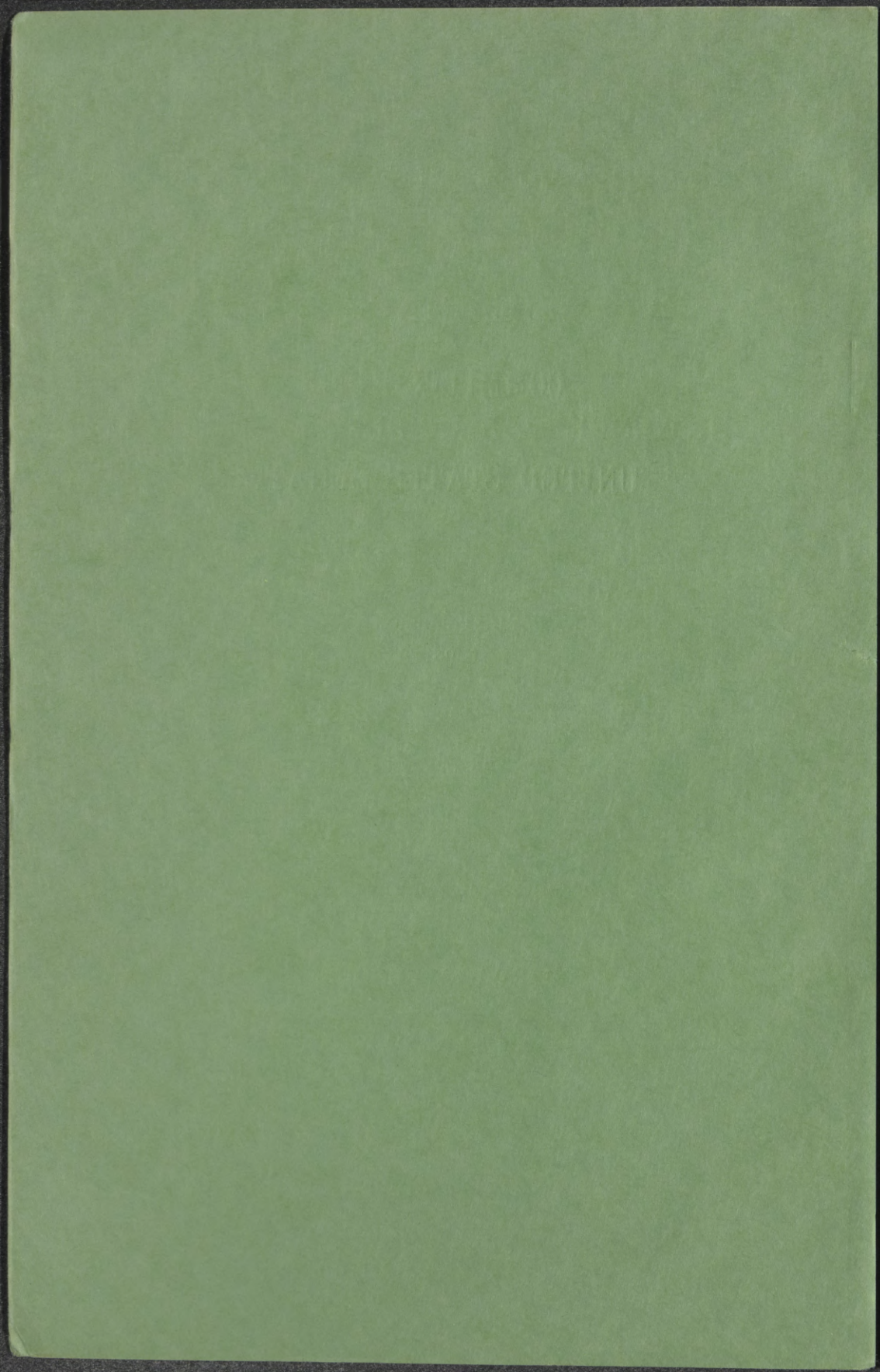
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WASHINGTON, D.C.—NOVEMBER 10, 1971

PART 7—APPENDIX

Serial No. 92-16





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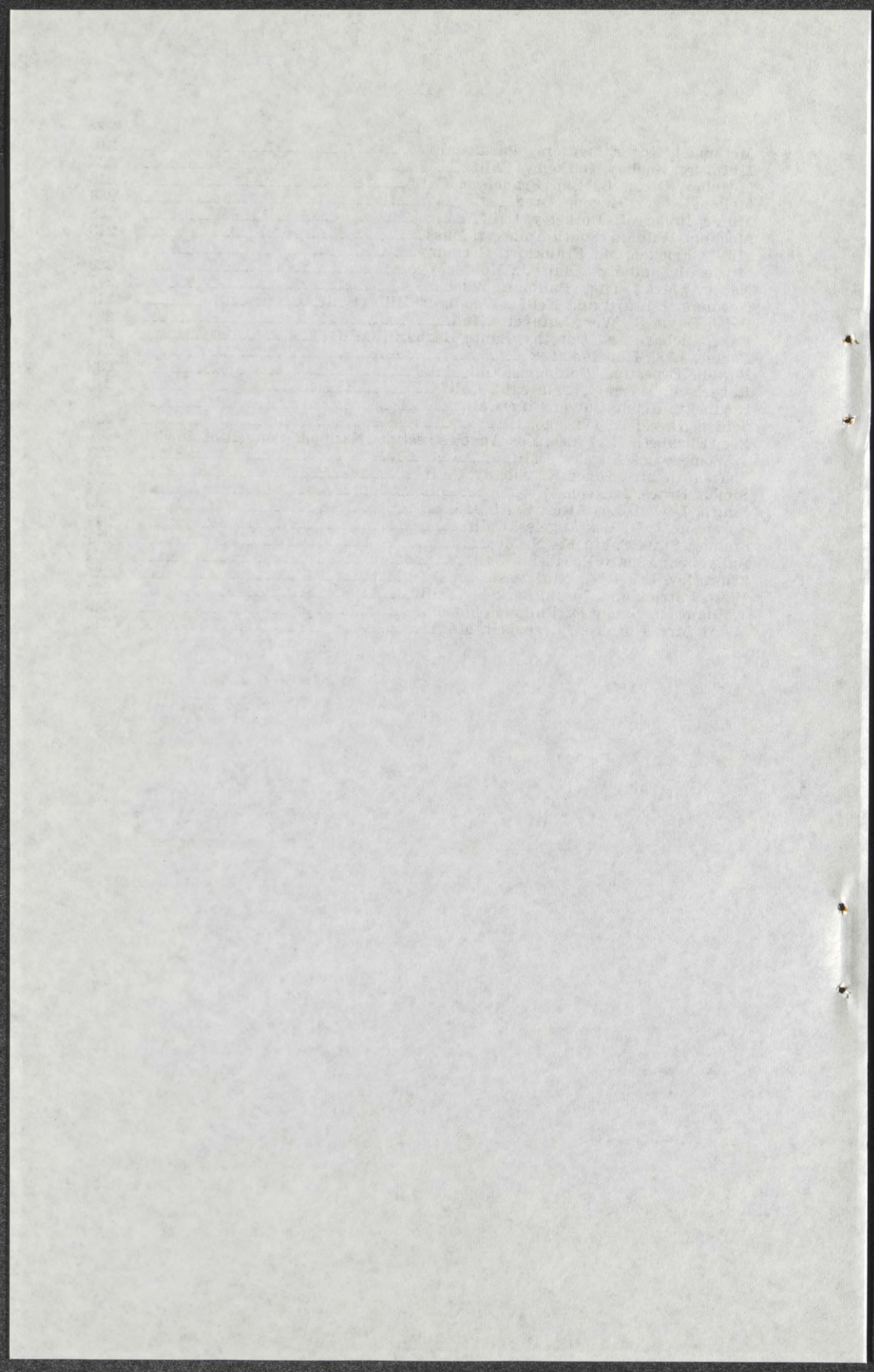
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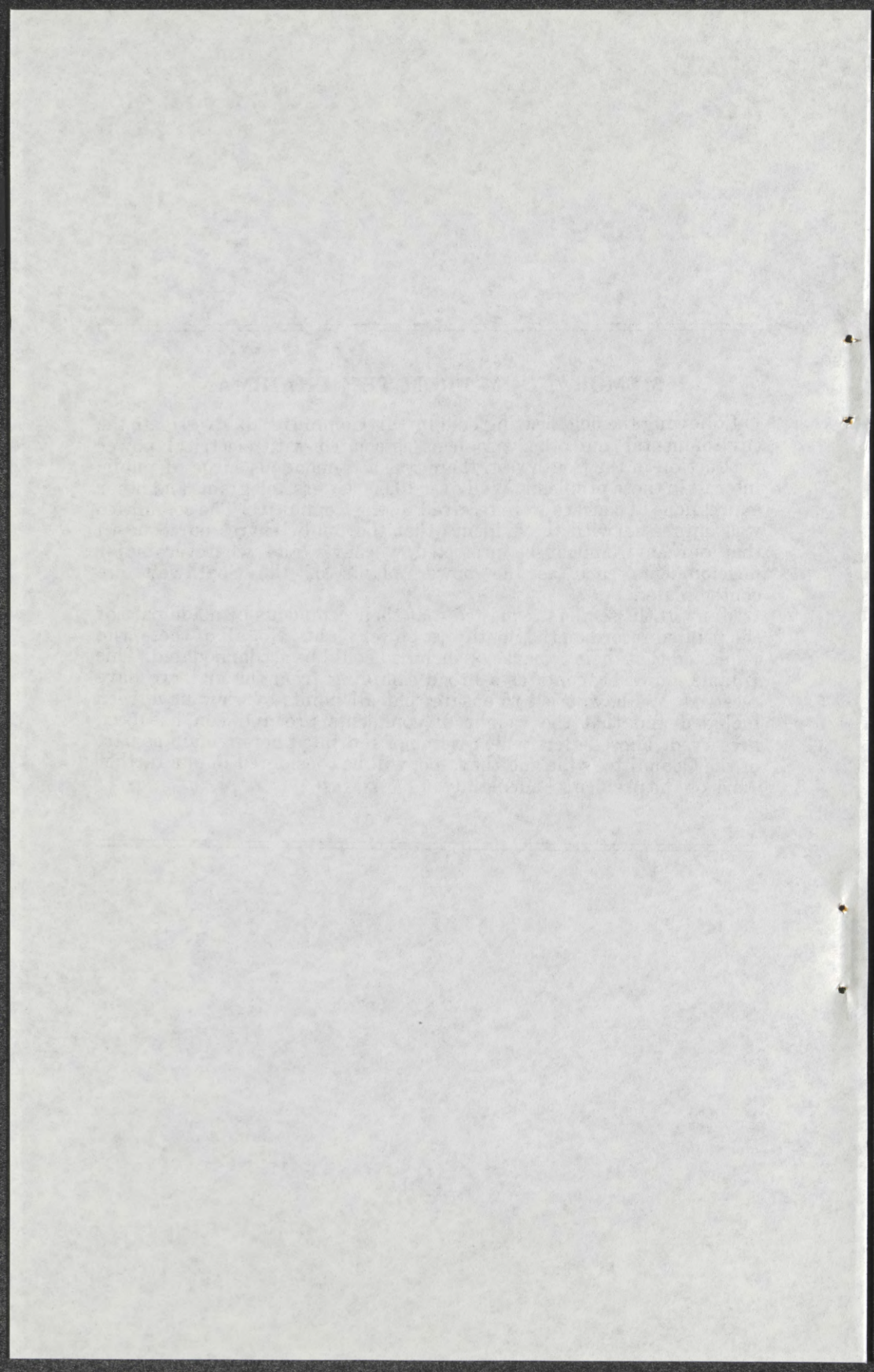
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MEMORANDUM FROM THE CHAIRMAN

Following the field hearing held by this Committee to investigate the environmental and other problems associated with electrical power production in the Southwest, there was a tremendous surge of public interest in those problems. Well over 10,000 letters, telegrams and other expressions of concern were received by the Committee. The committee was impressed with the evidence that the public shares our concern that our environment be protected whenever and wherever major developments such as the power plants of the Southwest are contemplated.

Many of the senders requested that their comments be made part of the printed record on the Southwest power plants. Not all of those who requested that their remarks be included could be accommodated. This volume, however, contains a broad sampling from the mail we have received. We have tried to ensure that all points of view have been included and that the weight of comments pro and con has been preserved. Those letters which were not reprinted here remain as part of the Committee's file and they, too, will be considered in our further work on the problems under study.



APPENDICES

APPENDIX 1

Communications pertaining to the hearing held at Albuquerque,
N. Mex., May 24, 1971

LOS ALAMOS, N. MEX., May 29, 1971.

Senator CLINTON P. ANDERSON,
Committee on Interior and Insular Affairs,
U.S. Senate, Washington, D.C.

DEAR SENATOR ANDERSON: Thanks for arranging the hearings on air pollution. I attended the Albuquerque meeting from about 3 p.m. to its conclusions and asked acquaintances about earlier testimony. It is my impression that two points have not been sufficiently documented, and I will try to do so below.

In a brief conversation with Messrs. J. Voerkler and D. Dreyfus, they suggested that I ask that this letter be made a part of the hearing record, and I do so.

The points I want to discuss are:

1. What value do our citizens and visitors put on visibility? Here I think of clear views of the Grand Canyon, Sangre de Christo Mountains, Navajo Mountain and many other colorful vistas which abound in the Southwest and are major attractions for all of us.

2. How much fly ash can the atmosphere carry without significant degradation of views of such attractions?

Personal data

I am a physicist, currently working with lasers. I do not claim to be an expert in the subjects presented, but I believe that the figures presented are accurate enough to make the points.

Currently I am serving as the Council Delegate for the Rio Grande Chapter of the Sierra Club and as Chairman of the New Mexico Wilderness Study Committee. Neither group has discussed these subjects, so these remarks should be considered as personal testimony.

Recreation including scenic views

The National Park Service's regional office in Santa Fe gave me the figures for visits to the Grand Canyon, Petrified Forest and Glen Canyon. Unfortunately, the average length of stay wasn't available in their reports. From my own experience I estimate one day at the Petrified Forest and two days at the Grand Canyon or Glen Canyon. Using the rule of thumb that a person spends \$10 per day while on such trips, I estimate that in 1970 visitors to the Petrified Forest and Painted Desert spent \$12 million dollars, Glen Canyon visitors spent \$18 million dollars, and Grand Canyon visitors spent \$45 million dollars.

The number of visitors to the Grand Canyon doubles every 11 years, and the growth rate for the other areas is comparable. If controls limiting the number of visitors aren't applied, I expect annual expenditures for the years 1980, 1990 and 2000 to be as shown in Table I. The figures are millions of dollars. Cumulative expenditures starting in 1970 are also shown. Increases due to inflation aren't included.

TABLE I

Area	1980		1990		2000	
	Annual	Total 1970-80	Annual	Total 1970-90	Annual	Total 1970-2000
Grand Canyon.....	88	650	166	1,900	310	4,150
Petrified Forest.....	24	180	47	540	92	1,240
Glen Canyon.....	40	300	70	800	135	1,800
Total.....	152	1,130	283	3,240	537	7,190

During the operating lifetime of the power plants the public will spend billions of dollars to enjoy the views listed above, and there are many more. Clearly, significant impairment of those views would damage the public interest by hundreds of millions of dollars.

The effects of fly ash on visibility

Before coal is burned in the power plant's furnaces it is very finely ground. Minerals in the coal are also finely ground, and most of the particles are fused. Part of the quartz and some other minerals vaporizes in the furnace and recondense as small particles. The resultant fly ash is composed mostly of transparent spherical particles ranging in size from about 80 μm to well under 0.5 μm , the wavelength of green light. For comparison, the thickness of most aluminum foil used in the kitchen is 0.001 inch = 25 μm .

It happens that I have a reasonably well equipped home laboratory. Using my optical microscope, I measured the distribution of particle sizes in fly ash and coal obtained from the Four Corners plant. Most of the particles are smaller than 1.2 μm , which is near the limit of resolution for my microscope. Particles small compared to 0.5 μm don't scatter light very strongly, so it is probable that particles I could see were larger than 0.2 μm . The geometric mean of the diameters for this size class is 0.5 μm , which is also the wavelength of green light.

My data are presented in Table II, with other quantities.

TABLE II

Size range μm	Settling velocity		Scattering cross section cm^2/gram	Source of ash			Scattering cross section per gram of total ash	
				Coal burned at 750° C. 694 particles percent of number	Fly ash 979 particles		cm^2/gram of total ash	percent of total
	ft./sec.	cm./sec.			percent of number	percent of weight		
0.2 to 1.25.....	0.7×10^{-4}	0.002	4.6×10^4	60.5	42.9	1.0	460	21
1.25 to 2.....	7×10^{-4}	.02	1.1×10^4	26.1	29.1	2.5	250	12
2 to 3.15.....	1.6×10^{-3}	.05	6×10^3	6.5	16.2	5.5	330	16
3.15 to 5.....	4.3×10^{-3}	.13	3.2×10^3	2.9	8.1	11.0	350	17
5 to 8.....	1.1×10^{-2}	.32	1.8×10^3	1.9	2.8	13.0	240	11
8 to 12.5.....	2.6×10^{-2}	.8	1.2×10^3	1.4	.6	13.0	160	8
12.5 to 20.....	6.6×10^{-2}	2	750	.6	.2	18.0	140	7
20 to 31.5.....	.16	5	470		.1	36.0	170	8
31.5 to 50.....	.43	13	300	.1				
Total.....				100.0	100.0	100.0	2,100	100

From Table II we see that an average value for the scattering cross section per gram of material collected by the precipitators is 2,100 cm^2/gm . Since collection efficiency is poorer for small particles, it would not be surprising to find that the average particle size in the emitted plume is significantly smaller. If so, the scattering cross section could be a factor of twenty higher. To illustrate the significantly worse effects of small particles I will include calculations for the case (scattering cross section/gram) = 21,000; a factor of ten larger than the mean found above.

Normal visibility in the Southwest

From the mountain peaks near Los Alamos we can frequently see Blanca Peak in Colorado—a distance of 175 miles. Typical viewing distances for the Grand Canyon, Painted Desert and Glen Canyon would be 20 miles.

A normal human eye can detect contrast changes of a few percent; reduction by 10% is quite evident.

Particles in the line of sight reduce contrast by scattering away light coming from the objects seen and by scattering sunlight into the viewer's eyes, making the scene. The amount of masking light depends in complex ways on the particle sizes and shapes, the angle between the line of sight and the line to the sun, and any cloud cover present. It is possible to calculate the contrast ratios quite accurately if all such factors are known, but I will not attempt it here. I will only point out that Grand Canyon visitors on the north rim look at the shadowed sides of the towers and canyon walls and are looking toward the sun. As a result, fly ash will interfere with their view much more than it will for visitors on the south rim.

For the calculations below I will assume that a contrast ratio change of 10% is produced by attenuating light from the objects viewed by 10% more than the attenuation of pure air.

Light attenuation by fly ash in the line of sight

Light traveling from Blanca Peak to Los Alamos would be attenuated by 10% if the fly ash concentration were $1.6 \mu\text{g}/\text{m}^3$ or 1 ton/160 cu. miles. Using the larger cross section mentioned above, the concentration would be one tenth as much, $0.16 \mu\text{g}/\text{m}^3$ or 1 ton/1600 cu. miles.

Where the viewing path is 20 miles, a 10% reduction of contrast would occur if the fly ash concentration were $15 \mu\text{g}/\text{m}^3$ or 1 ton/17 cu. miles. Using the larger cross section mentioned above, the concentrations would again be one-tenth as much, or $1.5 \mu\text{g}/\text{m}^3$ or 1 ton/170 cu. miles. Viewers looking toward the sun would see severe haze in either case. A concentration near 1 ton/1000 cu. miles would probably significantly increase the haze over that of normal air.

Total daily output should then be less than one ton, which is a factor of 40 less than that planned with scrubbers and bag filters for units 1, 2 and 3.

Air volume in which fly ash is dispersed

Average wind velocities range from 9 m.p.h. in the spring to 5 m.p.h. in the autumn. Vertical mixing depths range from 2.3 miles in summer to 0.6 miles in winter. I have no data giving the lateral diffusion widths and dispersion due to wind shear, other than photographs which suggest that a few miles would be a reasonable estimate. Using a wind speed of 6 m.p.h., a vertical height of 1 mile and a lateral width of 7 miles yields an estimate of 1000 cubic miles as the dispersal volume for the fly ash released in a 24 hour period. Wide variations should be expected, perhaps by an order of magnitude in either direction.

Cost of decreasing fly ash emission

One report lists the cost of electrostatic precipitators for units 4 and 5 (1590 M W) as \$4.7 million, which is a percentage cost of 1.7%. Precipitator efficiency should be near 99%. An additional factor of ten reduction might require another \$3 million and an additional factor of 100 reduction should cost less than \$10 million, and only slightly increase the cost of electricity to Arizona Public Service customers.

Improved figures

Calculations and data presented here have necessarily been approximate. Better data on fly ash particle sizes should be gotten with an electron microscope, and samples of the ash should be collected in the smoke stack or plume.

More complete calculations of the reduction of visibility due to fly ash should be made to establish the tolerable levels more accurately.

Observation of fly ash in snow at Los Alamos

Shortly after a snow storm in March, 1971, I collected and melted several gallons of snow from my yard. Sediment was collected and examined under a microscope.

More than half of the particles had the spherical shape characteristic of fly ash produced at the Arizona Public Service Company plant. I didn't attempt a size analysis because an electron microscope would have been necessary to get trustworthy data and properly distinguish the fly ash from natural dust particles.

Conclusion

From these figures I conclude that fly ash pollution of our atmosphere should be kept below 1 ton/2000 cubic miles, which would correspond to a total emission rate near 0.5 ton per day. Current estimates put the daily emission rate near 350 tons per day, a factor of 700 higher than the tolerable level. Improvements projected for Arizona Public Service's units 1, 2 and 3 may reduce the emission rate to 40 tons per day, 80 times the level needed from all plants combined.

Since light scattering by the fly ash is the objectionable feature, a better quantity to regulate would be the total scattering cross section of fly ash particles emitted per day. A figure near $10^{10} \text{ cm}^2/\text{day}$ from all contributing plants would seem reasonable.

A tax on fly ash emission would seem to be an excellent way to inject the profit motive into pollution control. Rates like \$3/million sq. cm. or \$50,000/ton can be justified, on the basis of damage to public recreation alone.

Respectfully yours,

BOB E. WATT.

NEW MEXICO CITIZENS FOR CLEAN AIR AND WATER,
Santa Fe, N. Mex., May 25, 1971.

Hon. HENRY JACKSON,
*Senate Office Building,
 Washington, D.C.*

DEAR SENATOR JACKSON: On May 10, 1971, I wrote you asking to testify before the Interior Committee's Field Hearing in Albuquerque, May 24, and to submit a document for the record. I received no reply and was not included among those testifying. Consequently, I now request that this letter and enclosure be included as part of the record of those hearings.

I am chairman of the Santa Fe Chapter of New Mexico Citizens for Clean Air and Water and a member of the State Board. This organization has 2500 members in 17 chapters throughout the state; we are united by a Newsletter published several times a year. As editor, I wish to introduce into the record the issue of April 1971, calling attention to the emphasis on pages 2, 3, and 4.

Scientists and technical specialists will speak for our organization, but I wish to speak in behalf of more than two thousand non-technical minded members who are very disturbed by impending developments. Very few are willing to give up the electric aids that have come into our lives—in short, we know there are going to be power plants, but when we see the plume of emissions, we know the clean-up controls are not adequate. Nothing less than the best control will be satisfactory to us! We have too much to lose.

There is lots more to the Southwest besides desert!

First, the rocks of the Grand Canyon form an open book of geologic history on display from the earliest times to the Mesozoic era; the chronicle is continued in the walls of Zion Canyon in Utah; later periods are delineated in the outcrops of southwest Colorado, and the latest in exposures in the Bisti area of New Mexico.

Second, geomorphic processes have shaped surprising and magnificent wonders in Monument Valley, the San Juan goosenecks, Rainbow Bridge and other natural bridges and arches, canyonlands in Utah, Angel Peak in New Mexico.

Third, extensive antiquities left by early man are matchless and irreplaceable at Mesa Verde, Chaco Canyon, Canyon de Chelly, Hovenweep, Betatakin, Keet Seel—to name a few.

Fourth, we are surrounded by striking ethnic examples—relic of ancient cultures—the Navaho, the Ute, and the Hopi Villages. To these people, Navaho Mountain and Shiprock are venerated shrines and the holiness of their beauty is being defiled!

Fifth, Lake Powell, Lake Mead, and Lake Mohave are modern recreation areas, par excellence.

Lastly, we who have our homes here enjoy a climate which, for years, has ranked among the highest for healthfulness. It is no exaggeration to state that ailing men and women have come here hoping to find a pleasant last year or two of their life, only to find they could recover health and live actively for ten—twenty—thirty—forty years longer.

The newcomer gets the impression that pollution is really not much of a problem, but we who live here have seen the change. We are used to sparkling long-range vistas. From parts of Santa Fe, for example, we can look north to San Antonio Mountain, near the Colorado border more than sixty miles away, or to Mount Taylor, eighty miles to the west. Today, we can no longer make out the detail we used to, and too often we cannot see these mountains at all. We know the dirty particles from the Four Corners power plants are responsible for this obliteration because their stream has been traced across the sky by airplane.

All these incomparables are in Jeopardy—all these examples of matchless beauty! To live in surroundings of beauty undeniably promotes a feeling of well-being. It is an inducement to good health and peace of mind. A century and a quarter ago, Ruskin said:

"Beautiful things are useful to men because they are beautiful and for the sake of their beauty only; and not to sell, or pawn, or in any other way turn into money. . . ." (Modern Painters, preface to 2d Volume, 1846)

Conservationists and environmentalists are accused of becoming emotional. When a man is faced with the prospect of losing the things that are dear to him—if his emotions are not aroused, there is something very wrong with him!

In all humility,

FERMOR CHURCH,
Chairman, Santa Fe Chapter, NMCCA&W.



New Mexico Citizens for Clean Air and Water

Newsletter No. 8 - April, 1971

LOOKING BACK ON THE LEGISLATURE

New Mexico Citizens for Clean Air and Water are especially grateful for the presence of 16 legislators who worked hard for environmental bills and were alert to sort out the meaningful from the spurious.

IN THE SENATE:

Michael D. Alarid (D-Bernalillo)
 Jerry Apodaca (D-Dona Ana)
 Edmundo R. Delgado (D-Santa Fe)
 Horace De Vargas (D-Rio Arriba-Sandoval)
 John P. Eastham (R-Bernalillo)
 Fred A. Gross (R-Bernalillo)
 Emmett C. Hart (D-Quay-DeBaca-Guadalupe)
 Robert H. McBride (D-Bernalillo)
 John D. Rogers (D-Los Alamos-Santa Fe)

IN THE HOUSE:

Max Coll (R-Chaves)
 Vernon Kerr (R-Los Alamos)
 James H. Koch (D-Santa Fe)
 Lenton Malry (D-Bernalillo)
 Walter Martinez (D-Valencia)
 John M. Radosevich (D-Bernalillo)
 David M. Salman (D-Union-Mora-Harding)

We believe most of our legislators failed to grasp the importance of the environmental legislation primarily because they do not appreciate the seriousness of our increasing pollution situation, but more immediately because the lobbyists for the moneyed interests convinced them that jobs and dollars would be threatened. To jobs and dollars they were quickly susceptible. Laws we hoped for were not innovative, although to some New Mexicans they seemed new. Reclamation of land after stripmining, sound forestry practices, commensurate fines for large polluters, class action suits to protect the environment, bans on "throw-away" containers, have all been enacted elsewhere: we watched them die in committee or on the floor.

The politicians seemed unaware that Class Action Suits were supported in the Democratic Platform of 1970, and that Tax Incentives for pollution controls were there denounced. Governor King remembered, however, for he vetoed HB 366 which offered Tax Credits for Pollution Devices. The setting up of an independent Environmental Protective Agency was also stressed in the platform and HB 205 establishes a new 5-man Environmental Improvement Board and takes over the present Environmental Services Division from HSS with little change. This bill passed with four votes against it in each house, viz:

IN THE SENATE:

(James Kirkpatrick, R-Dona Ana)
 (Harry M. McAdams, D-Lea)
 (R. C. "Ike" Morgan, D-Curry, Roosevelt)
 (L. M. Smalley, D-Hidalgo, Sierra, Luna)

IN THE HOUSE:

(John F. Bigbee, R-Torrance, DeBaca, Guadalupe)
 (Robert M. Moran, R-Lea)
 (Murray Ryan, R-Grant)
 (C. Gene Samberson, D-Lea)

The chronicle of the bills to regulate land subdivision (there were eleven) is set forth in detail in the New Mexico Review. In one shameless committee hearing, we witnessed professional lobbyists for the subdividers actually dictating provisions to amend bill to make their way easier. We found that controls on the state level—which we still believe are necessary—were opposed not only by subdividers, but also by the Municipal League and the County Officials organization. So, for the present, we must be sure these officials realize the depth and the extent of the problem. To quote an observant writer who was concerned with this matter forty to fifty years ago:

"A regional culture is the sum, expressed in ways of living and thinking, of the mutual adaptations of a land and a people. In the long run the land wins. If a people does not adapt itself willingly and efficiently, the land destroys it and makes room for another tribe... It is important to know whether a given people tries to understand and develop the country upon which it lives, or thinks of itself as imposing its derived notions of the Good Life upon the land." From REGIONAL CULTURE IN THE SOUTHWEST by Mary Austin, in Southwest Review, July 1929.

EFFLUENT REGULATIONS RELAXED FOR ALBUQUERQUE

The Water Quality Control Commission amended the effluent regulations for the Rio Grande between Angostura and Elephant Butte. The principal changes were (1) an increase in allowable COD from 50 mg/l to 80 mg/l; (2) a reduction in the settleable solids from .5 mg/l to .1 mg/l; and (3) reduction of the fecal coliform level to 500 organisms per 100 ml. Basis for the change appears to have been the statement by Albuquerque officials that while they could meet the present requirement of 30 mg/l BOD, a COD level of 75 mg/l was the best they could attain without major modification of the treatment system.

ARIZONA AND NEW MEXICO CITIZENS AGREE

Page, Arizona, sprang into being a few years ago as construction supply and service center for Glen Canyon Dam on the Colorado River. Above the dam, the clear water and the sparkling reflections of beautiful colored rock formations in Lake Powell – and the million visitors a year – are the pride of Page. But its citizens are apprehensive of the serious air and water pollution problems threatened by the super-generating plants of the WEST consortium of power companies and bureaus, which are moving in on them, following a pre-arranged time table.

TWO SUPER POWER PLANTS AT LAKE POWELL

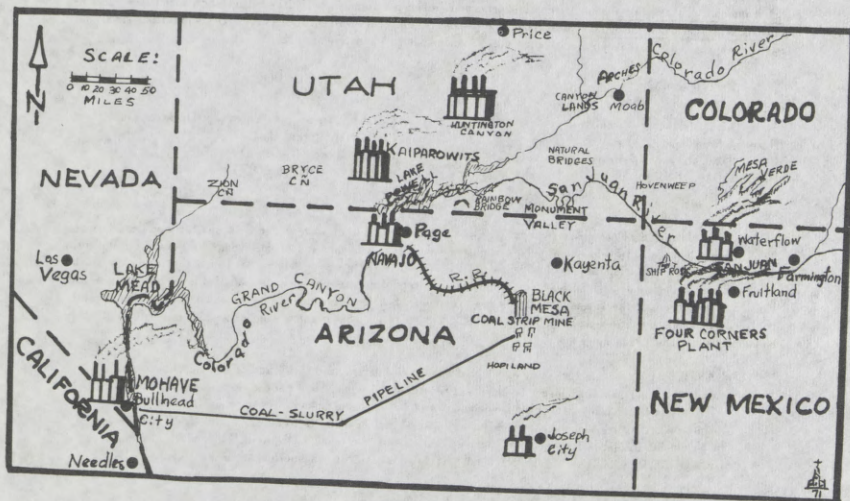
NAVAJO PLANT (now building)

Four miles from Page, 2 miles South of Lake Powell;
2.3 million kilowatts output from daily use of
23,000 Tons of Coal stripped from Black Mesa and brought
80 miles by a new Railroad across the Navajo Reservation,
and using 34,000 Acre feet of water, annually, to BENEFIT:
Salt River Project, US Bureau of Reclamation,
Los Angeles Department of Water and Power,
Arizona Public Service Co., Nevada Power Co., and
Tucson Gas and Electric Company, but
LOADING THE AIR with daily emissions of
220 Tons of Sulfur Oxides, 200 Tons of Nitrogen Oxides, and
15 Tons of Flyash (silica, alumina, & other particles).

KAIPAROWITS PLANT (after 1976)

Ten miles away, North of Lake Powell;
6 million kilowatts output from
54,000 Tons of plateau coal, daily,
and an annual consumption of
102,000 Acre feet of water to
BENEFIT: US Bureau of Reclamation,
Southern California Edison Co.,
San Diego Gas and Electric Co., and
Arizona Public Service Company, but
LOADING THE AIR, daily, with
513 Tons of Sulfur Oxides,
450 Tons of Nitrogen Oxides, and
100 Tons of Flyash.

Unless the quantities of these air pollutants are substantially reduced – and technology can do it – the effect upon Page, Lake Powell and the entire Southwest will be disastrous. CITIZENS FOR BEST ENVIRONMENT have organized in Page and ask for help. Address: Box 458, Page, Arizona, 86040.

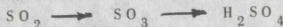


Have you thought about the network of transmission lines connecting these generators and their load centers?!

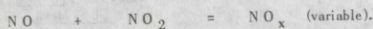
HOW MUCH POLLUTION?

Dr. Michael D. Williams, Research Coordinator of the John Muir Institute, Albuquerque, and formerly engineer with Los Alamos Scientific Laboratory, has provided the following figures and detailed discussion of conditions that can be expected to obtain in the states of the Four Corners area.

"Sulfur oxides and particulate matter were the first contaminants to be described by Federal criteria documents, and thus the first to fall under Federal abatement programs. Oxides of Nitrogen, however, are major contaminants responsible for the photochemical smog for which Los Angeles is notorious.



"Sulfur oxides are produced in large quantities by combustion of coal or fuel oil, the refining of metals, and other industrial processes. In a period of a few days to two weeks, some of the principal contaminant, sulfur dioxide (SO_2) is oxidized to sulfur trioxide, and this combines with water to form sulfuric acid. The acid droplets damage plant and animal life at very low concentrations. In addition, SO_2 can be carried on dust particles into the lungs in sufficient concentration to damage human health. Sulfur oxides are blamed in part for acid rainfalls in Europe and in this country. In some cases the rainwater was more acidic than fish could tolerate. New York and Chicago have experienced dangerous concentrations of SO_2 , exceeding acceptable levels by large amounts. Los Angeles has banned the use of high-sulfur fuel oil during seven months of the year in order to combat its SO_2 problem. The level in Los Angeles often exceeds that defined as acceptable. SO_2 played a large role in New York City's 1970 smog attack. In addition to health hazards, sulfur oxides taste and smell bad, and damage fabrics and other materials.



" NO_2 alone is a dangerous contaminant whose allowable levels in an industrial environment are lower than those of SO_2 , or the poisonous gas Cyanide. NO_2 reacts with water, or water vapor, to form nitric acid, and joins with SO_2 to damage plants at levels much lower than those normally considered dangerous.

"At present, power plants of the Colorado Plateau emit about 350 Tons of particulate matter each day. For comparison, Los Angeles produces 110 Tons per day, and New York City 140 Tons on an average summer day. Present regulations should reduce this emission figure to 240 Tons per day in a few years, providing no variances are granted. The proposed six power plants will emit 2,160 Tons of sulfur dioxide per day — more than Chicago (1,920), or New York City (1,077), and several times Los Angeles (225) — if the utilities continue with their present plans to use no emission controls for sulfur oxides. Also, the six plants will produce oxides of nitrogen ranging between 850 and 1,300 Tons per day. An exact figure cannot be projected because these gases combine in variable amounts. For comparison, in 1968, the whole Los Angeles area produced only 950 Tons per day, with automobiles contributing 695 Tons per day. Los Angeles considers its problem with nitrogen dioxide so severe that it has banned any further construction of large fossil-fuel power plants. Plants burning natural gas produce oxides of nitrogen as significant pollutants, although this contaminant is produced in quantities only half as large as those from burning coal.

LAKE POWELL

"The most severe local problem on the Colorado will probably occur at Lake Powell. Under present regulations an average of 1,110 Tons of SO_2 per day, 113 Tons of flyash per day, and 479 to 735 Tons per day of oxides of nitrogen will be emitted. Thus, in what used to be the wide open spaces, we will have more SO_2 than New York City, more dust particles than Los Angeles, and oxides of nitrogen comparable to those emitted by all the autos of Los Angeles. If higher ash-content coal, or higher sulfur-content coal should be used, these tonnages would soar to even higher levels. In one study, a power plant emitting 310 Tons of SO_2 per day exceeded the pollution limits set by New Mexico. Based on this standard (which is by no means strict enough), three of the six proposed plants — Kaiparowits, Fruitland, and Price — will be excessive polluters, under average conditions. Under high sulfur conditions, both Page and Mohave will join the list of excessive polluters, and San Juan probably will, also. Under such conditions all of the plants will exceed the daily summer emission of Los Angeles. The National Air Pollution Control Administration report on the Four Corners area (1970) suggested that vegetation damage is already occurring at Fruitland.

FOUR CORNERS

"Another severe problem will probably occur in the San Juan Basin of the Four Corners area. The plants located there will produce approximately 56 Tons per day of Flyash, 555 Tons per day of SO_2 , and 176 to 270 Tons per day of oxides of nitrogen. The sulfur and the ash emissions will be about half those of New York City; the NO_x emissions, 25 to 40% of those from the autos of Los Angeles; the sulfur emissions, more than double those of Los Angeles.

"At present there are no adequate means to calculate the exact effects of the emissions discussed above; nevertheless, the comparisons and those few calculations available indicate that the plants will pollute in the legal meaning, in common parlance, and in actuality. In addition, note that present pollution control standards do not take into account many important aspects of the problem. For one, New Mexico's standards do not prevent short-duration high concentrations that can occur during atmospheric conditions appropriately known as "fumigation periods". Second, they do not refer directly to the dangers of synergistic effects (the combined action of many contaminants). Third, the standards are not designed to maintain high visibility or high levels of sunlight. And yet, it may be noted that New Mexico's pollution control is relatively strict compared to that of neighboring states!

TALL STACK FALLACY

"Two other points should be emphasized. First, the present power company solution is to disperse the contaminants from tall stacks, which merely means dumping them several miles away. To evaluate the results of this technique, one should talk with the people of Anaconda, Montana, who live in the fallout shadow of the great mill stacks near there. Clearly, this technique does not solve large-area problems, such as the effect on sunlight, visibility, or acid rainfall. The fallout eventually occurs and even local dispersion can be frustrated by adverse weather conditions. Finally, the utilities talk about their "low sulfur" coal. But the facts are that none of their fuels would meet New Jersey's present requirements for coal allowed for use by power plants; Navajo-Hopi Black Mesa coal contains 2½ times the sulfur concentration allowable in New Jersey."

SUMMARY OF NUMBERS

Power Plant	Emissions (Tons per day)			
	SO ₂	NO	& NO ₂	Ash
Page, Arizona	229	133	to 204	15 (Arizona regulation)
Kaiparowits, Utah	880	346	to 531	98 (at 97%)
Fruitland, New Mexico	384	119	to 182	38 (New Mexico regulation)
San Juan, New Mexico	171	57	to 88	18 (New Mexico regulation)
Mohave, Nevada	157	91	to 140	30 (at 97%)
Price, Utah	334	99	to 152	41 (at 97%)
TOTALS	2,166	845	to 1,297	240

Kaiparowits calculations based on BTU value of 13,000; SO₂ at .95%; Ash at 8.09%.

San Juan calculations based on 0.7% sulfur; other characteristics like Four Corners.

Price calculations based on 1% sulfur; other characteristics like Black Mesa coal.

TONNAGE PER DAY BY AREAS

Lake Powell Area	1,109 Tons SO ₂ ;	479 to 735 Tons NO _x ;	113 Tons, Ash.
Four Corners Area	555 Tons SO ₂ ;	176 to 270 Tons NO _x ;	56 Tons, Ash.
Mohave Area	157 Tons SO ₂ ;	91 to 140 Tons NO _x ;	30 Tons, Ash.
Price Area	334 Tons SO ₂ ;	99 to 152 Tons NO _x ;	41 Tons, Ash.

COMPARE TONNAGE PER DAY IN OTHER AREAS

Chicago	1,920 Tons SO ₂	(average);	
New York City	1,077 Tons SO ₂	(average);	140 Tons, Ash (summer).
Los Angeles (1968)	225 Tons SO ₂	(summer);	950 Tons NO _x ; 110 Tons, Ash (average).
	310 Tons SO ₂	(winter);	695 Tons NO _x from Automobile Emissions.

ONGOING POLLUTION AT FRUITLAND

NMCCA&W do not believe the Federal Government is being strict enough with the existing Arizona Public Service Co. plant at Fruitland. DENVER POST (Feb. 4, 1971) narrates how the Federal Government made progressively harsher efforts over four years to abate Air Pollution from a Union Carbide plant in Marietta, Ohio. In April 1970, the National Air Pollution Control Authority complained because this plant was emitting 8½ Tons of Flyash and 270 Tons of sulfur dioxide daily. This plant was held responsible for 96% of the SO₂ and 66% of particulates polluting the area.

Fruitland Generating Units 1-5 at present emit 350 Tons of Flyash and 320 Tons SO₂ daily. Officials have said this problem will be solved in 1974 when APS proposed "improvements" go into operation. Then the Flyash will be 38 Tons emitted daily (4½ times that at Marietta) and SO₂ will still be 320 Tons daily (18½ per cent more than at Marietta). NMCCA&W declare this is no solution and ask authorities to be at least as strict with APS as with Union Carbide. Technology can provide the means for reducing both kinds of emissions to a small fraction of the proposed levels. NMCCA&W do not agree with the Department of Interior, and others, that presently designed equipment is adequate. This is just one of a handful of power plants that will pollute the region. Any control less than best is unacceptable.

The seriousness of the fine particles that pass the "scrubbers" and are thrown into the air cannot be overemphasized. These fines will usually be less than one micron. Because of their minute size they

- (1) interfere most with visibility,
- (2) are ingested into the lungs most readily, and
- (3) stay suspended in the air for long periods of time.

Senator Clinton P. Anderson (D-NM) asked for hearings "on the spot" regarding the Plateau Power Plants Complex. Accordingly the Senate Interior Committee, under Senator Henry Jackson (D-Wash.) has scheduled hearings as follows:

May 24, 1971, Albuquerque	Watch	Hearings in Page,
May 25, 1971, Farmington	your local	Phoenix and Durango
May 26, 1971, Salt Lake City	Newspapers.	may be added.

NEW FEDERAL LAW PROVIDES FOR AIR ONLY AS CLEAN AS CITIZENS DEMAND

The Conservation Foundation

set up a National Air Quality Conference last January in Cincinnati, Ohio on behalf of the federal Air Pollution Control Office (APCO) to instruct citizens from all the airshed regions in the United States about the provisions in the federal Clean Air Amendments of 1970. These provisions require all the states to pass certain enabling legislation which, in the opinion of APCO, is essential to enforcement of the new national "primary" ambient air quality standards. Each of the fifty states must prepare "implementation plans" or time schedules so that all sources of pollution—both stationary and moving—will be controlled to protect human health within four years. States are required to act by January 25, 1972 to meet strict requirements and timetables spelled out in the federal act. By failure to comply, a state will forfeit to the federal government its right to control air pollution within its boundaries and will lose its federal matching funds. This is a new relationship between the states and the federal government.

The aim of this Conference was to marshal citizen forces already active in protecting air quality at home. New Mexico was represented by NMCCA&W officers Mike Williams and Nancy Bartlit. More recent state conferences in Nevada and Utah were a part of this marshaling effort in states not having organized citizen groups. Actually, your dues to NMCCA&W made such a conference in New Mexico unnecessary and saved the taxpayers' money.

The Congress fully recognized the indispensable role citizens and citizen groups have played in air pollution control and has utilized this public watchdog by writing in the law citizen responsibilities and rights. For instance, the citizens, through mandatory public hearings, can and should demand the timetables for implementing the national "secondary" or more stringent state standards which protect present air quality, public welfare or visibility, property, plants and wildlife. Citizens are given the right to sue, in class actions, polluters or enforcers to stop air standard violations. Emission data of stationary sources which must be recorded continuously at the expense of the industry will be public record rather than proprietary information.

The federal law is written so that the citizen can get the quality of air he demands, above the general minimum level of health and property protection. If New Mexico's air is to remain cleaner than New York City's, the law puts the burden on the citizen to obtain a local standard by state law. We want the New Mexico standards to be better than the national level.

New Mexico's Air Quality Control Act needs amending in order to satisfy the federal requirements. NMCCA&W, the Governor's office, legislators, Health and Social Services Environmental Division, the Attorney General's office, APCO, and others will be preparing specific amendments to propose to the next session of the legislature. Some of these changes will be (1) requiring a plant to have a permit prior to construction, and a permit to operate, which can be revoked if emission regulations are exceeded, (2) state control of plant siting so that air quality standards are not exceeded, (3) state land use planning with regard to pollution, (4) traffic control for emergencies, (5) increased authority for abatement of pollution during emergencies when air standards are exceeded, and (6) subpoena power of witnesses before hearing boards.

In accord with Senate Joint Memorial 8 of the recent legislature the SOUTHWEST CONFERENCE ON AIR POLLUTION will be held in Albuquerque April 30, 1971. This is for legislators from NEVADA, UTAH, COLORADO, ARIZONA, NEW MEXICO and MEXICO. The principal purpose is to delineate the Federal Air Pollution Laws and how they tie into State Laws; if certain State Laws are not enacted by February 1972, the Federal Laws will apply.

PUBLIC HEARING ON AIR QUALITY CONTROL AMENDMENTS

May 14, 1971. 10:00 A.M., P.E.R.A. Building Auditorium, Santa Fe. To consider Amendments to Regulations:

- (1) Reg. 301 - Regulation to Control Open Burning.
- (2) Reg. 501 - Asphalt Plant Rotary Dryers - to include particulate emissions from pumice, mica, and perlite plants.
- (3) Reg. 100 - Definitions.
- (4) Reg. 201 - Ambient Air Quality Standards.
- (5) Reg. 401 - Regulation to Control Smoke.

Some proposals are more lenient; for material to be considered write: Air Quality Control Unit, H.S.S., P. O. Box 2348, Santa Fe, 87501.

Friday, May 21, at 8 P.M. in the Highway Department Auditorium, Santa Fe, the NM Society of Professional Engineers is presenting the American Iron and Steel Institute's SHOW AND TELL. 800 slides and movie film from seven projectors, with taped and live narration, depict the pollution situation we are all responsible for and suggest solutions. All invited.



ENFORCED COMPLIANCE

It is gratifying to recognize achievements in pollution control. The American Meteorological Society points out to us that the Small Business Administration has cleaned up the smoke plume extending from the factory stack in mid-United States in its old seal at the left. The new, purer symbol on the right could have more importance than a humorous reference suggests.



POLLUTERS HAILED INTO COURT

Attorney General David Norvell has filed two complaints alleging violation of Air Pollution regulations. C.W. Dunn, operator of a salvage yard near Lovington is cited for causing or allowing open burning on February 2 and March 13, 1971, and the District Court in Lea County is asked to assess a civil penalty of \$1000.00 for each offense.

In Rio Arriba County, an injunction is sought to prevent Jackson Sawmill, Inc., near Velarde, from violating the state's air quality regulations. The sawmill has not brought its operations into compliance, as it agreed to, by December 31. The firm says Clean, Inc., of Albuquerque is to modify the sawdust burner with a surplus missile cone and increased air pressure to achieve complete combustion and meet requirements.

ELK MOUNTAIN ROAD

At the regular meeting of the State Board, April 17, 1971, NMCCA&W adopted a stand that the proponents of Elk Mountain Road must establish their case on the basis of a sound and thorough evaluation of the ecological effects of the road before we can endorse it. We consider the "Environmental Analysis" published by the Santa Fe Forest an imaginative projection lacking important facts, figures, and documentation. We believe it incumbent upon us to demand a complete study in full compliance with the federal law.

OUR CHAPTERS ARE MULTIPLYING

ALAMOGORDO 88310
Frances Fisk, 1809 Corte del Sol

ALBUQUERQUE
Annette Rosenthal, Box 38,
Corrales 87048

CARLSBAD 88220
Marvin Boles, 1006 N. Tate

DEMING 88030
Mrs. Wm. Bonneau, 1220 E. Orange

ESPANOLA 87532
Jeanne Aeby, Rt. 1, Box 385 A

GALLUP 87301
Dr. Robt. Fishman, 1108 Martinelli Dr.

HOBBS 88201
Rev. Amos N. Gaume, P.O. Box 172

LAS CRUCES 88001
Barbara Schutz, 1904 Cruse Ave.

LOS ALAMOS 87544
Lawrence Bryant, Jr., 107 Carlsbad Ave.
Dr. John Bartlit, State Chrmn.
113 Monte Rey Drive, No.

LOVINGTON 88260
Rev. Robt. Buck, St. Mary's Episcopal
Church

ROSWELL 88201
R.A. Milligan, 700 N. Missouri, Apt. 37

SAN JUAN COUNTY
L. D. Holcomb, 1601 Camino Rio
Farmington 87401

SANTA FE 87501
Mrs. Ted Asplund, 100 Circle Drive

SILVER CITY 88061
Dorothy Thomas, 315 West 7th St.

SOCORRO 87801
Dr. Gale Billings, Geosciences Dept.
NMIMT

TAOS
Kate Lopez, Box 176,
Arroyo Seco 87514

TUCUMCARI 88401
Susan Sangston, Box 508

CHAMBER OF COMMERCE,
Raton, N. Mex., June 16, 1971.

Mr. JERRY T. VERKLER,
Staff Director, Senate Interior and Insular Affairs Committee,
The Capitol, Washington, D.C.

DEAR Mr. VERKLER: It has come to our attention that Senator Henry M. Jackson, Chairman of the Senate Interior and Insular Affairs Committee, is holding a series of hearings throughout the Southwest region, for study of the environmental impact of the new electric power generating plants being constructed in this area. This is a topic of great interest to our organization, and there are several points we would like to present for insertion into the record.

(1) POWER AS AN EXPORT COMMODITY

While some of these electric plants are designed to serve the needs of local citizens within the state of New Mexico, a major share of this power will enter the regional transmission system for distribution to other states, particularly southern California. Utilities within California find it more economical on balance to transport electricity rather than ship our coal. It seems perfectly clear that the areas receiving power need, desire and can use electric power generated in northern New Mexico.

(2) LOCAL ECONOMIC DEVELOPMENT BADLY NEEDED

The opportunity to mine coal and generate power for export to other areas represents to us a welcome addition to local economic development. It has been long a recognized fact that northern New Mexico and Arizona as well as southern Utah and Colorado are economically underdeveloped. In fact some five years ago the Congress established the Four Corners Regional Commission in an effort to spur economic growth in this area. Despite its efforts and our own hard work in this direction we still have not met our hopes or even our needs. Today too many of our citizens remain unemployed or underemployed. One of the great natural resources of the area is the coal which underlies large areas and represents a significant opportunity for our growth and development. Coal at one time made a real contribution to industry and commerce as well as to the economic advancement of our citizens, but for the last decade this activity has diminished rather than progressed. One cannot help but note the large degree of overlaps between coal resources and underdeveloped regions in both the eastern and western parts of the United States. It would seem that a revitalization of the coal industry would be a major step toward renewed growth and prosperity in these areas.

(3) SOME ELECTRICAL GENERATION PLANTS APPEAR TO BE DISTURBING THE
ENVIRONMENT

We are pleased to point out that much of the coal resource of our region is low in sulphur and ash content. As a consequence of its merits it is regularly mined and shipped to the West Coast for use there and transshipped abroad. However, even the finest natural unrefined coal possesses sulphur and inorganic materials which are detrimental to the environment in large quantities. Due to the fact that modern electrical central power stations in order to be efficient are among the largest, most expensive industrial plants in the world, they consume large quantities of coal and unfortunately emit undesirable pollutants.

(4) POLLUTION IS UNDESIRABLE

The Raton Chamber of Commerce does not take kindly to the destruction of the great environment which is our heritage. While coal is a great resource and economic activity is necessary to our welfare, we cannot allow activities which damage or destroy our standard of life in order to keep or improve our standard of living. Our area earns a substantial income from agriculture, forestry and tourism, and factors which diminish these activities are consequently a matter of concern. Thus, we as individual citizens and as an organization recognize that we face either a real or an apparent dilemma of conflicting economic and environmental considerations. For this reason we have studied this problem carefully as concerned citizens and businessmen, though not as experts. From our study we have come to several conclusions which we think point to a solution of the apparent impasse.

(5) THE CHOICES

Coal as it naturally occurs and as it customarily is used is a dirty fuel. It contains impurities that give use to fly ash, slag and SO_2 . Therefore we can either clean up coal itself or remove the impurities during or after the combustion process. As a final option the use of coal can be abandoned and the West Coast can import fuel reserves from foreign sources. This of course leaves our resources unused and many of our workers unemployed. It seems to us that this import procedure adversely affects the U.S. balance of payments and makes our country increasingly dependent upon foreign fuel sources. With all these undesirable features we think fuel imports are unwise as compared to upgrading the quality (cleanliness) and usefulness of our coal resources.

(6) RECOMMENDATIONS

Considering the Southwest power plant problem in its broad dimensions we recommend the following steps.

A. Install existing air pollution control equipment on existing and planned power plants. This equipment should meet realistic pollution standards. We are aware that this equipment must be carefully engineered and designed, but we think that all reasonable efforts must be made to install this equipment as soon as it is feasible. Needless delay would hurt our area.

B. In addition to this application of existing technology we strongly urge that the federal government start immediately a major research and development effort in conjunction with the coal and electrical industry. The objective of this program would be to develop during the next ten years methods and processes to utilize our coal resources with a high degree of effectiveness and cleanliness.

The support of coal research would include studies on coal gasification, production of clean coal and coke, and new power generation methods such as MHD (magnetohydrodynamics), fuel cells and hot gas turbine methods. With a full scale program we think that new and advanced technologies can be developed, allowing the full future utilization of coal as an energy and a chemical resource without damaging pollution.

We trust that you can manage this letter a part of the record to express our concerns about unemployment and pollution. But of even greater importance, we think these problems can be solved both in the short and long run.

Respectfully submitted,

WILLIAM H. DARDEN, *President.*

TAOS, N. MEX., May 16, 1971.

DEAR SENATOR JACKSON: I have lived in Northern New Mexico for four years and we are very alarmed about the air pollution caused by coal fired plants and strip mining in New Mexico.

The visibility—which was once beautifully clear for 100 miles—is now obviously fogged.

We are urging you to please help us save our state from such pitiful destruction.

Please use this letter as evidence—in any hearings at which it may be helpful.

Respectfully,

ANTOINETTE P. FANNING.

LOS ALAMOS, N. MEX., May 27, 1971.

HON. HENRY M. JACKSON,
Chairman, Senate Committee on Interior and Insular Affairs, U.S. Senate,
Washington, D.C.

DEAR SENATOR JACKSON: We wish to add our testimony to your committee's record in the matter of the production of electricity in the Four Corners area of the Southwest.

We are sympathetic with the need for electricity of our neighbors to the west of us, and, indeed, of New Mexico itself, but we are convinced that this power can be produced in a manner which will have little or no impact upon our unique environment (which we have had the privilege of enjoying for 19 years).

The first thought which occurs to us, living in Los Alamos, is that nuclear power is a safe and economic alternative which is most acceptable. This acceptability is indeed the case, and we recommend this source of power to the attention of the appropriate utilities in New Mexico, Arizona, and California.

However, power is being produced in the Four Corners area by the burning of coal, and more and larger coal burning power plants are proposed. To assure minimal impact upon the Southwest environment, it seems to us that these power plants should not be allowed to release more than trivial amounts of fly ash and smog-producing oxides of sulphur and nitrogen. Such very small releases are now practicable and economic. We see no reason why fossil-fueled power plants should be regulated any less stringently in regard to waste releases to the environment than are nuclear power plants. As you know, waste releases from nuclear power plants are virtually unmeasurable. We recommend such regulations to your committee's attention.

Another thought in this matter is that of the value of fossil fuels for petrochemicals and the conservation of this source for future generations. We suggest that, because a power alternative exists, fossil fuels should be saved when possible for their more valuable chemical applications. To accomplish this step, a license to use a fossil fuel could be established, and the charging of an annual fee be imposed, the fee being graduated with increasing use. We recommend this thought to your committee's attention.

Thank you very much for your consideration of these proposals.

Sincerely,

Mr. and Mrs. WILLIAM R. STRATTON.

LOS ALAMOS, N. MEX., May 26, 1971.

Senator HENRY M. JACKSON,
Chairman, Senate Committee on Interior and Insular Affairs, U.S. Senate,
Washington, D.C.

DEAR SENATOR JACKSON: My husband and I strongly object to the pollution of the Farmington plant and the proposed plants. It is our understanding that even with the most efficient available emission control devices that large quantities of pollutants will still be pouring into the environment. We would like to encourage all efforts towards eliminating this problem.

Some experts in ecology project that at our present rate of pollution in about four generations mankind will be extinct. This is based on scientific study and is an alarming projection of the future with firm basis. It's time to switch priorities before it's too late and emphasize the quality of the environment rather than this so called progress. We feel that clean air and water is far more valuable than the power it's being sacrificed for. We're in favor of a program emphasizing less use of power and strong pollution control until further technology produces an efficient non-pollution source of power.

Having attended the hearing in Albuquerque, I hope the committee will seriously consider the well thought out suggestions presented there: a moratorium on all the plants, a ban on advertising power use, the suggested sur-tax on nonessential power use (such as neon signs) and a land use policy.

We'll be eager to hear of the results of the hearings and of the action of the committee on this urgent problem which has warranted grave public concern.

Sincerely,

Mrs. MILES HINDMAN.

ALBUQUERQUE, N. MEX., May 26, 1971.

Hon. HENRY M. JACKSON,
Chairman, Interior and Insular Affairs Committee, New Senate Office Building,
Washington, D.C.

DEAR SENATOR JACKSON: Being a concerned citizen in the State of New Mexico I wish to convey my abhorrence at the power projects in the Four Corners area of the southwest. My husband and I have lived in Albuquerque for eleven years and resent the pollution of New Mexico skies for the benefit of California, Nevada etc.

It is about time the utility companies in this country (gas included) stopped advocating using more power for our so called affluent society and started pushing for conservation. Continued growth is certainly not the answer to our many problems.

I would like my statements to become part of the records of the U.S. Senate Committee on Interior and Insular Affairs investigative hearings in the southwest.

I hope for once we will listen to the Indians and the environmentalists, if for nothing else than the future of the last area of the United States with clean air, blue skies and wide open spaces.

Sincerely,

ROCHELLE S. GRAUBARD.
(Mrs. H. Graubard)

WHITE ROCK, N. MEX., June 3, 1971.

HON. HENRY M. JACKSON,
*Chairman, Interior and Insular Affairs Committee, New Senate Office Building,
Washington, D.C.*

DEAR SIR: I feel it is my responsibility as a citizen and Native New Mexican to write this letter urging you to take the necessary action to halt present deterioration of the environmental quality of the Southwest.

There must be set up a National study of the environmental ill effects of coal-burning power generation with steps toward a more efficient use and generation of electricity.

In 1957 I was an ambassador of New Mexico as Miss New Mexico. It was with great pride I represented my beautiful State. Unfortunately during the past 14 years our clean air, precious water, and scenic landscapes are being sacrificed for the production of electricity.

Please, I urge you to consider the importance of my letter and to include my comments and statements as part of the hearing record.

Sincerely,

PATRICIA J. JOLLY.

ALBUQUERQUE, N. MEX., May 22, 1971.

Senator HENRY JACKSON,
*Chairman, Senate Committee on Interior and Insular Affairs, Senate Office
Building, Washington, D.C.*

DEAR SENATOR JACKSON: I hope that this letter does not arrive too late to influence your decision on power generation in the Southwest. Please include this letter in the records of the committee hearings on power generation in the Southwest, being held this week.

My family and I are sickened by the prospect that the natural beauty of our Southwest which until now has been protected because of our economic underdevelopment, may be spoiled by coal burning plants which will produce power primarily for people who do not live in our enchanting Southwest. Many of these people probably have only a dim recollection of clean air and few are aware that one of the last places where one can see mountains which are over a hundred miles away may be ruined so that they can have power to run their already polluted cities. People in these Southern California cities do realize the dangers of this kind of energy production and are taking steps towards banning fossil fuel burning plants in their own areas.

My two grandfathers moved to New Mexico with their families because in the early part of this century a dry climate and fresh air were the only known palliatives for "consumption." Most of their children, grandchildren and great-grandchildren still live here because the clean desert air and the rugged beauty of the landscape made them want to stay, although it might be economically more profitable for us to live somewhere else. My husband came 10 years ago from the Mid-West, being attracted to these same qualities and today would not want to live anywhere else.

We feel sure that if these power plants are built, they will ruin the most attractive aspects of living in this area of the country. Increase in air pollution in the Albuquerque area is visible to those of us who have lived here all our lives or even a few years. It has been shown that the source of part of this pollution is from the one existing Four Corner's plant. How much more damaging will seven more plants be? Not only will the particulate matter be enormous and ruin the magnificent vistas and blue skies of most of the Southwest, but strip coal mines are scarring the surface and desert water is being wasted through evaporation processes and contamination, threatening to lower the water table in the Navajo lands which already suffer from a shortage of water.

Please block construction of any more coal-fired power plants in the Southwest. Instead we ask you to work for legislation for research to develop environ-

mentally safe alternatives for electrical energy, and/or the present methods of its production.

Sincerely,

JOANNE CALKINS FINK.
RICHARD T. FINK, Ph. D.
CLÉLIE MOORE.
Mrs. F. M. CALKINS, Sr.

ALBUQUERQUE, N. Mex., May 24, 1971.

HON. HENRY M. JACKSON,
*Chairman, Interior and Insular Affairs Committee, New Senate Office Building,
Washington, D.C.*

DEAR SENATOR JACKSON: We are very concerned about the fact that our environment here in the southwest is being slowly ruined by pollution of various sorts and among them one of the worst is the power plant in the Four Corners area. The environment in this part of the country is too fragile to support something as dirty and voracious as this particular plant is, much less any more of the same, as have been planned and started for this area. What also upsets us is the fact that most of the power from these plants goes and will go to the west coast. They are not even supplying much of the power for our own state! Even the so-called scrubbers that the present plant is installing takes only the fly ash out of the air and not the noxious sulphur and nitrogen which are real health hazards.

Some other form of fuel for power is absolutely and urgently needed for this country and soon if we are going to save what is left of our environment. If these plants are completed and put into use, our lovely state could look like Los Angeles as far as pollution is concerned.

We cannot just sit by and let our environment be ruined. We request, no stronger than that, we demand that a moratorium be placed on building these plants until some better method for producing power is implemented.

Yours very truly,

Dr. and Mrs. L. H. KOOPMANS.

ALBUQUERQUE, N. Mex., May 26, 1971.

HON. HENRY M. JACKSON,
*Chairman, Interior and Insular Affairs Committee, New Senate Office Building,
Washington, D.C.*

SIR: Concerning the matter of electrical power generation in the Southwest, I am sure that there are many marvelous advantages of our present way of life that are brought to us by the easy availability of electrical power. The quality of the life that we enjoy would be reduced drastically if economical electrical energy were no longer available.

However, I am also certain that we must examine the actual total cost of electricity, and try to determine whether we are paying the price in a form that we can afford. As you know, this is a large and difficult problem.

I am concerned about this problem for many reasons. My forefathers passed on to me a world full of wealth and beauty, and I feel an obligation to do the same for my own children. Within the past five years we have seen the atmosphere of Albuquerque noticeably degraded—a one intensely blue sky now often has a gray pallor, and dirt condenses out of the air onto window panes. So one of our most precious resources is being destroyed through its careless use. I don't know where the airborne trash comes from. I'm sure there are many sources. But people who are reliable, honest, and of good judgment say that a large part of it floats down from the Four Corners area.

We hear it asked: How much is the pure air, that we once had, worth? Let me turn this question around and ask, instead, how much it would cost to restore the air quality of this general region to what it was, say, 20 years ago? Most people would not take such a question very seriously, but if they would I'm sure the sum would be staggering in terms of R and D costs and capital investment. Some would say it is impossible, which is a sort of way of saying that there isn't that much money. This, then, is some measure (maybe not very good, but I don't know any better one) of the damage we have done, and our bills left unpaid.

I would urge the most serious attention not only to the rigid control of power plant emissions, but also to all of the related problems of energy production and utilization. It should not be our objective to bankrupt the power companies; it is only fair that the consumer pay the cost of the product. But let this cost, all

of it, be laid out in dollars and cents, and not hidden in human suffering and deprivation resulting from a degraded environment. I would prefer to pay more for power, and less for medical bills, and to see clearly for many miles as we once could see in Albuquerque.

Very truly yours,

MERRILL C. JONES.

UNIVERSITY OF NEW MEXICO,
Albuquerque, N. Mex., May 8, 1971.

HON. HENRY M. JACKSON,
Chairman, Senate Committee on Interior and Insular Affairs,
Washington, D.C.

DEAR SIR: I am writing to protest the building of any more large power plants in the southwest desert. I have lived in the Southwest all my life and have seen the air of my home town, Las Vegas, Nevada become polluted from the local power-plants. I don't like dirty air there and I don't like the idea that large areas of the Southwest will be covered with smog if those power plants are built. I know that there will be large areas of smog if they are built, because I am going to school in Albuquerque, New Mexico and the smog from the Four Corners Plant, which is about 150 miles from Albuquerque reaches here often. The clear, pure air of the Southwest is one of its greatest natural assets and the building of large power plants threatens this asset. That these power plants will also be located in some of the most beautiful areas in the Southwest is appalling to me. Please put this letter in the records of the committee's hearings.

Yours sincerely,

ALICE R. BREEZE.

TASS, N. MEX., May 17, 1971.

Senator HENRY JACKSON,
Chairman, Committee on Interior and Insular Affairs, Senate Office Building,
Washington, D.C.

DEAR SENATOR JACKSON: As a resident of New Mexico I am deeply concerned about the electric power plants that are being located in this area and the plan to increase the capacity of these plants sevenfold.

It is absolutely essential that these plants maintain adequate controls to stop the poisonous fumes being emitted—polluting the air for miles around, and utter madness that these controls haven't been enforced before this.

I urge you to do everything humanly possible to bring about these controls or to eliminate the plants entirely.

Please include this letter in the records of the Committee hearings on power generation in the Southwest, to be held May 24-27, 1971.

Respectfully yours,

(Miss) LOUISE GANTHIERS.

LOS ALAMOS, N. MEX., May 26, 1971.

SENATOR HENRY M. JACKSON,
Chairman, Senate Committee on Interior and Insular Affairs,
U.S. Senate,
Washington, D.C.

DEAR SENATOR JACKSON: We are writing to express our concern over the continuing deterioration of our environment, especially our air quality and visibility, due to the exploitation by outside power interests of the large low-grade coal deposits which we are unfortunate enough to have nearby.

The emissions from the power plants in the Four Corners area would not be allowed in the urban areas which consume the power. We should not be deprived of our clean air for the sake of cheap power for Phoenix and Los Angeles.

Let them clean up the emissions to the point where they would be allowed in Los Angeles, or shut down the plants already operating, and build no more!

Please consider this statement as testimony before your committee.

Sincerely,

WILLIAM M. VISSCHER.
JEAN D. VISSCHER.

TAOS, N. MEX., May 10, 1971.

HENRY JACKSON,
Chairman, Senate Committee on Interior and Insular Affairs,
Senate Office Building,
Washington, D.C.

DEAR MR. JACKSON: I am writing to protest the lack of controls upon the soft coal burning plants in the Southwest. It is increasingly outrageous to citizens to learn that such industrial enterprises behave as if the air belongs to them, with no concern for the health of the country or its people, plant and animal life. It is hard to believe that such industries can simply add to the pollution of the air without concern when it would not greatly burden them to provide cleaner plants.

I hope that not only will the increase of capacity of such plants be prevented, but that existing hazards to the air and water of the Southwest States will not be allowed to continue.

Unless citizens find they can trust their elected officials to safeguard the health of the nation, we can only foresee more disregard and contempt for the elected government of this country.

Very sincerely,

CECIL DAWKINS.

MONTEZUMA, N. MEX., May 9, 1971.

Senator CLINTON P. ANDERSON,
Senate Office Building,
Washington, D.C.

DEAR SENATOR ANDERSON: I would appreciate it if you would include this letter as part of the record of the committee hearings on power generation in the Southwest being held May 24-27 1971.

The astronauts have said that the coal fired electric generating plant in the four corners area is the worst observable pollution in the entire world. We must believe them. Most of us know that strip mining is the worst possible way of mining from our experience with West Virginia and other areas. It leaves the people in poverty and the land devastated. I experienced the inversion last summer in New York when the sky was a mixed acrid slime green sulphur colored grey and the air was impossible to breathe. It is a mystery to me that a million people did not die from it.

We all know that electrical power is necessary but the immense and artificial demand created by utility and appliance company advertising is not necessary. Let us be satisfied with essential needs such as light, heat and medical uses.

I have observed in South Africa nuclear powered energy plants with cooling towers that cause no observable environmental damage. Can we do less?

The time of a political, sentimental approach to conservation and environmental protection, where the conservationists have to jump like jack rabbits from the ecological disaster of the Florida Everglades to the Alaska pipeline to protect what is left, should be past. It is time the trained ecologists and the power and utility people put their heads together until they come up with solutions before more devastation occurs. The utility people can use their profits toward these ends instead of magnifying the problems, and we shall be eternally grateful to them.

I therefore request an immediate injunction against further construction and mining operations until such time as ecologically non dangerous power sources are decided upon.

Thank you for your efforts in this behalf.

Very truly yours,

LEE WEBER.

CORRALES, N. MEX., May 25, 1971.

Senator HENRY JACKSON,
Committee on Interior and Insular Affairs,
Senate Office Building,
Washington, D.C.

DEAR SENATOR JACKSON: As a taxpaying New Mexican I wish to go on record as strongly opposing the further construction of coal fired power plants in the Southwest. There is good evidence that other means of power (such as geothermal) could be used. This coal fired power goes to California and leaves us and

particularly the Hopi and Navajo Indians with polluted air and destroyed land from strip mining. The quality of the already scarce Colorado River water is deteriorating due to the concentration of salts therein, salts caused by evaporated water cooling the power plants—if more plants are constructed, more salts in the Colorado.

You said it right on yesterday that if we can put men on the moon we must have the technology to prevent existing pollution of such a magnitude as at the four corners and we can still provide jobs for the Indians and energy to the greedy millions of Californians. If they got rid of half their electric luxury gadgets they would probably need only half the electric power. Luxury items should not have anything to do with increased standard of living—in fact the manufacture of such luxury electric items destroys the quality of life. Electricity is for warmth, indoor cooking and moderate lighting to see and read by—PERIOD. I'm *not* willing to sacrifice my state's relatively high quality environment so that Californians can live unecologically electrically.

Sincerely,

AMY V. BUNTING.

ALBUQUERQUE, N. MEX., May 23, 1971.

HON. HENRY M. JACKSON,
*Chairman, Interior and Insular Affairs Committee, New Senate Office Building,
Washington, D.C.*

SIR: I see daily the effects of the large Four Corners Power Plant on the once clean and clear air of New Mexico and I fear that this is just the beginning of the serious pollution that is to come from this plant and others planned in New Mexico, Arizona, and Nevada. A serious assessment is due to be made, is in fact overdo, on the environmental effects of this power generation and related strip-mining activities.

I have seen the many health damaging and environmental damaging results of industry and power generation in many parts of the country. This could only result from failure to consider the protection of the environment that we all must live in. I view with apprehension the planning of more such plants as we now have in the Four Corners area.

The Southwest is the last bastion that we have that is still essentially free of the many polluters that face other areas of the country. The damage that has been done here is still correctable and should be corrected immediately while we can. With the formulation of the correct policies in this area there would be a chance to reverse the trend to degenerate the Southwest's environment. These policies should most likely be: control of power plant siting; tax law revisions; rate scale changes (make it expensive for the big users to damage the environment); research into other power producing means; and positive enforcement of all changes instituted.

My most valuable possession is the country I live in, make it possible for me to continue to live here in health.

Sincerely,

DAVID A. HUELSMANN.

RANCHOS DE TAOS, N. MEX., June 23, 1971.

DEAR SIR: I wish to go on record as opposing any further construction of coal fired powerplants and accompanying transmission lines and strip mines in the Southwest. I hereby request this statement be made part of the record in the Senate Committee on Insular and Interior Affairs held May 24, 25, 26, 1971.

Thank you,

SYDNEY M. COBB.

TAOS, N. MEX., May 25, 1971.

HON. HENRY M. JACKSON,
*Chairman, Senate Committee on Interior and Insular Affairs,
U.S. Senate, Washington, D.C.*

DEAR SENATOR JACKSON: The undersigned request that this statement be made part of the hearing record on Thermal Powerplant Construction in the Pacific Southwest.

We strongly oppose further construction of coal-fired power plants in the Southwest, and also demand that stringent controls be placed on those plants already in operation at Farmington and Mojave, New Mexico.

Our reasons are as follows:

1. The particulate emissions, in tonnage, exceeded the combined emissions of the cities of New York and Los Angeles combined—daily! The particulate size of this flyash peaks at .08 microns, which size is invulnerable to washout by rainfall. It scatters light from objects and scatters light in the line of sight. Its daily rate of fall, in the turbulent atmosphere of New Mexico, is negligible. Consequently the reduction of visibility in the 300-mile long area affected is serious. The renowned scenic beauty of our area is seriously threatened, the esthetic quality of our environment has already deteriorated.

2. The flyash is accompanied by vast amounts of nitric and sulphuric oxides, these form highly toxic and corrosive acids. The wildlife, vegetation and human health dangers are obvious. The particulate size of the flyash falls into the range longest retained by the human lung. Our area was once famous for the purity of its air, persons suffering from respiratory ailments came here to survive. The plants represent a threat to the health of our people, animals and plant life.

3. The water being used for the slurry line is being drawn from one of the dryest areas in the country. Due to evaporation caused by the slurry line, the salt content of the Colorado River has already increased. In a drought year, the affected area can hardly be expected not to suffer this additional loss of water.

4. Strip mining renders the land unusable. Eastern states have already seen legislation opposing this type of mining. We in the southwest do not want this destruction to our land to go unchecked.

PILAR HILL
(And Others).

LOS ALAMOS, N. MEX., June 9, 1971.

Senator HENRY M. JACKSON,
Senate Interior Committee,
Washington, D.C.

DEAR SENATOR JACKSON: One of the features of the Southwest that we have always found most appealing has been its crisp, clean air—a condition which lifts one's spirits beyond the measure of money. The clean air was a primary factor in attracting us to this area ten years ago. Lately, we have found that our once clean air is no longer so, and have been most distressed by this fact. We understand that existing power plants can be cleaned up, reducing the pollution temporarily, but also understand that if the plants proposed for the 4-corners area are built, even with modern controls, the pollution will be as bad as the present intolerable situation, if not even worse. We therefore oppose further power plant construction in this area.

We have observed that industrialists objections to pollution controls arise primarily from being put at an economic disadvantage with their competitors. Further, there seems to be no practical limit to the amount of pollution control technically possible, given enough money. Valuing a clean environment above price, we therefore recommend that the strictest possible pollution controls be demanded of all power plants, regardless of location, and that rates be increased a regulated amount, if the need is demonstrated, to pay for such controls.

Yours sincerely,

JUDITH E. NOVAK and JAN K. NOVAK.

LOS ALAMOS, N. MEX., May 24, 1971.

Senator HENRY M. JACKSON,
Chairman, Senate Committee on Interior and Insular Affairs, U.S. Senate,
Washington, D.C.

DEAR SENATOR JACKSON: Please read the New Mexico Citizens for Clean Air and Water Newsletter No. 8 for April 1971 and listen to the representatives of this organization who are speaking today. All the figures I would quote in this letter are in the Newsletter or being said by the representatives who were able to go to Albuquerque hearings. I agree with them fully.

The air here may look clean to anyone from the East or West Coast, but during the time we have lived here, we have seen the air become dirtier and dirtier. Pictures document this as a fact. I read in this morning's Albuquerque Journal about a newsman who said that when he was at the Farmington plant early Sunday morning the smoke was black. And when you toured the plant later Sunday

the smoke was much cleaner looking. Don't be deceived by these misleading tactics of the power companies. The newsman was correct.

I also read that the people of Farmington said at a luncheon on Sunday that they like the power plant and the pollution issue is exaggerated. I believe they are motivated by greed, or they have become so accustomed to dirty air, that they honestly do not know any better.

On the radio this morning, there was an item saying Senator Montoya had proposed a moratorium on further building of any additional power plants. I believe this is a good idea—we do not want any more power plants in our area. It is unfair to us to dirty our air so California can have power. If they want power, let them build plants in their state. And I am from California—we left to get away from too many people and dirty air. Let us all quit using so much electricity—no more neon signs or other unnecessary appliances.

The power company representatives state that wet scrubbers will cut down on emissions but why were these not installed from the beginning, why does it take so long to install them now and will they really do a complete job of cleaning up emissions? I will believe that when I see it. We need more powerful laws to help us and much stiffer fines for violators. But big money interests keep on defeating new laws when we try to get them passed.

There are other features of power companies to which I object: Unsightly high voltage power lines, coal slurry lines slashing the country side, coal-haul railroads and service roads, possible destruction of the Hopi mountain which is sacred to Indians, unfair advantage taken of Indians' water and mineral rights and industrialization of our area known for its natural beauty. There is also the area of strip mining. The mine manager says they planted 4 types of grass in a reclamation effort and nothing grew but Russian Thistle (Tumbleweed) because of lack of moisture. However, before strip mining there was vegetation. The grass did not grow because there were no nutrients in the soil after strip mining.

Please listen to testimony with an open mind and try to help us. Please consider this letter as testimony before your committee.

Thank you,

Mr. and Mrs. JOHN LUCAS and FAMILY.

MONDAY, MAY 24, 1971.

Senator HENRY M. JACKSON,
Chairman, Senate Committee on Interior and Insular Affairs, U.S. Senate,
Washington, D.C.

DEAR SENATOR JACKSON: Please read the New Mexico Citizens for Clean Air and Water Newsletter No. 8 for April 1971 and listen to the representatives of this organization who are speaking in Albuquerque today. All the figures I would quote in this letter are in the Newsletter or being said by the representatives who were able to go to Albuquerque hearings. I agree with them fully.

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On the radio this morning, there was an item saying that Senator Montoya had proposed a moratorium on further building of any additional power plants. I believe this is a good idea—we do not want any more power plants in our area. It is unfair to us to dirty our air so California can have power. If they want power, let them build plants in their state.

The power company representatives state that wet scrubbers will cut down on emissions but why were these not installed from the beginning, why does it take so long to install them now and will they really do a complete job of cleaning up emissions? I will believe that when I see it. We need more powerful laws to help us and much stiffer fines for violators. But big money interests keep on defeating new laws when we try to get them passed.

There are other features of power companies to which I object: Unsightly high voltage power lines, coal slurry lines slashing the country side, coal-haul railroads and service roads, possible destruction of the Hopi mountain which is sacred to Indians, unfair advantage taken of Indians' water and mineral rights and industrialization of our area known for its natural beauty. There is also the area of strip mining. The mine manager says they planted 4 types of grass in a reclamation effort, and nothing grew but Russian Thistle (Tumbleweed) because of lack of moisture. However, before strip mining there was vegetation. The grass did not grow because there were no nutrients in the soil.

Thank you,

Mr. and Mrs. EUGENE V. HAWKINS.

LOS ALAMOS, N. MEX., May 24, 1971.

HON. HENRY M. JACKSON,
Chairman, Interior and Insular Affairs Committee,
New Senate Office Building, Washington, D.C.

DEAR SENATOR JACKSON: Please include this letter in the record of the hearings on the Four Corners powerplants.

For years the people of New Mexico have enjoyed clean air and water. This is at least partly because the residents of the area have seen the ecological disaster created by unrestrained greed and the madness of the expansion-is-progress ethic. We have restrained ourselves from building and importing such cancers as the factories and powerplants that make the nonnecessities and ego-boosters of a greedy and vain society.

However recently the people of the overpopulated cities of the western coast have decided that we no longer have this right. They have decided that we must pay for their luxuries. If this powerplant pollution were being caused to provide power for the same people who must suffer the adverse affects of this pollution this controversy would be an entirely different matter. But this is not the case! The people of New Mexico will not tolerate this!

There should be a moratorium on the construction of powerplants in the southwest. In fact, maybe there should be no new plants at all.

Secondly the existing plants must be made to meet strict standards for not only particulate matter but also for nitrogen and sulfur oxides.

Thirdly there must be a stop to America's suicidal energy and expansion drive. It should be obvious to anyone not blinded by greed that growth cannot go on indefinitely in a finite world.

And lastly, the destruction of the Indian reservations by strip mining must be stopped. Indians have a right to their traditional ways and strip mining is destroying this right as surely as pollution is destroying my right to breathe clean air.

Thank you,

JOHN PAUL BRONSON.

FARMINGTON, N. MEX., June 10, 1971.

HON. HENRY M. JACKSON,
Chairman, Interior and Insular Affairs Committee,
New Senate Office Building, Washington, D.C.

DEAR SENATOR JACKSON: As a concerned resident of the Four Corners Area, I want to express strong opposition to the use of this area for the location of coal-fired power plants. I would like for my statement to be included, if possible, in the record of the public hearings conducted on the subject of power plants in the Southwest.

I am not qualified to present scientific evidence concerning the health hazards posed by the operation of coal-fired power plants. Except to say that the evidence presented during the public hearings concerning threats to the health of people, animals and vegetation seems to me quite sufficient grounds for immediate action to halt the proliferation of powerplants in the Southwest, I shall confine my remarks to other aspects of the problem which I consider equally urgent.

The Four Corners Area, and adjoining areas in Colorado, contain some of the most magnificent natural beauty to be seen anywhere in this country, and were, until the advent of the Four Corners Power Plant, an area of unspoiled air. The officials of the plant claim that by 1973 their entire operation will have con-

trols that will remove 99.2% of particulate emissions. No one hopes any more than I that this will indeed be so. But I am extremely concerned about the cumulative effect of the remaining .8% of matter when compounded by the operation of the other five plants either now under construction or authorized, whose proponents have indicated that they will operate under control standards similar to those promised by the Four Corners Plant. It is not even known yet whether the Four Corners Plant control equipment will operate at the efficiency level claimed for it. Therefore, I think that not only should there be no further permits for plants in the area, but that serious consideration should be given to suspending construction of those underway, until and unless the effectiveness predicted for controls at the Four Corners Plant has been proved beyond doubt, and the cumulative effects of the 0.8% emission which will not be controlled have been intensely investigated and thoroughly reported to the public.

The national parks and wilderness areas of the mountain and desert states (and the still relatively clean air of most of them) are a priceless resource—valuable in ways that can never be equalled by coal and power plants and the electricity they generate. I believe that the citizens of this country have an inherent right to view the beauties of these regions through clean, clear air, rather than merely as silhouettes behind a haze of smoke. And I believe that we have the right to see and enjoy these natural wonders in the absence of air pollution this year, next year and all the years to follow, and not just at some hypothetical future date when truly effective controls may have been devised and be in operation. To permit other situations to develop in which smoggy skies prevail for a period of several years, while the power plant people experiment with first one thing and then another in an attempt to assuage public clamour, would be tragic for Colorado and the desert Southwest. The fact that the preservation of the considerable personal fortunes of a few individuals may depend on the expansion of power generation operations should not be allowed to obstruct the right of the rest of the people to see and enjoy the heritage of natural beauty which belongs to all of us, in air unspoiled by harmful particles and unsightly smoke and ash.

Regarding the prediction by the power companies of the need for more and more power not only for the nation as a whole, but on a per capita basis, I urge that an intensive educational campaign be put into operation nationwide to (1) inform the people of the scope of this anticipated increase and its probable effects on the environment and on the already alarming rate of depletion of our natural resources, (2) to inform the people of all the purposes for which power is used which contribute nothing to the comfort and well-being of anyone, and (3) to encourage everyone to conserve power in daily living. I think also that the power companies should be encouraged in every way—forcefully if necessary—to develop more efficient methods of power generation.

I would like also to comment in regard to a matter which arose during the Durango, Colorado, hearing—that of the proposed power plant at Paonia, Colorado. Though not a part of the Four Corners Area, Paonia is in close proximity, and the proposed plant should, I think, be viewed as part of the problem of coal-fired power plants in the Southwest. Couldn't the construction and operation of this plant be prevented because of its proximity to the Maroon Bells-Snowmass Wilderness? If the Wilderness Act does not protect these areas from air pollution, it should be amended to do so. For smog would violate the spirit of the wilderness as surely as the roads, motorized vehicles and commercial activities from which it is protected by the Act. I strongly believe that until such time as power plants and other industries are able to operate without emitting harmful and/or visible matter, the wilderness areas and national parks of the Rocky Mountain states and desert Southwest should be strictly protected from their pollution.

Respectfully,

(Miss) ANN TRULOVE.

LOS ALAMOS, N. MEX., May 20, 1971.

Senator HENRY JACKSON,
Chairman, Senate Interior Committee,
Senate Office Building, Washington, D.C.

DEAR SENATOR JACKSON: I grew up near the Rio Grande river in southern Colorado, about 50 miles north of the New Mexico border. As a result, I feel I know the southwest well. I attended college near Los Angeles, was stationed near New York city during military service, and I did two years of postdoctoral

physics research in Chicago before I deliberately returned to the southwest to live permanently. I have with horror watched the severe degradation of our air quality over the last two years, and I am very concerned that we prevent here the situation which I experienced in southern California, New York, and Chicago. Your committee is probably aware that the projected pollution emissions of the six southwestern power plants will equal or exceed those of New York and Los Angeles combined, in terms of fly ash, SO_2 , and NO_x .

In the fall of 1970 I began making my own photographic documentation of the damage to visibility in the Los Alamos area, 100 miles from the plant near Farmington. My greatest problem was in finding a perfectly clear day, such as was previously normal, for making comparison photographs. I made every effort to make comparison photographs under identical lighting conditions, with a wide temperature-dewpoint difference so that water vapor would not be a factor in the photographs. I have photographs which document visibility impairment in Los Alamos over a distance of three miles. I submit to the committee a pair of photographs chosen for their identical lighting, weather, location, and time of day. These were taken in late October, 1970. There was no blowing dust. In short, the pictures are an accurate representation of the air quality damage due to the Farmington power plant.

We can put some of the numerical figures concerning the power plants into a perspective which may be new to the committee. A year-round average of our natural particulate concentration in the air is about 20 micrograms per cubic meter. The proposed national secondary standard of the air pollution control office is $60 \mu\text{g}/\text{m}^3$. This proposed standard would represent a severe degradation from our natural air; nonetheless let us compare the power plant emissions with it. The Farmington plant now emits about 350 tons per day of particulate. If each day's output were spread uniformly in the air at a level of $60 \mu\text{g}/\text{m}^3$, one-half mile deep over the earth a reasonable depth for pollutants, then the power plant alone would pollute 2,600 square miles to the level of the proposed standard, each day. Since the particles do not settle out of the atmosphere in one day, if at all, the net effect is to pollute tremendous areas of the earth. If all of the proposed plants meet current regulations, the future particulate output is expected to be 240 tons/day, which would, by the proposed federal standards, pollute 1800 square miles per day, one-half mile deep.

A similar analysis can be done for the other contaminants. Again, for SO_2 , the proposed national secondary standard (annual average) is $60 \mu\text{g}/\text{m}^3$. By the above analysis, we would estimate the SO_2 pollution to be 15,000 square miles daily.

Such a situation is not necessary. There appears to be no reason why the power companies cannot use the fluidized-bed burner rather than pulverizing the coal—this more modern type of burner results in much less ash in the exhaust. SO_2 can be recovered economically, if not profitably. As one engineering reviewer of the subject concludes, "It is hard to escape the feeling that PF (pulverized fuel) combustion might never have been developed, if . . . the chemical engineer's interest in fluidization had appeared sooner."

We are sacrificing our air, and the beauty of our land, for the sake of about 15% in our electric bills. We cannot get adequate regulation and enforcement at the state level since the problem concerns several states (and one state governor is sufficiently blind to the problem that he publicly wishes to exclude your hearings from his state). Members of the committee, I implore you to consider the matter carefully, and to consider national standards limiting emissions, water usage, and strip-mining wastes of the power plants.

I greatly appreciate the committee's attention.

Sincerely,

DONALD A. NEEFER.

TULAROSA MUNICIPAL SCHOOLS,
Tularosa, N. Mex., May 19, 1971.

Hon. HENRY M. JACKSON,
Chairman, Senate Committee on Interior and Insular Affairs,
U.S. Senate, Washington, D.C.

DEAR SIR: Please, gentlemen, do all in your power to stop the development of power plants currently proposed for our Four Corners Area.

In my fourteenth year of teaching in primary departments of village schools in our state, I must make this urgent plea on behalf of the innocent entrusted to our care who are not yet able to dictate the policies that can secure or destroy the world they confidently expect to inherit.

As in each previous year, a third to one half of my charges come from families who have inhabited this dry region of our globe since pre-territorial times. In the days when the Pilgrim Fathers still wore infant clothes in lands abroad, their grandfathers were developing a way of life here, which, though rarely enriching them materially, was harmonious with their natural environment. Over the intervening years while our own avaricious antecedents were wantonly destroying great natural regions of our precious land for material gain, they repeated their cycles of life here in dignity, respectful of the great natural setting around them. The land they have used for all of these centuries stands as a monument to their loving stewardship; it is, in great part, the place Coronado saw.

How fortunate for us that those who came after saw little of value to plunder here and departed, leaving intact the true wealth of the region: its priceless air, glorious sun and soul-restoring splendor of turquoise sky. These are the blessings their forebears tended and these my second graders expect to enjoy.

In our classroom we have turned recently to the reading of the old classic folk tales which each generation enjoys—if for no other reason than to discover what it was their grandparents enjoyed. So, for perhaps the hundredth time, as child and adult, I heard the old story of Chicken Little. Against all expectations, and for the first time in all those years, I identified with the panic-stricken chick and, when they turned up their beautiful faces to laugh, I wanted to weep.

Sincerely,

(Mrs.) DOROTHY JOHNSTONE.

NEW MEXICO STATE SENATE,
Santa Fe, May 5, 1971.

HON. HENRY M. JACKSON,
Chairman, Senate Committee on Interior and Insular Affairs,
Washington, D.C.

DEAR SENATOR JACKSON: As you know a very large part of the world's coal reserve is located in the four corners region. If this coal is to be put to full use, then more stringent standards will be needed both for emissions from power plants and for ambient air quality standards. For instance, the secondary Federal standard for suspended particulates in air of 60 micro-g/m³ annual average makes a farce of our present air quality in the West. This corresponds to a visibility of about 15 miles.

To see over distances of 60 to 80 miles, this value should be reduced to about 35 micro-g/m³. The Federal standards may be adequate goals for highly polluted metropolitan areas, but in this part of the country they are merely an inducement to destroy a clean environment. Federal standards, in this case, are very inadequate.

I respectfully recommend to you that Congress and the EPA recognize that there are serious aspects of the general welfare in jeopardy. The Federal government should assume a posture of recognizing values of living which already exist on a regional basis and not settle for something of lesser quality.

Thank you for this opportunity to express myself.

Sincerely yours,

JOHN D. ROGERS.

SILVER CITY, N. MEX., May 5, 1971.

HON. HENRY M. JACKSON,
Senate Committee on Interior and Insular Affairs,
U.S. Senate,
Washington, D.C.

DEAR SENATOR JACKSON: Like many New Mexicans, we are concerned about the deteriorating quality of our environment, in particular the clean air for which our southwestern states are so famous. Granted that our burgeoning American population desires increased electric power supplies, with the technology now at hand and new methods yet to be devised, generating plants can and must produce power without desecrating New Mexico's natural attractions. They will not do so, however, until forced to by law.

We recommend that there be a moratorium on any further construction of power plants in the southwest until new state standards (which must be far stronger than the lenient federal regulations) can be enacted. For example, 10 to 15 miles minimum visibility is a reasonable goal for highly industrialized areas of the United States, but here in the Southwest's open spaces, one or two hundred miles should be imposed as a visibility standard.

Considering that from the Four Corners area plants alone, sulphur and ash emissions will be about half those of New York City; NO_x emissions, 25 to 40% of those from autos of Los Angeles; sulphur emissions more than double those of Los Angeles, certainly stricter controls are indicated. This action is dictated, not only by aesthetics and the potential threat to tourism, but also by danger to the physical environment. The National Air Pollution Control Administration report on the Four Corners area (1970) suggested that vegetation damage is already occurring at Fruitland.

If and when power becomes more expensive as a result of installing costly pollution control devices, maybe fewer consumers will waste electricity, thus conserving energy resources.

Yours truly,

DALE and MARIAN ZIMMERMAN.

STATEMENT OF CAROL J. MAGLE

I first became aware of the existence of the Four Corner's Power Plant in 1963, when Joe Devaney of Los Alamos, New Mexico, traced a brownish cloud of pollution from Los Alamos back to its source in Fruitland, N.M. As a student at the University of New Mexico, I have recently been looking at sulfur oxides emission data from local and foreign plants and at studies of sulfur's effects on human and plant life. I make these comments in the hope that we may have a safer and more beautiful state to live in.

As yet, no one has taken any long-term data on ground level concentrations near the plant, so we can only estimate the amount of SO_2 and its derivatives in the air near the Four Corner's Plant. Calculations made by the National Air Pollution Control Administration indicate that half-hour peaks as high as 2 ppm (parts per million) and relatively long-term averages of .08 to .16 ppm are occurring in Fruitland now with units one through five in operation.¹ The NAPCA goes on to say that these shorter term averages would be expected to produce bronchoconstriction in sensitive persons and that the long-term rates would produce "functional disturbances in the elderly" and vegetation damage.²

It is also helpful to look at sulfur content at ground level in terms of an annual mean. An HEW publication describes a study of a power plant emitting 295 tons of SO_2 per day that produced an annual mean of about .027 ppm,³ enough to affect human health and vegetation by HEW standards. Fruitland, emitting 384 tons of SO_2 per day,⁴ can be estimated to produce an annual mean of .085 ppm near Fruitland, taking minor differences in conditions into account.⁵ At a .03 ppm annual mean the NAPCA shows that chronic plant injury and leaf drop may occur.⁶ Since the New Mexico Ambient Air Quality Standard is at present set at .03 ppm SO_2 annual mean, I feel that a more stringent standard should be adopted to insure a safety margin. Experiments with rye grass show that growth and yield can be suppressed by SO_2 without causing any visible injury.⁷ Thus it can be concluded that a standard should be set considerably lower than the point at which visible injury occurs.

A smelter at Trail, British Columbia, emitting 10,000 tons of SO_2 per month produced damage in vegetation 50 miles away.⁸ Fruitland emits an average of 9,900 tons per month, thus endangering vegetation in Chaco Canyon, Mesa Verde, Navaho Lake, Four Corners Monument, and the Carson National Forest. Of course, Fruitland is only one of several plants in the Four Corners Area. The total SO_2 emissions from Page, Kaiparowits, Fruitland, San Juan, Mojave, and Price will average of 2,100 tons *per day* compared to New York City's 1,100 tons, Houston's 393 and Los Angeles' 225.⁹

There is substantial evidence that the SO_2 levels predicted for Fruitland and nearby towns will produce some excess deaths and many health problems. The Four Corners Power Plant is shown producing .16 ppm SO_2 at Fruitland (5 miles downwind), .14 ppm at Farmington (16 miles downwind) and .10 ppm at Aztec (29 miles downwind) when wind speed is 8.9 mph and stability conditions are "Neutral".¹⁰ A study by Ralph Larsen of the NAPAC predicts that in New York City .16 ppm SO_2 would cause 46 excess deaths, that .14 ppm would cause 22 excess deaths, and that .10 ppm would cause 9 excess deaths in a single episode. The yearly death rate would be seven times that for a single episode.¹¹ The much lower population of the Four Corners Area indicates a probability of about one excess death every two years on this basis. The signifi-

Footnotes at end of statement.

cance is that current SO_2 levels from the Four Corners Power Plant alone are endangering human life.

A comprehensive study by J. Hickey¹² relates increases in deaths from non-communicable diseases to SO_2 levels in the air. Hickey's data was taken in the Standard Metropolitan Statistical Areas. Even for the lowest SO_2 level Hickey measured, $12\mu\text{g}/\text{m}^3$, the significant relationship to deaths held. Hickey also found¹³ that bisulfite (a derivative of SO_2 that can be expected in the Four Corners Area) produces a mutagenic hazard by scrambling the components of the DNA molecule.

One dramatic example of what SO_2 can do to vegetation can be found in the Ochre Mountains near Salt Lake City, Utah. John Muir documents the lush stands of fir trees that existed in the area in 1890 in his book, *High Trail*. In about 1900 a copper smelter started to emit large amounts of SO_2 into the air nearby. Today those lush stands of trees have been reduced to four-foot stumps, the chief cause of the destruction being sulfur dioxide.¹⁴

When SO_2 combines synergistically with NO_2 , damage to plants occurs at much lower levels than if either component were acting alone. At .05 ppm to .25 ppm SO_2 can react with NO_2 "in short-term exposures (e.g. 4 hours) to produce moderate to severe injury to sensitive plants."¹⁵ The abundance of NO_2 and of SO_2 at the above-named levels¹⁶ in the Four Corners Area shows the need for strict control of these elements through legal action.

Wet-scrubbing techniques currently in operation in similar plants prove that it is feasible to remove 99% of the SO_2 emitted by the Four Corners Plant. The Fulham installation in pre-world war II Britain removed 98% of its emissions while burning .9% sulfur coal. (Four Corners coal has an average sulfur content of .7%).¹⁷ In the United States, two utilities, Kansas Power and Light and Union Electric, have ordered full scale sulfur removal equipment for their new plants, an indication of the economic as well as the technical feasibility of the project.

The wet-scrubbing process involves washing the stack gases with an alkaline solution, and is entirely compatible with the scrubbers now used for effective removal of particulate matter.¹⁸ Despite the cries of the power companies in the Four Corners Area, I cannot believe that legislation requiring the installation of wet-scrubber would cause their economic ruin. The cost could be passed on to power consumers, and would be in the neighborhood of 1-3% of each consumer's present bill.

In conclusion, we cannot wait for extensive studies to be conducted in the Four Corners Area before enacting stringent controls. I have mentioned only a few of the many studies documented by HEW, the NAPCA, and others showing that similar situations have led to serious damage of people's health and that of vegetation. The New Mexico standards are not stringent enough to prevent damage, and the legal enforcement powers at present are inadequate. Since the technology to vastly improve the situation is available, it is my fervent hope that its use will be made mandatory.

CAROL J. NAGLE.

FOOTNOTES

¹ National Air Pollution Control Administration, "Estimates of Air Pollution Concentrations from Four Corners Power Plant—New Mexico", Jan. 1970, p. 65.

² Same as above, p. 73.

³ U.S. Dept. of HEW, "Air Quality Criteria For Sulfur Oxides", pp. 3-19.

⁴ Mike Williams, "Air Pollution Associated with Colorado Plateau Power Plants".

⁵ Interview with Mike Williams, research coordinator for the John Muir Institute, May 1970.

⁶ "Air Quality Criteria . . .", p. 162.

⁷ Same as above, p. 160.

⁸ Interview with Mike Williams, May 1970.

⁹ "Air Pollution Associated with Colorado Plateau Power Plants", Mike Williams.

¹⁰ NAPCA, "Estimates of Air Pollution Concentrations . . .", p. 65.

¹¹ Ralph I. Larsen, "Relating Air Pollutant Effects to Concentration and Control," Journal of Air Pollution Control Association, April 1970, Vol. 20, No. 4, p. 220.

¹² "Ecological Statistical Environmental Pollution and Chronic Disease", by R. J. Hickey, et al., IEEE Transactions on Geoscience Electronics, Vol GE-8, No. 4, Oct., 1970.

¹³ Same as above, p. 187.

¹⁴ Interview with Mike Williams, May 1970.

¹⁵ "Air Quality Criteria . . .", p. 162.

¹⁶ NAPCA, "Estimates of Air Pollution Concentrations . . .", p. 65.

¹⁷ APCA Journal, Nov. 1958, Vol 8, No. 3, "Atmospheric Pollution, The Role Played by Combustion Processes", by E. S. Grohse and L. E. Salina.

¹⁸ Interview with Mike Williams, May 1970.

LOS ALAMOS, N. MEX., May 15, 1971.

HON. HENRY M. JACKSON,
Chairman, Senate Committee on Interior and Insular Affairs,
U.S. Senate.

DEAR SENATOR JACKSON: There are many reasons for not allowing construction of any more of these disastrous powerplants, the most obvious being the loss of healthful clear air in the Southwest. In addition, there is the excessive use of water, already in short supply, the strip mining, transmission lines, extra roads and railroads in our scenic area. Also, there is the fact that urban needs of the West Coast are endangering our native Indian's land, water and other needs. Why on earth should we here provide the power for California and destroy ourselves in the process?

Is it really "progress" to ruin our land and to use up all our natural resources? Why can't the government begin to ration some power, water, oil etc.? Or to control the population demanding all these things? During a war these things would be done and surely our environmental crisis is even more severe. We know people here who are voluntarily curtailing the use of our diminishing resources and perhaps many more would do so if it were sufficiently impressed upon them.

We urge you and your committee to prevent any further construction of these powerplants and wish there were a way to end the operation of those now completed. If you do not do this it is the tragic end of the Southwest as a desirable and beautiful place in which to live and there seems to be no place else left to go!

Very truly yours,

Mr. and Mrs. RICHARD W. ANDRAE.

SANTA FE, N. MEX., May 18, 1971.

HON. HENRY M. JACKSON,
Chairman, Senate Committee on Interior and Insular Affairs,
U.S. Senate, Washington, D.C.

DEAR SENATOR JACKSON: It is impossible for me to add any technical details to the testimony of all the experts who have spoken at these hearings, but I represent a point of view which I believe is shared by many people. I am angered by the heedless destruction of the land which is taking place across the United States and now comes to the Four Corners, resulting in air and water pollution, disruption of the desert ecology and changes, mostly adverse, in the life of the Indian people who live there.

The Four Corners controversy is generally believed to be an example of the confrontation between those who want to "save the environment" and those who want to develop and exploit the earth's resources. It seems to me that the real issue is between the increasing demands by more people for more of everything, and the inevitable exhaustion of the means to satisfy these demands. In the case of electrical energy, for instance, the thinking revolves around the idea that more plants must be built to provide for expanding use. It is taken for granted that this expansion is necessary and desirable. As long as this idea dominates, I do not think the problem will be solved. Rather, should we not initiate a nationwide campaign for non-consumption? President Nixon has recently given impetus to this idea by urging the conservation of electricity. It is implied that this is an emergency measure taken because of present shortages in the production of power. Instead, it should become a basic principle, to be applied not only to energy, but to the consumption of paper, metal, fuel, etc., and to the production of many items which are luxuries or conveniences and not necessities. Of course, this would pose problems in the economy, and frankly, I do not know how it can be done, short of a complete overhaul not only in economic theory, but in practice as well. But if it is *not* done, I do not see how we can long survive at the present rate at which we are using our resources.

Walter Cronkite's question, "Can the World be Saved?" suggests an urgency which must be communicated to people everywhere. They must be made aware of individual responsibility for the welfare of the earth, and a willingness to forgo some of the things they do not really need. The present concern with environmental problems is heartening; industry can no longer go its unimpeded way, but stronger controls must be imposed and these can only be effective if the people at large understand the need for them, and support them.

Considering the present crisis in electric power, the continued advertising by the electric companies to "live better electrically" is not only irresponsible, it is immoral. How can people be expected to meet the crisis when they are continually urged to live in all-electric homes equipped with every possible electric appliance?

I am glad that the Committee is reviewing the Four Corners situation. It is imperative to stop these fossil fuel power plants before their air and water pollution, and the strip mining of coal to feed them, destroy this beautiful land, which is unique in the United States. We resent the fact that the Southwest is being sacrificed to provide power for cities in states which will not allow fossil fuel power plants within their borders.

Of course there must be electrical energy, but there should be a massive research program to explore and make workable other sources, such as the geothermal which might prove a suitable alternative, especially in the Southwest. Solutions to the dangers of thermal and radioactive pollution in atomic plants should be sought, so that we would not have to substitute dangers from these plants for those from fossil fuel plants. If using thermonuclear fusion for power generation is at present impractical, cannot a crash research program be instituted to make it possible?

Finally, no solution to any of our environmental problems can be effective without population stabilization. The producers of goods and services maintain that it is the demands of the people which make necessary the subdivisions, the power plants, and the industries. Since Americans are notoriously extravagant in their use of natural resources, the population explosion here is even more serious than in many other countries.

I hope the members of the Committee have found their visit to the Four Corners illuminating and will be able to suggest solutions to the problems they have found there.

Sincerely yours,

MARJORIE B. MCPHARLIN.

ALBUQUERQUE, N. MEX., May 17, 1971.

Hon. HENRY M. JACKSON,
Chairman, Senate Committee on Interior and Insular Affairs, U.S. Senate, Washington, D.C.

DEAR SENATOR JACKSON: I wish to go on record as opposing the building of more power plants in the "Desert Areas of the Pacific Southwest."

I have lived most of my life in New Mexico and therefore react rather emotionally to an issue such as this. I like the Southwest, and after spending two years in the Boston area, deliberately chose to return to Albuquerque. Not only did I dislike the weather, but I also disliked living among so very many people. This is what I am afraid will happen out here. At the risk of being provincial and selfish, I don't want to provide electrical power for Los Angeles, nor do I want to encourage more people to move into the Southwest, and to provide electrical power for ex-Angelenos.

There is really no point in polluting our air until it becomes as dirty as that over Southern California or New York. We are headed in that direction already and don't need any outside help. I'm certain someone has shown you The Picture from the Apollo flight where one of the few identifiable landmarks was the pollution from the Four Corners Plant. Besides that, an influx of people would only bring more cars with their attendant problems. This, I imagine, is what everyone wants to move away from, anyway.

Another problem is the water. I am afraid that the power plants will lower the underground water level of the area and, God knows, there is little enough to begin with. The above ground rivers are already overworked. Again, an influx of people will place more demands on the existing water supply, both for more water for more power plants, and for more water for direct, personal use. This is hardly fair to the Navajo and Hopi who should have first claim on the water and who would be the last to get any power. Somehow, I don't think all that many hogans are fully wired.

Nor do I think it particularly fair to these people to strip mine their lands. I doubt that the mining operations would employ enough Indians to compensate for the land and water taken out of farming and herding. This method ruined much of the eastern areas of the United States, and now someone is proposing to spread that blight over the entire country. I would strongly suggest that they mine the Hollywood Hills instead. Tourism is one of the strongest industries

out here. It is a relatively clean industry and will be eliminated when the scenery is.

For all the above reasons and for love of the desert left just as it is, I ask that the threat of the proposed power plants in the Southwest be permanently eliminated, and that the Four Corners and Mohave Plants be shut down.

Please make this letter part of the hearing record.

Peace,

(Miss) LYNN R. FREEDMAN.

LOS ALAMOS, N. MEX., May 28, 1971.

HON. HENRY M. JACKSON,
Chairman, Senate Committee on Interior and Insular Affairs, U.S. Senate,
Washington, D.C.

DEAR SIR: We wish that this letter be made a part of the record of the "hearings on thermal powerplant construction in the desert areas of the Pacific Southwest".

We are appalled at the almost total lack of reason by our government concerning the construction of power plants in the four-corners area. It is obvious to anyone who tops the plateau thirty miles west of Cuba, New Mexico that the four-corners power plant is spewing forth an enormous amount of "garbage" into the air. At this point, the powerplant is eighty miles away. Eighty miles!

Why must our family breathe the noxious substances placed into the air by these power plants when they don't even supply power to us? It doesn't take an intelligent person to understand the ploy that the power companies are exercising by building plants in the four-corners area which do not meet the pollution standards in the very areas that they serve.

This is a totally incredible situation. I just cannot believe that the right to clean air is being denied the people in the southwest by the United States government. This is the only real institution with the power to stop it. We cannot expect the power companies nor the people of California to stop it.

We implore you to:

(a) Pass legislation requiring effective, continuous removal of all noxious pollutants to at least the level of the current state-of-the-art in air pollution control.

(b) Put into effect a moratorium on the further construction of power plants in the four-corners area (including those not completed today) until the state-of-the-art in air pollution control reaches acceptable levels. ("Acceptable levels" is left undefined here on purpose; these levels can be specified by compromise between environmentalists, government and power plant officials.

Thank you for your consideration.

Yours truly,

DR. and MRS. JAMES B. MORRIS, Jr.

LOS ALAMOS, N.M., May 24, 1971.

HON. HENRY M. JACKSON,
Chairman, Senate Committee on Interior and Insular Affairs, U.S. Senate,
Washington, D.C.

DEAR SENATOR JACKSON: The hearings which you and your committee are now holding offer the opportunity—perhaps the last last chance—of leading to a moratorium in powerplant construction in the desert areas of the Southwest, and to the cleanup of the Farmington (Fruitland) plant which has already polluted this area.

It is inexcusable to me that coal-fired power plants which could not legally be built in southern California are instead being built in one of the few remaining clean-air areas, primarily to furnish power to southern California. It is particularly unfortunate that these plants also use vast quantities of water in a very water-short area and, in a very scenic part of the country, destroy the land by strip-mining, darken the formerly clear skies, cover the land with transmission lines to carry the power elsewhere, and pollute the scarce water with sulfuric and nitric acid, mercury, and increased salinity.

My wife and I remember well how clear the air was here, most of the time, before the Fruitland power plant went into operation four years ago. We suddenly found ourselves apologizing to visitors to Los Alamos for the curious

Los-Angeles-like smog which began to appear here on certain days. It was not for some months that we realized that a new and tremendous power plant had begun operation near Farmington at the same time that the smog first appeared. Now our view of Santa Fe and the Rio Grande Valley and the Sangre de Cristo Mountains, which we value highly, is quite commonly degraded, or even concealed, by smog.

It is unbelievable that we as a nation would wish to fill our land with smog, fumes, and pollution merely to obtain unlimited amounts of electrical power at the lowest possible price. Particularly is this unbelievable if the area most affected is full of national parks and landscapes that people come from around the world to experience—such as Grand Canyon, now beginning to be plagued with smog from power plants.

Only at the national level of government can these problems be effectively attacked. Such immense fossil-fueled power plants can pollute the air of several states from one source, and will be built wherever state laws are sufficiently lax to permit them to be built without the most effective possible pollution controls, or to be built at all.

I do not see how it can be in the national interest to have as our goal the unlimited expansion of our power supply, at the cost of our whole environment. The very cheapness of power which does not have to pay for environmental damage leads to waste of power—to vast production of aluminum for cans and glass for no-return bottles, to be discarded on the landscape, and to air-conditioners made necessary in large cities by the heat output of countless other air-conditioners. Large buildings are left lighted night and day, and so much light brightens the sky that astronomers are faced with almost insoluble problems, wherever the observatories are located.

Desirable remedies for these very serious problems, I believe, are a moratorium on smog-producing power plants in every part of the country, but particularly in scenic areas of scarce water, and a combination of strict controls on pollution output and heavy penalties for environmental damage due to those plants already built. In areas with better water supplies for cooling, the use of non-polluting nuclear power in place of fossil fuels should be encouraged, rather than halted as has happened perhaps too often.

Thank you for scheduling these hearings, which I hope will lead to effective national legislation to control power-plant pollution. I would appreciate it if you could make this letter part of the hearing record.

Sincerely,

JAMES TERRELL.

LAS VEGAS, N. MEX., May 28, 1971.

Hon. Senator HENRY M. JACKSON,
Chairman, Senate Committee on Interior and Insular Affairs,
U.S. Senate, Washington, D.C.

DEAR SENATOR JACKSON: May I first thank you for the interest that you and your committee on Interior and Insular Affairs have shown in our particular problem in Northern New Mexico. I should like to request that the following statements, made by one citizen on behalf of his family and many friends, be considered as formal testimony before your committee. I wish it to be placed in the printed record of your hearings. My family and I moved to Northern New Mexico from Michigan in 1954. From then until about 1966, I felt this was one of the best moves I ever made. The bright blue sky, glittering sunrise, and blending colors of forest, desert, and mountain landmarks were something I would not have seen in the industry burdened areas of Michigan, Ohio, Illinois, Indiana, etc. It was like a whole new view of earth.

Then, with the advent of the power plant in the Farmington area, we noted the beginning of a gradual change in this part of the United States. The Rio Grande Valley, with its clear air and brilliant colors began developing a slight haze. Airline pilots as long as four or five years ago said they could clearly trace paths of smoke and pollution from the four corners region, moving north of the Jemez Mountains and down into the Rio Grande Valley north of Espanola, New Mexico. At that time I wasn't particularly alarmed, for the air was still relatively clear. That was my error, for it was the beginning of a power plant octopus for this area.

In 1967 I accepted a position as Superintendent of Schools in a mountain school district southwest of Denver. Three years later, in August of 1970, I moved

back to my favorite state, New Mexico, with a position at New Mexico Highlands University. Since that time I have made four or five business trips to Albuquerque, Santa Fe, and Los Alamos, and I am completely appalled and absolutely outraged at the success-to-date of this power plant conglomerate, in what would appear to be their deliberate and ruthless attempts to completely ruin the atmosphere of one of the few remaining clean and beautiful places in the United States.

It sickens me to read in the paper, each day of your hearings, the deliberate distortions of truth which come so glibly from the tongues of "spokesmen" for the power company conglomerate and other vested interests who would load the four corners area with their pollutant producing "industry". Short-sighted commissioners would argue that property value would increase in their areas (up to 1500%); so what—they would then have all of the blessings and advantages of the debt ridden, crumbling environments of the industrial east and mid-west which I left and the over populated and pollution loaded west coast. I would urge the commissioners, in their great wisdom, to move away from here into an area with its 1500% greater property value. I strongly support the effort of intelligent men and women who are attempting respectfully to call the attention of your group and other responsible leaders of our country to the very real danger of heavy atmospheric and ecological pollution in Northern New Mexico.

During the next few days your committee will hear thousands of opinions; an alarming number of which will be glittering generalities, vague half-truths, and outright distortions of fact from the power companies and several short-sighted, self-styled, local leaders.

Please prevent further buildings of any more power plants in this four state area. If these power plant people are so eager to solve "future power needs" of an area, make them move those plants to where they are really needed—California, or anywhere else at least 800 miles away from here.

I want my children to continue to grow in this land of the "Big Sky" and enjoy the last frontier of clean air and spacious skies in the United States.

Sincerely yours,

STANLEY J. HIPWOOD, Ph. D.

ALBANY, CALIF., June 1, 1971.

CENTRAL CLEARING HOUSE,
Santa Fe, N. Mex.

GENTLEMEN: Enclosed is a color slide of the coal burning power plant located about 10 miles east of Shiprock, N.M., at a time when its pollution level was clearly unacceptable, at least to me. Please make use of it and the following statement in whatever way seems appropriate, including transmission to any congressional hearings on similar developments in the southwest.

The accompanying photograph was taken on June 24, 1970 at about 10:30 AM local time, from a point on the road $\frac{1}{4}$ mile east of the power plant. The "smoke cloud" which can be seen in the photograph was clearly visible as a continuous stream as far west as the Ship Rock. Obvious "smog" extended at least as far as Teec Nos Pos, Arizona.

I was returning to California after completing some geological work in northeastern New Mexico and southern Colorado and had intended to photograph the Ship Rock, which was of some geological interest to me. As I drove down route 666 into the town of Shiprock, N.M. from the higher land to the north, a stream of red brown smoke lay in the San Juan valley as far as could be seen in each direction. Since this precluded taking any good photographs of the Rock, we decided to detour to find the source of the smoke pall which we had thought might be something temporary. Of course, we found the power plant to be the source, about 10 miles east of Shiprock.

Having always been thrilled and invigorated by this land on past occasions, this day was sobering and depressing as we continued to drive west through this cloud into Arizona. It was a shock to find a single source such as this power plant capable of such a widespread degradation of the air quality, and so totally destructive of the beauty of this land which depends so much on light, color and space. I strongly oppose any future development of this kind.

Sincerely yours,

JOHN C. STORMER, Jr.

CENTRAL CLEARING HOUSE
328 East de Vargas
Santa Fe, New Mexico 87501
(505) 982-4349



ENERGY

A PARTIAL STATEMENT OF ENVIRONMENTAL OBJECTIVES

In part, we seek:

- An immediate moratorium on all expenditures for the construction of the Navajo Project and the Black Mesa-Lake Powell railroad.
- Full review by the Environmental Protection Agency of the combined, synergistic effects of the complex of coal-fired power plants in operation, under construction, and planned in the Southwest scenic heartland. This review should include but not be limited to:
 1. the synergistic effects of air pollution from super plants in the Four Corners region.
 2. water allocations for power plants and their impact on the total water picture in the Southwest.
 3. siting policies, especially those which permit siting adjacent to national recreation areas.
 4. land use values relating to extra high voltage long-distance transmission lines, slurry lines, railroads.
 5. strip-mining reclamation potential on arid and semi-arid land.
 6. the impact of power plant and strip-mining developments on Indian reservations affected by them.
- Immediate enactment of a non-degradation policy for air quality in the Four Corners region.
- Full review by the Department of the Interior of decisions leading to location of the Navajo Project adjacent to Glenn Canyon National Recreation area.
- Immediate investigation of alternative sites and problems relating to:
 1. location of Navajo Project elsewhere on the Reservation (if so desired by the Navajo Tribe).
 2. location off the reservation.
 3. location outside the area designated as the "Upper Basin" of the Colorado River.
- Acceptance of the principle that until power needs by industrial, commercial and residential segments can be regulated with an eye toward efficient allocation of limited resources, rationing and rate regulation are the only immediately available ecologically sensible alternatives. If we do not accept rationing and stiff rate regulation, we are only postponing the day when "brown-outs" cannot be avoided and multiplying the damage to our environment, which, if it can be corrected at all, will cost multiple billions more than it would today.
- In as much as the time required to investigate and relocate the Navajo Project and others could delay their contribution to the energy demand of the Southwest and Southern California by as much as three years, immediate steps should be taken by the government to:
 1. formulate a national energy policy.
 2. allocate funds to study and then implement ways to reduce the rate of growth in demand for electricity by industrial, commercial, and residential segments. The study should include but not be limited to: ways to encourage low energy demanding alternatives that do the same job as high users of electricity; implementation of an immediate ban on all advertising promoting increased use of electricity; rationing mechanisms that will anticipate and limit differences between supply and demand and thus limit any chance of "brown-outs."
 3. develop natural gas reserves at an accelerated rate. Gas fired plants can be constructed in one year. Coal fired plants take four years. The commitment to develop our dwindling gas reserves implies recognition that we are buying time with gas reserves to perfect other technologies.
 4. assist and if necessary subsidize the utilities to extend the life of generating facilities scheduled to be shut down according to the original formula for completion of the Navajo Project and others.
 5. assist the utilities involved in the Navajo Project and others in the design, location and construction of gas fired plants to help offset anticipated shortages.
 6. support vastly accelerated programs of research, development and demonstration projects for conversion of coal to gas and for utilization of thermonuclear (fusion) and geo-thermal potentials.
 7. require advertising urging consumers to use less electricity.

LEGAL CONSIDERATIONS

Description of three lawsuits filed regarding the Four Corners Power Development

1. NEPA lawsuit. On June 2, 1971, the Native American Rights Fund, in behalf of the Jicarilla Apache Tribe of Indians, six individual Navajos and the Committee to Save Black Mesa, Inc., filed a lawsuit in the United States District Court in the District of Columbia. Joining on the papers was the Sierra Club. On this same date, the Environmental Defense Fund and the National Wildlife Federation filed a similar lawsuit, together with a motion to consolidate with the suit filed by the Native American Rights Fund.

The suit is against the Secretaries of Interior, Agriculture, Army and the Chief of the Corps of Engineers. The plaintiffs request that the Interior Department, as the "lead agency" within the meaning of the Guidelines promulgated under the National Environmental Policy Act, prepare a cumulative, regional impact statement assessing the environmental and cultural consequences associated with locating a large electrical power complex in the Four Corners area. Plaintiffs contend that a regional study is required by NEPA and that individual, piecemeal impact statements which have been prepared to date by Secretary Morton, do not comply with this Act. In addition, the plaintiffs request that subsequent to the preparation of the impact statement in draft, there be a full administrative hearing with those persons responsible for preparation of the statement made available for cross-examination; and lastly, that until this statement is completed, there be a moratorium on all further federal participation in this electrical power development. Plaintiffs contend that NEPA requires the preparation of an impact statement before any major federal action is authorized.

Secretary Morton announced on May 27, 1971, that there would be a regional study (but not necessarily one in compliance with NEPA), but that federal participation would continue while the study is being prepared.

2. HOPI lawsuit. On May 14, 1971, the Native American Rights Fund, on behalf of 62 Hopi traditional and their leaders, filed a lawsuit in the United States District Court in Washington, D.C., against the Secretary of the Interior and Peabody Coal Company. The specific relief requested is that the Secretary's approval of the Peabody lease to strip mine coal from Black Mesa be set aside. The grounds are that the Hopi Tribal Council (the lessor of the lease) was not properly constituted pursuant to the Hopi constitution. The constitution provides that the Kikmongwi, or traditional leader of each village, shall designate representatives to the Hopi Tribal Council. In fact, the majority of the Kikmongwi did not certify representatives to the tribal council; as a result, there was not a proper quorum to transact business. Plaintiffs further contend that even if the Tribal Council was properly constituted, it had no express authority to enter into the Black Mesa lease. The third ground of the lawsuit contends that the Secretary has breached his fiduciary responsibility to the Hopis by allowing the Hopi Tribal Council to become an instrument of the "progressives," to the complete disenfranchisement of the traditionals.

3. FOUR CORNERS lawsuit. On May 11, 1971, Donald Juneau of DNA, the Navajo Indian legal services organization on the reservation, filed a lawsuit in United States District Court in Washington, D.C. The plaintiffs in the suit are five enrolled members of the Navajo tribe residing in close proximity to the Four Corners power plant. The suit is against the Secretary of the Interior and the Secretary of Health, Education and Welfare. The plaintiffs contend that the Secretary of the Interior and the Secretary of Health, Education and Welfare breached their trust responsibilities to the Indians by failing to adequately provide for their health and welfare when approving the site lease for the Four Corners power plant. They ask that the Secretary of HEW immediately begin a program of ground monitoring to determine whether there are any harmful effects from these pollutants on the plaintiff's health, livestock and vegetation.

Prepared by Bruce Greene
Native American Rights Fund, Berkeley, Ca.

In addition to the suits already described, several other suits are being considered. If the legal theories for these additional actions appear sound, litigation will follow. Attorneys for environmental groups have been assured that no sound legal action need go untested for lack of funds and other support.

NEW MEXICO CITIZENS FOR CLEAN AIR AND WATER, TAOS CHAPTER,
El Prado, N. Mex., May 24, 1971.

Senator HENRY JACKSON,
Senate Committee on Interior and Insular Affairs, Senate Office Building, Washington, D.C.

DEAR SENATOR JACKSON: In my position I have access to many specific facts dealing with Air Pollution in New Mexico. I fully support the Articles on Air Pollution contained in "Environmental Quality". The first Annual Report of the Council on Environmental Quality. August 1970 Washington, D.C. However, I do not see the council on Environmental Quality's recommendations carried out quickly enough or fully enough to protect us from dangerous amounts of Air Pollution from the coal burning power plants in the southwest. Specifically here in Taos County, New Mexico we are effected by the smoke plume from the Four Corners plant at Fruitland, N.M.

I will call your attention to two quotes which I consider relevant to the problem of Air Pollution here in Northern New Mexico. First in relation to the TALL STACK method employed by the Arizona Public Service Company as an "adequate" solution to emission control:

The American Chemical Society states in an article entitled "Cleaning our Environment". 1969: The tall stack does not reduce the emission of pollutants, but rather reduces the local ground-level concentrations. The average height of power plant stacks to be completed in 1969 for coal-burning power plants will be 609 feet, compared with 243 feet in 1960, and stacks as high as 1000 feet or more are being built. These taller stacks are designed to disperse the emissions from the very large power plants, 500 to 1000 megawatts and up, that today's technology has made possible. Such plants emit very large volumes of contaminants, and the overall effect of using tall stacks to disperse them is not fully clear. One unanswered question is the effect of the practice on ground-level concentrations some miles from the stack. Another is its effect on atmospheric chemistry not obviously related to adverse effects on humans and other receptors. Until such questions are resolved, the tall stack should be regarded conservatively as an interim or partial solution to the pollution problems of power plants."

The second quote which I consider to be of utmost importance is the following recommendation of the Council on Environmental Quality: (pg. 88 #5 The first Annual Report of the Council on Environmental Quality):

"A more balanced research and development program is necessary to hasten the development of more efficient energy processes. Although control technology for sulfur oxides will provide appreciable improvement for several decades, a longrun answer to this type of air pollution lies in better energy conversion processes which will emit less pollutants per unit of energy produced. Gasified coal, fluidized-combustion, breeder reactors, and nuclear fusion all hold promise. Although research for new nuclear power sources has already received significant support, greater attention must be given to these other processes. Even now, the Nation needs to use its fuel resources more effectively through development of a national energy policy. Such a policy would guide the use of natural gas, low-sulfur coal and oil, and other energy resources to assure their availability and minimize air pollution."

Furthermore: "The Council on Environmental Quality believes that a very high priority should be given to air pollution control. The opportunities for making significant improvements in the environment, at relatively low cost, are impressive. Indeed, the benefits which can be derived from greater control of air pollution far outweigh the costs of the control measures."

I personally would like to stress the necessity of a national energy policy. If the Utility Industries continue to side-step necessary pollution control regulations blaming either lack of technology or economics as holding them up, it is time for the government to step in! I speak as a citizen of the United States and I demand that my government protect our air so that my children may live to enjoy a quality of life not inferior to that into which I was born.

It is clearly indicated that once the public becomes educated to the fact that certain types of power production cause pollution, they are willing to reexamine their life styles, their consumer patterns and join one another crossing the generation gap and gaps of race and class as well to search for better alternatives.

When the young people who are in school today and are being educated to believe in an "environmental ethic" become of age they will surely determine the end to irresponsible Industrial and governmental action or inaction. Let us act now before it is too late!

Respectfully yours,

EMILY V. NIEMAN, Vice Chairman.

AMERICAN CHEMICAL SOCIETY, 1969—CLEANING OUR ENVIRONMENT

RECOMMENDATIONS: UTILITY POWERPLANTS

Recommendation A16: Translation of federal air quality criteria for sulfur oxides and particles into air quality standards should proceed rapidly so as to speed widespread application of the available means of controlling these emissions.

Recommendation A17: Existing research to define the overall effectiveness of the tall stack in meeting air quality standards should consider the effects of mass emissions of pollutants not only on local, ground-level concentrations, but on the local and regional air masses and on ground-level concentrations outside the local area.

Recommendation A18: Investigations of techniques for desulfurizing fuels must be carried to the point where economic evaluation is possible. Particularly desirable would be early definition of the amounts and locations of coals that can be cleaned economically of significant amounts of pyritic sulfur. The development of economical coal cleaning processes is a responsibility of the coal industry, and more comprehensive studies should be made than have been made in the past. Further research appears to be required on hydrodesulfurization catalysts that are not deactivated by the heavy metal in residual fuel oils.

Recommendation A19: The development of first-generation processes for removing sulfur oxides from utility stack gases should be supported and stimulated so as to achieve early commercialization, particularly in order to offer a control option for existing power plants. Research and development on new and original methods of removing sulfur oxides from utility stacks should proceed rapidly to the point at which specific processes can be selected for advanced development.

Recommendation A20: Current studies of nitrogen oxides emissions by stationary sources should define the economics and effectiveness of modifying existing power plants, where possible, or of using alternative fuels to reduce such emissions.

Recommendation A21: Research and development on new combination processes should include pollutant emissions as a basic parameter.

IN SUPPORT OF THE BAGHOUSE (FABRIC FILTRATION) FOR CONTROLLING VISIBLE STACK PLUMES

"A California power company has experimented with both the precipitator and the baghouse (fabric filtration) for controlling visible stack plumes when burning California residual fuel oil (111). The plumes were found to be caused by relatively small amounts of particles and sulfur trioxide aerosol mist. Both are predominantly in the submicron size range and thus produce significant light-scattering effects and the consequent visible plume. A prototype precipitator on a 175-megawatt boiler was unable continuously to meet the local requirements for visible emissions. A prototype baghouse has been operating on a 320-megawatt boiler since 1965 and has proved to be capable of eliminating visible plume. Operating problems have been encountered with the baghouse, however, and it is still (in 1969) not considered a commercially proven control device, although considerable progress has been made (NAPCA also has been studying the baghouse and plans contract work to evaluate it as a chemical contractor for removing both sulfur oxides and nitrogen oxides)."

STATEMENT OF MR. LAUREN B. HITCHCOCK, PROFESSOR OF ENGINEERING, STATE UNIVERSITY OF NEW YORK AT BUFFALO, AND CHAIRMAN, TECHNICAL ADVISORY COMMITTEE ON AIR POLLUTION, ERIE COUNTY HEALTH DEPARTMENT, APRIL 20, 1971

"I do not know of any wet-scrubber which will be as efficient as electrostatic precipitators and for fine particles, probably the most efficient device is a BAG FILTER installation which costs about the same as electrostatic precipitators but gets more of the fine particles. As experience has shown in many cases, a plant can remove 99+ % of the particles greater than 1 micron, yet the reduction is visibility and the haze looks as thick as ever. This is because most of the reduction in visibility is caused by the sub-micron particles and these can be substantially reduced by means of a bag filter installation and to some extent electro-

static precipitators. Sub-micron particles can remain air borne indefinitely and I am very skeptical that there is any wet-scrubber that would have much effect on these."

STATEMENT BY DR. L. B. HITCHCOCK, MAY 13, 1971

"A possibility would be to insert a bag house up stream from the wet scrubbers, thus removing 99.9% of the solids in the bag house and removing at least part of the SO₂ in the wet scrubbers. This however, would be a bold new approach although the component parts are well demonstrated."

SANTA FE, N. MEX., May 24, 1971.

HON. HENRY M. JACKSON,
Chairman, Senate Committee on Interior and Insular Affairs, U.S. Senate,
Washington, D.C.

DEAR SENATOR JACKSON: Why do we need more power in the Southwest? Is it so that we can have an electric carving knife in every kitchen and an electric pencil sharpener in every office? Or is it so that already overcrowded Los Angeles can become even more unfit for human habitation?

We are just beginning to see a change in priorities, a realization that because something can be done does not mean that it should be done, an awareness that we cannot go on despoiling and desecrating our beautiful land without disastrous consequences.

My family and I have visited New Mexico regularly for years and one year ago we made Santa Fe our home. The change in the quality of the air caused by the existing Four Corners Plant has made us heartsick. Certainly maintaining the quality of life in the Southwest is as important as permitting the endless proliferation of gadgets and housing tracts in Los Angeles.

It isn't electrical power that is in short supply, but the power within us—the power to realize what is happening to our civilization and the power to do something about it.

Please do not permit more power plants to be built in the Four Corners area, and require those already operating to either stop contaminating and polluting or stop operating.

Most sincerely,

SAUL COHEN.

LOS ALAMOS, N. MEX., May 24, 1971.

HON. HENRY M. JACKSON,
Chairman, Senate Committee on Interior and Insular Affairs, U.S. Senate, Wash-
ington, D.C.

DEAR SENATOR JACKSON: I should like this letter to be entered into the official record for these hearings.

I wish to compliment you for holding these most important hearings on the Thermal Powerplant Construction in the Four Corner's Region. I have personally watched the degradation of the quality of the air in the Rio Grande valley since the Four Corners Plants have come into operation.

The need for power is undeniable but the citizens of New Mexico and the other states affected are greatly concerned over the multiple assault upon the land, water and air incurred by these operations. I strongly urge the Federal government to (1) place the most stringent possible regulations on air emissions from these plants—realizing that the "state of the art" in stack precipitators can be markedly improved by having teeth in the need to improve; to (2) give consideration to the diminished quality of the Colorado River due to evaporation by cooling operations, disposal of the Black Mesa slurry and the build up of salts in the river waters; and to (3) use this occasion to seriously consider Federal legislation to ban and/or control strip mining throughout the United States—assuredly in arid lands the surface destruction caused by such mining operations is very nearly irreparable. A concomitant problem is the disposal of the tons of fly ash and particulates recovered by suitably efficient precipitators.

Finally as a citizen I feel it is the responsibility of our Federal government to control the construction of this power network to assure that the quality of life in the southwest is not impaired. In this task I would welcome (a) delay in bringing nearly completed plants into operation until solutions to problems are

found; (b) restricted operation of currently operating plants; and (c) as a taxpayer I would be willing to pay a power surtax or have industry receive reasonable Federal aid if such expenditures provided reasonable environmental solutions.

Thank you.

Yours truly,

DANA L. DOUGLASS.

ALBUQUERQUE, N. MEX., June 1, 1971.

HON. HENRY M. JACKSON,
Interior and Insular Affairs Committee, New Senate Office Building, Washington, D.C.

DEAR SENATOR JACKSON: We are much pleased that your committee has come to New Mexico and the Southwest to view the coal-power plant problems in the Four Corners area and to hear statements concerning these problems.

There is a vast soft coal supply in the Four Corners States and there is a growing need in this country for electrical power. Let us proceed with caution though, and insure adequate controls for the quality environment which we have enjoyed in the past. Let us call for a moratorium on coal power plant construction in the Four Corners area until research comes up with better means of converting this coal resource to electrical power.

The Bisti Natural and Geological area on B.L.M. land south of Farmington must be spared of destruction by strip mining for coal which lies beneath it. Other valuable natural areas must be searched out and preserved before they are destroyed.

Electrical power advertisement and consumption should be reduced. Neon signs would be a good place to start. Commercial power rates should be increased with the cost being passed on to the consumer.

Research must be pushed for nuclear power plants along the sea coast where the surplus heat for condensation can be utilized for desalting sea water to provide for fresh water needs, and decreasing the demands for fresh water from up stream. This should be at the same time decrease the heat-pollution problem arising from nuclear power plants.

Research for better conversion of coal to natural gas should also be pursued and utilized. Underground natural gas pipelines are less offensive than high voltage transmission lines and would disburse the power plant locations.

Most important of all, we must provide means to stabilize our population growth rate. Loss of tax exemption for the third child and increased tax rate for the fourth and additional children, would be a good place to start. Free birth control methods and sterilization for persons on relief is needed nationwide. We must reduce considerably, the influx of immigration into the United States for citizenship.

These may sound like harsh actions but effects of the growing power plant needs, the many forms of pollution, and the pressures of our exploding population are all too apparent. We must take effective action and soon if we are going to save a livable environment.

Respectfully Yours,

MILO M. CONRAD.

ALBUQUERQUE, N. MEX., May 25, 1971.

Senator HENRY JACKSON,
Chairman, Senate Committee on Interior and Insular Affairs, Senate Office Building, Washington, D.C.

DEAR SENATOR JACKSON: I would like to call to your attention a most timely and pertinent article which appeared in the May 14, 1971 issue of Science Magazine. Entitled "Solar Energy: A Feasible Source of Power?", it discusses recent developments in the area of solar energy use, and bears importantly on the current consideration being given continuation of construction of coal burning electric generating plants in the Four Corners area.

The article notes that while hopes for utilizing solar energy on a large scale have not materialized in the past, new proposals emanating from the University of Arizona suggest feasible solutions for past problems. The research efforts of two astronomers at the University of Arizona have resulted in the development of a high efficiency coating for collecting surfaces, a factor which greatly in-

creases the feasibility of large scale use of solar power. The author points out that, while initial costs of construction would be higher than those associated with conventional means of power production, a solar plant completely eliminates the air pollution problems inherent in the coal burning production of power, and the radioactivity hazards of nuclear power production. It is further noted that a solar powered plant would only be operable in the Southwest area of the country, where sufficient sunlight is available.

The obvious implication of these developments is to curtail construction of coal burning electric generating plants until the feasibility of solar energy has been fully explored. Given the urgency of the problem it would seem appropriate that the Federal Government move quickly to assess the promise of these recent developments and, if findings are sufficiently positive, authorize the construction of a test plant in the Southwest region.

Sincerely,

PEDER J. JOHNSON.

ADVANCED URBAN SYSTEMS CORP. OF ALBUQUERQUE,
Albuquerque, N. Mex., May 15, 1971.

Hon. HENRY M. JACKSON,
Chairman, Senate Committee on Interior and Insular Affairs, U.S. Senate,
Washington, D.C.

DEAR SENATOR JACKSON: Please enter my comments in the field hearing record on Thermal Powerplant Construction.

As a native New Mexican I am totally opposed to the continuation of thermal powerplant construction in the Desert Areas of the Pacific Southwest.

The pollutants created by these powerplants already have greatly reduced the visibility of our (formerly) clean Southwestern air.

I am also opposed to the consumption by the powerplants of large amounts of scarce water in the Colorado River Basin. These plants also threaten the quality of the Colorado River water.

The most significant damage to the land has come from strip mining operations underway at Black Mesa and the Navajo Mines.

Finally, the power plants are unfairly threatening the lifestyle of the real native people, the Indians.

Please don't allow the quality of our environment to be further degraded by continuation of the thermal powerplants.

Sincerely,

ROSS B. PERKAL,
Research Assistant.

ST. JOHN'S COLLEGE,
Santa Fe, N. Mex., May 17, 1971.

Hon. HENRY M. JACKSON,
Chairman, Senate Committee on Interior and Insular Affairs, U.S. Senate,
Washington, D.C.

DEAR SIR: I would like to express my opinion concerning the development of power plants in the Four Corners area of the Southwest. I would also appreciate the inclusion of this letter as a part of the hearings that you are to open concerning this matter.

The Four Corners area is one of the most beautiful regions of this country, and all should be done to preserve it in its original state for the enjoyment of future Americans and the well-being of its inhabitants. I see the Four Corners power plant project and the strip mining associated with it as extremely harmful to the future inhabitants, the ecology, and the beauty of this area. Strip mining has already gouged ugly scars on Black Mesa and other areas, and the amounts of fuel that will be needed when the rest of the power plants are built will wreck havoc with the land. There are people who live in this country and who depend on it for their living. The Navajo will be most affected by this development; the pollution to the land, the air, and the water will endanger their lives while the power produced will be siphoned off to California and southern Arizona. So now we will rob the Indians of their very air and water so we can live in extravagant luxury.

I myself can bear witness to the pollution that is growing on account of these power plants. This winter smog first appeared in Santa Fe, which is a city without any heavy industry or great numbers of polluting vehicles, and the smog

was distinctly seen to come from the northwest. The air pollution is now known to come from the Four Corners plant. Weather satellites have photographed plumes of smoke drifting 250 miles from this one plant. When all the plants are in operation, they will put out daily amounts of air pollutants greater than those produced by New York City. Water pollution will also grow with these plants since they use the Colorado River and its tributaries to cool the generators. This will use water that is preciously scarce in the Southwest, and it may also raise the salt concentration in the Colorado to the point of uselessness for human consumption and irrigation.

Therefore, I am opposed to the development and operation of these plants and to the destructive strip mining in the Four Corners area. Thank you for your consideration.

Sincerely,

DONALD F. MERRIELL.

LOS ALAMOS, N. MEX., May 10, 1971.

HON. HENRY M. JACKSON,
*Chairman, Senate Committee on Interior and Insular Affairs, U.S. Senate,
Washington, D.C.*

DEAR SENATOR JACKSON: A desert area is universally recognized as a region of delicate balance between various forms of life and total barrenness. Proposals to build huge coal-fired power plants throughout the southwest deserts would destroy this balance, creating a vast wasteland. These powerplants would adversely affect the area in many ways: by denuding the land actually stripped for coal; by upsetting the water balance by evaporation loss and possibly by water-table loss; and by contaminating the atmosphere with sun-shielding particulates and noxious fumes. The "benefits" to be gained in recompense for these losses are power for export throughout and beyond the adversely affected region; power for supplying already overgrown cities and subdivisions; power which could be obtained by other means with less damage to the environment.

Though nuclear plants have their drawbacks, they are less objectionable than more fossile fuel powerplants. Properly controlled, a nuclear plant will contaminate the atmosphere less with radioactive materials than a coal plant of comparable capacity; the sun-shielding and noxious emissions are nil; only the thermal and radioactive waste problems and the fuel supply source remain as drawbacks. These latter problems, though important, are much less severe than the overall impact of fossile fuel plants. Nuclear plants are now very feasible alternatives. Looking farther ahead, it may be that thermonuclear plants will become feasible with still fewer drawbacks.

For the long term, we must reduce the public's demand for ever increasing power consumption. Increased electric rates with which to pay for cleanup of powerplant waste and despoliation are one means of doing this. The limitations on consumption forced by "brownouts" are another. Though unpopular now, both approaches may be necessary.

Yours truly,

D. H. JANNEY.

JOHN MUIR INSTITUTE FOR ENVIRONMENTAL STUDIES, INC.,
June 4, 1971.

Senator HENRY JACKSON,
*Chairman, Senate Interior Committee,
Senate Office Building, Washington, D.C.*

DEAR SENATOR JACKSON: With reference to my testimony presented in Albuquerque on May 24, I would like to apologize for making a further addition to an already voluminous record, but I believe there were several issues which were left in a somewhat unsatisfactory state. The points which I feel deserve further expansion are (1) residence times of sulfur compounds and particulates; (2) the role of windblown dust on particulate concentrations; (3) pooling of air contaminants from multiple plants; and (4) the "tall stack solution."

1. RESIDENCE TIME FOR SULFUR COMPOUNDS AND PARTICULATES

The reference quoted by Dr. Hill is from a 1950 article. The author of this article has made certain assumptions which have led him to the conclusion that

78 percent of the sulfur compounds emitted in Great Britain are deposited there.¹ Unfortunately, the measurements he reports state that only 14 percent of the sulfur compounds are deposited there. This fact makes his assumptions and hence his conclusions about residence times somewhat suspect.

More recent work by Junge and Werby has produced a residence time of 43 days for sulfur compounds.² They also report experiments giving residence times of 6-17 days for particulate aerosols. The criteria document sheds little additional light on the subject. It reports experiments that indicate the conversion of sulfur dioxide to sulfur trioxide will take from two days to 25 days.³ It does not discuss the ultimate fate of the particulates and sulfuric acid droplets which form from the sulfur trioxide. These aerosols would be expected to have residence times comparable to other fine particulates. A recent report by the American Chemical Society gives estimated residence times between five days and two weeks for the entire process.⁴ The reference used by Dr. Hill does not seem to be widely accepted. In an arid region, the scavenging mechanisms would be expected to be somewhat less effective.

2. WINDBLOWN DUST AND PARTICULATE CONCENTRATIONS

The maximum 24 hour average particulate concentration measured in Farmington in 1970 occurred on September 11.⁵ The winds for that day and the week proceeding it were all near or below average for September, which is a relatively calm month.⁶ The concentration measured exceeds both New Mexico's standard and those predicted by the NAPCA for typical conditions with neutral stability and the wind towards Farmington.⁷ Somewhat higher 24 hour averages probably occurred, but were not picked up by the measurements which were made on only one day a week.

In 1970 the arithmetic mean of the particulate concentrations measured in Farmington was $93.9 \mu\text{g}/\text{m}^3$ (micrograms per cubic meter). Background concentrations are not known, but $20-30 \mu\text{g}/\text{m}^3$ is probably close. Calculations for the San Juan plant give for example $23 \mu\text{g}/\text{m}^3$ including the emissions of the plant.⁸ The Huntington Canyon measurements by Dr. Hill and his associates which was referred to by Dr. Bartlit in his testimony ranged from about $20 \mu\text{g}/\text{m}^3$ up to $78.7 \mu\text{g}/\text{m}^3$. This last measurement was apparently made near a dirt road and more a characteristic of the sampler placement than the general background for the area. The dustfalls he reported which are comparable to those of typical cities are probably not representative of the area. It is curious that Dr. Hill reported that measurement with no reference to its anomalous character.

Dustfall values in themselves are poor indices of pollution because the dustfalls are primarily composed of particles larger than 10 microns which have short residence times. For instance, a 1 micron particle settles at a rate one hundredth of that of a 10 micron particle. Thus a 1 micron particle may stay in the atmosphere 100 times as long as a larger 10 microns particle.

3. POOLING OF AIR CONTAMINANTS FROM MULTIPLE PLANTS

A calculation performed by NAPCA indicated that significant visibility restrictions could occur approximately 150 miles downwind even if every particle which struck the ground were lost.⁹ One can conceive of a similar situation with winds draining down valley. Downstream from the San Juan and Four Corners plants is the San Juan River and thence to Lake Powell where the emissions from Kaiparowitz and Navajo are added. Still further downhill is

¹ Meetham, A. R., "The Natural Removal of Pollution from the Atmosphere," Quarterly Journal of the Royal Meteorological Society, vol. 76, No. 330, October 1950, pp. 359-371.

² Junge, Christian E. and R. T. Werby, "The Concentration of Chloride, Sodium, Potassium, Calcium, and Sulfate in Rain Water over the United States," Journal of Meteorology, vol. 15, No. 5, October 1958, pp. 417-425.

³ U.S. Department of Health, Education, and Welfare, "Air Quality Criteria for Sulfur Oxides," National Air Pollution Control Administration Publication No. AP-50, pp. 7-9.

⁴ American Chemical Society, "Cleaning Our Environment; The Chemical Basis for Action," Washington, D.C. 1969, p. 29.

⁵ New Mexico Health and Social Services Department, "Summation of Data from San Juan County for the Year 1970."

⁶ U.S. Weather Bureau, "Monthly Climatological Data," vol. 74, September 1970, New Mexico section.

⁷ Natural Air Pollution Control Administration, "Estimates of Air Pollution Concentrations from Four Corners Power Plant," January 1970, pp. 63-64.

⁸ Bureau of Reclamation, "Study of Environmental Factors, San Juan Generating Station," Department of Interior, Salt Lake City, Utah, May 1971, p. 18.

⁹ Ibid, NAPCA report, p. 78.

Grand Canyon and finally the Mojave plant. In the trip downstream the sulfur compounds may have formed sulfates or sulfuric acid mist and the whole mess is in Grand Canyon or Lake Powell (except for Huntington Canyon and Mojave). Terrain features have restricted the dispersion of the plume and the longest extension of the plume to Lake Powell has only traveled about 175 miles (1½ days' time at 5 miles per hour). Even without the contribution from San Juan and Four Corners, we have emissions at Lake Powell comparable to major cities.

4. TALL STACK SOLUTION

One of the solutions advanced by the representatives of industry was the use of tall stacks for the dispersion of pollutants. Studies conducted by the TVA have recently discounted this as a possible approach to air pollution problems. They have found that certain meteorological conditions will give the same concentration irregardless of the smokestack height. Officials of the Environmental Protection Agency now state, "... expected maximum concentrations are constant for physical stack heights which exceed 60 meters."¹⁰ All of the stacks discussed for the new plants are taller than 180 feet and thus no gain can be expected in this fashion.

In addition to the above information, I would also like to request inclusion of the attached article from "Science," May 21, 1971, Vol. 172, No. 3985.

Sincerely yours,

MICHAEL WILLIAMS, Ph. D.,
Research Coordinator.

[From Science, May 21, 1971, vol. 172, No. 3985]

CONTINUING INCREASE IN USE OF ENERGY

Consumption of energy is the principal source of air pollution, and energy production, transportation, and consumption are responsible for an important fraction of all our environmental problems. Use of energy continues to rise at the rate of 4.5 percent per year. Even if fuel supplies were infinite, such an increase could not be tolerated indefinitely. But fuel supplies are not inexhaustible, and this combined with the need to preserve the environment will force changes in patterns of energy production and use.

Our economy has been geared to profligate expenditure of energy and resources. Much of our pollution problem would disappear if we drove 1-ton instead of 2-ton automobiles. Demand for space heat and cooling could be reduced if buildings were properly insulated. Examples of needless use of electricity are everywhere. Promotional rates and advertising tend to encourage excessive consumption.

Slowing down the rate of increase in use of energy will not be easy. Public habits of energy consumption will not be quickly altered, and a sudden change in the rate of growth of energy consumption would cause major additional unemployment.

Most people are at least somewhat aware that their consumption of various forms of energy adds to pollution. Yet despite all the publicity and exhortations, little effect has been noted in overall energy consumption. Increase in use of energy has not abated. Some signs of impact can be detected. Sales of smaller automobiles have increased somewhat. However, the rate of increase of "clean" electricity was 6 percent last year in spite of brownouts and the economic recession. Consumption of natural gas in the production of electricity rose 11 percent, reflecting in part a desire to use cleaner fuel.

A major factor in the burgeoning use of energy is its low price—one that does not take into account all the costs to society. In the generation of electric power from coal and oil, millions of tons of sulfur dioxide are released, which cause billions of dollars worth of damage to health and property. We are consuming rapidly, at ridiculously low prices, natural gas reserves that accumulated during millions of years. Prices for energy should reflect their full cost of society. The Nixon Administration's proposed tax on sulfur in fuel should be enacted. The rate structure for electric power should be modified to discourage excessive use. A substantial increase in the price of natural gas, including a new federal tax, would diminish waste of this resource. Taxes on automobiles should increase sharply with weight and horsepower.

¹⁰ Federal Register, vol. 36, No. 67, Wednesday, Apr. 7, 1971, p. 6686.

Measures to cut excessive use of energy are likely to come only after a long time, if ever. We should face the possibility that increased consumption of energy will continue and prepare to meet that possibility. Atmospheric pollution is not an inevitable consequence of production of energy. In the use of fossil fuels, production of sulfur dioxide is not an essential by-product. Destruction of the environment is not a necessary consequence of strip mining. Pollution from almost every method of producing and utilizing energy could be sharply attenuated either through better practices or through development of new methods. In view of the importance of energy to society, present expenditures on research and development related to energy are small and these are not well apportioned. Two areas that particularly merit increases in support are thermonuclear research and development of pollution-free means of using coal for electricity, liquid fuels, and methane.—PHILIP H. ABELSON.

STATEMENT OF DR. J. H. TURNER, P.E., ASSISTANT PROFESSOR OF CHEMICAL
ENGINEERING, UNIVERSITY OF NEW MEXICO

Qualifications: A small amount of work on water pollution about twenty years ago (pulp and paper wastes). Major interest for the last six years has been air pollution abatement. I was one of approximately sixty people in the country granted a Public Health Service Air Pollution Fellowship for doctoral studies in this area. I am presently the only person in my department teaching engineering courses in air pollution abatement and am also directing research and doing consulting in the field.

This testimony represents only my own views. I was present during a large part of the Albuquerque hearing and feel compelled to comment on what was said there and on the available written testimony. There are five categories of interest:

- (1) General Comments
- (2) Effects and Abatement of Particulates
- (3) Effects and Abatement of Sulfur Oxides
- (4) Effects and Abatement of Nitrogen Oxides
- (5) Effects and Abatement of Mercury.

1. GENERAL COMMENTS

Primary Conflict.—The boundaries of conflict seem to be: a) If we don't have the new power plants we will decrease our standard of living by having fewer electrical conveniences and ultimately fewer jobs. More people will be on welfare and more people will suffer from disease and malnutrition. b) If we do have the power plants we will decrease our standard of living by having fewer recreational conveniences and ultimately by destroying the environment. More people will suffer from pollution related disease.

Regardless of which path is taken someone will suffer, at least over the short run. If the doctrine of the greatest good for the greatest number is followed (or the least harm to the least number), then we should try to find which path is demonstrably more harmful.

The effects of an abundance of power have been shown in the revitalization of the South after T.V.A. was established. Last summer's brownouts show the effects of a slight reduction in power, and the east coast blackout of a few years ago showed that large scale power outages or shortages would be catastrophic. There is no question but what our industrialized society is highly power dependent.

Waste products from fossil fuel power plants can be harmful or deadly in sufficient concentration. In some cases statistical inference has shown excess deaths in large populations during adverse pollution conditions. This would be similar to excess deaths caused by, e.g., a severe heat wave.

We can rapidly reduce the effects of a heat wave by means of an electric air conditioner. We cannot, at present, rapidly reduce the effects of lack of electrical power. If damage is inevitable, I would rather see it come from advancing into new areas than retreating into old ones. Man's climb towards civilization has continually required more and more multiplication of his musclepower to free him from tasks of sheer survival. A large part of the multiplication now comes from electricity. In areas of the world not having such multiplication life spans are shorter and more time and energy are spent obtaining food and shelter.

I think the problems of pollution will be more amenable to solution than the problems of lack of power. Much of the testimony given by environmentalists indicated that problems exist, and erroneously implied that power company officials either were not aware of the problems, or did not care about them.

Witness Credibility.

I was disappointed that some witnesses showed either essentially quite selfish viewpoints, or else implied that their technical backgrounds gave them a more authoritative view of the problems. I inferred that at least one person was more concerned about the aesthetics of mountain scenery than about the economics of jobless people. There was also one person who implied he had much technical activity in air pollution topics, but who as little as a year ago had had no formal training in the area, little actual experience, and was on record as not wanting to support the teaching of air pollution courses in his university department.

Another short sighted approach is the one that we shouldn't send power to California because they get the electricity and we get the pollution. The Californians might well say, "We have more pollution than you do because we make things that are, in part, for your use. If you won't send us power, we won't send you the food and other goods that we produce."

Use of Resources.—We have two kinds of mineral resources, those which are used to form goods and can be recycled, and those which are used as fuels and cannot be replaced. When we have exhausted our fossil fuels, we had better have replacement energy sources in usable form (solar power, geothermal power, nuclear, hydro, wind, tidal, or some other presently unthought of source). Until that time the major restriction on fuels is that we must use them less rapidly than we develop the newer energy sources. When newer sources are developed, then coal can join buffalo chips and whale oil as no longer needed fuels (of course, buffalo chips and whale oil are renewable fuels).

Moratorium and Demonstration Units.—Unless these cover just a very short time span we're in trouble from power shortages.

Demand for National Land Use Policy and Energy Policy Agencies.—In effect these already exist, and recommendations have been made for future actions in regard to electrical power generation. See: *Electric Power and the Environment*. A Report Sponsored by the Energy Policy Staff, Office of Science and Technology, August 1970 (Government Printing Office). The basic recommended policies are listed in the letter of transmittal preceding the report.

The Energy Crisis.—An excellent article detailing present and future problems of power generation is *The Energy Crisis* by G. C. Gambs and A. A. Rauth. The article is in the May 31, 1971 issue of *Chemical Engineering* magazine (McGraw-Hill). A copy of the article is appended. Of particular interest are the sections on: *Fuels Crisis, Power Plants and Ecology and The Only Real Answer.*

2. EFFECTS AND ABATEMENT OF PARTICULATES

Particulates are primarily a nuisance, but can lead to respiratory disease or aggravation of respiratory disease. They can also act as a synergist in combination with other gases, and can contain leachable elements of varying toxicity. Technology for particulate removal is available and routinely used for removals of up to 99+%. Essentially complete removal is theoretically possible, but is very difficult and expensive in practice. Disposal of ash can present problems to prevent leaching damage.

3. EFFECTS AND ABATEMENT OF SULFUR OXIDES

Sulfur oxides are damaging to humans at low levels, and to vegetation at even lower levels. Removal of sulfur oxides can be accomplished in one of three ways: use low sulfur fuel, remove sulfur from the fuel before use, remove sulfur compounds from combustion products. Coal from the Four Corners region is low in sulfur, but perhaps not quite low enough. Sulfur removal from coal has been investigated, but no methods are in use. Many removal methods for sulfur dioxide in stack gas have been investigated, but at present none has been demonstrated for removal to very low concentrations over a long period of time. Usable methods are imminent.

4. EFFECTS AND ABATEMENT OF NITROGEN OXIDES

Some oxides of nitrogen are also harmful at very low concentrations. Unlike particulates and sulfur oxides, it is combustion conditions, rather than fuel

composition, that determine the major amount of nitrogen oxides emitted. Combustion control to reduce the oxides also gives some reduction in efficiency. Although control technology for nitrogen oxides is not as far advanced as that for sulfur oxides, efficient removal schemes should be soon forthcoming.

5. EFFECTS AND ABATEMENT OF MERCURY

Many mercury compounds are toxic at low levels to a variety of living things. Mercury is scattered throughout the environment in uncertain fashion.

There is at present more conjecture about mercury in the fuel and effluent from power plants than there are hard facts. For example, there are three lakes in New Mexico that are reported as having excessively high mercury levels, yet one person conjectures that the mercury in Navajo Lake is from the Four Corners Power Plant. How would he explain the mercury level in Elephant Butte Lake, which is over 200 miles from the plant?

At least one person said that the mercury coming from the stack would all be in the form of mercury vapor. This is not necessarily so. The furnace and stack conditions could convert the mercury in the coal to other mercury compounds of varying toxicity and ease of removal.

Apparently most measurements of mercury concentration have been made on the coal, with few measurements on the ash and fewer or none at all on the stack and water effluents. The assumption that essentially all the mercury in the coal goes out the stack is not certain. Ash is collected at more than one place in the combustion process, and the character of the ash is different at different places.

"Mercury in the Environment," U.S. Geological Survey Professional Paper No. I 19.16.713, U.S. Government Printing Office, gives the value of one gram as a lethal dose for man. If one were to assume that 6700 pounds per year of mercury (about 60 gallons) is emitted from the Four Corners plant, and that all the mercury is in the form of mercury vapor, and further that all the mercury condenses and falls to earth evenly distributed in a ten mile radius (a great oversimplification), then there would be a residue of 0.000347 grams of mercury per square foot of earth. Stack emission concentrations would be on the order of 0.04 milligrams per cubic meter. Some rough measurements at the Four Corners plant gave readings much lower than this.

If mercury emissions were at potentially dangerous levels, scrubbing or adsorption would be removal methods, but this technology is not well advanced.

Closure

Lack of power will pose more serious problems than building new power plants. Until nuclear power plants can be designed and built, we must rely on coal fired plants. Degradation of the environment can be increasingly reduced as new control technology becomes available. Since most of that technology will probably involve treatment of the flue gas, plants now going on the drawing boards should be arranged so that there is room for add-on treatment units.

The Energy Policy Staff, Office of Science and Technology, has already studied the problems of Electric Power and the Environment. Their recommendations should be followed, with the understanding that we cannot have a ten year halt in the construction of new power plants.

I hope the committee will excuse the rough nature of this statement. The preparation has been hurried because I had planned to listen while others spoke. After hearing them I would like my views presented also.

The Energy Crisis

Increasing growth in demand for electric power, continued shortages in supply of fossil fuels, and stringent pollution abatement codes will impose severe problems in availability of power for the future needs of the chemical process industries.

GERARD C. GAMBS and ARTHUR A. RAUTH, Ford, Bacon & Davis, Inc.

The U.S. gross national product has risen from \$285 billion in 1950 to approximately \$1 trillion in 1970, more than a threefold increase in 20 years. This rapid rise has caused severe stress in some of our most basic industries. Notable among these is the electric power industry, which has seen demand for its energy supply quadruple since 1950, and foresees an even more rapid growth. The ability of the power industry to keep up with this growing de-

mand is now being taxed to its limit, and the supply of power is approaching, or possibly has already reached, a crisis stage.

Industrial management has become concerned over this growing shortage, for power is the key to maintaining and increasing the flow of raw materials, chemicals and manufactured goods to satisfy the increasing needs of a growing population. If the current power trend is permitted to continue,

Sales of Total Electric-Utility Industry Plus Industrial Generation of Electricity—Table I

Sales of Total Electric-Utility Generation							Total Electric-Utility Generation	
Year	Industrial			Commercial Sales	Residential Sales	Other Sales	Total Sales Plus Industrial Generation	Total Electric-Utility Generation Plus Industrial Generation
	Sales	Generation	Total					
	All values in billions (10 ⁹) kwh.							
1950	142.0	59.5	201.5	51.8	70.1	16.8	340.2	388.6
1955	257.9	82.0	339.9	77.9	125.4	20.2	563.4	629.0
1960	344.8	88.8	433.6	114.8	196.4	28.0	772.8	844.2
1965	433.4	102.3	535.7	202.1	281.0	40.6	1,059.4	1,157.6
1970	605.0	115.0	720.0	309.9	442.0	59.7	1,531.6	1,673.0
1975	903.0	172.0	1,075.0	458.0	649.0	97.0	2,279.0	2,489.0
1980	1,344.0	256.0	1,600.0	677.0	915.0	162.0	3,354.0	3,664.0
1985	2,016.0	384.0	2,400.0	1,002.0	1,229.0	278.0	4,909.0	5,362.0
1990	3,024.0	576.0	3,600.0	1,440.0	1,600.0	480.0	7,120.0	7,777.0
1995	4,536.0	864.0	5,400.0	2,200.0	2,100.0	800.0	10,500.0	11,469.0
2000	6,636.0	1,264.0	7,900.0	3,250.0	2,900.0	1,200.0	15,250.0	16,658.0

Source of data: for years 1950 to 1970, Ref. 4; for years 1971 to 2000, projections by authors.

industrial growth will be impeded, not for lack of demand for industry's goods but as the result of industry's inability to solve a problem of energy supply.

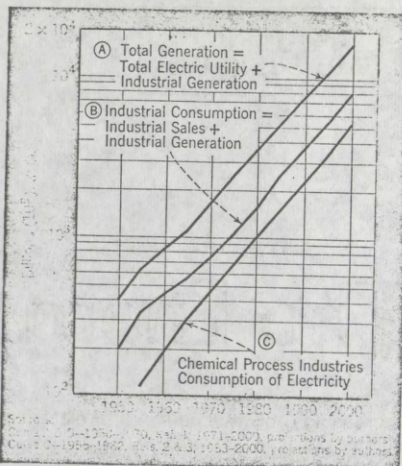
The power crisis of which we speak is not unique to the chemical process industries (CPI); it equally affects both the commercial and residential sectors.

Today's problem is threefold.

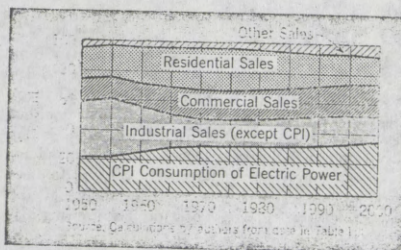
First, it is one of growth—a growth that requires doubling of utility capacity every nine years. This is phenomenal when considering the mammoth task of engineering, procurement and the construction of central generating stations. Unfortunately, installed capacity is not expanding at the same rate as power demand. This is not by intent; it is simply that all of the problems associated with the construction of utility stations—cost studies, the obtaining of permits, locating fuel supplies, site selection, overcoming municipal and public opposition, engineering, purchasing of long-delivery items, and low productivity in construction—have retarded power-plant construction to the extent that our future power supply is in jeopardy. All of these problems are doubly so for nuclear plants, where the lead time required from award of contract to plant startup is approximately seven years, as compared with four to five years for fossil-fuel plants.

Second, it is one of fuel supply. Fossil fuels are only marginally available to meet current electric demand, and hold out little hope of being available in massive quantities to meet future needs. The supply situation is being aggravated by a slowdown of nuclear power-plant construction, thus forcing an increased dependency on fossil fuels. It is estimated that in 1970 the additional fossil-fuel requirements due to nuclear slowdown were equivalent to 100 million bbl. of fuel oil, and by 1975-1976 the extra requirements could be as high as 400 million bbl./yr.

Third, it is one of ecology—keeping the undesirable byproducts of electricity generation under control, for example by minimizing changes to the landscape, limiting the discharge of pollutants to the atmosphere to an acceptable level, confining discharge-water temperatures so that lakes and rivers can be kept below allowable temperature gradients, and maintaining the level of radiation discharges within limits.



GENERATION and use of electricity—Fig. 1



DIVISION of electric power in U.S.—Fig. 2

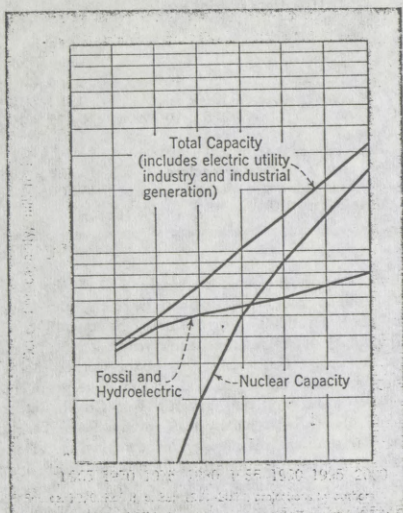
Utility Growth

An indication of the problems that lie ahead can be obtained from Table I and Fig. 1 and 2. Here, past growth and projected future growth of electrical-energy generation are shown.

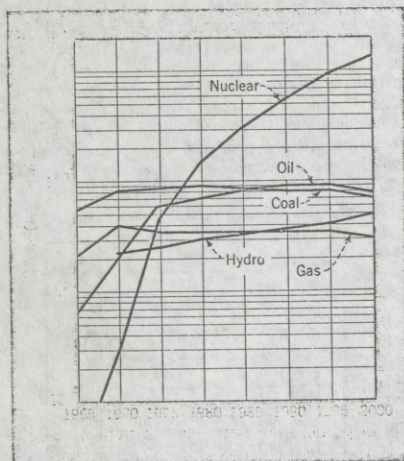
Total power generation in the U.S. has doubled every 10 years since 1950, and this rate of growth will accelerate during the next 30 years. The problems created will be enormous. Fig. 3 shows that if these goals are to be met, and if an adequate reserve is to be maintained, generating capacity must be increased from the current 359 million kw. to approximately 1,050 million kw. by 1985; and to 3,200 million kw. by the year 2000. This is an annual growth rate of nearly 8% or a doubling time of nine years.

Based on 1970 dollars, and using the average construction costs per kilowatt shown in Fig. 4, and the forecast of power-generating capacity in

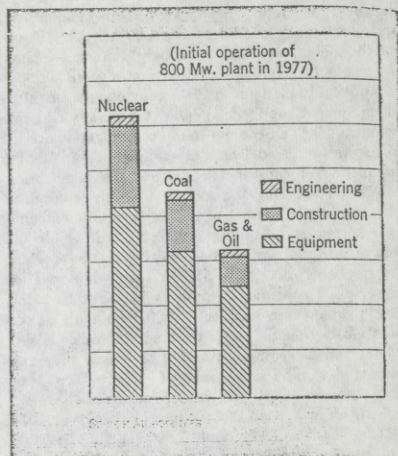
ENERGY CRISIS . . .



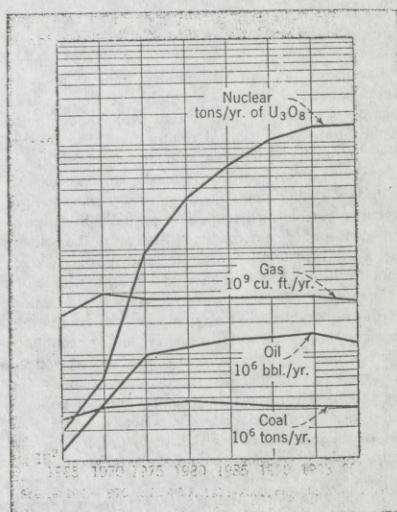
FORECAST of total generating capacity—Fig. 3



PROJECTED electrical generation by fuels—Fig. 5



COSTS for thermal plants—Fig. 4



FUEL requirements for thermal plants—Fig. 6

Fig. 3, an investment of \$850 billion for power plants alone will be required over the next 30 years.

In addition, approximately \$225/kw. are needed for transmission and distribution equipment and facilities, amounting to \$550 billion. Total expenditures for generating equipment, and transmission

and distribution facilities, will therefore total \$1.4 trillion. Inflation will no doubt increase this amount considerably, and it is reasonable to assume that the figure will more nearly total \$2 trillion.

The vast effort of designing and constructing these plants can be grasped by looking into the

manpower requirements involved. To build the 2,900 million kw. of capacity that must be installed over the next 30 years, nearly 19 billion engineering and construction manhours are required. This figure, for thermal-plant construction only, does not include the manhour requirements for transmission and distribution installations nor the manhours required of equipment suppliers to build the boilers and machinery. The scheduling and coordination needed to assure ontime delivery of equipment and ontime completion of construction staggers the imagination.

When comparing the requirements to build these plants with the number of people currently available, experienced and working in the field, it is obvious that major problems and bottlenecks will occur. There are probably not over 55,000 men employed on power-plant construction projects in the U.S. today. Possibly there are another 10,000 men with power-plant background, now working in other fields, who could be easily utilized. Combined, they represent a workforce capable of 130 million man-hours a year; but if the growth rate is to be maintained, we will need 222 million manhours in 1975, 590 million in 1985, and 1,690 million in 2000. This is equal to 845,000 construction men working full time. Other expanding industries will, unfortunately, be in competition with the power industry for the construction-labor pool.

Fuels Crisis

Recent events in this country and around the world have set in motion a number of changes with regard to the type of fuel that will be consumed in the future generation of electricity. These changes stem partially from what can be described as a normal transition from fossil-fueled plants to nuclear, partially from definite and growing shortages of certain types of fossil fuels, and partially from growing concern of environmentalists over the effects that 20 million tons/yr. of sulfur and nitrogen oxides from fossil-fueled plants have had on our planet.

These changes are having a considerable effect on the power-plant industry, altering its complexion and creating a sense of urgency and uncertainty. The consumer of electrical energy has also recognized this growing change. In recent peak periods, he has witnessed blackouts, brownouts, reduced voltages and other effects, making him visually aware that this is not just the power industry's problem or the fuel supplier's problem but that it is his problem as well.

Out of this crisis, definite trends are appearing from which the future use of fuels for electricity generation can be forecast. Fig. 5 and 6 show what is believed to be a reasonable assessment of the situation now, and the direction that the use of each of the fossil and nuclear fuels will take in the next 30 years. Fig. 5 shows the predicted generation of electricity by these various fuels. It can be seen that nuclear-power generation is expected to increase

U.S. Reserves of Fuels—Table II

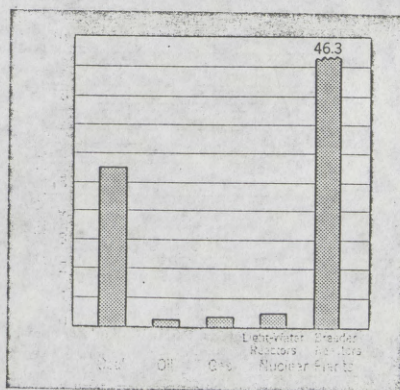
		Heating Value, Btu.
Coal.....	220 × 10 ⁹ tons	5.500 × 10 ¹⁸
Oil.....	31 × 10 ⁹ bbl.	0.195 × 10 ¹⁸
Gas.....	275 × 10 ¹² cu.ft.	0.275 × 10 ¹⁸
Uranium		
Resources as U ₃ O ₈ ...	920 × 10 ³ tons	
If used in light-water reactors.....		0.463 × 10 ¹⁸
If used in breeder reactors.....		46.300 × 10 ¹⁸
Reserves as U ₃ O ₈ ...	243 × 10 ³ tons	

from the present level of nearly 2% of the total (28 billion kwh./yr.), to 35% by 1980, and 85% by the year 2000. Fig. 6 shows the quantities of fuel that will be required each year.

The U.S. is consuming 40% of the world's energy resources and yet has only 7% and 22%, respectively, of the world's oil and gas reserves. On the other hand, the U.S. has nearly 40% of the Free World's natural uranium resources. This combination of insufficient oil and gas and plentiful reserves of uranium is a most compelling reason for the U.S. to go predominantly to nuclear power. A comparison of the energy potential of the reserves of various fuels is shown in Table II and Fig. 7.

The fuels crisis is not just a U.S. problem. Other nations are feeling the pinch as well. G. L. Decker, manager of energy for the Dow Chemical Co., pointed out in a recent report on "Global Power and Fuel Trends" that:

"During the past year [1970], fuel prices in the U.S., Canada and Europe have risen sharply. They will continue to rise at least until 1975 and probably for some time beyond that. By 1975, fuel prices will be roughly double what they were in 1969.



SOURCES of fuel for U.S. energy—Fig. 7.

ENERGY CRISIS . . .

These increases must inevitably be reflected in rising prices for energy intensive products."

He further states: "As well as being more expensive, fossil fuels are in short supply in the U.S., Canada and Europe. This has resulted from a combination of factors including: rising demands, shrinking reserves, more-stringent antipollution regulations, oil-production cutbacks in Libya, closing of the Trans-Arabian Pipeline, and a worldwide shortage of tankers. These changes are reflected in electric power, which is becoming more costly and in shorter supply. This results in a trend toward nuclear energy gaining momentum despite delays in the U.S., and it will become a significant source of energy during the 1980's."

Dow Chemical's reaction to the fuel shortage has been positive. Dow and Consumers Power Co. are building a nuclear-chemical plant complex (nuplex) at Midland, Mich., assuring themselves of an adequate power and steam supply.

Advancing the art of complexing, Dow has completed a study for the Government of Puerto Rico of a facility that would include several energy-intensive industrial plants consisting of a desalting plant and a nuclear-power plant, all combined in an integrated system. The complexing idea conserves energy, capital, and permits the economic use of many waste products, such as waste heat and the chemical effluent from the desalting plant, which under ordinary circumstances could be sources of pollution. Dow is continuing its efforts with a study in conjunction with Texas A&M University for the development of a nuplex for the state of Texas.

Fossil Fuels: Coal

Coal can be pinpointed as a major culprit in our current power dilemma. It isn't that there is a shortage of coal itself to meet today's and future demands. There is simply a shortage of the production of coal.

Since World War II, up to the early 1960's, the coal industry had produced coal at a level higher than the consumption rate. Coal prices remained at the same level over a number of years due to the competitive fuel situation. Mine labor was relatively plentiful, air-pollution codes were nonexistent or at best minimal so that any grade of coal could be burned with any sulfur content.

This situation changed rapidly with both the introduction of the nuclear-power plant and the imposition of air-quality standards and controls. Nuclear plants, it was claimed, were the panacea of the power industry. They were clean, their fuel was inexpensive, and they generally appealed to the industry as being the new breed of power plant especially suited for large central-stations.

As a result of the nuclear threat to coal, coal mine expansion for speculative production was reduced to near zero. In brief, producers refused to spend money to produce coal for which there was an uncertain market. As for today, new sources of coal

are not being developed as rapidly as they are needed, and they probably will not be until the sulfur question is resolved. This is particularly true in the eastern U.S., where most coals contain 3 to 4% sulfur compared with the 0.5% or 0.3% content required by many air-pollution laws.

Compounding the reluctance of producers in the early sixties to expand coal production, other factors contributed to slowing its development. The most important of these were: a shortage of skilled labor to work in the mines; an unwillingness on the part of the coal industry to open new mines except for those dedicated under long-term contracts; the sulfur problem; and a definite shortage of economically minable coal in the eastern U.S. Other problems frequently cited were a shortage of railroad coal-cars, the effect of the new Federal Mine Safety Act, rising exports, and rising freight rates.

The labor shortage has seemed to be the number one problem. Over the past 15 years, the coal mine labor force declined from 400,000 to 120,000 as a result of mechanization in the mines. Until 1969, rising productivity through mechanization enabled the mines to produce nearly enough coal to satisfy the demand. But then, at the same time as coal demand rose, productivity in underground mines suddenly dropped. During the 1969-1970 period, productivity in some underground mines declined 20 to 30%. Much of this was due to the new Federal Mine Safety Act, which imposed certain activities upon miners other than digging coal.

Some of the lower productivity was due to the use of new, inexperienced miners. Some resulted from the turmoil in the United Mine Workers. But, the long-range problem has been the inability to attract new mine workers, or even to bring back those who have moved away into other industries.

As a result, the price of coal has skyrocketed, upsetting the economics and profitability of existing and planned facilities. Coal-burning power plants have been eating into their stockpiles, old plants are being converted to burn oil or gas, and new-plant decisions have been altered to counteract the coal shortage. Some typical reactions are:

- Ontario-Hydro, the largest Canadian utility company, has announced it will construct four 750-Mw. power units designed to burn residual oil or crude oil. These will be the first oil-fired power plants on the Ontario Hydro system, built because of the inability to get sufficient coal from the U.S.

- A major electric-utility company in the East Central Region was constructing an 800-Mw. coal-fired unit, but was unable to obtain a long-term coal contract to supply the unit, which is scheduled to start up in the early 1970's.

- In northern West Virginia, the nation's largest coal-producing state, which mines 25% of the total U.S. coal, an electric-utility company was unable to obtain a long-term coal contract for a new nine-month power plant.

As electric utility companies find it more difficult

to obtain supply contracts from coal companies, many of them are purchasing existing coal mines and coal companies, or opening up their own coal reserves. Thus, a trend is developing in which some of the major consumers of coal will be producing all or a large percentage of their coal requirements. As an example, American Electric Power Co., which already mines a large percentage of its coal, announced in March 1971 a new 2,600-Mw. coal-fired power plant to be constructed near Gallipolis, Ohio. The 7 million tons/yr. of coal needed for this plant will be produced by AEP from its own coal reserves in nearby Meigs County, Ohio.

Fossil Fuels: Oil

Oil consumption in the power industry is skyrocketing, due to conversions from coal to oil, and the building of new oil-fired plants, as shown in Fig. 6. It is anticipated that the 1970 power-plant use rate of 330 million bbl./yr. will rise to 1,150 million bbl. by 1980, compared with the consumption in 1965 of 120 million bbl.

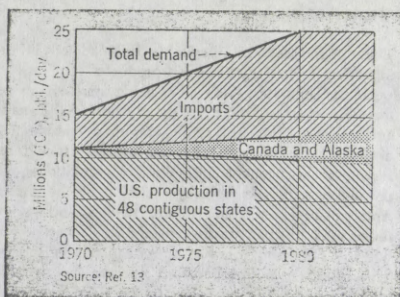
Much of the current rise can be attributed to the belief that the coal problem, both as to production and sulfur content, will be of long duration. Converting to oil seems to be the short-term answer where supplies from foreign sources are readily available. This is especially true on the entire Eastern Seaboard from Maine to Florida where residual oil from Europe, the Middle East and South America has easy access to U.S. ports.

The long-term outlook, however, is not as optimistic. U.S. residual production is less than 7% of the total, with most U.S. refiners favoring gasoline, jet fuel and other light-end products. Our oil-fired power plants are becoming more dependent upon foreign supplies.

As shown in Fig. 8, it is anticipated that only half of the U.S. demand for oil, which will reach 25 million bbl./day by 1980, will be met by production from the U.S. (including Alaska) and Canada. The other 12.5 million bbl./day will have to be supplied by imports, synthetic fuel, etc. World oil reserves amount to 540 billion bbl. These are mainly in Africa, the Middle East, and other parts of Asia, which sectors account for 72% of the total. It is clear that both Europe and the U.S. will become increasingly dependent on imports of oil.

As a result of this imbalance in supply and demand, the U.S., Japan and Europe will have to pay higher prices for oil. This situation will not change until there is another energy source large enough to offer strong competition. This competition is and will increasingly be nuclear power.

Low-sulfur oils, both crude and residual, are not readily available, and as a result of the trend toward more-severe restrictions by air-pollution codes, a tight supply situation has developed. Venezuela, which has been a principal supplier of residual oil to the U.S., does not now have the capability to produce



OIL demand, production and imports—Fig. 8

oil with 0.3 to 0.5% sulfur in sufficient quantity to meet the new air-pollution codes. Current desulfurization capacity in the Caribbean can handle 250,000 bbl./day at 0.3 to 0.5% sulfur, far short of the current 1-million-bbl./day consumption rate for electric-utilities plants alone. As previously projected, this rate will increase to nearly 3 million bbl./day by 1975-76—an almost impossible situation if it becomes necessary to supply low-sulfur fuel oil in this amount. The blending of high-sulfur Venezuela and low-sulfur Middle East residuals with a resulting 1% sulfur content offers short-term help in areas where air-pollution codes permit.

The burning of low-sulfur crude presents an alternative. Experiments have shown that the refinery can be completely bypassed, and that crude can be burned efficiently in existing oil-fired boilers after minor modifications. Crudes with less than 0.3% sulfur are available from Libya and Nigeria. Crudes with less than 1.0% sulfur are available from Canada. These offer some hope of easing the problem.

A number of U.S. East Coast utilities are now converting power plants to burn low-sulfur Libyan crude oil, starting in 1971. This fuel will be burned not only in boiler plants but in some cases will be used in gas turbines for power generation. Florida Power has ordered four 50-Mw. gas turbines for 1972 delivery. These will fire Libyan crude and will be the first gas turbines to go onstream to fire crude oil. Consumers Power has recently announced that it has signed a contract with Imperial Oil Ltd. of Canada to supply two of its power plants near Bay City, Mich., with low-sulfur crude, starting in 1972. The well-publicized results of burning crude oil in Japanese power plants for a number of years has no doubt encouraged this move. In 1970, the Japanese power industry burned over 40 million bbl. of crude oil and will burn over 70 million bbl. in 1971.

Oil from the North Slope of Alaska also offers some hope—but only well into the future. The earliest deliveries of 1 million bbl./day cannot be expected until the late 1970's. An 800-mi. \$2-billion pipeline

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from Prudhoe Bay on the North Slope to Valdez must be built before the first barrel of oil is shipped. The oil would then be transported by freighter to U.S. markets. If Dept. of Interior approval is given by 1972 for the pipeline construction, and if construction on the pipeline begins shortly thereafter, 500,000 bbl./day of crude should be available for 1976-77, rising to 2 million bbl./day by 1980-85. An alternative oil and gas pipeline route has been proposed for moving North Slope crude oil and natural gas to the U.S. This route, going across Canada through the Mackenzie Valley, would terminate in the Midwest states.

Fossil Fuels: Natural Gas

Although the use of natural gas to generate electricity has been consistently criticized as an inferior application, consumption by electric utilities has risen steadily, now being about 3,900 billion cu. ft./yr., as shown in Fig. 6.

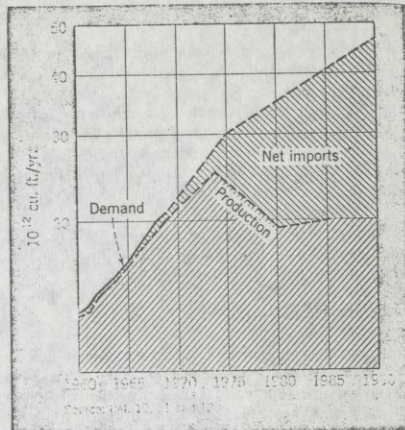
Interest in natural gas for the power industry has been stimulated by the overall energy and pollution problem. It is considered to be a superior fuel in terms of meeting air-quality standards and is relatively cheap when considering its ease of handling with no sulfur, ash or residue-disposal problems.

Unfortunately, the supply of natural gas has been limited and the outlook is bleak, primarily due to the reluctance of suppliers to drill new wells. This reluctance can be attributed to the low well-head price, which is controlled by the Federal Power Commission for gas shipped interstate.

The expected shortage of natural gas that has been predicted for many years has now arrived. As a result, the use of gas for power generation by electric utilities is expected to decline. This reduction will be the most severe in the areas covered by the Northeast, East Central, Mid-Continent and Mid-America Reliability Coordinating Groups and Councils. Many gas distributors have announced that they cannot take on any new customers until the gas shortage has been alleviated.

The announcement in September 1970 by Louisiana Power & Light Co. of its plans to build a 1,165-Mw. nuclear plant near Taft, La. is a clear indication of the serious situation with regard to the natural-gas supply in the second largest gas-producing state. Natural gas was not available at all in the quantities needed for this size power plant. The economic evaluation was based on a comparison between a nuclear plant and either a coal- or oil-fired plant.

As old gas-supply contracts, based on the sale of gas for 7 or 8¢/million Btu. expire, the use of gas by many utilities, even in major gas-producing states, will decline because the cost of gas under new contracts will be as much as five to six times the present prices. This trend will influence many more utilities and industries to go to nuclear plants as the only way to produce power at a reasonable cost.



NATURAL GAS demand, production and imports—Fig. 9

It is expected that the gas supply-demand relationship in the U.S. will deteriorate rapidly from 1973 on, as shown in Fig. 9. It is also anticipated that by 1980-85 we will have to import as much as 50% of the gas we will be consuming. In 1970, the U.S. consumed 25 trillion cu. ft., and it is forecast we will consume 40 trillion cu. ft. by 1985. However, the production of gas from within the U.S. is expected to decline to the point where it may be as low as 20 trillion cu. ft. in 1985. If so, it will necessitate the importation of liquefied natural gas (LNG), or manufacture of synthetic high-Btu. gas from oil or coal in the amount of 20 trillion cu. ft./yr. to make up the difference between supply and demand in 1985.

Current work under the Atomic Energy Commission's Plowshare program could result in doubling the U.S. gas reserves from 275 trillion to 600 trillion cu. ft. The first Plowshare nuclear shot for gas stimulation was Gasbuggy in December 1967. It resulted in the production of twice as much gas in a 1-yr. period as had been produced from an adjacent gas well during a 10-yr. period. The second gas stimulation shot was a 46-kiloton nuclear device at Rulison, Colo., that was detonated on Sept. 10, 1969.

The discouraging aspect of Plowshare is that the AEC has failed until now to recognize the full potential of the Plowshare Program and its possible effect on the energy supplies of the U.S. Until it does, nothing significant can come from nuclear stimulation of gas-bearing strata. It has been estimated that it will require a \$75-million research program over a 3-yr. period to develop the proper nuclear device for stimulation of these strata.

Liquefied natural gas from Algeria is to be shipped to the East Coast of the U.S. starting in the mid-1970's. Much of this gas will be for household and

industrial use. It is forecast that the delivered price of 85¢ to \$1/million Btu. into transmission lines will result in very little of this gas being used for generation of electricity.

One very important process, developed in Great Britain, uses naphtha as a feedstock for the manufacture of pipeline gas. It is known as the CRG-SNG process (catalytic rich-gas/substitute natural-gas). This process offers great promise in helping to alleviate the natural-gas shortage in the U.S. A large number of these plants are in operation in England, and the process is now ready for U.S. commercial application.

Cost of high-Btu. pipeline gas from the CRG-SNG process will be about \$1.10/million Btu. based on 10¢/gal. for naphtha feedstock.

Nuclear Fuel: Uranium

From the standpoint of logistics alone, it will be economically and physically impossible on a long-term basis to supply fossil fuels (particularly coal) to utilities located any significant distance from the point of production.

Fortunately, in the short space of a few years, nuclear power has moved from an idea to a commercial reality. As a result, the worldwide uranium mining industry will bear the brunt of the burden in supplying fuel to electric generating plants.

It is forecast (Fig. 3) that installed nuclear power in the U.S. will grow from the 1970 level of 7 million kw. of capacity to nearly 200 million kw. by 1980, to 900 million kw. by 1990, and to 2,400 million kw. by 2000. Since the nuclear plants will be base-loaded and will operate at 75 to 80% of capacity for most of their life, the generation of power will grow from a level of 22 billion kwh. in 1970 to 1,400 billion kwh. in 1980, to a level of 5,400 billion kwh. by 1990, and to 15,000 billion kwh. by the year 2000. By 2000, nuclear-power generation will amount to 80 to 90% of the total power generated. It seems likely that light-water reactors will predominate in the 1970's, with advanced converters taking over in the 1980's, and breeders taking over in the 1990's.

Development of fuel sources for nuclear plants is a problem. However, it is far less a problem than developing fossil-fuel sources for the same kilowatt capacity. For example, it takes 17,800 tons of coal to equal one ton of uranium oxide concentrate in equivalent energy in the present relatively inefficient light-water reactors that have 1% to 2% conversion of energy. Even when we take into account the actual physical mining of the uranium ore, when compared with mining raw coal including reject, the ratio is 63 tons of raw coal, as mined, to equal 1 ton of uranium ore, as mined. From the standpoint of labor requirements, the uranium mining-and-milling industry is at a distinct advantage compared with the coal industry.

As an illustration of the relative sizes of uranium

mines and coal mines, and their production of energy units, a typical uranium mine and mill will produce 1,000 tons/yr. of uranium oxide. This requires the mining and milling of 400,000 tons/yr. of uranium ore, or only 1,600 tons/day on a five-day-week schedule. This 1,000 tons/yr. of uranium oxide in the present light water reactors is equal in energy to 17.8 million tons of coal. A typical large coal mine produces 2 million tons/yr. of coal, so this would be equivalent to nine coal mines.

The investment in coal mines to produce 17.8 million tons of coal annually would be about \$250 million. And about 3,000 to 3,500 men would be needed. On the other hand, the uranium mine and mill would cost about \$20 million and require about 100 men.

Power Plants and Ecology

The thermal generation of power must, because of its very nature, result in some form of pollution. Knowledge of this has resulted in a polarization of interested people into those who are for ecology and those who are for power. Oddly enough, each side of this growing controversy seems to have the same common goal. It is inconceivable, for instance, that the staunch ecology supporter really wants to revert back to a candle-lit society. It is just as inconceivable that public and municipal power utilities want to mar the landscape, pollute the atmosphere or foul our waterways. The common goal of both sides is undoubtedly to provide ample power while keeping pollution to tolerable limits. Just what those tolerable limits are, and how best to achieve them, has motivated most of the controversy.

Much of the concern of ecologists about the effects that power-plant effluents have on the environment have been fairly well publicized. Fossil-fueled power plants presently emit about 20 million tons of pollutants a year. Nuclear plants emit traces of radioactive material, and the disposal of spent nuclear fuel is a materials-handling problem of considerable magnitude. With electric-power use doubling every nine years, it is no surprise that the fear of proliferating the landscape with power plants and transmission lines has become a matter of serious concern, and it would indeed be folly if, in the planning of new facilities, these matters were ignored. On the other hand, an overriding concern for the environment at the jeopardy of providing adequate power would be an even greater folly.

The current fuels crunch can be largely attributed to the replacement of high-sulfur fuel oil and coal by low-sulfur oil and gas, which are in short supply. Planned new facilities, both fossil and nuclear, have been subjected to unreasonable scrutiny, resulting in long delays, amounting in some cases to years. The net effect of these actions has indeed contributed heavily to the power crisis. If rational compromise between the need for electric power and the need for a clean environment are not reached soon, a national

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tragedy will result, and its economic impact will be felt for years to come.

It is ironic that all of the discussion, legal maneuvers and polemics that have succeeded in delaying the approvals and construction of new power plants have also succeeded in contributing to delaying the correction of other pollution problems. All equipment for the treatment of sewage and industrial wastes requires power. The growing waste-recycling industry will become a large power user.

Utilities in their efforts to meet the need for cleaner power plants are faced with a dilemma of no small magnitude. Power users want low rates, and yet, providing for nearly pollution-free power plants will add significantly to the capital and operating cost of plants and to the cost of electricity to the user: Low-sulfur fuel costs more than high-sulfur fuel. Locating power plants far from the point of power usage requires much additional capital for transmission equipment and right-of-way. Removing sulfur and nitrogen oxides from stack emissions is approaching technical feasibility but the costs are high. Cooling towers to lower the discharge temperature of water are expensive.

All of these things, when reduced to the common denominator of cents per kilowatt hour will raise the cost of electricity considerably. If we want clean power, we must be prepared to pay the price in the form of higher electric rates. But we had better face this reality now and get on with the job of providing adequate power or we will face industrial and economic stagnation.

A prelude to what the future may hold is revealed in an announcement in March 1971 that Dow Chemical has delayed completion of a \$20-million magnesium and chlorine plant. The plant, which is located in Dallesport, Wash., has had its completion pushed back from late 1971 to January 1975. One of the reasons cited for the delay is doubt about the adequacy of electric-power and natural-gas supplies in the Northwest during 1972 to 1974.

Power Requirements of the CPI

The power crisis is of particular importance to the chemical process industries (CPI), which as a group consume more electrical power than any other segment of the U.S. industrial complex.

In 1970, as shown in Table III, the CPI consumed 460 billion kwh. or 31% of the total U.S. sales and industrial generation of electricity, and 63% of the total industrial sales and industrial generation.

The projected rate of growth for the CPI for the next 30 years, to the year 2000, will require quantities of power far in excess of anything previously contemplated. In contrast to the growth pattern for overall power use of doubling every nine years, the CPI has a doubling rate of eight years. The amount of power that will be needed will have to be provided on this basis.

Estimated power requirements for the CPI for the

year 2000 are forecast at 5,250 billion kwh., or more than 11 times the 1970 power requirements of 460 billion kwh. Equally startling is the realization that by 2000 the CPI alone will require nearly four times the 1970 power consumption of the entire U.S. for all uses and purposes. By the year 2000, the CPI will be using 32% of the total U.S. electric power production of 16,500 billion kwh.

Some indication of CPI present and future power use can be grasped from Table III, in which the 18 segments of the chemical process industries are listed with their power requirements. It is clear from these forecasts that the CPI is now facing the most critical period of its history in terms of power and must now give careful consideration to how it is to obtain (what it has always taken for granted) a plentiful supply of electric power.

Management must become aware of the seriousness of the energy crisis, and act now to save not only the CPI but the entire productive capacity of the U.S.

It must be willing to testify at the hundreds of hearings, ranging from federal down to the local level, being held for obtaining approval for power-plant construction and operation. In many cases, these hearings are taking place at the insistence of the people who are opposed to the growth of electric power. The battles for America's survival as an industrial nation are being fought at these hearings but there is no one there to present industry's views on its requirements for power. The electric utility companies are standing there alone, fighting not only their own battle but industry's battles as well.

The effects of past industrial apathy are already being felt. In New York, between 1965 and 1970, Consolidated Edison had planned to add 1.2 million to 1.4 million kw. of capacity; its actual increase was 700,000 kw. because of repeated blocking of proposed plants. The World Trade Center, which will be in full operation in 1972, will require as much electric generating capacity as the city of Schenectady (80,000 kw.), spreading the rapidly disappearing reserves of Con Edison even thinner.

Alluding to delays of new power sources for Baltimore Gas & Electric Co., the Chamber of Commerce of Metropolitan Baltimore estimates that power shortages will cause serious dislocations within the Metropolitan Baltimore economy. Under the most conservative estimate, approximately 30,000 new jobs would not be created through 1975 and this total might approach as much as 160,000. The total dollar loss in wages, taxes, services, etc., is estimated as over \$1.3 billion per year.

Long Island Lighting's first planned nuclear facility, an \$20,000-kw. unit at Shoreham, is now scheduled for startup by 1976. It has been opposed by conservation groups from the outset, and the application for licensing before the board of the AEC has been met head-on by these groups. Thousands of pages of transcripts have been produced so far in a move to dismiss the application.

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Total Electric-Power Requirements of the Chemical Process Industries—Table III

	1963	1965	1970	1975	1980	1985	1990	1995	2000
All values in billions (10 ⁹) kwh.									
Chemicals (including petrochemicals).....	98.3	130.0	230.0	360.0	580.0	911.0	1,451.0	2,304.0	3,660.0
Drugs and medicines.....	1.6	2.1	3.6	5.7	9.2	14.3	22.7	36.1	57.4
Explosives and fireworks.....	1.0	1.2	1.7	2.3	3.0	3.9	4.9	6.1	7.7
Fats and oils.....	2.3	2.5	3.0	3.6	4.2	4.8	5.6	6.6	7.7
Fertilizer and agricultural chemicals.....	1.3	1.4	1.8	2.2	2.7	3.3	4.1	5.0	6.3
Foods and beverages.....	4.7	5.1	6.0	6.9	7.8	8.9	10.2	11.6	13.2
Leather tanning and finishing.....	0.4	0.4	0.3	0.3	0.2	0.2	0.2	0.1	0.1
Lime and cement.....	7.8	8.4	10.2	12.5	14.7	16.9	19.8	23.3	27.3
Man-made fibers.....	3.8	5.3	9.7	15.5	24.0	36.3	55.9	86.3	133.0
Metallurgical and metal products.....	51.4	58.0	78.0	108.0	145.0	193.0	261.0	352.5	477.0
Paints, varnishes and pigments.....	1.2	1.3	1.6	1.9	2.2	2.6	3.0	3.5	4.1
Petroleum refining and coal products.....	20.6	22.2	27.0	33.0	39.0	46.8	56.5	68.2	82.5
Plastic materials, synthetic resins.....	2.6	4.2	10.0	19.0	35.0	65.6	121.0	223.7	413.2
Rubber products.....	5.0	6.1	9.5	13.5	20.0	28.6	41.3	59.6	86.1
Soap, glycerin and related products.....	0.6	0.7	0.9	1.1	1.4	1.8	2.3	2.8	3.6
Stone, clay, glass and ceramics.....	7.9	8.7	11.0	13.5	16.5	20.1	24.5	29.9	36.5
Wood, pulp, paper and board.....	36.5	39.5	54.0	67.0	84.0	105.2	132.5	166.0	209.5
Other chemically processed products.....	5.1	5.7	7.4	9.2	11.5	14.1	17.4	21.5	26.5
Totals.....	252.1	302.8	465.7	675.2	1,000.4	1,477.4	2,233.9	3,406.8	5,251.7

Source of data: for 1963, Ref. 2; for 1965-82, calculations by authors based on data in Ref. 3; for 1983-2000, projections made by authors.

Industrial Generation of Power

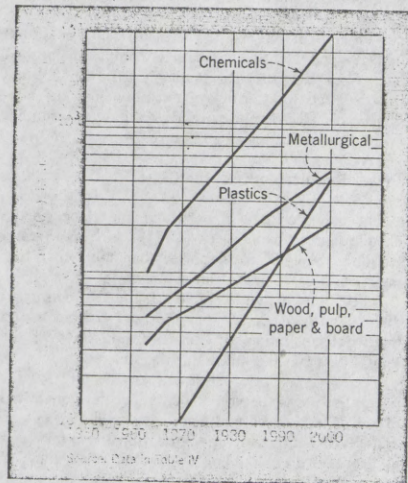
The major portion of the chemical-process-industries' power consumption in 2000 will be in four of the segments listed in Table III. These are: chemicals, metallurgical, plastics, and pulp and paper, and are compared in Table IV and Fig. 10.

In 1970, they used 80% of the total CPI power, and by the year 2000 these same four will consume 91%. The greatest growth rate will be in the plastics industry, which will increase its power consumption 41 times between 1970 and 2000. Electric-energy demands of the chemicals segment will grow only 16 times over the same period, but will have much more impact on the total power consumption of the CPI. Chemicals' present power consumption rate is already 23 times that of the plastics industry. The petroleum industry, which was a significant user in 1970 (consuming 27.0 billion kwh.), will account for a smaller percentage of overall power use in the next 30 yr., and has been omitted from this comparison.

Of the four segments in Table IV, the metallurgical and pulp and paper industries have the lowest growth rate in energy use. In contrast, they generate the greatest percentage of their own power. Conversely, chemicals and plastics have the highest growth rate in energy use, and generate the least percentage of their own power. Part of the reason for this may simply be the prudent use of process steam for turning steam-turbine drives of machinery, rather than the generation of electric power.

Industry tradition also may have a great deal to do with this unique situation, where the tendency is

to follow the lead of existing plants and do what was done before—only bigger. The chemicals, plastics and petroleum industries will have to take a second look at present practices and consider greater generation of onsite power. Of course, this approach should be logically considered as a means of utilizing waste heat; or consuming fuel-type feedstocks or unwanted com-



LARGEST users of power by 2000—Fig. 10

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bustible byproducts such as in metallurgical coke plants, topping plants and the like; or for guaranteeing power availability during the local utilities' peak-load periods.

In anticipation of shortages, every company should examine its future requirements and determine whether or not the local utility can supply sufficient power. If shortages are anticipated and if it would be necessary to arrange for onsite power (either totally or partially), no time should be wasted in putting these plans into action, because up to seven years may be required to provide independent power sources.

The methods of onsite generation of electricity are varied, and each plant will have several options. Frequently, these depend on the process, geographic location, availability of fuel, and availability of power from utilities. Among the most efficient are ones that combine production of electricity and the process operation into an integrated system. Thereby, steam for both process and power is generated in the same boiler and ideally, where the boiler fuel is a waste byproduct of the process.

Plants now using fossil-fueled steam boilers for onsite generation, or those contemplating this for expansion or new development, should examine their future fuel-supply situation carefully. It may be prudent, if a serious crisis is anticipated, to consider plant relocation. Unpleasant as this may seem, when the choice is between having power or not having power, the decision is not difficult to make. There are many areas in the West where low-cost fossil fuels are available and where such relocation would be feasible.

Logically, companies should avoid generating their own power from fossil fuels in areas where such fuels are already in tight supply. Utilities would indeed get priority over whatever fuel is available, and would be able to generate electricity more efficiently. Obviously, long-term fuel shortages in an area will make nuclear-plant development mandatory.

Nuclear plants have become feasible for onsite generation if plant requirements for power and/or process steam are sufficiently large. If the demand criteria warrant, the possibility of building a nuclear-power plant to be used either solely by the company or jointly with an electric utility should be investigated. Nuclear units as small as 500 Mw. are practical. Nuclear fuel is available in many areas more readily than low-sulfur fossil fuels that meet environmental standards. It is even conceivable that small nuclear units in the 200 to 300-Mw. range can be economic alternatives, particularly when the more sophisticated financing and leasing arrangements are factored in. The nuplex concept of combining industry-owned nuclear generation along with a chemical complex is a far-reaching example of such use.

The single-cycle gas turbine and the diesel generator have obtained prominence for baseload onsite generation of power, particularly where there are no process requirements for steam. Growing in popularity is the combined-cycle plant. This type has created a great deal of recent interest. Industry as well as public utilities may find it to be an answer to their power-generating problems. The combined-cycle plant includes gas turbines, heat-recovery boilers, and steam turbines. It has a high efficiency with a low heat-rate in the 9,400-Btu./kwh. level, has no thermal pollution, and has a low installed capital cost in the range of \$120 to \$135/kw. Plant sizes range up to 230 Mw., with load factors of 20 to 80%.

Plants having critical processes that are dependent on absolute continuity of power supply usually include standby emergency generating equipment to either maintain the process or permit an orderly shutdown. These are usually gas-turbine or diesel-driven generators, and are sized for that portion of the load that needs to be maintained.

So far, much has been said about fossil-fuel and nuclear plants, and their primary importance as power sources for industry in general, and the CPI in particu-

Growth Rate for Largest CPI Users of Electric Power in 2000—Table IV

	1963	1965	1970	1975	1980	1985	1990	1995	2000
All values in billions (10 ⁹) kwh.									
Chemicals (including petrochemicals).....	98.3	130.0	230.0	350.0	580.0	911.0	1,451.0	2,304.0	3,660.0
Metallurgical and metal products.....	51.4	58.0	78.0	108.0	145.0	193.0	261.0	352.5	477.0
Plastic materials, synthetic resins.....	2.6	4.2	10.0	19.0	35.0	65.6	121.0	223.7	413.2
Wood, pulp, paper and board.....	36.5	39.5	54.0	67.0	84.0	105.2	132.5	166.0	209.5
Total for top four segments.....	188.8	231.7	372.0	554.0	844.0	1,274.8	1,965.5	3,046.2	4,759.7
Total chemical process industries.....	252.1	302.8	465.7	675.2	1,000.4	1,477.4	2,233.9	3,406.8	5,251.7
Top four as percent of total CPI.....	75%	76%	80%	82%	85%	87%	88%	89%	91%
Total U.S. generation including industrial.....	1,011.4	1,157.6	1,673.0	2,489.0	3,664.0	5,362.0	7,777.0	11,469.0	16,658.0
CPI as percent of total U.S.....	25%	26%	27%	27%	27%	28%	29%	30%	32%

Source of data: same as Table III.

lar. There are other methods of commercially generating power, and they are worth mentioning in order to present a more complete picture of the power situation.

Hydroelectric Power

Hydroelectric plants are notable for their ability to produce electricity without pollution, and at an efficiency unmatched by thermal plants of any type.

There are approximately 55 million kw. of installed hydroelectric capacity in the U.S. today. This represents about 40% of the total potential hydroelectric capacity in the contiguous 48 states, which amounts to 134 million kw. If fully developed, an average of 500 billion kwh./yr. could be produced. Most of the undeveloped capacity is in the Pacific Northwest, and in areas where the cost of development is not competitive with thermal plants. Alaska and Canada both have considerable hydroelectric potential, although the market for the electricity is not yet available.

At times, hydro plants are designed to operate as base-loaded plants, though frequently they are designed to operate during peak-power loads. Available head and stream-flow, reservoir-storage capacity, and operating limitations imposed in the interest of other water uses are the determining factors.

Usually, hydro plants are integrated with overall development of recreational projects, water supply, flood control, and other water uses. Hydro plants are not immune from opposition, primarily from those opposed to the opening of undeveloped areas for recreational purposes and to the flooding of vast tracts of land.

Geothermal Plants

One of the most unusual ways of generating power is by harnessing geothermal steam. Pacific Gas and Electric is now the sole user of this method in the U.S., and has 192,000 kw. of installed capacity. The potential for this type of generation is limited to those areas where this natural phenomenon occurs. Frequently, this is in areas with little or no industry, and where the cost of transmission is high. If fully exploited, this type of generation would add little to the overall power situation. It is estimated that if all usable geothermal steam were tapped for electrical generation, a total of 100 million kw. would be added to U.S. capacity.

Incineration

Burning of refuse as fuel for the generation of power is a recent innovation in the U.S. but has been going on in Europe for some years. It shows considerable promise of becoming an excellent method of disposing municipal wastes. Refuse has an average heat value of about 5,000 Btu./lb. With a population of 200 million people, our nation produces

500,000 tons/day of municipal waste. If this waste were all channeled into power-plant use, 10 million kw. of installed capacity would be required to handle it.

At best, we can expect only a small portion of municipal refuse to be channeled into power generation unless utilities take the task upon themselves. Due to shortages of capital, municipalities will go for the least expensive methods, which are conventional incineration, landfill, etc.

Union Electric of St. Louis may be setting the pace for refuse disposal by modifying an existing coal-fired boiler to accept a mixture of 10% refuse and 90% coal (based on heat values). In this one unit, 300 tons/day (or 30% of St. Louis' refuse) will be disposed of. Startup is scheduled for late 1971.

Incinerating refuse in a power plant may be an ideal way of disposing of it, but this cannot make a significant contribution to power generation.

Peaking Plants

Peaking plants are those specifically designed to supplement base-loaded plants during periods of maximum demand. These may consist of older, less-efficient thermal plants; pumped-storage plants; and gas-turbine, diesel and hydroelectric plants, as previously mentioned.

The pumped-storage plant uses hydroelectric turbines that are driven from a headwater pool. The headwater pool is filled during off-peak periods by pumps that usually obtain their power from thermal plants. The prerequisite for a satisfactory pumped-storage plant is the availability of energy at low incremental cost for the pumping cycle, since 3 kw. of energy are required for the pumping cycle for every 2 kw. of energy generated during the peaking period.

The simple open-cycle gas-turbine generator is gaining popularity as a low first-cost source of economical peaking capacity. New York's Consolidated Edison plans to install approximately 2 million kw. of these units prior to 1974. It is forecast that the total capacity of gas-turbine generators in the U.S. will increase from the present 12 million kw. to as high as 60 to 75 million kw. by 1975. Several manufacturers are designing or considering designing gas-turbine units as large as 100,000 and 200,000 kw. These larger units will be used for mid-range service—between peak-load and base-load service.

Energy costs are high for operating gas turbines because their thermal efficiency is low and because they burn high-grade liquid fuel or gas. But they have the distinct advantage of being able to be started, synchronized and fully loaded in 5 to 20 min. This ease of starting offers savings that offset the high fuel-cost.

Diesel generators offer features similar to the gas turbine. They are quick starting and can accept full load from cold startup within 60 to 90 sec.

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Their limited available size, usually not in excess of 2,000 kw., restricts use in major power systems.

The Only Real Answer

The magnitude of the job of satisfying the power requirements of the U.S. is beyond comprehension. As of Dec. 31, 1970, we had about 360,000 Mw. of total installed capacity in power plants. By 1980, we will need 700,000 Mw., increasing to 1,500,000 Mw. by 1990, and to 3,200,000 Mw. by the year 2000.

In the next 30 yr., we must obtain approval for, construct, and start up eight times as much power-plant capacity as we have built in the entire history of our country. This does not consider existing plants that will be retired from service and that will have to be replaced by new ones.

Obviously, fossil fuels will continue in short supply and cannot possibly meet the growing power demand. Hydro-plant developments are limited to the remaining available sites. Exclusive of nuclear power, all other types of commercial generation combined cannot add significantly to our power capability.

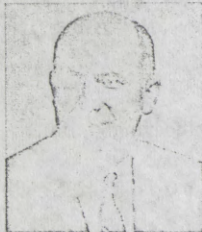
Nuclear plants are our only real hope of satisfying future demand, and our only alternative to economic stagnation. To make it possible, the electric utility industry will have to perform a most difficult and trying task, that of building plants at a rate equal to the growth of power consumption. They will need all the help they can get. The chemical process industries can be influential in attaining these goals by making their needs known to the Federal Power Commission, the Atomic Energy Commission, and to all the appropriate legislative bodies.

After all, the average amount of electricity in the gross sales value of products in the U.S. is now only 2¢ out of each dollar. But if there is no electricity, there will be no production, and the loss of 2¢ worth of electricity will eliminate \$1 of sales. You might say that industry needs the electric utilities much more than the electric utilities need industry. ■

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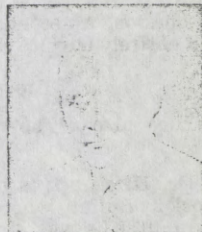
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STATEMENT OF LAUREN B. HITCHCOCK, PROFESSOR OF ENGINEERING, STATE UNIVERSITY OF NEW YORK AT BUFFALO, RE FOUR CORNERS POWER PLANT, MAY 7, 1971

The operation of a 2100 megawatt power plant at Farmington, N.M., using sub-bituminous coal, is attended by some difficult engineering problems; one of which is air pollution. The coal in question is reported to run approximately 22% ash and 0.5% sulfur. The finely ground coal with its high ash content creates a major problem in the production of fly ash emitted from the stacks. Due to the low sulfur content, the fly ash has a high resistivity, thus making it difficult to secure the necessary efficiency with an electrostatic precipitator. Efficiencies of electrostatic precipitators under these conditions can commonly be on the order of 97% removable of solids from the stack gases. The remaining 3% represents a tremendous air pollution problem.

Installation of the most efficient available wet scrubbers of the Venturi type would be expected to operate at 99% plus efficiency, leaving something on the order of 0.8-1.0% solids emitted from the stack. Even if this corresponds to as low a grain loading in the exit gas as 0.025 grains per cubic foot, with the tremendous tonnage involved, this still represents a very large tonnage of fly ash. Furthermore, the wet scrubbers require a very large volume of water, and to attain the efficiency mentioned also requires a high pressure drop. In Venturi scrubber installations with which I am familiar, I would not expect the quoted efficiency to be obtainable with a pressure drop of less than 50 inches of water. For example, a large modern Venturi scrubber installation treating basic oxygen furnaces emissions operates with a 42 inch pressure drop and results in an exit gas averaging 0.05 grains per standard cubic foot. The mean particle diameter of these emissions is approximately 2 microns.

Unfortunately, in most dust collecting equipment, and specifically with wet scrubbers of the Venturi type, the particles remaining in the exit gas are predominately submicron in size and it is these submicron particles which account entirely for the reduction in visibility from the resulting plume. Submicron particles remain airborne for long periods and thus may be transported many miles from the origin.

It is also well known that it is the submicron particles which represent the greatest threat to respiratory disease because they are so small that they penetrate beyond the normal defenses of the respiratory system, reaching into the lower fine structure of the lungs into alveoli.

Such particles also adsorb sulfur dioxide, from whatever source in the atmosphere, part of which becomes oxidized to sulfur trioxide and then becomes sulfuric acid. These submicron particles therefore act as transport agents for lung irritants.

Removal of submicron particles is much greater by the use of bag filters. Since it is the submicron particles which it is most important to reduce to lowest practicable and feasible level, it would appear it would be in the public interest to utilize this type of technology in the treatment of the fly ash emissions under discussion. A secondary advantage of bag houses would be to greatly reduce, if not entirely obviate the use of water.

BIOGRAPHICAL SKETCH—LAUREN B. HITCHCOCK

(See also "Who's Who in America", "Who's Who in Engineering", and "American Men of Science")

Dr. Hitchcock is a professor of engineering at the State University of New York at Buffalo where he lectures on air pollution control technology.

In 1954 he was appointed President and Managing Director of the Air Pollution Foundation of Southern California. Before coming to Buffalo, he was a consulting engineer in New York City and worked with several large companies on air pollution problems.

Educated at M.I.T. (S.B., S.M., Sc.D. in Chemical Engineering) he organized the first professional course in chemical engineering at the University of Virginia 40 years ago. Since then his career has accented the organization and administration of new and growing enterprises in the chemical industry—with Hooker Chemical, Vice President of the Quaker Oats Chemicals Department, and President, National Dairy Research Laboratories. He was a founder and first President of the Commercial Chemical Development Association and has been an officer or director of several other professional societies. He is a member of the Air Pollution Control Association and has published numerous technical

papers. Currently he is chairman of the Technical Advisory Committee on Air Pollution for the Erie County Health Department and a member of the Research and Development Committee, Environmental Health Resources, Health Planning Council of Western New York, Inc. He was Chairman of the Air Pollution program for the Institute of Environmental Sciences meeting in Boston, April 1970. In March 1971 he received the Professional Achievement Award of the American Institute of Chemical Engineering, Western New York Section.

THE UNIVERSITY OF CHICAGO
DIVISION OF THE PHYSICAL SCIENCES
DEPARTMENT OF PHYSICS
530 SOUTH EAST ASIAN AVENUE
CHICAGO, ILLINOIS 60607-7080
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APPENDIX 2

Communications pertaining to the hearing held at Las Vegas, Nev.,
May 25, 1971

DESERT RESEARCH INSTITUTE

ATMOSPHERIC SURVEY—MOHAVE GENERATING STATION, SOUTHERN CALIFORNIA
EDISON COMPANY

The subject survey was begun in the fall of 1968, approximately two (2) years before the planned commercial operation of the Mohave Generating Station and will continue for approximately two (2) years after the initiation of commercial operation.

In order to carry out the study, a sampling network was established as shown on Figure 1. The stations were located in a general north—south direction since the power plant is located in a rather narrow valley of the Colorado River. Furthermore, air movement in the valley is generally in the north or south direction depending upon the season. It is therefore believed that this network will permit a satisfactory evaluation of the possible influence of the station upon the immediate environment.

The following measurements are made at each station on a continuing monthly basis; dustfall, sulfate, chloride, ash, carbon, nitrate, iron, sulfation and airborne solids. Standard jars are used to measure all of the above quantities except sulfation and airborne solids. Total sulfation is measured by means of standard lead candles. Airborne solids, i.e. those larger than about two (2) microns are measured on both a horizontal and vertical basis using standard techniques. Typical levels of dustfall and sulfation in the area for 1971 are shown on Figures 2 and 3.

By-monthly data is also taken with measurement of sulfur dioxide, nitrogen dioxide, nitrogen oxide, suspended solids, benzene soluble solids, sulfate, chloride, nitrate and iron. The gaseous components are measured with bubbler tubes using the West-Gaeke method for sulfur dioxide and the Saltzman method for oxides of nitrogen. The standard "HIGH VOL" sampler is employed to collect that data pertaining to suspended solids. Typical solids data for 1971 is shown on Figure 4. Sulfur dioxide and oxides of nitrogen data are not shown since these are essentially at threshold or background levels.

Sulphur dioxide is also monitored continuously by means of standard wet chemical recording instruments located at River Bend and Needles. Additional measurement of NO_2 , NO_x and SO_2 on a continuous basis, is provided by a mobile air quality monitoring facility. This is operated on a monthly rotating basis between Katherine's Landing, Bullhead City and Big Bend.

This then completes a brief description of the program. For an interpretation of the data gathered from this study to date, the reader is referred to the foregoing statement and to the Annual Report submitted to the Southern California Edison Company in April 1971.

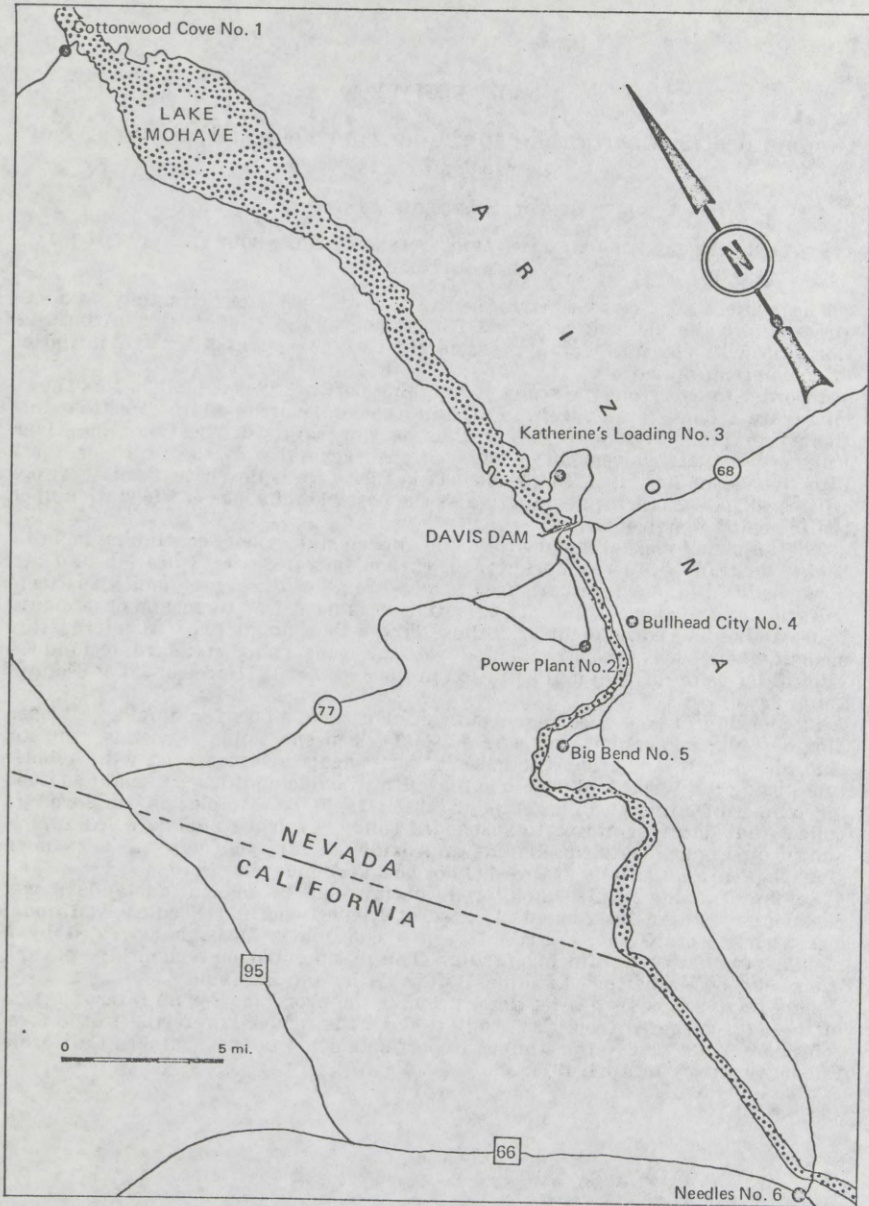


FIGURE 1 - GENERAL LOCATION OF SAMPLE COLLECTION SITES

DUSTFALL

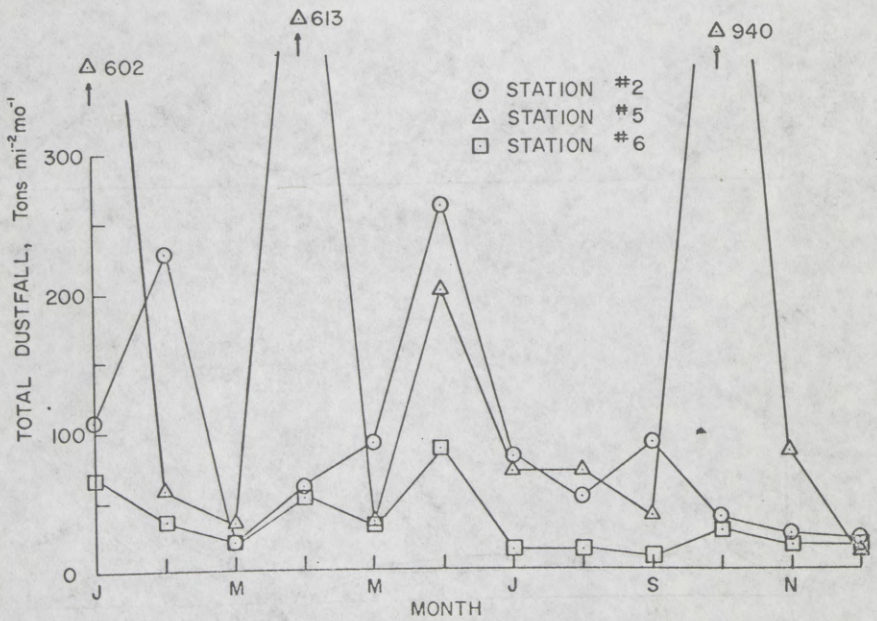
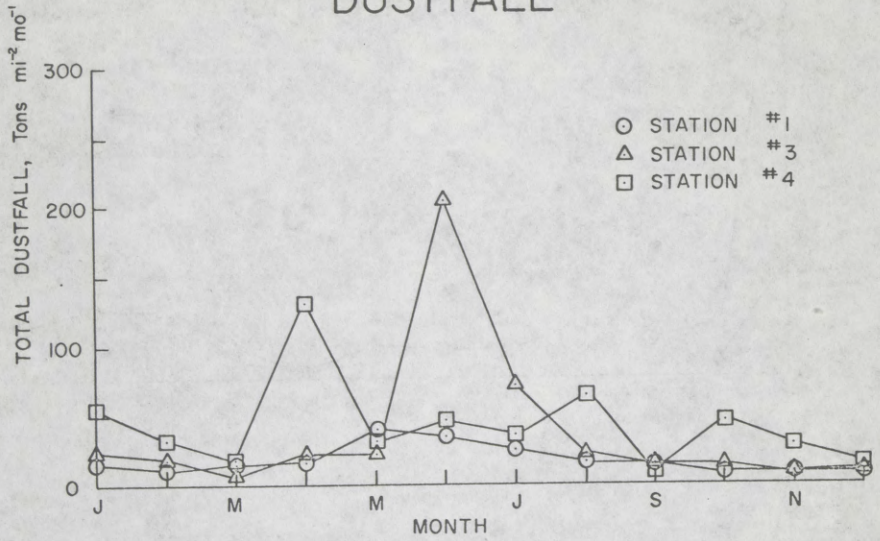


FIGURE 2.

TOTAL SULFATION

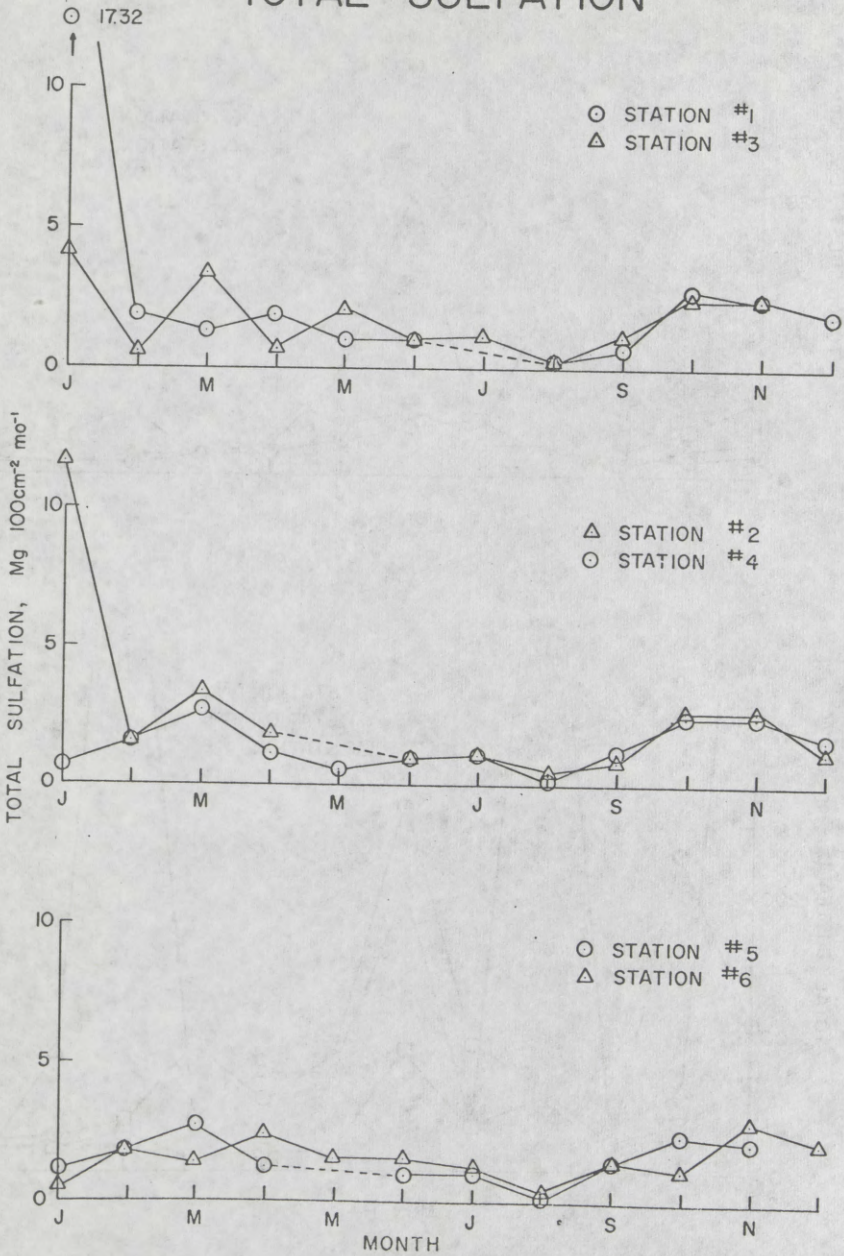


FIGURE 3.

SUSPENDED SOLIDS

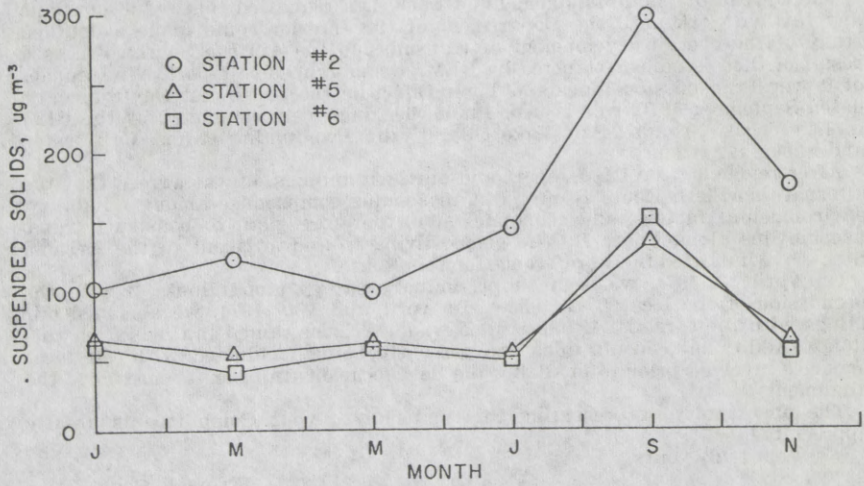
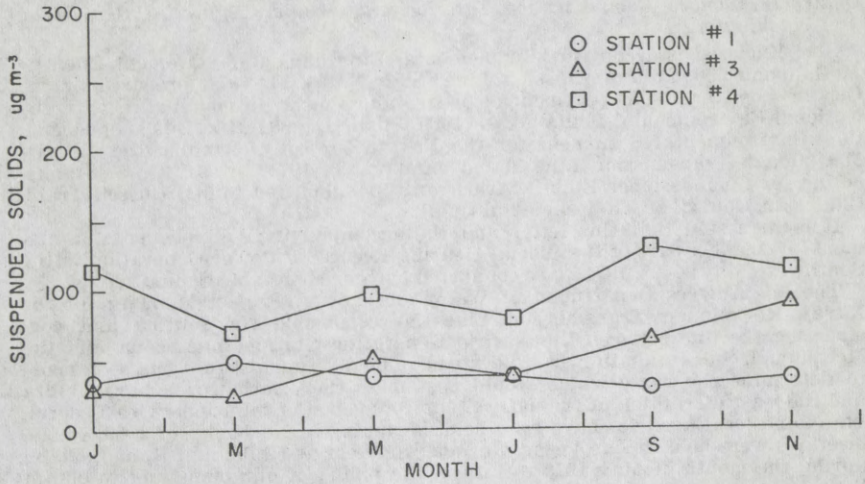


FIGURE 4.

DEPARTMENT OF WATER AND POWER,
CITY OF LOS ANGELES,
Los Angeles, Calif., May 18, 1971.

Hon. HENRY M. JACKSON,
Chairman, Senate Committee on Interior and Insular Affairs, U.S. Senate,
Washington, D.C.

SIR: Enclosed is a copy of "Supplemental Environmental Statement, Navajo-McCullough 500 Kv Transmission Line," dated May 14, 1971, prepared by the City of Los Angeles, Department of Water and Power, in compliance with the National Environmental Policy Act of 1969, Public Law 91-190. This supplements the "Environmental Statement for the Navajo Project," including the Navajo-McCullough Transmission Line, dated January 13, 1971, by Mr. G. G. Stamm, acting for Commissioner Ellis L. Armstrong, as submitted to Mr. Russell Train, Chairman, Council on Environmental Quality.

It is requested that this letter and the accompanying "Supplemental Statement" be made a part of the Official Hearing Record on Power Generation in the Southwest, May 24-28, 1971, to be conducted by your Honorable Committee.

The Los Angeles Department of Water and Power, Project Manager for the Navajo-McCullough Transmission Line, is responsible for routing and constructing the line between the Navajo Generating Station in Arizona and the McCullough Substation in Nevada. Extensive field reconnaissance has been made to determine the route which would best meet the criteria for both reliability and the least disruption of the natural environment. Consultations with Federal, State, and local agencies have been held, beginning in November of 1969. Public meetings were held in Las Vegas, Nevada; St. George, Utah; and Kanab, Utah; during the month of May 1970 to inform the public of our plans and to obtain their comments and suggestions. Prior to July 21, 1970, we filed with the Bureau of Land Management office on what was later to be known as Route A, as shown in the attached "Supplemental Statement."

The Bureau of Land Management (BLM) then requested that we discontinue any further work until the Department of the Interior could make a detailed study of the overall development of transmission lines in the Southwest. As a result of these studies conducted by BLM, a comprehensive report, "The Impact of Power Transmission Lines and Their Effect on the Southwest Environment," dated September 1970, was issued. Public hearings were conducted by the BLM in Las Vegas, Nevada; Salt Lake City, Utah; Twentynine Palms, California; and Phoenix, Arizona.

After reviewing the BLM report and our own findings, it was agreed that the alternate northern Route B offered a reasonable compromise among reliability, environmental factors, and economics. We, therefore, plan to construct transmission line along Route B. The people living in and adjacent to the Arizona Strip have indicated their preference for this Route.

On April 13, 1971, we began a preliminary survey along Route B with the permission of the local BLM offices. In April and May 1971, we amended our filings with the three BLM offices in Nevada, Arizona, and Utah, based on this Route. Additional consultations are presently being conducted with the local agencies involved prior to finalizing the field locations in order to maximize the alignment.

The opportunity of presenting this material to your Committee is greatly appreciated.

Very truly yours,

FLOYD L. GOSS,
Chief Electrical Engineer and Assistant Manager.

SUPPLEMENTAL ENVIRONMENTAL STATEMENT. NAVAJO-McCULLOUGH 500-KV
TRANSMISSION LINE, NAVAJO PROJECT—ARIZONA

(Prepared by the City of Los Angeles Department of Water and Power)

I. INTRODUCTION

This supplemental environmental statement for the Navajo-McCullough 500-Kv Transmission Line is submitted to supplement the January 13, 1971, letter to Russell Train and is in keeping with Section 102(2)(C) of the National Environmental Policy Act (P.L. 91-190).

In response to the increased demand and based upon projected electrical power requirements, a coal-fired electrical generating plant is being constructed near Page, Arizona. Six agencies are participating in the Navajo Power Project at Page. They are the Arizona Public Service Company, Salt River Project, Tucson Gas and Electric Company, Nevada Power Company, Los Angeles Department of Water and Power, and the Bureau of Reclamation.

Three new transmission lines are required to transmit power from the Navajo Generating Station to load centers at Phoenix, Arizona, Las Vegas, Nevada, Central Arizona Project, and Los Angeles, California. Two of these lines link the Navajo Plant to the Phoenix area, and are not considered in this statement. The third line will extend from Page, Arizona, to the McCullough Switching Station near Boulder City, Nevada, along Route B as shown on the attached Figure No. 1. Power will be transmitted to Los Angeles from the McCullough Switching Station over existing Los Angeles Department of Water and Power (LADWP) lines. Nevada Power Company and USBR will take their share of power from McCullough Switching Station.

The LADWP will design and construct the Navajo-McCullough 500-KV Transmission Line. Nevada Power Company will operate and maintain the line.

II. DESCRIPTION OF THE PROJECT AREA

The location of the transmission line being studied crosses the northwestern part of Arizona, parts of southern Utah, passes near the town of Mesquite, Nevada, then southwest and south to its terminus at the McCullough Switching Station.

Due to the physical variation of the region, temperatures and precipitation vary considerably. The project area is generally hot and dry. Some of the desert basins receive as little as 2 inches annual rainfall with average summer temperatures in excess of 100°F.

Native vegetation consists primarily of desert types such as creosote bush, burr sage, yucca, and joint fir in the lower elevations while Joshua trees, segebrush, pinyon pine, and juniper are found at the higher elevations.

A wide variety of wildlife is found throughout the study area including: mule deer, desert bighorn sheep, mountain lion, fox, coyote, badger, antelope, bobcat, varieties of squirrels and chipmunks, many species of birds and various snakes and lizards. A rare and endangered species found in the study area is the Gila Monster. Other endangered species include the Desert Tortoise and the band-tailed pigeon.

III. PLAN OF DEVELOPMENT

The line is designed with an average span of 1,500 feet, or approximately 3.5 towers per mile. The towers will be the freestanding type, ranging in height from 70 to 136 feet measured to the bottom of the crossarm. The tower will support three phases in a horizontal configuration, with a phase spacing of 34 feet. Each phase will consist of a bundle of two 1.762-inch subconductors. Two overhead ground wires will be installed at the top of the towers. New construction roads will be kept to a minimum.

IV. ENVIRONMENTAL STATEMENT

1. The Environmental Impact of the Proposed Action.

(a) About 4 acres of land per line mile will be used for tower sites and the roads required for line construction.

(b) Right-of-way fences are not planned and therefore, movements of both domestic animals and wildlife would not be affected. Where the transmission line access road crosses existing allotment fences, it is anticipated that cattle guards will be utilized instead of gates.

(c) In areas of human population concentration, the line is placed near foothills or valleys, where possible, and kept out of sight when compatible with the terrain.

(d) Population patterns are not expected to be affected. The population densities in the general areas of the route are currently very small, and substantial increases over the next 50 years are not anticipated.

(e) Most of the lands of the study area are publicly owned. South of the transmission line route is the Kaibab National Forest and Grand Canyon National Park. Public domain lands predominate north and west of the Colorado River core, except for extensive areas of private lands in the Las

Vegas Valley. The Navajo Indian Reservation is on the east side of the study area. The Kailbab Indian Reservation is located in about the center of the study area.

2. Any Adverse Environmental Effects which Cannot Be Avoided Should the Proposal Be Implemented.

(a) The appearance of the transmission line will probably be the most adverse effect. The LADWP plans to comply in every way possible with the Department of the Interior's publication, "Environmental Criteria for Electric Transmission Systems," and the Federal Power Commission's proposed "Guidelines for the Protection of National, Historic, Scenic and Recreational Values in the Design and Location of Rights-of-Way and Transmission Facilities."

(b) The removal of native vegetation for tower sites and construction roads will be another adverse effect on the environment. This loss of vegetation will amount to about 1,040 acres.

(c) Access to remote areas through use of the construction roads could have a negative or positive effect, depending upon one's point of view. There are numerous existing roads in the area traversed by the proposed transmission line.

3. Alternatives to the Proposed Action.

Four routes have been studied for the transmission line. The four routes studied are shown in Figure No. 1. There is a southern route which is essentially the existing corridor from the Four Corners Generating Station to the Eldorado Substation. The proposed northern Route B is north of the Grand Canyon through the Arizona strip. The Department of the Interior published "The Impact of Power Transmission Lines and . . . Their Effect on the Southwest Environment," dated September 1970, a study directed by the Bureau of Land Management. The conclusion by the study team, after considering the data collected concerning the impact on the environment, reliability requirements of electrical systems, projected power requirements, and power generating sources, is that two utility corridors are required through the Arizona-Nevada portion of the study area. The team recommends that both Routes B and C be established as corridors between the power sources and load centers.

4. The Relationship between Local Short-Term Uses of Man's Environment and the Maintenance and Enhancement of Long-Term Productivity.

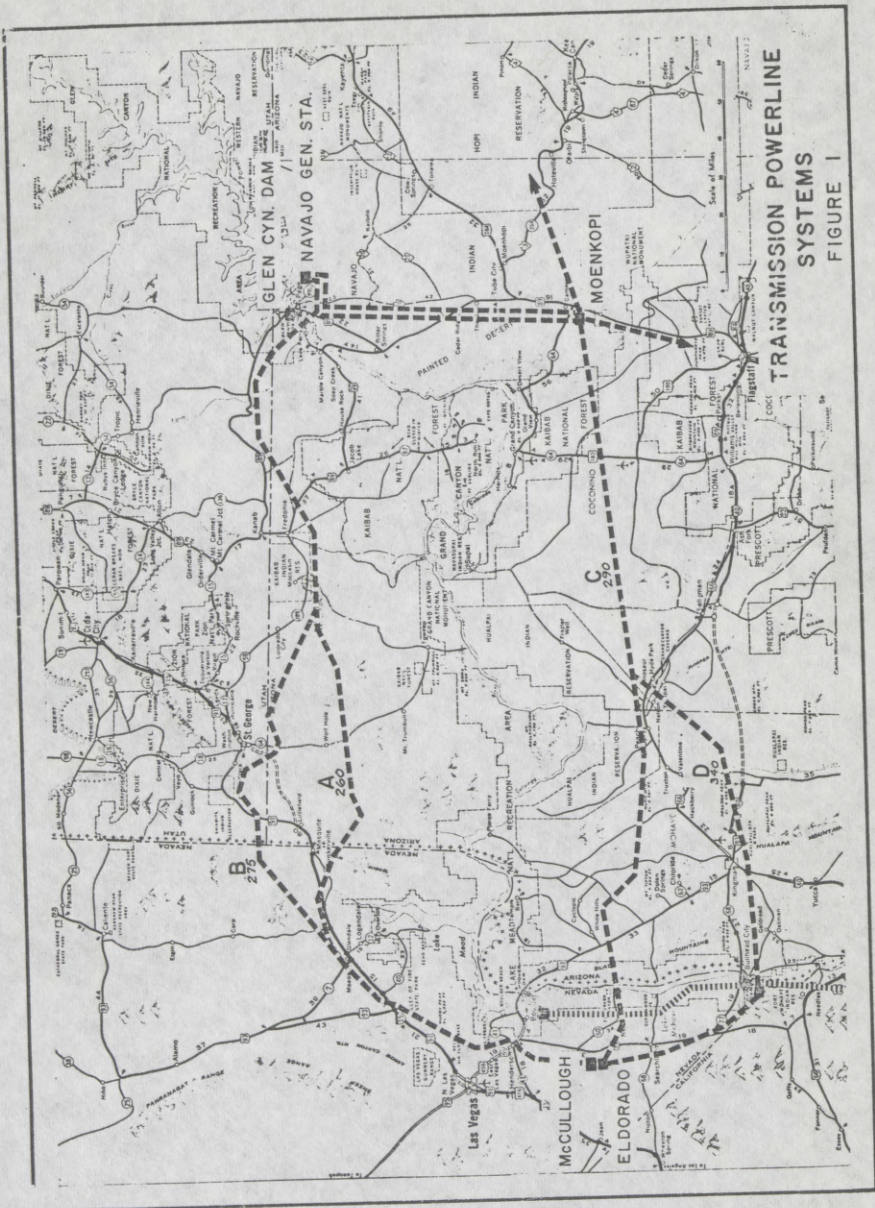
(a) The benefits derived from this project will not be short-lived. The transmission line will provide enough electrical power to serve the needs of about 1,000,000 people for an indefinite period of time.

(b) The northern route will provide access to a large area of relatively undisturbed land. This will benefit those people seeking recreation in such an area.

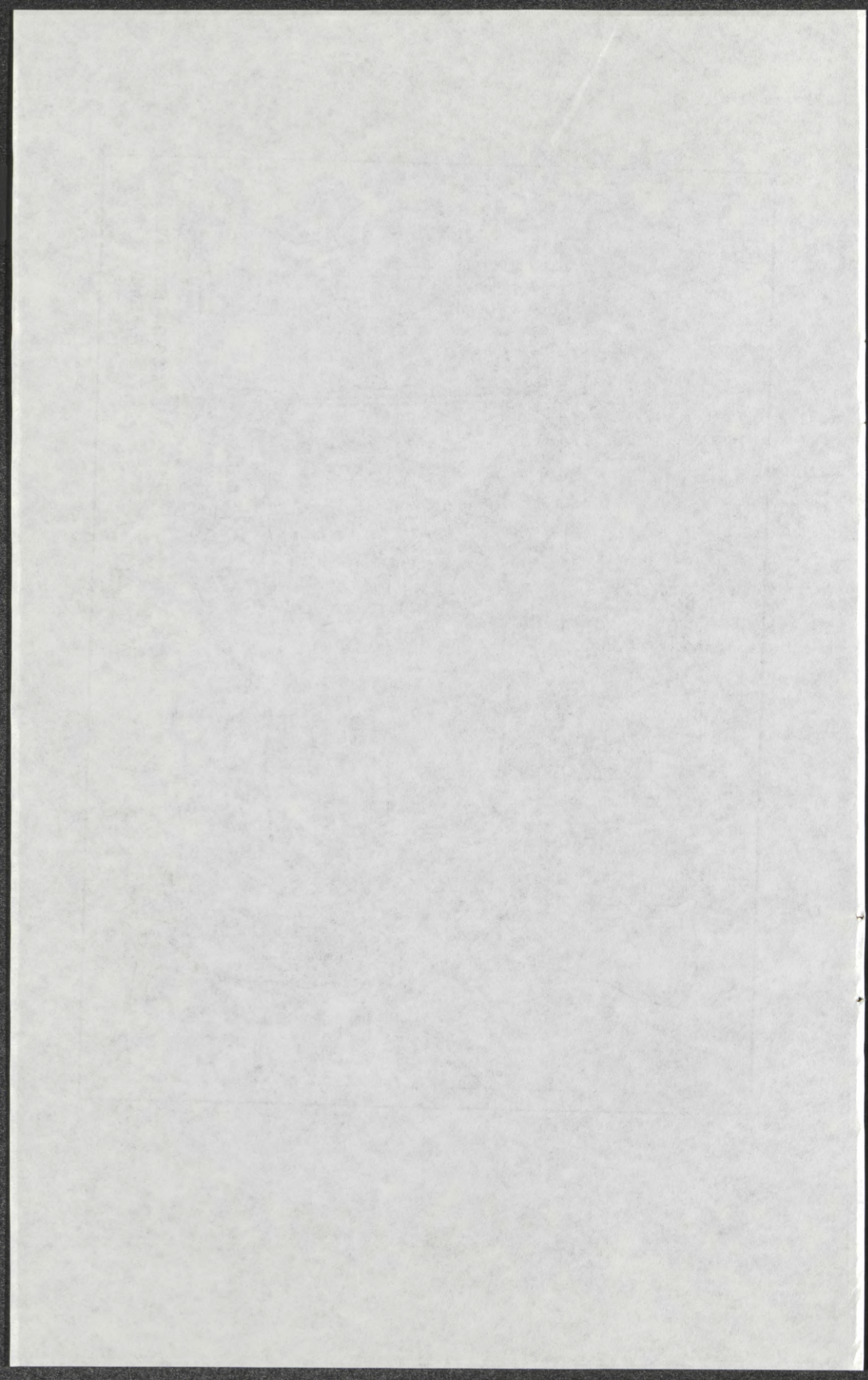
5. Any Irreversible and Irretrievable Commitments of Resources Which Would Be Involved in the Proposed Action Should It Be Implemented.

(a) There would be no absolute irreversible and irretrievable commitments of resources with the implementation of this project. Assuming that the transmission line would exist indefinitely, the area occupied by the transmission towers, the area affected by the construction roads, and the natural scenery affected by the presence of the transmission lines would be committed.

(b) The effects on the land derived from access into it would probably become permanent.



TRANSMISSION POWERLINE
SYSTEMS
FIGURE 1



APPENDIX 3

Communications pertaining to the hearing held at Salt Lake City,
Utah, May 26, 1971

COLORADO STATE UNIVERSITY,
Fort Collins, Colo., June 2, 1971.

HON. GORDON ALLOTT,
Senator from Colorado,
Senate Office Building,
Washington, D.C.

DEAR SENATOR ALLOTT: May I ask that you and your committee who have been conducting hearings on the environmental impact of electric generating plants in the West give some consideration to the items I wish to present in this letter.

I submit that it is unfortunate that the public press has seen fit to give overwhelming attention to the views and statements of the negative environmentalists. I have failed to see a proper reporting and thoughtful and documented statements and opinions presented by environmentalists who are also realists.

May I present what I think are satisfactory qualifications to permit me to speak on this matter. First of all I am *actively* engaged in scientific research dealing with the impact of electric power development in the West. I am not presenting you with any promissory notes or any suggestions of need for further research. I am presenting you with the fact that I am actively engaged in this kind of research here and now in the State of Colorado. My involvement includes detailed studies of the environmental impact of coal-fired electrical generating plants on the western slope of Colorado. My research also includes the detailed evaluation of the environmental impact of any potential oil shale development on the western slope of Colorado. I have been engaged in environmental biological research for some 30 years, both as a civilian scientist and as a federal civil servant.

One large contribution to this entire problem is my book on "The Biological Aspects of Water Pollution" published by the Charles C. Thomas Company. It has been interesting to me to note the large number of non-biologists and "instant ecologists" who have been given more than their share of the public press in reference to power developments in the West.

I submit that it is incontrovertible that a power crisis is facing the United States. I have studied this matter quite thoroughly. I have become convinced that the American people want the kinds of things that require additional power. I see no indication that the great masses of the American public wish to forego sufficient amenities to permit us to decrease our power requirements. Moreover, it is evident that from the technological and economical point of view nuclear power development just is not feasible at this time. It seems clear to me that we must have additional electrical power. Consequently we must work out a program to insure that we have this power. This working out will require certain kinds of "trade-off". Some aspects of the environment will necessarily be modified. Other aspects of the environment can probably be improved in a positive way.

The statement that there should be a moratorium on the construction of electrical power plants in Colorado is irresponsible and simply has little scientific data to support it.

I was particularly concerned, in reading the news releases on the hearings, about the reported testimony of Lane E. Kirkpatrick who is listed as the technical secretary of the Colorado Air Pollution Control Commission. He is reported to have suggested that we in the United States should depend on fusion energy for our shorter run needs for electrical power. This type of technology (harnessing the hydrogen bomb type) just is not in the books at the moment. This type of technology is a generation away from us. In the meantime we need power.

Again it is reported that Kirkpatrick, speaking for the Commission, suggested that the effluents from Four-Corners power plants will emit more sulfur dioxide than one finds in Chicago or New York. It is furthermore reported that he suggests that the emissions will be seven times as much as emitted in Los Angeles. Unfortunately Kirkpatrick seems to be unfamiliar with the meteorology of the West. The environmental situation of the West can hardly be compared with the unique situation in Los Angeles or the strange situation in New York City or in Chicago.

Kirkpatrick is also reported to have addressed himself to the matter of state and federal legislation to prevent so-called environmental scars caused by strip mining operations. If one is interested in humane values, the strip mining of coal is the safest and least harmful to workmen's health of any of the mining methods we know. Certainly underground mining is disastrous for the poor men who have to go down and dig the holes. Strip mining has a record of low accident rate and low adverse effects on health. In the West there is no reason to have permanent scars as a result of strip mining operations. Some of the suggestions made by Kirkpatrick are uninformed. It is reported that he wants laws which would require the saving and restoring of top soil. In the West this idea could be questioned on many grounds.

First of all one wonders how far down the top soil *by law* could be defined. Secondly, one is not impressed with the high quality of the top soil in the western part of Colorado anyway. In some instances, the turning over of a mountain exposes a kind of substrate which may be more useful for rehabilitation of the land and what was originally there. In addition, Kirkpatrick is reported to have asked for the replanting of a strip area with "natural vegetation"; whatever natural vegetation means in the West which has been intensively grazed and cultivated for a wide variety of agricultural needs is not clear. If he means we should try to grow the prickly-pear cactus or some of these things I am afraid I would have to disagree with him.

May I submit at this point that my own studies are intimately involved with the matter of rehabilitation of strip areas in the West. It is rather interesting to note that as far as I have any record Kirkpatrick has never discussed with me any of the unique rehabilitation problems of strip land in Colorado.

It seems to me that with reasonable regulations of a more *general sort* we can develop the power resources so badly needed by our Nation and at the same time save parts of the environment that urgently require saving. At the same time we must face up to the fact that *natural resources must be used for human welfare*. It is ridiculous to say that we will not develop additional power and then be faced with the fact that babies will be denied incubators; sick individuals will be denied kidney machines; persons in ill-health will be denied proper air conditioning, and the like. I cannot see that this type of thinking leads to anything but disaster.

My dear Senator may I point out that the Department of Zoology at Colorado State University in addition to having an active, vigorous research program going on directly related to the environmental impact of power developments has submitted to the National Foundation a major research proposal, on an interdisciplinary plan, which would permit us to get detailed documented answers to many of the concerns that I am sure you have and all of us from the State of Colorado have concerning power developments. At the moment we have heard nothing from the National Science Foundation on this proposal. However, we are confident that its intrinsic merits should insure its being funded. We have involved in our proposal persons from all the various disciplines which could possibly be brought into an evaluation of power developments. Economists, sociologists, city planners, political scientists, lawyers, biologists, chemists, physicians, engineers, and businessmen all have a part to play in this program that we have submitted to the National Science Foundation. It is our hope that this proposal will be supported in such a way that we can give answers of a *positive nature* to decisionmakers to help them arrive at the best possible decisions. Our goal in this is not to end up with a recommendation for more research. Our goal is to end up with specific items which can be used in the decisionmaking process.

May I submit to you, respectfully, the plea that your committee (and other committees like yours) not give undue weight to testimony, opinions, and statements made by the instant environmentalists. Many of these individuals certainly have good intentions, but are not informed. On the other hand, many of these individuals are using the environmental fad to implement some of their pet sociological schemes. In other words I do question the motives of some of these individuals.

We must also realize that we have in our midst a significant number of "eco-freaks". These individuals are similar to the "needle-freaks" one encounters in the drug abuse world. The "needle-freak", when he cannot get a hard drug, will inject almost anything; he has a compulsion about getting a needle into his vein and squirting something into his body. By the same token the "eco-freak" will grab on to any idea no matter how ridiculous and far out if, in his mind, it bears some relation to environmental ecology as he defines his words. He then will push these matters to their ultimate absurdity. Among some of these absurdities are the recommendation that all homes make their own soap out of bacon drippings and lye; in the process these same people recommend that we mix this mess in an *electric* blender.

May I also refer to comments made on the possibility of severe mercury pollution resulting from coal-fired power plants in the West. This type of scare tactic is proper for scientists to use. Apparently a chemist, Roy Craig of Durango, has questioned the reliability of mercury analytical methods for coal. It is true, in our personal experience, that coal is difficult to analyze. The organic material causes some complications. However, we have been able to analyze Colorado coal quite successfully for mercury content. We find that it contains generally a relatively low amount of mercury. Across the United States the mercury content of coal varies in wild fashion from somewhere around .01 parts per million mercury up to as high as 30 parts per million mercury. In Colorado, in our experience, coal runs less than .1 part per million mercury. I think it unfair to discuss the horrible details of frank mercury poisoning in the same breath one is discussing the possible mercury hazard from power plant smoke stacks. This type of mixed thinking is hardly appropriate for an objective scientist.

May I point out to you that we here in this department are actively engaged in monitoring the mercury in each western environment and in evaluating the mercury movement into the environment from already existing power plants. To date we have no evidence which would support the grave prediction of doom which some of your witnesses implied. Over a period of some years we may find items of concern which then should be handled in a proper scientific manner.

If the Secretary of the Interior does have a task force which will conduct a comprehensive examination of all the factors involved in a power plant development program, may I ask that he have at least one scientist on that task force who is actively and personally involved in research along these lines. It seems ridiculous that all kinds of dogmatic statements are accepted from individuals who have at best a hearsay relationship to what is actually going on in the power industry and in biology as related to power plant developments.

If there is an interest in your office to know specific individuals who would be in a position to speak authoritatively about the interrelationship of biology and power plant development in Colorado, I certainly can give you a list. I will include for your consideration three persons in Colorado State University who are actively week-in and week-out working out scientific details on power plant development as related to the ecology of the West: Dr. Charles G. Wilber, Professor of Zoology; Dr. Edward B. Reed, Professor of Zoology; Dr. Stephen G. Martin, Assistant Professor of Zoology, and Dr. William A. Berg, Assistant Professor of Agronomy; all these individuals are at Colorado State University; all these individuals are daily involved in specific studies related to power development.

Among these studies are the rehabilitation and revegetation of strip lands in the West; the effect of coal-fired power plants on vegetation of the West; the effect of coal-fired power plants on the aquatic biology of western lakes and streams; toxicological implications of power plant operation on the ecology of Colorado; and similar specific data.

I hope that you will forgive this rather long letter. I would like to submit the following conclusions and opinions which I hope you and other committees will consider:

1. National power needs are clearly documented and must be met in a reasonable fashion.
2. Because of the unique quality and quantity of coal resources of the West and especially in the State of Colorado it seems inevitable that a significant number of coal-fired electric generating plants will be put into operation in the western regions of Colorado.
3. There is no reason that the operation of these power generating plants cannot be made compatible with appropriate concern for environmental quality.
4. Negative and cavalier attitudes toward human needs for power cannot be made a serious part of the decisionmaking process.

5. Legislators and administrators who will form the eventual decision should insure that they have the first hand opinions of scientists who are actively engaged on a day-to-day basis in research on the ecological impact of power developments.

6. Most forward looking industrial leaders have already shown a willingness to recognize environmental quality as an important element in the decision-making process. These industrial leaders merit the strong support of all the people of the United States.

The undersigned and other responsible research scientists at Colorado State University are ready and willing to serve as advisers and consultants to persons in the decision-making process on matters dealing with the ecological impact of power plant development.

Cordially yours,

CHARLES G. WILBER, Ph. D.,
Chairman and Professor.

STATEMENT OF GLEN P. WILLARDSON, VICE PRESIDENT, UTAH RURAL ELECTRIC ASSOCIATION

Our Organization represents eleven Rural Electric Cooperatives serving in the State of Utah and in portions of the adjoining States of Arizona, Colorado, Wyoming, Idaho and Nevada. They are: Bridger Valley Electric Assn., Dixie Rural Electric, Empire Electric Assn., Escalante Valley Electric Assn., Flowell Electric Assn., Garkane Power Assn., Moon Lake Electric Assn., Raft River Electric Coop., San Miguel Power Assn., Wells Rural Electric Co., and Mt. Wheeler Assn. We wish to make the following statement:

1. The Southwestern United States definitely does need more electrical power to serve its growing population; plants like Kaiparowits must be built to serve this need. The claim of some conservationists that the coal should be hauled to population centers and the power plants built there is unrealistic; costs would be prohibitive, and by any standard it's better to spread people out rather than continue to concentrate them into vast population centers.

2. We feel that power plants can be strategically located at locations throughout the Colorado Plateau and allow us to have the economic growth which we so desperately need without befouling the environment.

3. The Conservationists are properly constantly outraged at the haze now covering some of the four-corners area. It is understandable that they resist any more power plants in this particular area. But they fail to realize that the Farmington, N.M., plant that causes most of the present pollution was built with virtually no emission controls. The participants in the Kaiparowits project testify that the controls being engineered for this plant will virtually eliminate emissions.

4. Appropriate regulations concerning pollution from power producing plants should be enacted and strictly enforced. This should include immediate action to clean up the emissions of existing plants.

5. Rationing or curtailing power usage is impractical and not in the public interest.

6. We feel that another look should be taken at construction at hydro dams, which are completely non polluting. There are good hydro sites at Bridge and Marble Canyons on the Colorado River and at Echo Park on the Green River. We feel the advantages of hydro power generation far outweigh any disadvantages which they might cause.

7. The following restrictions should apply to any plant built within the State of Utah:

(a) Any power used during construction of the plant and any power used in any community or other industrial development in the immediate vicinity of the plant should be supplied by the utility serving the area prior to construction of the plant without any duplication of facilities.

(b) Consumers within the State of Utah should have the right to use and/or recall for use within the state, on a preference basis, any power generated.

(c) Preference customers, or organizations of preference customers such as Intermountain Consumers Association should have an opportunity to participate in any plant built, and should not be excluded merely because of size.

8. Southern Utah should have the new jobs and new income that will be created by the Kaiparowits project along with the broader tax base it will produce. Moreover, it's good to have such economic development take place away from the Wasatch Front in rural areas where the need for growth is greatest.

We thank you for the opportunity to submit this statement and respectfully request that it be incorporated as a part of the hearing held in Salt Lake City on May 26, 1971.

STATEMENT OF THE GARKANE POWER ASSOCIATION, INC.

Garkane Power Association is the electric utility presently serving the area adjacent to the proposed Kaiparowits Plant in Kane County, Utah. We have watched the developments regarding this plant for some time. We also attended the hearing held in Salt Lake City on May 26, 1971. We wish to make the following statement:

1. The Southwestern United States definitely needs more electrical power to serve its growing population. The proposed Kaiparowits Plant or another similar coal fired plant must be built to serve this need before other sources of energy will be available at a reasonable cost. The claim of some conservationists that the coal should be hauled to population centers and the power plants built there is unrealistic; costs would be prohibitive, and by any standard it's better to spread people out rather than continue to concentrate them into vast population centers.

2. We feel that coal fired plants can be strategically located near the coal fields of the Colorado Plateau without befouling the environment. We believe the States and Federal agencies involved should develop a master plan for siting power plants, as has been recommended by the Five and Six-County Organizations of Southern Utah.

3. The Conservationists are properly outraged at the haze now covering some of the four-corners area. It is understandable that they resist any more power plants in this particular area. But they fail to realize that the Farmington, N.M., plant that causes most of the present pollution was built with virtually no emission controls. The participants in the Kaiparowits project testified that the controls being engineered for this plant will virtually eliminate emissions.

4. Appropriate regulations concerning pollution from power producing plants should be enacted and strictly enforced. This should include immediate action to clean up the emissions of existing plants.

5. Rationing or curtailing power usage is impractical and not in the public interest.

6. We feel that another look should be taken at construction of dams for hydro generation in Bridge and Marble Canyons on the Colorado River. The State of Arizona, all preference customers of the Bureau of Reclamation as well as private utilities, and the general public would benefit from these dams being built. It is a proven fact that the advantages of hydro power generation far outweigh any disadvantages.

7. The following restrictions should apply to any plant built within the area served by Garkane Power Association in Southern Utah:

A. Any construction or start up power for the proposed Kaiparowits plant should be supplied by Garkane Power Association. We have notified Mr. Titus of Resources Company that Garkane Power Association is ready, willing, and able to serve their construction and start up power needs. If the plant is built Garkane will need to build a small transmission line into the Glen Canyon City area to supply the needs of community growth in that area. The construction of an additional small power transmission line in the area by Resources Company to serve their construction and start up power needs would only be a duplication of facilities.

B. Intermountain Consumers Power Association who is the agent for Garkane Power Association and other preference customers in the State of Utah should have an opportunity to participate in the proposed Kaiparowits Plant or any other plant built in the State of Utah.

8. Southern Utah should have the new jobs and new income that will be created by the Kaiparowits project along with the broader tax base it will produce. Moreover, it's good to have such economic development take place away from the Wasatch Front in rural areas where the need for growth is greatest.

We support the statements made by the Chairman of the Kane and Washington County Commissions, as well as the Mayor of the City of Kanab at the hearing held in Salt Lake City on May 26, 1971.

UTAH MANUFACTURERS ASSOCIATION,
Salt Lake City, Utah, June 21, 1971.

The Subcommittee on Water and Power Resources, Senate Committee on Interior and Insular Affairs, Washington, D.C.

GENTLEMEN: Since we were not invited to present our testimony at the recent Senate hearings on the power projects in southern Utah, we would like to submit in writing our views on this subject.

First, we are aware of the possible effects on our environment of any new power plant which might be built in Utah. However, we have studied the question of the project's possible effect on the environment. Despite the protests of that segment of our society which seems unduly concerned that any further building of power plants will irreparably damage our environment, we feel assured that currently we have plants operating within the limits set and future technology will adequately solve any pollution problems.

As an Association, we feel it is vital that the state of Utah take full advantage of its natural resources. Coal is one of the more abundant of these resources. Utah was the largest coal producing state west of the Mississippi River from 1947 to 1964. Since 1849 when coal was first discovered in Utah, the state is credited with the production of more than 309 million tons. In monetary value at the mine, this has meant approximately \$1.2 billion worth of coal. Of all of Utah's minerals, only copper has exceeded coal in total value.

Twenty years of full operation of the proposed Kaiparowits plant alone, with the first unit expected to operate in 1978 and full operation by 1982, will require 300 million tons of Kane County coal, or an amount almost equal to the total tonnage of coal produced in Utah during the 120 years from 1851 through 1970. Present estimated reserves of recoverable coal in Utah are almost 14 billion tons. One of these major reserves is in the Kaiparowits Plateau. Testing since 1963 has indicated there are 1.5 billion tons of recoverable coal in this field, or five times the total amount of coal previously produced in Utah. If properly utilized, this will provide power, employment, income, and taxes for Utah. Since 1960, special attention has been focused on Utah's coal as a source of electrical energy, principally for industrial uses in California, Nevada, and Arizona.

The construction and operation of the proposed coal mine and steam generating plant would greatly enhance the economy of the entire state of Utah. It would give an economic shot-in-the-arm to all of southern Utah and to Kane County in particular, which is one of the more underdeveloped counties in the state.

The immediate impact of the coal mining and steam generation of these plants on our economy is of significance in terms of exploration, employment, etc. However, the first major impact on the economy will be in 1974 when, if approved, power plant construction will begin. This will be accelerated in 1978 with the first operation of the coal mine and the generating unit. Further acceleration will be seen each year to 1982, when coal mining will reach an annual total of 15 million tons and all five steam generating units will be producing a total of five million kilowatts of electrical power.

Construction crews for the Kaiparowits plant are expected to peak at 1,400 in the period 1975 through 1981 and will be slightly lower in earlier and later construction years. Average annual plant construction wages will be in the neighborhood of \$15,000 per man, for a total annual plant construction payroll of \$19.5 million over a period of eight years.

Construction of the coal mine and facilities will require approximately 150 employees per year. Average annual wages for each construction employee are expected to be about \$12,000 or \$1.8 million per year in total wages and salaries.

The impact of this payroll, plus the tremendous increase in property taxes, will work wonders for an area of the state which is particularly undernourished economically. Other benefits to the state and region include a greatly broadened ad valorem tax base and federal and state sales tax collections from the operating owners and from all others who derive direct or indirect benefits from the project.

For these and other reasons, we urge you to endorse the project.

Sincerely,

ROBERT E. HALLADAY,
Executive Vice President.

SALT LAKE CITY, UTAH, *June 13, 1971.*

HON. HENRY M. JACKSON,
*Chairman, Senate Committee on Interior and Insular Affairs, U.S. Senate,
Washington, D.C.*

DEAR SENATOR JACKSON: As a citizen of the State of Utah, I am writing to voice my concern over the proposed building of the coal-fired electrical generating power plants in the four-corners region. I ask that my statement be made part of the Hearings record.

For the following reasons, I oppose the construction of these plants!

1. These plants pose a direct threat to our environment by polluting our air and land with great quantities of sulfur oxide, nitrogen oxide and fly ash. All of our scenic wonders—Grand Canyon, Lake Powell, Zion, Bryce, Capitol Reef, Arches, Canyonlands, Monument Valley—will be adversely affected by the proposed construction. Furthermore, these plants will require great quantities of our precious water for operation.

2. The proposed plants will use enormous amounts of coal, most of the coal will be strip-mined on Indian lands. We must not take any more from the American Indian; nor can we afford to use up our valuable natural resources.

3. I object to our southwestern United States and particularly Utah being used by out-of-state companies for plants which provide power for southern California. The citizens of our area should not be victimized and subjected to pollutants so that electricity can be supplied to Los Angeles, San Diego etc., especially when the need for more power has not been adequately determined.

Therefore I request a moratorium on the building of power plants until adequate pollution controls can be designed: and until the need for more electricity can be established. I hope you and your committee will make every effort to preserve our beautiful western land, water, and air.

Sincerely,

ELOISE MCQUOWN.

STATEMENT OF HAROLD B. LAMB, M.D., CONSERVATION CHAIRMAN, UTAH
AUDUBON SOCIETY

Mr. Chairman, I am Harold B. Lamb, M.D., Conservation Chairman of the Utah Audubon Society. I wish to convey to you and the Senate Interior Committee our deep concern about the present program of power plant construction in the Colorado Plateau country. This program does not include prior assurance that existent technology is available, or even if available, will be used to protect an environment that is unique to the Colorado Plateau.

We do not oppose power plants per se, perhaps even in the areas suggested, but we do ask for a realignment of priorities. We strongly suggest that only when pollution control technology is available and only when the proponents express a willingness to use this technology (irrespective of additional cost), that the plants then be built. We should first define the environmental goals we seek and only build the plants when we know they will not significantly damage the environment so we can meet these goals. In some instances merely meeting presently existing federal or state ambient air standards is not enough. Certainly, the air about Glen Canyon and Grand Canyon should be of better quality than that required of Phoenix or Salt Lake City. Clean air is to the Colorado Plateau what water is to the Everglades.

Proponents state they will meet all emission standards but to date there are no emission standards. What should these standards be? In the various congressional Clean Air Acts there is frequent reference to "non-degradation" of air quality. Since some "development" seems inevitable, perhaps such a goal is unattainable. However, the references certainly must mean that when the necessary technology is available such technology will be applied so as to prevent environmental degradation. With this premise in mind we should like to present the following recommendations.

AIR POLLUTION CONTROL

Particulates.—With presently known technology, removal of this pollutant to 99.8 or 99.9% can be accomplished with the use of electrostatic precipitators, scrubbers, and filter bags. With *presently* suggested design efficiencies of 99.5%, an excessive amount of particulates will pollute the air if the consortium of plants is completed. It is the difficult-to-capture particles of one micron size or less that will be pumped into the air and it is this sized particle that causes the most dispersion of light and the only sized particles to penetrate into the lung past the natural filtering systems of the nose and pharynx. Thus it is the very particles which will now escape that are most likely to adversely affect the health of local residents. This not only raises questions about public health for all but poses a question of ethical treatment of a minority group that probably has little or almost no knowledge of the consequences of air pollution.

Sulfur Oxides.—At present there are no definite commitments to obtaining low or even reduced sulfur oxide emissions. With presently known technology 80 to 90% of SO_x can be removed and plant should be constructed without this equipment installed. An initial step to show good faith should be the prompt modification of the presently existent Farmington plant.

Nitrogen Oxides.—The Utah Audubon Society does not have the expertise to analytically criticize NO_x control but it believes all control methods available should be incorporated since these contaminants per se are toxic and in combination with other factors are instrumental in the production of photochemical smog.

EFFECTS ON FAUNA

Of the environmental impact studies available to the Utah Audubon Society, there is nowhere documented any studies on effects of power plant development on birds, mammals, insects, etc. This information is complex to ascertain or may be impractical; however, some baseline studies should have been completed even before the construction of the Farmington plant and before the development of Navajo, let alone Kapairowits.

EFFECTS ON FLORA

The material submitted at hearings, as well as in impact statements, is patently inadequate and even that which is presented is conflicting in its implications so that to date no conclusions or even extrapolations can be made from the data.

REHABILITATION

Even in less scenically important areas strip mining is deplored and now rejected by a majority of Americans as an inappropriate method of extracting coal or other minerals. In desert areas "rehabilitation" is even more difficult than in areas with more abundant topsoil and water resources. "Rehabilitation," at best, in this area is really a euphemism which means dump the by-products somewhere out of sight and hope by some leveling process and reseeding a partial restoration of the land can be accomplished. In impact studies and at hearings no reference is made to reseeding studies or their success. The Utah Audubon Society opposes the use of strip mining—not only in the Colorado Plateau but elsewhere in the United States.

INTERFERENCE WITH WATER TABLE

Although the Farmington plant now taps underground water supplies for coal slurries, no studies are published (for the public at least) on the potential effect on water seeps or springs upon which native inhabitants and wildlife depend for their water supplies. Such an omission is not only neglectful but represents an example of continued arrogant disregard of our society towards wildlife and raises questions concerning the propriety of and ethical treatment of the native inhabitants.

Nowhere in the hearings or the impact statements do I find expression of concern about the use of 300-370,000 acre feet of water per year in an area that is already notoriously water short and in a river drainage that is already badly over-committed. Assuming that the plants will be built (and there should be serious doubt about this, a means of reducing markedly the consumption of water would be the use of so called "dry" cooling towers. Such towers are approximately 2½ times as expensive as "wet" towers and are not ideal for use in large plants, or

in hot, dry climate. Should there not be intensive research to improve this technology for its early use in our semiarid lands?

To summarize—the Utah Audubon Society recommends.

1. Environmental goals should be defined before construction of power generating plants continues.
2. Recognizing the principle of "non-degradation," any available technology must be incorporated in present and future plants.
3. No further development of the power complex should be permitted until thorough studies of the desert ecology have been completed—specifically these should include studies on fauna, flora, hydrology, and "rehabilitation."
4. Strip mining should be considered an inappropriate use of land.
5. The use of "dry" cooling towers should be investigated in the interests of conserving water.

NORTH OGDEN, UTAH, *June 11, 1971.*

Senator FRANK E. MOSS,
6205 New Senate Office Building,
Washington, D.C.

DEAR SENATOR MOSS: I had the opportunity to sit in on the hearings held at Salt Lake City where proponents and opponents to the building of mega-kilowatt coal-fired generating plants presented their cases.

Before attending this hearing I was of the opinion that the hearings were being conducted as a cover-up, as I felt rather strongly that the decision had been made by someone to build the plants regardless of public opinion.

The whole day was spent listening to the various arguments. The meeting was conducted in an acceptable manner except too much time was given to the power companies.

Particular attention was paid to what you said and how you said it. At the end of the hearing I was convinced that you were of an open mind and perhaps leaned a little towards the viewpoint as expressed by the opponents to the power plants.

My reaction to the arguments by the power companies is as follows:

1. They would not build one power plant or build one mile of power lines regardless of the public need unless there was a lot of money to be made, as, for example, the power companies' refusal some years ago to build power lines to needed areas even though power was available and the amount of lines to be constructed was minimal. Such a refusal, you may recall, resulted in the establishment of the Rural Electrification Administration (REA).

2. The power companies did not commit themselves to building into their plants any controls whatsoever. My thinking is that they will not unless they are forced to. Mr. Furniss stated he would do what is legal. Under present State laws in Utah, Arizona, New Mexico and Colorado, this means next to nothing. The same thing holds true as far as federal regulations are concerned. I call your attention to the plant at Farmington, New Mexico where no controls whatsoever have been installed. We need uniform state laws and federal regulations with definite restrictions, perhaps even zero pollution, either in the air or water which may be used. Until such laws and regulations have been enacted and correlated, all construction plants now being constructed and new plants which are in the planning stage should be stopped.

3. Their arguments that technology is not available to guarantee completely clean air and clean water do not hold up, as proved by the conservationists.

4. The power companies' presentation covering air-flow studies was most incomplete. For example, last week I spent considerable time in the area under consideration. During one 24 hour period I travelled an air line distance, about 200 miles, beginning at about 50 miles south of Chinle, the Four Corners Area and into Blanding. During this period the wind was blowing rather strongly from the west, not hard enough to make driving hazardous, but in sufficient strength that for a considerable part of the time one could not see the road immediately in front of the car and without the white median strip on the road one would have had to stop. It was impossible to see the mountains on either side of the road. Sometimes the hills that were within a half mile of the road were not visible. Arriving at Blanding, the dust was still heavy enough to hide the hills west of Blanding. Next morning a considerable amount of dust was still visible as far west as the Colorado River. I don't know how wide the dust belt was, but I estimate it at least 100 to 150 miles. This figures out to be about 25,000 square miles contaminated by dust. This points up the

fallacy of the power companies' arguments that fall-out from plants would not travel very far.

5. Mr. Furniss made no mention of the possibility of using a standard nuclear power plant or a fusion type nuclear power plant or of using geo-thermal generating units at the point of use. There is enough geo-thermal power available under Southern California to supply that area with electrical energy for the next 30 years. Such plants do not need water for cooling. Pollution can easily be controlled and the plants produce fresh water as a by-product. Such plants are in use in Mexico and Europe and we had better "get on the ball" here.

Nothing was said about upsetting the delicate balance of nature throughout the area to be traversed by pipe lines, railroads, transmission lines, services roads, etc. over a vast area. Nothing was mentioned about misrepresenting to the Indians the full impact of giving up their rights to Colorado River water. All they have left at the present time is 12,900 acre feet—about enough water to irrigate 3000 or 4000 acres.

6. The power companies' presentation failed to mention the combined effects of a number of plants operating together. This, in my opinion, is the key point. The public is not being given complete, factual information by the power companies.

7. The power companies are, in my opinion, the wrong people to dictate the type of generating plants to build for the very strong reason that they have a serious conflict of interests involved and therefore they cannot be completely objective.

The opponents did a beautiful job of tearing the power companies apart, not only on the ecology phase of the problem, but also in answering your questions as to the increase in power costs to the consumer if the plants are cleaned up.

On the way home from the hearing I heard a news broadcast to the effect that the Secretary of the Interior had ordered a moratorium on building the power plants in the Four Corners Area. This was good news, as it would appear that no smart power company official would build or even start to build a multi-million dollar power plant until all facets of the problem had been thoroughly explored and the taxpayer had made a final judgment, first, on the need for building the plants, and second, for the type of plants to be built. The power companies would not start construction before the thing had been thoroughly explored unless they had been assured before the public hearings were held that such hearings would not curtail their efforts in any way. This was the point I raised in the first part of this letter.

A few nights after the hearing I read in the Odgen Standard Examiner that Senator Moss and Governor Rampton were terribly upset because the Secretary of the Interior had put a stop to all power plant construction. The Secretary's announcement put the interests of the Public first and was the only way to handle the situation until all facets of the problem had been explored and settled, and certainly this has not yet been accomplished.

The evidence so far leads me to the opinion that the power companies were sure that the hearings would not in any way alter a decision which someone had made prior to the public hearing that the plants would be built. If such is the case, then the public has been very seriously hoodwinked and a considerable amount of taxpayers' money wasted. A little later the Secretary of the Interior made another public statement that he did not mean what he said the first time, so it appears that someone applied considerable pressure on the Secretary to modify his statement.

It won't make any difference to me or you which way the decision goes. It will, however, have a profound effect upon our grandchildren. Let's be sure we do not make the same kind of monumental blunder in the Four Corners Area as has Egypt with the Answan Dam, as the results will be with us from this time out.

At the hearings you said that anyone desiring to submit a paper for the record could do so up until June 25th and that it would become part of the official investigation and would be included in the report. Therefore, I request that this paper and the attached article from Life Magazine of April 16, 1971 be made a part of your report.

(The material referred to was retained in the committee files.)

The following suggestions and ideas are submitted for study by the Interior Committee or whoever handles this matter:

1. That an independent engineering firm be hired to study your report and also any other information that could be made available to them. The firm so chosen that they will not have a conflict of interests as do the power companies, and that the report from such an engineering firm be given the highest consideration.

2. That some better, cleaner way be found to convert coal into electrical energy. For hundreds of years our only way, so far, has been to touch a match to the coal and burn it. Perhaps we can come up with a better way. Turning coal into gas might be one technique.

Burning coal, as we now do, is a tremendous waste. We recover less than 50% of the potential energy in the coal. Coal is not replaceable and this sort of waste should not be tolerated at all.

3. The independent engineering firm should investigate the use of geo-thermal power for the lower California and Arizona areas. I understand that there is a wealth of information available. This information should be gathered and made part of the public record.

4. They should investigate the use of fission and nuclear power.

5. They should investigate the use of standard nuclear power plants located somewhere on the Pacific Coast, where the return of heated water and/or contaminated water could be returned to the ocean and disposed of beyond the continental shelf so as not to upset the ecological balance of the ocean, especially salt water marshes, mouths of streams, estuaries, etc. This might involve the use of titanium for pipe lines laid on the ocean floor and extended to the edge of the continental shelf. Titanium is one of the metals which would not be adversely affected by salt water contamination and could be expected to have a very long life. Research on this metal is available from the SST research program, unless we have dumped this research down the drain.

6. Determination should be made how best to restore areas which have been torn up by roadways, pipelines, and transmission lines. Restoration should include reseeding and restoring the surface to its natural condition.

7. Require all power plants fired by coal to be free of all contaminants emitted to the atmosphere or contained in waste water.

8. Perhaps the most important point will be to make the power companies demonstrate this ability before any new construction is begun or before power plants now under construction are completed. A good place to start would be to force them to clean up the Farmington plant. In the meantime, the power companies should be required to pay a fee deposited to the Federal Treasury, somewhere between \$50 or \$60 a ton for all contaminants emitted. If this is done, you will find the power companies will clean up their plants in a hurry.

9. Determine the fair price to be paid the Indian Nations involved or other people for rights of way, etc. In our own local area, rights of way for low voltage power lines have run as high as \$500 an acre. Perhaps rights of way for multi-million kilowatt transmission lines should be based on the total amount of power transported.

10. There is one more point that should be given serious consideration. The peak population in the Los Angeles area may have arrived or will shortly. Evidence of this lies in the fact that a trickle of people is now leaving that area and moving into Utah, Arizona, New Mexico and Colorado. In talking with a number of these people about their reason for leaving the Los Angeles area their reasons are that life down there is intolerable due to smog, crime, congestion, slow travel, indifferent people, etc. This trickle probably will continue until it becomes a real exodus.

To do less than is suggested in this paper, either in the clean-up area, the right of way fee, etc. or in permitting pollution to exist without just compensation to the public, amounts to a large subsidy. We have had enough of subsidies, for example, the 50 year old subsidy to the radio and TV media.

California will not permit new coal burning generating plants to be constructed under any condition. Why should we poison our air for their convenience?

Sincerely yours,

FRANCIS W. WOODS.

SALT LAKE CITY, UTAH, June 7, 1971.

Senator FRANK E. MOSS,
Senate Office Building,
Washington, D.C.

DEAR SENATOR MOSS: My wife and I attended the power plant hearings in Salt Lake City and have followed the controversy with great interest.

We have been surprised at your apparent bias in favor of the plants (as we were at your support of the SST) especially in view of the very immediate and irreversible effects that this power complex will have on the Indian People,

the ecosystem, the health and welfare of the people of Utah, and the ability of Utah to attract vacationers in the future.

The only possible benefit to Utah comes through construction of the plants and the later sale of coal and water. The drawbacks are many. University of Utah professor James Clayton has shown that in the case of defense installations, a true economic benefit to the area does not exist because the additional services required by the larger population will, in the long run, outweigh the benefit of the installation itself.

In the case of the power plants, most of the jobs provided will be in coal mines. At least in the case of the underground mines, many people will be brought into the state, irrevocably changing the character of many small Utah communities. When the mines close in 35 years, these people and their families will spend, in many cases, more years in ghost towns as wards of the state than they did as contributing members of the society. We must also take into account the dangers of underground mines, and the many victims of the operation who will rely on the state for help.

The importance of the tourist dollar in Utah must also be considered. The construction of the plants, extensive coal mining, and operating pollution over a period of 35 years can do nothing but hurt the tourist gathering ability of the beautiful, almost pristine Southwest. The tourist industry is now one of the most important in the state, and as urban pressures increase, tourism should grow to be much more important. In view of all of these considerations, I doubt that the long range economic benefit to the state of these power plants will be as impressive as at first glance.

Another factor to consider would be the amounts of pollution produced by the power complex. The plants must be considered as a group, since that is how they will actually operate and the effects will be cumulative. Even at the most efficient operation promised by the companies, the result would be *massive* amounts of pollution—and the actual operation of the plants apparently is not as efficient as the theoretical levels promised; the particulate levels, for example, actually run closer to 95% than to 99.5%.

One of the most telling commentaries at the hearing was Dr. Shapiro stating that Kaiparowits alone would not be *as* bad as New York City, but would give off only $\frac{1}{4}$ or $\frac{1}{2}$ of the respective pollutants. Arguing over the relative cleanliness of the plants, when you *know* that they won't be really clean regardless of the percentage figures given, seems much like arguing with a prostitute over the price, once one has decided on the act.

We think that it would be better to call for an objective study of the entire electrical power issue, weighing the long-term impact against the short-term gains, considering the Indian viewpoint, and insuring that the various steps taken to this stage have been taken fairly and openly. If the operation of the complex to this point, and the plans for the new plants, have not been in the best interests of the people and the environment, there is little reason to believe that the same system will do appreciably better in the future.

There appear to be many areas in which the power interests have not negotiated openly and fully, not only with the Indians, but also in acquiring coal leases and land and water rights. There are also aspects of massive thermal generation that seem to have not been studied, not the least of which being the release into the atmosphere of possible harmful trace elements contained in the coal. A statement at the hearing to the effect that the prototype for this type of plant is only .02% of its projected size indicates that Kaiparowitz itself will be a prototype, and no one really knows exactly how it is going to operate, or what the effects will be.

Our suggestion would be to increase research on new forms of power generation, especially fusion and solar radiation. The use of coal reserves for this purpose now only forestalls the ultimate reckoning and uses resources which may be necessary for other, perhaps now unknown purposes in the future.

If this means the rationing of electrical power, and increased costs to the power user, we would welcome such a step. The larger users of power have not paid their share anyway, and there is a fantastic continuous waste of power which higher costs might help curb.

If, in order to effectuate an objective power study and an interim moratorium on plant construction, the national government must take over some functions of the state public service commissions, so be it. We feel that the approaching crises will be of world-wide scope and have such a long range impact that it will outweigh local and immediate concerns.

Yours truly,

CHRISTIAN AND SYDNEY FONNESBECK.

ST. GEORGE, UTAH, May 21, 1971.

HON. HENRY M. JACKSON,
Senate Committee on Interior and Insular Affairs,
Washington, D.C.

DEAR SENATOR JACKSON: The purpose of this letter is to urge you to employ your full power and prestige to prevent the erection of coal burning power plants in the Four Corners area. This area, as you must know, has a beauty unsurpassed on this globe. To dot the area with enormous coal burning power plants that would not only despoil the landscape but obscure this scenic land from the public gaze would be sacrilege.

I would like to call your attention to the article in the Salt Lake Tribune of Sunday, May 16, 1971 on page B-6, by Terry Newfarmer. On this page there is a map showing the various power plants in the Four Corners area that are in operation, are in construction or are in the planning stage.

I am especially concerned about the power plant now under construction at Page, Arizona, the so-called Navajo plant. This plant is to be located about four miles from Lake Powell. *This plant will burn 23,000 tons of coal daily!* The pollution to be anticipated from this gigantic furnace is unbelievable.

The coalition of companies constructing this plant states that 99.5% of the fly ash can be recovered. To my knowledge that high percentage recovery has not heretofore been accomplished. The estimated particulate emission from the plant at Page is 14 tons daily. In addition, it is anticipated that 210 tons of oxides of sulfur and 204 tons of oxides of nitrogen will also be emitted. All of these substances are heavier than air and will fall to earth and seek the lowest level which will be Lake Powell in that area.

There seems to be considerable discussion as to the "impact on the environment" that this plant will make and that the succeeding planned plants will make.

I urge you to assume that the estimates of the emissions from the Navajo plant are correct and that prior to further construction on the Navajo plant, the following pilot study be done.

(1) For a period of 60 days, discharge 14 tons of fly ash into the atmosphere at the Navajo plant site.

(2) For the same period of time, discharge 210 tons of sulfur oxides into the atmosphere at the same site. (These sulfur oxides could very likely be obtained from the Kennecott plant in Salt Lake City.)

(3) Also, for the same period of 60 days, discharge 204 tons of nitrogen oxides into the atmosphere at the Navajo plant site.

(4) Have collection stations at two or three areas around Lake Powell as well as other strategic points in the Four Corners area to detect the concentration of and effect of these pollutants in those areas.

(5) If possible, use labeled (radioisotope) sulfur and nitrogen in order accurately to determine the concentration and spread of these noxious substances.

(6) Multiply by several fold the visible and invisible pollutants and you should have a good estimate of what the Four Corners area will be like when the contemplated power plants are all constructed. It is well to realize also that pollution has accumulative effect for in excess of a simple additive effect.

The above recommendation is a fairly simple and relatively inexpensive means of determining the "impact on the environment" that the Navajo plant will have. I pray that your committee will take this recommendation under serious consideration.

I would appreciate very much if you would incorporate this letter in the hearing record.

Respectfully yours,

CARLYLE F. STOUT, M.D.

STATEMENT OF JOSEPH C. FACKRELL, EXECUTIVE DIRECTOR, INTERMOUNTAIN
CONSUMER POWER ASSOCIATION

Our Organization represents twenty-eight Consumer Owned Electric Utilities located throughout the state of Utah. They are: Beaver, Bountiful, Dixie, Enterprise, Ephraim, Escalante, Fairview, Fillmore, Flowell, Garkane, Heber, Holden, Hurricane, Hyrum, Kanosh, Kayville, Lehi, Meadow, Monroe, Moon Lake, Morgan, Mt. Pleasant, Mt. Wheeler, Oak City, Paragonah, Parowan, St. George, Spring City.

Our Organization believes that plentiful, reliable, low cost electrical energy should be made available to all who wish to use it. We also believe that the

environment of our country should be protected to the maximum possible extent. With these two goals in mind we wish to make the following statement :

1. Electrical energy does more to improve our environment by recycling waste, treating sewage, removing stack particulates, and in many other ways, than it does to degrade the environment. The many benefits that electricity provides should not be denied to any consumer.

2. Appropriate regulations concerning pollution from power producing plants should be enacted and strictly enforced.

3. Taxes or other charges based on the amount of pollutants emitted are merely licenses to pollute and should not be enacted.

Rationing or curtailing power usage is impractical and not in the public interest.

4. Revising rate schedules to penalize the high users of electricity would merely deny the benefits of electricity to low and moderate income families.

5. We should consider again the construction of hydro dams, which are completely non polluting, in Bridge and Marble Canons on the Colorado River and at Echo Park on the Green River. We feel the advantages of this type of power generation far outweigh the disadvantages.

6. In addition to environmental restrictions properly enforced, the following restrictions should apply to any plant built within the State of Utah :

- a. Any power used during construction of the plant and any power distributed in the immediate vicinity of the plant should be supplied by the certified utility serving the area.

- b. Consumers within the state should have the right to use and/or recall for use within the state, on a preference basis, any power generated.

- c. Preference customers, or organizations of preference customers such as our own, should have an opportunity to participate in any plant built, and should not be excluded merely because of our small size.

Thank you for the opportunity to submit this statement.

SALT LAKE CITY, UTAH, May 23, 1971.

Senator FRANK MOSS,
Senate Office Building, Washington, D.C.

DEAR SIR: I would like to say a few words about pollution caused by coal fired power plants such as the Four Corners Plant at Fruitland, N.M. These large plants discharge from their stacks on the order of a few million cubic feet per minute of gases. These are tremendous volumes and the several power plants being planned for the Four Corners area together would be discharging literally billions of cubic feet per day of gas containing deadly poisons into the air we breathe. Though I haven't seen the power companies admit it yet, these gases contain deadly carbon monoxide in the concentration range of about 2,000 ppm to 10,000 ppm (parts per million), possibly more, and prolonged exposure to even 100 ppm is deadly to humans. Also, there is a concentration of from about 1,000 to 2,000 ppm of sulfur dioxide in these gases. It takes an exposure of only about 8 hours to 10 ppm of this invisible gas to kill a human. Not to be ignored are the oxides of nitrogen which are present to the extent of approximately 300 ppm in every cubic foot of gas discharged from a coal fired power plant. Nitrogen oxides are present in air in the concentration range of a few parts per billion due to natural sources and in big cities are what is seen at various times of the day as smog caused by automobiles. During peak smog periods the concentration of so-called NO_x (nitrogen oxides) is only of the order of 0.2 ppm so it's easily seen what billions of cubic feet per day of 300 ppm gas will do to the entire Four Corners area.

Also, I doubt if the power companies could tell you how much of what they prefer to call simply "water vapor" in sulfuric acid mist coming out of their stacks. Last but not least is the threat of serious damage over a long period of time resulting from oxides of metals being discharged from power plant stacks. These metals such as deadly poisonous arsenic, lead, uranium, etc., are commonly present to the extent of a few parts per million in mineral deposits and are quite probably present in these trace amounts in the coal reserves of the Four Corners area. Upon burning millions of tons of coal the oxides of these metals may become very significant in quantity thereby causing a definite threat to the health and safety of the people and agricultural industry of the area.

Finally, I would like to say that it's not the visible fly ash which the power companies plan to remove that is really dangerous but rather the poisonous materials you can't see such as sulfur dioxide, carbon monoxide, nitrous oxide, etc.,

that are most deadly and these substances cannot be removed from power plant gases at the present time because there is no known economically feasible method for removing them. In fact there is not even a method being developed for removal of oxides of nitrogen from power plant gases.

These are reasons why I think every effort must be made to halt construction or planning of any coal fired power plant in the Four Corners region.

Sincerely,

DONALD L. WEBB,
Chemist, U.S. Bureau of Mines.

SALT LAKE CITY, UTAH, June 7, 1971.

Mr. HENRY M. JACKSON,
*Chairman, Senate Committee on Interior and Insular Affairs,
U.S. Senate, Washington, D.C.*

DEAR SENATOR JACKSON: Comments from myself and family for the record concerning specifically the Huntington Canyon thermal-electric powerplant of the Utah Power and Light Company but also the Kaiparowitz, Escalante, Fremont plants in Utah, the San Juan, Fruitland plants in New Mexico, the Mohave, Navajo, and Cholla in Arizona, are contained herein.

My vocation is fish and wildlife biologist, U.S. Fish and Wildlife Service. Also, I am a U.S. Naval Aviation pilot, retired reserve, and part-time ski instructor. My wife, Shirley P. and children, Paul Eliot, Lori Ann, Carolyn, and David Alan Richardson, all at the above address, are as deeply concerned about our Utah and home environment as I. This statement is provided solely from the standpoint of private citizens. My entire family concurs in this statement.

I was able to attend only the last 2 hours or so of the 4 corners powerplant hearing which was conducted by Senator Frank E. Moss, Utah, at Orson Spencer Hall, University of Utah, Salt Lake City, on 26 May 1971. Fortunately, I obtained copies of some of the statements prepared for presentation at the hearing.

My (our) following statement is tantamount of categorically insisting that Utah Power and Light Company (Huntington Canyon plant), Salt River Project (SRP), Arizona Public Service Company, Southern California Edison Co., El Paso Electric Co., and all member companies of the Western Energy Supply and Transmission Associates (WEST) be constrained from any further construction of that already underway and from constructing any more fossil fuel fired electrical powerplants. An absolute moratorium on construction and operation of such plants must be declared. Until facilities are installed and operating in the Four Corners plant and the Mohave plant which will enable the plants to cease damaging and degrading the environment, economically and ecologically, with oxides of sulfur and nitrogen and airborne particulates, they must be required to cease operations. Public consumers of electrical energy, both citizen and industrial, will be obliged to pay more for their electricity to help pay for installation and operation of the required measures. BUT, in the idiom of the day, "IT IS A MATTER OF LIFE AND BREATH!"

Expertise and technology are available right now to accomplish such requirements! Your special attention is directed to the printed statement of Associate Dean Noel de Nevers, College of Engineering (Chemistry) University of Utah. Other papers and testimonies prepared and submitted at or for the hearing referenced in the third paragraph of this letter which should be read completely and very seriously considered are the following:

Forester Ronald M. Lanner, Dept. of Forest Science, College of Natural Resources, Utah State University, Logan, Utah; Dr. LeRoy Kuehl; Dr. Stanley L. Welsh, Professor of Botany, BYU, Provo, Utah; Dr. Gordon Short, Respiratory Pathology, Salt Lake City, Utah; Mr. Gene Foushee, Geologist and Lodge owner, Bluff, Utah; Mrs. Patrick Brennan, President, Utah League of Women Voters.

The above listed testimonies express our thinking and recommendations concerning refusal to subsidize the concerned electrical power companies' employees and stock holders with the environment that rightfully belong to you, us, the citizens of this Nation and peoples of the entire earth. Where is your ecological conscience and that of all those employed by the Federal Government? Of those whose sustenance is paid for by the tax paying citizens of our great land, of those who are made stewards of this earth and of outer space by Him who organized them???? Shall we bite the hand that feeds us??? Or shall we willfully shorten our own personal stay on this mundane sphere???

Enclosed is a clipping from Thursday night's Deseret News. It is helping me to believe that the NATIONAL ENVIRONMENTAL POLICY ACT of 1969 (P.L.

91-190), particularly SECTION 102 (2) (c) is actually fact and not fancy! May the FOE (Friends of the Earth) of BLIND PROGRESS and of the PROGRESS OF THE BLIND (the power consortium, et al.) be instrumental along with all thinking people everywhere in seeing the light while it can still penetrate. After all—what good is the German Mark or the US dollar WITHOUT LIFE!!!!?

What about R and D, pilot plant studies and practical application of alternate sources of energy, e.g., magnetohydrodynamic (MHD), solar, controlled nuclear fusion, geothermal???

Sincerely yours,

LEWIS D. RICHARDSON & FAMILY.

Enclosure.

[From Deseret News, Salt Lake City, Utah, Thursday, June 3, 1971]

SUITS FILED TO HALT SIX PLANTS—POWER PROJECTS THREATEN FOUR CORNERS. GROUPS ASSERT

WASHINGTON.—Two lawsuits designed to halt or delay construction and operation of six power plants in the Four Corners area of the Southwest were filed Wednesday in Washington's U.S. District Court.

The suits were filed by environmentalists and Indians, who asserted the plants threaten the beauty and clean air of the area involved, which includes part of southern Utah.

The National Wildlife Federation and the Environmental Defense Fund filed suit against Interior and Agriculture Departments. The second suit was filed against Interior, Agriculture and the Corps of Engineers by the Sierra Club and the Native American Rights Fund.

SEEK INJUNCTION

The organizations, which asked that the suits be tried together, are seeking an injunction barring federal agencies from cooperating further with development of the power plants until they comply with the 1969 Environmental Policy Act requiring environmental impact statements.

The Interior Department already has issued impact statements on several aspects of the development and has promised a new, comprehensive study.

But the groups that filed the suits allege the studies do not meet the 1969 law's requirements.

STOP PLANS

The suits, if successful, could forestall construction of the huge Kaiparowits plant planned for southern Utah, halt construction already under way at four other sites and even shut down a plant operating near Farmington, N.M.

The court also was asked to invalidate all past federal actions—a wide variety of authorizations and contract approval—underlying the power development.

The Indians asserted, in addition, that in authorizing the power plants, the Interior Department failed in its legal obligation to protect the Indians and their reservations.

FOUR CORNERS

The lawsuits are the third and fourth filed against power development in the Four Corners region.

On May 11, five Navajo Indians sued to invalidate the Interior Department's approval of 1960 and 1966 contracts by which the Navajo tribe permitted construction of the Four Corners plant on reservation land near Farmington, N.M.

They argued that the plant, in operation since 1964, emits more smoke than New York City and endangers their health.

On May 14, religious leaders of the Hopi tribe sued the Interior Department to invalidate a lease for strip mining of coal to fuel the power plants on Black Mesa, a part of the Hopi reservation considered sacred in the tribal religion.

JUNE 3, 1971.

DEAR SIR: Having attended the public hearing on the Kaiparowits power plants, held in Salt Lake City, May 26, 1971, I would like these statements to be entered as part of the record of that hearing.

After following with interest for over five months the growing conflict over the Kaiparowits power plants, I would like to propose a solution:

I realize that to cling to either side of the energy vs. environment conflict with a hear-, see-, and speak-no-evil attitude is a fruitless, narrow-minded, and dead-end course of action. The solution and the future of our state depends on proper utilization of knowledge and power to arrive at a fair and universally suitable compromise.

I propose the formation of an in-depth research committee to delve into every possible effect the Kaiparowits plants could possibly have on geological structures, wildlife, flora, and the human population in the area. Various groups of this committee would be assigned to find solutions to specific problems. Ultimate points to consider might include underground and strip mining methods, gradual dropping of ground level over mined areas, eyesores such as powerlines, tailings, settling and evaporation ponds, smokestacks and their emissions, and the effects of pollutants—invisible as well as visible upon the vegetation, wildlife, livestock, and people. They might also explore the possibility of having one huge plant, centrally located, with all the pollutants 100% eliminated.

I understood from listening intently to speakers at the hearing on May 26, including Messrs. M. C. Titus and John Stratton, that research in regard to any possible environmental damage is incomplete. At one point Mr. Stratton stated that studies on emission levels of all pollutants has not been done. Research and knowledge on the subject is indeed lacking, and extremely necessary before any decision can be made intelligently. Therefore, I suggest that the extremists of both sides co-operate with an all-out study of the present situation and of future problems. I finally believe that the only course possible is to have the plant or plants built, but under the stipulation that all pollutants—atmospheric, aquatic, and terrestrial—be controlled 100% at all times.

The companies involved should, at their own expense, restore with natural vegetation all tailings ponds, access roads, and barrow pits when a given coal supply area is exhausted. As to the cost for the research committee, possibilities lie in university and school projects, donations from ecology groups, fund raising drives, and percentages paid by participating state governments, proportional to the amount of power their state would receive. This would not burden one source only.

The cost of pollution controls, to be decided upon after research, should come primarily from the consumer. With so many people using power, the addition of a fraction of a cent per kilowatt hour would not burden any individual with the cost of clean air. Personally, I would be more than willing to pay more for electricity so that my future children (not to exceed two) and I may live and breathe in the clean air we take so much for granted today.

There will, no doubt, be people who object to the raise in price. It is ironical that many of these same people will take their families on an annual vacation to an area like Grand Canyon or Lake Powell just to breathe the clean pure air, marvel at the beauty of unspoiled nature, and get away from the smoggy crowded city conditions.

Electricity is not an inalienable right in itself, though many people treat it as such; however, I don't imply nor propose that it should be eliminated. I just want to "Keep It Clean" for future generations.

Sincerely,

LINDA DIAL.

SALT LAKE CITY, May 26, 1971.

HON. HENRY M. JACKSON,
Chairman, Senate Committee on Interior and Insular Affairs, U.S. Senate,
Washington, D.C.

DEAR SENATOR JACKSON: I request the following statement be made a part of the hearing record concerning power plants in the Four Corners region.

In view of the attitude and concern of most intelligent and far-sighted persons concerning our environment, I am amazed and shocked that the Federal Government or any state would consider, or even allow to be considered, proposals to install and set into operation any plant or industry which will emit high order pollutants or offensive contaminants into the atmosphere. Even now, concerted effort is being brought to bear on similar installations everywhere with small success in getting them to control pollutants.

How can responsible men in government allow a massive compounding or even a prolongation of such conditions or fail to insure the peoples they represent that *all* future facilities will be *required* to use every necessary device, means, and/or cost necessary to guarantee American Citizens that *all* emissions, visible

or unseen, will never exceed present or future established levels of long term environmental safety.

Finally, as a Utah Citizen, why should we pay "through the nose" for California's lavish, unquenchable lust for more power?

With great concern,

MONTE W. SMITH,
Engineering Technician.

SALT LAKE CITY, June 2, 1971.

HON. HENRY M. JACKSON,
Chairman, Senate Committee on Interior and Insular Affairs, U.S. Senate,
Washington, D.C.

DEAR SIR: Please include this letter in the hearing record on the environmental effects of power plants in the Four Corners region.

We would like to recommend that an immediate moratorium be placed on construction of power plants in the Four Corners area until environmental studies are completed. The air quality of this magnificent region must not be sacrificed for the commercial profit of the power companies or the unrealistic power demands of the cities. The power companies must be required to tap the energy of the region in a manner which will not affect the environment. This will be expensive, and not easily sold by the mass advertising of the power companies.

But the result of these suggestions will be a realistic approach to energy use by Los Angeles and other cities and most important the survival of areas of scenic beauty on which a dollar value can never be placed.

Sincerely,

ALAN A. WICKMAN and JUNE WICKMAN.

SALT LAKE CITY, UTAH, May 24, 1971.

HON. HENRY M. JACKSON,
Chairman, Interior and Insular Affairs Committee,
New Senate Office Building, Washington, D.C.

DEAR SIR: As I learn more about the power plants being planned for the Southwest, I am becoming alarmed at the prospects of the degradation of our environment, our natural resources, and the beauty of the area. I urge the suspension of these power projects and a thorough national study of the environmental ill effects of coal-burning power generation and of strip-mining.

I urge an immediate moratorium on all power plant construction in the Southwest until a thorough national study can be made regarding the national use of electrical energy. We need to determine our priorities with regard to the environment and our increasing demands for electrical power before we embark on projects which have the potential for destroying an entire area.

I wish these comments to be included as part of the records of the hearings which are being conducted.

Sincerely,

MARDEANNE WAHLEN.

SALT LAKE CITY, UTAH, May 25, 1971.

HON. HENRY M. JACKSON,
Senate Committee on Interior and Insular Affairs,
U.S. Senate, Washington, D.C.

DEAR SENATOR JACKSON: Rather than desecrate the Southwest, displace the Navajo and Hopi from such lands as they have left, and turn about the nation's only remaining clear air into sooty murk, all for the sake of continuing and increasing ostentatious consumption in Los Angeles, Las Vegas and other cities, it seems we should begin encouraging more meaningful and worthwhile use of the electric power facilities we have. We would also do well to attempt to ease the so-called power "shortage" by more use of regional interconnections and by more support of development of higher-efficiency generating and transmission techniques, and by rate structures scaled to discourage unnecessary consumption, than by continuing to build plants "because they're there".

Please enter this letter into the record of the hearing on the environmental impact of coal-fired generating plants in the Four Corners region.

Thank you,

Mr. and Mrs. CARL W. EHRLMAN.

SALT LAKE CITY, UTAH, May 25, 1971.

DEAR SENATOR JACKSON: I am writing this in the hope that my interests and those of many of my friends might receive consideration beside the interests of the power companies in deciding the fate of the southwestern United States. I have spent considerable time in Southern Utah, and I am saddened by the slow encroachment of commercial interests into that fascinating wilderness area. It is already clear that my children will see little more than a pale shadow of its present and past beauty.

But while slow development is unavoidable, there is no reason on earth for the massive destruction now being planned by the power companies. Strip mining may leave scars for centuries in Appalachia—it will destroy the Kaiparowits Plateau forever.

If the people of Los Angeles need so much power for their color television, their electric toothbrushes and their neon advertising, they should either put up with the smog which is its by-product or they should pay for the devices necessary to control that smog. We in Utah should not have to pay for their excesses.

I would be more than happy to pay higher taxes so that the people of the big cities can enjoy their power-consuming luxuries, if only they will leave me my air and the beauty of my desert wilderness.

Please include this statement in the hearing record.

Sincerely,

PHILIP W. RYAN.

SALT LAKE CITY, UTAH, May 20, 1971.

HON. HENRY M. JACKSON,
Chairman, Senate Committee on Interior and Insular Affairs,
U.S. Senate, Washington, D.C.

DEAR SIR: I request the following statement be made a part of the hearing record concerning power plants in the Four-Corners Region.

A moratorium on building of power plants in the Four-Corners area should be declared until the true need for power can be established and until adequate pollution controls can be designed for any that must be built. Over populated cities like Los Angeles should not be allowed to have cheap electricity at the expense of polluting the air and endangering the health of people in the Four Corners Region. Irrational exploitations of coal resources may degrade the quality of life of future generations. Educate the public to use less electricity and stop heating their homes with it, if gas were used for heat and cooking this would help. Stop advertising 'power to spare'. Higher costs (rates) for the more electricity used and cheap rates for the least amount used.

Sincerely,

(Mrs.) K. M. BERGER.

Senator HENRY M. JACKSON,
Chairman, Committee on Interior and Insular Affairs, Senate Office Building,
Washington, D.C.

DEAR SIR: I wish to go on record as opposing any further construction of coal fired power plants and accompanying transmission lines and strip mines in the Southwest. I hereby request this statement be made part of the record in the senate committee on insular and interior affairs to be held May 24, 25, 26, 1971.

I urge you to consider the environmental consequences and cultural destruction by coal fired power plants and stripmining in the Southwest. I request and immediate injunction against further construction and mining operations, and ask that you consider less ecologically dangerous power sources.

Sincerely yours,

KENNEY DENNEY.

SALT LAKE CITY, UTAH, May 10, 1971.

HON. HENRY M. JACKSON,
Chairman, Senate Committee on Interior and Insular Affairs, U.S. Senate,
Washington, D.C.

DEAR SENATOR JACKSON: For years we have been enjoying the exquisite scenery and clean air to the Four Corners region, and we view with alarm plans to construct further air-pollution power plants in that area. Living as we do near a

large copper smelter, we know how unpleasant and damaging air pollution can be. We would be extremely disturbed if such an unnecessary evil were to spread through the Colorado Plateau area as well.

To construct these power plants at the expense of severely damaging the most important asset of the region simply does not make sense. It would be much more reasonable to wait to build them until emissions of harmful wastes can be fully controlled. It would also be much more reasonable to wait until conservation-oriented methods of coal mining can replace the destructive and wasteful strip mining methods currently used.

Above all, it would be reasonable to discourage unnecessary use of electricity by the American public so that the construction of such power plants itself becomes unnecessary.

Please include these comments as part of the hearing record.

Yours truly,

JOSEF AND SARA MICHL.

LOGAN, UTAH, May 26, 1971.

HON. HENRY M. JACKSON,
Chairman, Senate Committee on Interior and Insular Affairs, U.S. Senate,
Washington, D.C.

DEAR SENATOR JACKSON: This letter is in vigorous protest of the power plants proposed for the Four Corners area of this country. It is absolutely unbelievable to me that people are even contemplating such development. Because Los Angeles and other such urban areas are screaming for more electricity (which is largely unnecessary), power companies are planning to destroy one of the most scenic areas in the country, Los Angeles smog in the Four Corners area, so that Los Angeles residents can have more air conditioners, electric can openers, and other such unnecessary uses of power. Incredible!!!

I ask that your committee declare a moratorium on future building of power plants in the Four Corners area. More research needs to be done on amount of pollution produced and the true need for generation of this power. To my mind, it is a question of preserving recreational areas for future use or generating power and pollution for present consumption—short versus long term view.

Please include this letter in the hearing record. I am sorry that I cannot send the required 50 copies; I am a graduate student and have limited funds.

Hopefully,

CHRISTIE STEKETEE.

SALT LAKE CITY, UTAH, May 21, 1971.

HON. HENRY M. JACKSON,
Chairman, Senate Committee on Interior and Insular Affairs, U.S. Senate,
Washington, D.C.

DEAR SENATOR JACKSON: I am writing because I am concerned about the construction of more power plants in the four corners area of Utah, Colorado, Arizona, and New Mexico. The four corners area is one of the most beautiful and varied landscapes in the country—or in the world, for that matter. Its contours and colors have been shaped by nature for hundreds of thousands of years. Now we, in our ignorance, can ruin all that in a few short years. If the four power plants planned for the area are added to the two already there, parts of the region will have air pollution greater than Los Angeles or New York; perhaps even worse, large portions of the area will be strip mined for coal (for example, over four hundred acres per year at Black Mesa). The prospect of any part of this beautiful region becoming a moonscape of scarred earth and piles of dirt is frightening. I hope that you have seen this region yourself—its delicate flowers, its cactuses, banks of grass, beautiful deserts, large forests, eagles, lizards, and rivers. It is incredible. But these power plants will ruin it, not only for us but for generations to come. Can we afford to have this cavalier attitude toward the past and the future, for the sake of theatre marques, electric can openers, and air conditioners in the present? Can we afford the danger to human health, the reckless use of water, the damage to the land, air, and wildlife that the power plants would result in? I hope that you and your committee will show the American people that the power and influence of the utility companies are not absolute; I hope that you will put the issues in perspective, that you will look both to the past and the future, both to the eons that have made that area what it is, and to the future generations who

might be deprived of its breathtaking beauty. I hope that you will halt, once and for all, the construction of power plants in the four corners area.

Sincerely,

JOHN VERNON.

LOGAN, UTAH, May 24, 1971.

HON. HENRY M. JACKSON,
*Chairman, Interior and Insular Affairs Committee, Senate Office Building,
Washington, D.C.*

DEAR SENATOR JACKSON: I strongly support the suspension of all coal power projects in the Four Corners region.

The uncertainties of the effects on air, water, land, and recreational resources are reason enough to suspend these projects.

Of even greater concern is the philosophical question as to the right of southern California, an area obsessed with profligate growth, to exploit the resources of the land and people—the Navajos and Hopi—who are living within their means.

Power companies have used irresponsible advertising in creating consumer demands for electrical gimmicks and I see no valid reason that the Four Corners region should be abused to support southern California.

Sincerely,

GEORGE E. HART.

LOGAN, UTAH, May 20, 1971.

HON. HENRY M. JACKSON,
*Chairman, Senate Committee on Interior and Insular Affairs, U.S. Senate, Wash-
ington, D.C.*

HON. SENATOR JACKSON: I write to oppose the continued construction and operation of thermal powerplants in the Southwest deserts of this country. The statistics on contamination of the air (240 tons of ash, 2000 tons of sulfur oxides, and up to 1300 tons of nitrogen oxides *PER DAY*) are staggering. The potential harm to the desert ecosystem is incalculable.

It is inconceivable that Western Energy and Supply Transmission Associates are motivated by anything more than a profit margin. The only reason the plants are planned in the desert area in the first place is that the pollution laws are stricter in California. Too often in this country industry and destruction of the environment have been inseparable. *We cannot have more destruction on the scale of the past. Industry must adjust its methods.*

On an algebra examination, an equation that doesn't balance is merely marked wrong. In pollution of our environment, we are literally playing with the survival of present forms of life on earth. Who knows what selective forces might be activated, and who knows what the results would be, besides initial high mortality? Ecological research has shown that the earth's systems of nutrient cycling, water and air circulation, climate, energy flow, and more are very highly integrated. To advocate programs which had to the imbalance of the system is insanity. As a man shortly to receive a Master's degree in Animal Ecology and as a citizen I write to oppose this program.

There must be another way.

Urgently,

RICHARD T. PAUL.

HON. HENRY M. JACKSON,
*Chairman, Interior and Insular Affairs Committee, New Senate Office Building,
Washington, D.C.*

DEAR SIR: A few years ago I purchased a lot, for retirement purposes, located just a few miles from Bullhead City, Arizona which cost me a little over \$3000.00. I purchased this property because I liked the desert sunshine and clean air.

Since the purchase of my lot a coal burning electrical generating plant has been constructed across the Colorado River from my lot. I know that many people in this area as well as myself are not elated over the construction of this air pollution machine.

I think it is a dam shame that an average working man takes a part of his life savings for a retirement place and then is supposed to accept the consequences of actions taken by large corporations. They say money can buy anything and this proves it to me.

In other words I'm informing you for whatever good it does I am against the pollution from the Mohave generating plant and similar plants being constructed in the south west.

Please include my views and statements in the hearing record.

Yours truly,

WILLIAM H. SHOLINE.

SALT LAKE, UTAH, May 24, 1971.

HON. HENRY M. JACKSON,
*Chairman, Interior and Insular Affairs Committee, New Senate Office Building,
Washington, D.C.*

DEAR SENATOR JACKSON: We are greatly disturbed over the development of the coal burning power plants in the South West of our nation. Since this type of electricity generation has been banned in many parts of the United States, it seems uncomprehensible that we could allow our precious Southwest area to be polluted and disturbed in such a manner.

We strongly urge the suspension of all power projects in the Four Corners area. We would like to see a reduction in the demand for electricity, including a ban on all promotional advertising by the utilities, and the establishment of rate scales which charge the large user more per kilowatt hour than the small user. We also urge the enactment of legislation which would authorize extended research into alternate methods of energy production which would correct and compensate for the huge burden the people and companies now place on our natural resources.

Respectfully,

GARY AND BARBARA ANDERSON.

MOAB, UTAH, May 20, 1971.

Senator HENRY M. JACKSON,
*Chairman, Committee on Interior and Insular Affairs, Senate Office Building,
Washington, D.C.*

DEAR SIR: I wish to go on record as opposing any further construction of coal fired power plants and accompanying transmission lines and strip mines in the Southwest. I hereby request this statement be made part of the record in the senate committee on insular and interior affairs to be held May 24, 25, 26, 1971.

I urge you to consider the environmental consequences and cultural destruction by coal fired power plants and strip-mining in the Southwest. I request and immediate injunction against further construction and mining operations, and ask that you consider less ecologically dangerous power sources.

Sincerely yours,

ROBERT OSSANA.

SALT LAKE CITY, UTAH, May 20, 1971.

HON. HENRY M. JACKSON,
*Chairman, Senate Committee on Interior and Insular Affairs, U.S. Senate,
Washington, D.C.*

DEAR SIR: Some people regard the desert country as barren, inhospitable, worthless land. Such people have not taken the time or made the effort to expose themselves to the gentle charm of these great land areas.

I, for one, love the great deserts. I love their cobalt skies, their great unbounded vistas, their magnificent rock formations, their stands of juniper and pinon and their abundance of fresh, pure air. To me they represent a treasure beyond price and ought to be jealously guarded against those who would despoil them.

There is a healing quality in the silence and the freshness of wilderness area (whether it be forest or desert) which seems to be vital to the spiritual welfare of the individual. If these areas are contaminated or defaced, then we have been robbed of one of our most priceless possessions and we become subject to the spiritual diseases so common in our urban areas which find expression in many forms of violence. As the population grows, so the need increases for wilderness areas in which the spirit of man can revive itself.

We must not lose contact with mother earth or our lives will become shallow and artificial. I submit, therefore, that our unspoiled wilderness areas are our most valuable earthly possession and must NOT be traded away.

I would strongly advocate a sane, sensible approach to the problem which would measure sacrifices against imagined needs so that we do not find that we, as Esah of old, have "sold our birthright for a mess of pottage."

Respectfully,

ARDEN G. OLSEN.

THE UNIVERSITY OF UTAH,
Salt Lake City, June 10, 1971.

HON. HENRY M. JACKSON,
Chairman, Interior and Insular, New Senate Office Building, Washington, D.C.

DEAR SENATOR JACKSON: We would like to express our great concern over the operation, construction and planning of the thermal electric power plants in the Colorado plateau and four corners desert area. After reading accounts of the recent Salt Lake City hearings and other sources of information, we feel that the power needs of the Southwest should be met by these types of plants only if the resulting pollution is better controlled. The control services may make the production of electric power a more costly process, but as consumers of this power we must be willing to bear the additional costs.

The continuation of these plants as they are now operating is unthinkable in terms of their effect on our air and the recreational land near the plants.

Thank you for the consideration of our views. Please include our comments in the records of the Salt Lake Hearings.

Sincerely,

DR. AND MRS. DONALD P. HARTMANN.

SALT LAKE CITY, UTAH, June 3, 1971.

HON. HENRY M. JACKSON,
Senate Committee on Interior and Insular Affairs, U.S. Senate, Washington, D.C.

DEAR SENATOR JACKSON: I have done much reading in the area of thermal-electric power and attended the hearings in Salt Lake City on May 26th. I am aware of the large financial benefits that the power plants have and will have in the Four-Corner Region and I am also aware of the fact that many of the counties down there need a raise in their standard of living. But after much thought and research on this topic I have come to the conclusion that there have been no assurances in the past that the plans will not seriously harm the environment and there are no concrete assurances that proposed plants will not do likewise. We have reached the turning point—I believe that we can no longer take risks with our environment. We are at the stage where we have to know exactly what the impact will be of *all these power plants together*—and no one, including Mr. Titus of Utah Resources can tell us what the impact will be. In our day and age, no one can convince me that we do not have the technology to determine what the impact will be. We do, or if we do not, it can rapidly be developed and researched out. And before a plant is in advanced planning stages.

Unless the elected officials of this land stop considering the economic benefits first and the environmental benefits or harm last, we will never get anywhere but into more and more pollution. At the hearings, time after time, economic benefits were mentioned to the point where the listener became aware that politicians and utility men and local representatives from counties where the plants would be, had been blinded to other factors. And I am sure this was not lost on Senator Moss. I declare that it will be a tragedy if the impact on the environment does not get top attention in this issue. It is my opinion that industry despite all attempts to the contrary, has failed to assure us that the environment will not be adversely affected by the plants. They have proven themselves very reluctantly to include the best available pollution equipment in their plans—too expensive I am told. Instead, they spend huge sums of money advertising increased usage of electricity.

It is my opinion that the Navajo and Kaiparowits plants should not be built. They are too close to numerous recreation areas, parks and monuments. I know they will pollute—you know they will pollute. Industry in this country is not yet at the stage where they feel they have to clean up—only when the government tells them to. And our federal and state governments are too influenced by industry lobbies to enact and enforce decent emission and ambient air standards.

Yours truly,

LAWRENCE C. W. JENSEN,

OGDEN, UTAH, June 14, 1971.

HON. HENRY M. JACKSON,
*Chairman, Senate Committee On Interior and Insular Affairs, U.S. Senate, Wash-
ington, D.C.*

DEAR SENATOR JACKSON: This concerns proposals to build additional coal generating plants in the Four Corners region of the Southwest.

I have just returned from London and would have appeared at your Salt Lake City hearing on May 27 had I been here. About 15 years ago London cured its terrible smog problem by banning the burning of soft coal for all purposes.

Certainly we in this country should profit by London's experience and prohibit the use of soft coal in the gigantic quantities involved for the Kaiparowits, Navajo and other plants until industry has demonstrated the know how to remove the sulfur oxides, nitrogen oxides and fly ash.

Sincerely,

JOHN M. HERBERT.

LOGAN, UTAH, May 24, 1971.

HON. HENRY M. JACKSON,
*Chairman, Senate Committee on Interior and Insular Affairs, U.S. Senate, Wash-
ington, D.C.*

SIR: I feel that such plants should be located nearer to the centers of population which expect to gain the benefit of the generated power. If these areas need the power, then they should be willing to put up with the by-products of pollution.

The money that is to be spent to build these plants could be put to better use in educating the public as to the more efficient use of electricity, not how to use more electricity.

The southern part of Utah depends very much on tourism for its major income. The operation of these proposed power plants will all but kill tourism in this area, not to mention what they will do to the permanent residents of the area and the environment itself.

The benefit of additional power for the large cities of Arizona and California is not worth the slow death of one of the last clean areas in the United States.

Again, I oppose coal fired power generation in the Four Corners Area.

Respectfully,

JAMES W. FAIN.

PANGUITCH, UTAH, May 22, 1971.

HON. HENRY M. JACKSON,
*Chairman, Senate Committee on Interior and Insular Affairs, U.S. Senate,
Washington, D.C.*

DEAR SENATOR JACKSON: For most of those who will testify at the hearings the issues in the controversy will center largely around whether the plants will affect the recreational values of the area. For those of us who live here, however, the issues are far more basic. If the plants are constructed as planned it is those of us who live in southern Utah who will have to live with them day by day. Right now our most precious heritage is that our air is relatively clear and our land is free and untrampled. One can see beaver in our streams, deer in our meadows, and wildflowers blooming in profusion along unpolluted stream courses. This is the kind of experience which is becoming increasingly rare in this country, and it is the reason why most of the residents of this area live here. If money were my object I could make more living almost anywhere else, and this is true of most of us. We stay because of something of far more worth.

The values we treasure, however, are being threatened by a power complex whose major purpose is the generation of electricity for cities hundreds of miles away. Having made our major cities uninhabitable, we are now proceeding to turn the last vestiges of wilderness America into fly ash dumps to satisfy the insatiable power demands of the Pacific southwest. By now it is becoming increasingly clear that we can no longer go on devouring power at ever-increasing rates. Someday, probably soon, we will have to take stock of our real needs and come down to earth on our use of power. My fear is that such a day will come too late to save my home and those of my neighbors from a poisoning our city dwellers have already come to regret. It makes no sense to try to solve the pollution problem in one area by dumping it somewhere else, especially when that somewhere else is an area of supreme natural beauty which should be held in trust for the

enjoyment of all future generations. Even at best the Navajo and Kaiparowits plants will spew enough SO₂ and fly ash into the air to make Page a second Los Angeles, and the temperature inversions so common to the area will compound the problem beyond belief. I respectfully urge you to do everything in your power to see that the degradation threatening this area is stopped before it can go any further.

Sincerely yours,

HANK HASSELL.

SALT LAKE CITY, UTAH, June 2, 1971.

HON. HENRY M. JACKSON,
*Chairman, Senate Committee on Interior and Insular Affairs, U.S. Senate,
Washington, D.C.*

DEAR SENATOR JACKSON: I am writing this letter in protest to construction of fossil-fueled power plants in the South West region without total environmental control. No pollution should be permitted to enter the atmosphere from these proposed plants either thermal, gaseous (oxides of carbon, sulfur and nitrogen) and/or particulate (fly ash). These objectives can be reached in designing these new plants although costs will be increased. Consumers of this power should be willing to pay the price. I am.

The power plants which are already in existence should also be made to adhere to similar environmental controls within the very near future (1-2 years). These existing plants cannot be allowed to continue polluting the air.

Peabody Coal Co. should be forced to quit destroying Black Mesa by using mining methods incompatible with existing environment. This is a national disgrace and should be stopped.

Thank you for this opportunity to present my views of these subjects.

Sincerely,

WALTER STEVENS, Ph. D.

SALT LAKE CITY, UTAH, May 23, 1971.

HON. HENRY M. JACKSON,
*Chairman, Interior and Insular Affairs Committee, New Senate Office Building,
Washington, D.C.*

DEAR SENATOR JACKSON: I, along with many other Utah citizens, am very concerned over the environmental effects of the coal burning power plants planned for the scenic Southwest. The exploitation of this unique area by a consortium of power companies, comprised in the main by California concerns, needs the careful attention of your committee. I ask that the following remarks be included as part of the Senate Interior Hearings in the Southwest.

It is difficult to see how coal burning power plants, electrical needs notwithstanding, can be in the true public interest. The planned Kaiparowitz Generating Station, under the presently proposed controls will emit an estimated 513 tons of SO₂, 450 tons of oxides of nitrogen and 100 tons of flyash daily. That is more air pollution than that produced by New York City and Los Angeles combined! In addition, the associated strip-mining, which has so devastated lands in the East, should not be allowed to establish a strong foothold in this relatively untouched desert land of wild beauty. Then, as if these considerations were not sufficient to cause one to pause before proceeding blindly with further construction of such plants, there is the problem of water. The Colorado River Basin, which will house all of these plants, is an arid region. The wanton consumption of water from an area already short of this vital resource seems grossly irresponsible, if not criminal.

I urge an immediate moratorium on the further construction of these plants until it can be shown that they will not devastate the environment, that they will not endanger the health of the people living in the Four Corners area. If these concerns are not considered valid enough by your committee to provide such a moratorium, I urge that optimum controls be mandatory and enforced. Of equal importance, I urge the development of an energy ethic. That is, steps must be taken *now* to reduce the demands for electrical energy; demands which are often artificially created by the power companies themselves. We must be responsible enough, reasonable enough to recognize that our resources are finite. Therefore, a ban must be placed on the irresponsible advertising practices of these "public" utilities. Their rate scales must be revised to charge the larger user more per kilowatt hour than the more prudent consumer. Our consumption

must be reduced rather than increased. We can no longer continue to flagrantly waste the earth's natural resources. We must take immediate steps to reverse a trend that can only end in the complete depletion of those resources along with the ultimate destruction of our planet.

Yours truly,

NOREEN OGDEN.

SALT LAKE CITY, UTAH, May 26, 1971.

HON. HENRY M. JACKSON,
Chairman, Interior and Insular Affairs Committee, New Senate Office Building,
Washington, D.C.

DEAR SENATOR JACKSON: Members of the Interior and Insular Affairs Committee are now conducting hearings in this area concerning electric power plants in operation, under construction and in the planning stage in the Four Corners area of Utah, Arizona, New Mexico and Colorado, and other parts of the Intermountain West. An intense propaganda campaign is being conducted in this region in opposition to the construction of new power plants in these areas and other parts of the country by a number of environmentalist groups including the Sierra Club, Central Clearing House and others.

In the light of the very vocal demands of these groups, I should like to express my strong support of a policy of continuing to make use of our resources and improve our technology for the betterment of this and future generations. In my judgment the development and utilization of coal burning electric generating plants in the Four Corners area and other Intermountain locations is sound and should move ahead without delay to help meet our increasing needs for electric power. Likewise, we should continue the development of electric generating plants that use energy from other sources, including nuclear energy.

This is not to say that such plants should be built with a complete disregard for the pollution of our environment. Such safeguards as are economically feasible should be built into these and other facilities now under construction and in the planning stage, and those that are now in operation. Research and development of more effective and practical safeguards against pollution should receive high priority.

I do not share the pessimism of many of the environmentalists who predict gloom and destruction of our land and its inhabitants. Within recent decades man has developed knowledge and technology and have advanced his status far beyond anything we know of in the past, and I believe this process has just begun—that our knowledge, intelligence and technology have the potential of elevating mankind to heights not now dreamed of. Our problem, it seems to me, is to keep our course directed toward constructive ends, and I believe that on balance man is constantly showing improvement in this regard.

The solution to our problems is not to abandon our increasing ability to sustain greater populations in more effective ways, to abandon our technology, to turn around to a "back to nature" movement. The solution is to continue to make the best possible use of the things we know how to do and to search out ways to do them better, taking advantage of such improvements as we go along.

At the risk of being somewhat immodest, I should like to point out that I do feel qualified to speak on this matter. My formal training was in the field of engineering. Throughout my business career I have had close contact with technical, economic and environmental aspects of power generation and utilization over much of the western part of the country, in both technical and administrative capacities, including my present position of President and Chief Executive Officer, with Utah-Idaho Sugar Company.

I earnestly urge that your Committee give its full support to the continuing development of energy resources in the Four Corners area and other parts of the country where feasible development can be made. Will you kindly make any comments a part of the Hearing record?

Sincerely yours,

ROWLAND M. CANNON,

SALT LAKE CITY, UTAH, May 26, 1971.

Senator HENRY JACKSON,
Chairman, Senate Committee on Interior and Insular Affairs, New Senate Office Building, Washington, D.C.

DEAR SENATOR JACKSON: I am an ecologically concerned citizen of Utah. I think that the "Four Corners" area should be kept, as much as possible in reserve for the future. It is such a pretty place and really is unique.

The Kaiparowits power plant shouldn't be built because it could only harm Utah, ecologically and economically, in the long run. For the plants already started or in existence, I think that stringent air pollution standards should be required and tough surveillance be kept up constantly for compliance.

As for strip mining, I'd like you to ban it entirely from the U.S., these mines are eyesores and polluters of the water supply. Unless strict reclaiming or revitalizing rules are enforced, the whole Four Corners area could look like a disaster area.

Please include this letter as part of the hearing record of the "Four Corners Industrial Complex" held in Salt Lake City, Utah on May 26, 1971.

Sincerely,

SUSAN K. BARNHILL.

SALT LAKE CITY, UTAH, June 26, 1971.

HON. HENRY M. JACKSON,

Chairman, Senate Committee on Interior and Insular Affairs, U.S. Senate, Washington, D.C.

DEAR SIR: I am writing to voice my opposition to the construction of the Kaiparowits power plant. I don't believe that there is any way this plant can be built without emitting large amounts of both highly visible and dangerous particles, and aside from the ecological questions involved here, this would have seriously detrimental economic consequences.

I feel this plant would be unsound economically for the following reason: as our population, affluence, and per capita consumption increase, the demand for recreational space will multiply accordingly. This demand will place a premium on unpolluted, open, free country, removed from the ugliness and hate of today's population centers. At present, the area containing the Grand Canyon, Lake Powell, and Monument Valley, the areas surrounding the place where this plant would be built, is one of the most open, free and unpolluted places in the country. It is also one of the most popular recreation centers in the West, and as mentioned above, will become increasingly valuable in the years ahead. It is not hard to see that with a little thought the Southwest can become one of the prime recreation centers of the country, bringing in millions of dollars of revenue to otherwise poor states.

Keeping these facts in mind we cannot help but realize that any construction that would put hundreds of tons of pollutants into the air every day would damage terribly the recreation possibilities of an area. No one wants to go boating on a lake where the air is three times as thick as in the city he left. And there is no doubt in my mind that the air indeed become this dirty if the plant is built. The Four Corners plant has amply demonstrated just what pollution control means to the power companies in this "age of ecology." We are no longer swayed by talk of "99% efficiency." We have yet to see a totally clean power plant, and in this unique wonderland, nothing else will do.

The issues concerning this plant go much deeper than figures about tonnages and kilovolts. At stake is nothing less than the humanity and wisdom of the whole government power structure. To sacrifice freedom and beauty to the insatiable demands of a power-crazed mob is to deny our ability to plan with foresight, our ability to realize just what it is that makes life joyful in this country; it is to deny our own intelligence, and in the end, our own humanity.

Sincerely yours,

MARION DICKMAN.

WASATCH MOUNTAIN CLUB,
Salt Lake City, Utah, May 25, 1971.

HON. HENRY M. JACKSON,

Chairman, Senate Committee on Interior and Insular Affairs, U.S. Senate, Washington, D.C.

DEAR SENATOR JACKSON: I am writing to you on behalf of the more than 700 members of the Wasatch Mountain Club, so that our position can be incorporated into the record of the Power Plant Hearings which you will be conducting in our area this month. Our organization is primarily concerned with out-of-door activities: hiking, mountain climbing, ski touring and river running. Although we are not organized as a conservation club, we nevertheless feel that the question of power plants in the Four Corners area is so critical to our activities that we must speak on this issue.

"We of the Wasatch Mountain Club are neither against progress, nor against power. If our lights grow dim we will complain as loudly as anyone else. We are deeply concerned, however, with the present proposals for power plants in the Southwestern United States. We feel that environmental considerations have not been given adequate weight in the planning of these facilities. We are particularly disturbed by the half-hearted manner in which the power companies are responding to the challenge of reducing stack emissions, a challenge which they are attempting to meet more by public relations than by engineering skills. We are concerned that part of the increasing demand for electrical power, which is used as the justification for construction of these facilities, is being artificially generated by advertising, and by rate schedules which encourage excessive and wasteful power usage. Most of us are Utahans by choice; a choice determined, in part, by our belief that Utah is a better place to live than most other parts of our country. While we are not adverse to industrial development, we cannot help but notice that those states which have had the highest rate of industrial growth are exactly those in which we would least like to live.

Senator Jackson, you are the guardian of our rights in this matter. We urge you and your committee to ascertain that no power plant will be built in Utah, Colorado, Arizona or New Mexico which detracts from the overall desirability of this area as a place to live.

Thank you,

SHERMAN BLOOM,
Conservation Director.

THE UNIVERSITY OF UTAH,
COLLEGE OF MEDICINE,
Salt Lake City, May 20, 1971.

HON. HENRY M. JACKSON,
*Chairman, Senate Committee on Interior and Insular Affairs, U.S. Senate,
Washington, D.C.*

DEAR SENATOR JACKSON: The medical effects of the emissions from such plants are severe and lead to a very unpleasant and lingering death for those unfortunate enough to be its victims. The economic losses from tourists turned away from one of the greatest attractions in the United States would cause the residents of the region to suffer reverses to satisfy the needs of a distant state. In view of the effort to lure American tourist away from Europe and to "see America first" it might be wise to leave a few spots for them to see, unobstructed by smog. If the citizens of California had the good sense to outlaw emissions of the magnitude involved in these plans surely they did not expect the peoples of other states to put up with this degree of pollution in order to allow them to continue an ever increasing demand for electric power. There is almost a sense of the comic in the situation in which power companies insist they need more power sources, then spend millions to entice consumers to ever greater uses of electricity so that the power will not go to waste. They then request more sources when their advertising is so effective that the initial supply is insufficient. The advertising is misleading and creating a false market. Electric heat is expensive and inefficient. The "8 out of 10 housewives who prefer an electric range" must live in Outer Mongolia. I've never met them and most certainly am not one of them. Then there is the natural beauty of the land to be considered. One sometimes gets the feeling this is not considered germane in Washington although recent events have been encouraging. Open pit scars, mounds of overburden, grey skies, economical straight-line roads and railroads truly destroy the harmony that makes the desert so appealing.

Finally, if the reports are true that the Arizona Public Service Company installed only one third of the pollution-control equipment specified in its contract with the Department of the Interior, the Four Corners plant should be shut down until the requirements are met. This example of the integrity of the power companies, coupled with the loose wording of the contracts, bodes ill for the future of the southwest.

I am unable to send 50 copies as requested, since I do not have the financial resources of the power companies. I trust this will not be prejudicial against my opinion.

Sincerely yours,

ANN R. WENNHOLD, M.D.,
Asst. Research Professor.

LOGAN, UTAH, May 23, 1971.

HON. HENRY M. JACKSON,
Chairman, Senate Committee on Interior and Insular Affairs, U.S. Senate,
Washington, D.C.

DEAR SENATOR JACKSON: I write to you concerning the proposed consortium of power plants (WEST) in the four corners area of the western states.

I seriously object to the construction and operation of the power plants in the last remaining wilderness areas of the western, in fact, the entire United States. I think such blatant disrespect and lack of insight toward the environment and the energy problem must be thoroughly restudied with emphasis not on land destruction (400 acres per year will be strip mined and in such a fragile environment it would take many years for the environment to recover even considering intensive man interference, as well as, upwards of 880 tons of sulfur oxides emitted daily), but on a new energy ethic. We are not answering the ultimate question by producing six short run plants to provide power for Los Angeles by seriously damaging the western deserts.

The answers are population stabilization plus methods to control electrical output. These areas need be studied and immediately put into effect. In 35 years the coal will be gone, the desert turned into a land of acidic soil, the underground wells of water depleted, many canyons filled with slurry, hundreds of Navajos and Hopis displaced, and tons of particulate matter, sulfur oxides and nitrogen oxides (all deadly lung poisons) will be part of the once blue skies (from 141-880 tons of SO₂ emitted daily from the six proposed plants, from 93-450 tons of NO₂ emitted daily, and from 6-320 tons of particulate matter emitted daily). All for southern California's rampant growth and misuse of energy. And it is all being produced in the western U.S. because of severe emission controls in southern California.

But, now imagine, in 35 years the coal will be depleted. California will still be growing and more energy will be needed!!

Most respectfully,

RICHARD CARTER.

WOODS CROSS, UTAH, May 20, 1971.

HONORABLE CHAIRMAN: Why should we of the desert Southwest be asked to tolerate air pollution on an immense scale to supply power to Southern California? If they want the power, let the price bear the cost of a clean operation.

I have observed that the smoke from campfires can seriously limit the visibility at the Grand Canyon. If smoke from a few campfires can hamper the visibility at the Grand Canyon, what will the emission of hundreds of tons of sulfur oxides, nitrogen oxides, soot and fly ash do?

Have you seen the volume of pollutants presently coming from the Fruitland Project? Please look.

I love the Grand Canyon. I beg of you, do not destroy it. In my opinion the Grand Canyon is the grandest thing in the world. Please save it.

Mr. J. B. DEWELL.

SALT LAKE CITY, UTAH, May 18, 1971.

HON. HENRY M. JACKSON,
Chairman, Senate Committee on Interior and Insular Affairs, U.S. Senate,
Washington, D.C.

DEAR SENATOR JACKSON: I am alarmed and somewhat incensed at the permissiveness of the United States government in allowing the huge power companies to reach such an advanced stage of building and planning before public hearings are held to determine the need, safety and detrimental effects on the environment of such installations. I refer, of course to the Four Corners power plants already in existence and/or projected for one of the most scenic and beautiful areas of our country.

I resent, as a citizen of Utah, the rape of our land and air and water so that California may have cheap electrical power which they will not allow to be provided within their own boundaries tapping their own resources...

I deplore the federal government's long history of exploitation of the American Indian lands wherein treaty after treaty and contract after contract have been nullified under pressure from mining, logging and power interests in the specious name of economic growth. These projects in the Four Corners area will pollute their air, steal their precious water, strip mine their sacred mesas and mountains

and cross their grazing lands with huge scarring roads while providing in their contract a skillful loophole which will permit them even to escape responsibility for restoring the land after they have had done with it. Despite all the usual rationalizations, this is cruel, covetous and dishonorable.

I deplore also the slick and constant advertising by the power companies to induce an ever-increasing demand for more electricity far beyond what is necessary so that they can seem to justify their proliferating installations. Far better that electricity should be rationed than that more and more luxury uses should be demanded by an American public in response to tempting advertising by greedy power companies. Furthermore, these plants will be able to function only a few years, relatively speaking, since the supply of coal and water is definitely limited.

The consumption of electricity must be drastically curtailed and the population stabilized or there will be no electrical power sources left in a hundred years—or even fifty years from now. An Energy Ethic must be established now—this is the time and the place. Stop these plants from being built to pollute the environment on or near Indian lands in this pristinely beautiful country. Start rationing or reducing the demand for electricity now or there will be no tomorrow for electric power.

Sincerely yours,

Dr. RUTH SHAW WYLIE.

SALT LAKE CITY, UTAH, May 26, 1971.

HON. HENRY JACKSON,
Chairman, Senate Interior Committee, New Senate Office Building, Washington, D.C.

DEAR SENATOR JACKSON: Although the need for electric power is undoubtedly great in the southwest area of the United States, the rights of the American people living in that area and the rights of all those who will visit that area, should be considered. The estimated 1,100 tons of sulfur dioxide pollutants that will be poured into the atmosphere daily by the Kiaparowits plant and others, must be required to be removed from the smoke stacks and made into by-products. If modern technology is not capable of this, the plants should not be built!

The writer offers an alternate source of energy that is entirely pollution free. Solar energy, which is available in unlimited amounts, should also be considered. This would require research by the U.S. government in the opinion of the writer, who is the inventor of the Young Solar Furnace. Batteries of these furnaces could be used in semi-tropic areas of the United States and in tropic desert areas of the world, making possible the reclamation of millions of acres of land that could be put into use for agriculture, etc. Sea water could be pumped into canals that could transport it into these areas, where it could be converted into fresh water by solar stills or multi-stage flash-evaporation plants.

In addition, the Young Solar Furnace would operate with maximum efficiency on the surface of the Moon, where it could be used as a source of electric power for permanent bases there. Figures from the NASA Facts Publication NF-38/12-67 indicate that semi-conductors "can be used to convert 4-5 per cent of the heat to electricity." However, in comparing forms of energy conversion, the steam-electric generator is much higher than other forms, attaining a rating of 55%, according to the proceedings of the Solar Energy Conference held in Phoenix, Arizona in 1955.

One Unit of the Young Solar Furnace is capable of concentrating solar heat energy from an area of 7,800 sq. ft., focusing it into a stationary boiler for use by a steam-electric generating plant. The design of this concentrator is twice the diameter of the one built by Goodyear Sunstrand Aviation for the Air Force Solar Program, which can produce temperatures in excess of 2000° at its focal point.

Batteries of the Young Solar Furnace could produce unlimited amounts of electric energy during daylight hours in desert areas of the U.S. and the world, making possible the reclamation of great areas of land now going to waste, with no pollution of the atmosphere, the land or the water.

Drawings and descriptions of this invention may be obtained by contacting Simons Ideas/Inventions, Inc., 6442 Coldwater Canyon, North Hollywood, Calif. 91606, or the writer. It is requested that this letter be made a part of the hearing record.

Your truly,

JOHN H. YOUNG.

SALT LAKE CITY, UTAH, May 24, 1971.

HON. HENRY M. JACKSON,
Chairman, Senate Committee on Interior and Insular Affairs, U.S. Senate,
Washington, D.C.

DEAR SENATOR JACKSON: I write to urge:

(a) That construction of power plants in the four-corners area be halted immediately.

(b) That construction of all coal-powered units be halted permanently.

(c) That construction on none proceed until absolute assurance can be given that neither the emissions from the plants themselves, nor the acquisition of the power sources for the plants, will disrupt (as clearly would be the case under present plans) the unspoiled nature of the immediate surroundings.

I propose instead:

(a) That in the future power units be built near the location in which the power produced will be used.

(b) That steps be taken now to face the implications of the consumer-consumption attitudes toward electricity which prevail at present.

I submit that this country literally cannot continue to exist unless our habits and attitudes with respect to consumption are altered; that eventually we will have exhausted the kinds of power sources presently and potentially available in the four-corners area; and that the central question is only this: *will we face the implications of our consumption-oriented, over-growing, population before or after we have despoiled one of the loveliest, remote areas of the United States?*

Facing the central question will be difficult. But the courage of our Senators and Congressmen in leading us in self-evaluation and re-direction will be helpful and necessary.

Yours with urgency,

MARGARET S. REED.

SALT LAKE CITY, UTAH, June 8, 1971.

HON. HENRY M. JACKSON,
Chairman, Senate Committee on Interior and Insular Affairs,
U.S. Senate, Washington, D.C.

DEAR SENATOR JACKSON: I should like to have this statement made part of the hearing record. I believe that a moratorium of power plants in the Four Corners area should be declared until the true need for power can be established, and until adequate pollution controls can be designed for any that must be built. Overpopulated cities like Los Angeles should not be allowed to have cheap electricity at the expense of polluting the air and endangering the health of people in other areas of the country.

The public must be educated to reduce consumption of electricity and to stabilize the population. The Four Corners area is near to and contains many wilderness and monumental areas that should not be destroyed. The small amount of employment that the power plants in the Four Corners area would provide is not worth the many ill effects that will occur due to the power plants.

Thank you.

Sincerely,

MRS. LINDA SEDIVEC.

SKY VIEW HIGH SCHOOL,
 Smithfield, Utah, May 20, 1971.

HON. HENRY M. JACKSON,
Chairman, Senate Committee on Interior and Insular Affairs,
U.S. Senate, Washington, D.C.

DEAR SENATOR JACKSON: I am writing you this brief letter to express my concern over the proposed coal burning power plants in the Four Corners area. I would like to go on the record as being extremely opposed to such power plants in this area; and I would like my statement entered in the official record of the hearing to be held on May 26, 1971, in Salt Lake City, Utah.

It is obvious to environmental experts, scientists, and others who know the effects of pollution on our environment that these proposed power plants are a travesty and a suicide against our land. They are, in effect, adding hundreds of tons of air pollution to an otherwise unspoiled area. The strip mining of coal from Black Mesa and other Indian lands is not only a crime against the environment but also a blatant violation of the rights of the Navaho and Hopi people.

Can you imagine dark, sooty smog in the middle of our desert wilderness areas? Hard to believe, but scientists project that this is exactly what will happen if these power plants are built. Making it even more difficult is the fact that the power generated from these plants will be used primarily by residents of Southern California. In other words, we are destroying one area to give power to another area that was destroyed long ago. This insanity must not be allowed to continue. I urge a moratorium on all power plant construction in the Four Corners area until pollution control laws can be implemented and *enforced* and ecological studies are done in depth. We must stop the destruction of our few remaining wilderness areas before it is too late. Please enter this in the official record of proceedings on this matter.

Many thanks,

ALAN R. HARRIS,
Chairman, English Department.

LOGAN, UTAH, May 19, 1971.

HON. HENRY M. JACKSON,
Chairman, Senate Committee on Interior and Insular Affairs,
U.S. Senate, Washington, D.C.

DEAR SIR: I am Thomas J. Lyon, and I teach at Utah State University in Logan, Utah. My research and writing specialty is the history and literature of the American West. I am the President-elect of the Western Literature Association.

I mention all this because I believe my studies have given me a fairly good knowledge of what the West was like. Living here now and watching trends, it is possible to hold the past alongside the present and make some informed guesses about the future.

The past of the West is found in terms like *space*, *clarity*, and *freedom*. These mythic meanings of the West, for American culture, are still very much alive. In many respects, Americans have seen their destiny in the frontier and the West. This is reflected in both serious literatures and in the pulp market.

The West is where nature, the wild, still can be found in larger proportions than the civilized or tame element. For this, it is very important in an urban-industrial culture. A long and deep vein in American history, the love of natural wildness, can still be tapped in the West, and can refresh and even purify many of our recognized illnesses.

But if the urban industrial manner of living exploits the wild country harshly, then there will be no such place, no such re-creation, for the future. This is an eminently simple idea, but apparantly it has not been realized very widely yet—at least out in public policy.

The plans for large power plants in the Four Corners area are harshly exploitative. The plants will pollute the air, water, and what soil there is in the area; the strip-mining for coal will turn the area into a hellish sort of dump; the transmission lines for carrying the electricity will drape and festoon and uglify the remaining landscape.

No matter what pollution-abatement measures are taken, the effects just listed will occur. Our nation will lose a rare asset, the wild country upon which its dreams have fed for centuries, and in which it could find ways to renew itself. This is a great loss; no culture has survived, much less flourished, without this dimension. It is doubtful to me that American traditional values could survive in the face of such premeditated and large-scale destruction of the landscape as these power plants envision.

The justifications for the plants are obvious: more power for more uses for more people. The short-sighted view thinks this is substantial and logical. But the long view says, what then? What will you do when the coal runs out, and you're left with a slag heap?

We are starting, some of us, to reassess our values and our needs, in the new light of ecological understanding. We are starting to see that we not only enjoy wild land, but we *need* it in very deep ways.

This new understanding must fight for its existence and growth against the traditions of exploitation and purely money-oriented growthmanship. It would be a tragic irony if, at this moment of the dawning of new understanding, we purposefully wrecked one of our last large remaining tracts of wild country. This wrecking cannot even be justified in terms of the money-and-goods logics. In the long view of American history, it looms as an enormous evil, a sign of a perhaps cancerous pathology.

Sincerely,

THOMAS J. LYON.

SALT LAKE CITY, UTAH, May 29, 1971.

HON. HENRY M. JACKSON,

Chairman, Senate Committee on Interior and Insular Affairs, U.S. Senate, Washington, D.C.

DEAR SIR: I wish to enter the following comments into the record composed of testimony from public hearings on the proposed coal fired power plants for the Four Corners region. I present an argument against further construction or planning of these power plants based on three premises: (1) that there is a valid ethnic argument against them, (2) that there is very strong opposition to them from a technical standpoint and (3) there is a preferable alternative to coal fired generation of electric power which has been known for several years and which is more in keeping with modern times, that is, the generation of electric power by atomic nuclear reactors.

First of all an ethnic question is raised by the idea of power companies from Southern California and Southern Arizona to generate power in the far away Four Corners region where pollution is not presently a problem and clear blue skies are in abundance, this power to be used in California and Southern Arizona for the most part. Many of us who grew up in the Four Corners area have left to find work elsewhere, but one main reason for returning there from time to time is to enjoy the clean, unpolluted air which that particular part of the U.S. still has plenty of. I used to take this for granted, but after living where air pollution is a major problem, one is able to appreciate the great value of clean air. This is one of the most valuable assets the Four Corners area has. My opinion is that if the power plants now under construction and in the planning stage are allowed to be built the clear blue skies there will no longer be seen as the area will become another "smog ghetto" resembling Los Angeles or New York City. One of the sad consequences of the whole project is that the valuable coal and water resources of the Four Corners area are being exhausted for the benefit of the Southern California Edison Company, the Arizona Public Service Co., and the people of Southern California and Southern Arizona.

I have worked in a copper smelter in Southern Arizona where I observed the serious air pollution problem generated by several smelters in that area. I have seen most of Southern Arizona and much of Southern New Mexico under a dense blanket of blue smog so thick that it was difficult if not impossible to see the ground from an airplane. This smog spreads for hundreds of miles and will do the same thing in the Four Corners area if the proposed power plants are built.

Let the power companies pipe their coal in slurry form to Southern California and Southern Arizona and build their power plants there where the people can enjoy their electric gadgets and coal smoke at the same time! They mustn't be allowed to make the Four Corners area the industrial outhouse of the West. What is happening is the Four Corners area is being paid to take the air pollution which is being created by the unreasonable growth and demand of people who live far away and who need to be reminded that "you can't have your cake and eat it too." Clean air is priceless these days and indications are that it will become more so in the future.

Secondly, I would like to present some technical facts which argue against the operations of coal fired power plants stemming mainly from air pollution caused by them which can never be 100% eliminated regardless of the amount of money spent on pollution control equipment.

Fossil fuel fired power plants such as the Mohave or planned Navajo plant at Page, Arizona, discharge from their stacks on the order of a few million cubic feet per minute of gases. These are tremendous volumes and the several power plants being planned for the Four Corners area together would be discharging literally billions of cubic feet per day of gas containing deadly poisons into the air we breathe. These gases contain deadly carbon monoxide in the concentration range of about 2000 ppm to 10,000 ppm and prolonged exposure to even 100 ppm is deadly to humans. Also, there is a concentration of from about 500 to 1500 ppm of sulfur dioxide in these gases. It takes an exposure of only about 8 hours to 10 ppm of this invisible gas to kill a human. Not to be ignored are the oxides of nitrogen which are present to the extent of approximately 330 ppm in every cubic foot of gas discharged from a coal fired power plant. Nitrogen oxides are present in air in the concentration range of a few parts per billion due to natural sources and in big cities are what is seen at various times of the day as smog caused by automobiles. During peak smog periods, the concentration of so called NOx (nitrogen oxides) is only of the order of 0.2 ppm so it's obvious what billions of cubic feet per day of 330 ppm gas will do to the entire Four Corners area.

There may be a problem involving sulfuric acid mist being discharged from

power plant stacks and I doubt if the power companies could tell the public how much of what they prefer to call simply "water vapor" actually is sulfuric acid mist coming out of their stacks. I have had experience working with sulfuric acid mist at the Bureau of Mines and in a copper smelter and it is a very difficult pollutant to eliminate. It is easily seen coming out of smokestacks in very small concentrations.

Last but not least is the threat of serious damage over a long period of time resulting from oxides of metals being discharged from power plants. These metals such as deadly poisonous arsenic, lead, uranium, mercury, etc., are commonly present to the extent of a few parts per million in mineral deposits and are quite probably present in these trace amounts in the coal reserves of the Four Corners area. Upon burning millions of tons of coal, the oxides of these metals may become very significant in quantity thereby causing a definite threat to the health and safety of the people and agricultural industry of the area. At the public hearings in Salt Lake City, the Executive Vice President of Arizona Public Service Co. had no answer to the question asked him by Senator Moss on how much of these trace elements are present in Kaiparowits coal.

Finally in my technical argument, I would like to say that it is not the visible fly ash which the power companies plan to remove that is really dangerous but rather the poisonous materials you can't see such as sulfur dioxide, carbon monoxide, nitrous oxide, etc., that are most harmful and these substances cannot be removed from power plant gases at the present time because there is no known economically feasible method for removing them. In fact, according to the May issue of *Environmental Science & Technology*, there is not even a method being developed for removal of oxides of nitrogen from power plant gases.

I have been working on sulfur dioxide removal from smelter gases for the U.S. Bureau of Mines and although sulfur dioxide can be removed from smelter gases there is presently no economically feasible method for doing this. Power plant gases pose a much more difficult problem than smelter gases as far as sulfur dioxide removal is concerned because of extremely large volumes of gas being handled in power plant stacks and very low concentrations of sulfur dioxide in them compared to smelter gases.

My third and final argument against the construction or planning of coal fired power plants in the Four Corners area or anywhere else is that there is a much cleaner essentially pollution free method of generating electric power for the growing demands of our nation, that is, by using nuclear energy for this purpose.

The public hearings in Salt Lake City lacked testimony proposing that nuclear power be considered as an alternative to coal fired plants. There was a brief statement by a power company witness that nuclear generation of large amounts of electricity was at least 25 years away but that is very difficult to believe. According to the May issue of *Engineering and Mining Journal* the Japanese generated 1,300 megawatts using nuclear energy in 1970 and are now in the process of buying uranium reserves in Canada, Africa and Australia to supply their nuclear generating plants which will by 1980 be generating 27,000 megawatts and by 1985 60,000 megawatts. This is a far greater supply of power than the proposed coal fired plants will give.

I think that this country could use nuclear energy to generate all the electric power needed in the very near future. Perhaps the power companies need to be reminded that we are living in the twentieth century and burning coal for power generation should be considered a thing of the past. Also, burning coal for this purpose is very inefficient, about 40% efficient, so the energy from most of the coal burned is wasted and we cannot afford to waste this valuable limited energy source. There may be in the near future a method developed for economically making natural gas out of coal through coal gasification which would be a much better use of our coal reserves especially in view of the fact that natural gas reserves may be running low. I think that the possibility of using nuclear energy for power generation in place of energy from fossil fuels should be studied thoroughly. Thank you.

Sincerely,

DONALD L. WEBB.

SALT LAKE CITY, UTAH, May 25, 1971.

HON. HENRY M. JACKSON,
Chairman, Senate Committee on Interior and Insular Affairs, U.S. Senate,
Washington, D.C.

DEAR SENATOR JACKSON: I am writing concerning the plans of WEST to build six coal-fired electric plants in the high desert of the Colorado Plateau. Please

include my statement in the hearing record being held May 26th, 1971 in Salt Lake City.

As a member of the League of Women Voters, a property owner in Southern Utah as well as Salt Lake City, I am only too well aware of what inversions can do with such immense amounts of pollution. If we allow such a source of pollution to be created, then we deserve the loss we are bound to receive in the tourist industry as well as many other areas. We want people to come and enjoy Utah with us, but our clean, desert air has been one of our greatest selling points.

I firmly believe that we need time to develop a means to use our coal resources with much less fly ash, sulfur oxide and nitrogen oxide emissions. Pollution controls can be built that will prevent this kind of pollution, if it is required.

Overpopulated cities should not be allowed to have cheap electricity at the expense of polluting Utah. I feel the Electric Companies are pushing the use of electricity to excess. After careful study, I concluded that the use of electricity in air conditioning and heating was excessive and unnecessary. This pushing of the use of electricity should be curtailed. It is wasteful of a limited resource, and soon future generations will be paying the price.

In conclusion, I urge that a moratorium of building of power plants in the Four Corners area should be declared until the true need for power can be established and until adequate pollution controls can be designed.

Sincerely yours,

Mrs. William L. Ormsby.

UTAH STATE UNIVERSITY,
Logan, Utah, June 9, 1971.

Hon. Henry M. Jackson,
Senate Office Building,
Washington, D.C.

DEAR SENATOR JACKSON: I wish to express my concern for the construction of electric power generating facilities in the primitive Four Corners area of the United States. My purpose in writing to you is to place my thoughts on record with others presented at hearings conducted by the Senate Interior Committee in Utah, Colorado, Arizona, and New Mexico.

In making this statement I recognize that there is a critical need for power in the United States at the present time. Particularly pressing is the need for power in the densely populated areas of the west coast. However, I feel that proceeding with construction of these power generating plants in the fair environments of the southwest desert is indeed a serious matter and is presently being planned with inadequate information with regard to environmental problems such as sulfur dioxide production, smoke and fly ash, aesthetic degradation, water utilization, communications, economic returns to the area in which the coal is obtained, and the very serious social adjustments that would be necessary to accommodate both the construction and the operation of the coal mining industry to provide fuel for the power generating plants.

Over the past year several of us at Utah State University have seen the futility of expecting any substantial research financed by either the power plants or the Federal Government in answer to some of the serious but so called peripheral questions.

It is true that the background studies of the nature of the resource, the location of the plants and the physical facilities necessary to transmit the power have been worked out by both the power industry and the Department of Interior. Although this kind of information is necessary to provide background, the more critical issues of social, aesthetic, and environmental changes that would be brought on by power plant operation have been studied in little detail. Such problems deserve a great deal of study before the green light to construct the power plants should be turned on.

I do not take the attitude that we should avoid using resources at hand. Neither should we fail to plan for any kind of growth in the future. However, the only way that we can proceed is with a solid base of information developed in the context of long term concerns for the goals of society considering all aspects of environmental quality and not merely those which generate short term economic gains but ignore the results of such shortsighted development.

May I give you an example of the kind of put off that has been experienced in the past year. Well over twelve months ago a group of concerned individuals met at Flagstaff, Arizona to consider the environmental aspects of building the Navajo Power Plant and the associated strip-mining on Black Mesa. A number

of people were very anxious to study and provide solid answers to problems concerned with this project. An organization called the Colorado Plateau Environmental Council was formed to coordinate and to obtain the very best research approaches to problems. However, little, if anything, has resulted from this meeting. A number of scientists have prepared research proposals but the answer given to them by the Council is merely that they are hoping (and I say against hope) that the power industry, the Federal Government, or some other source would see the need for such studies and assist in their financing. I believe that the power companies have completely ignored this group. Yet, these proposals do have merit and could be very useful in providing valuable information on the environmental and social impacts of the plant construction and operation.

The scientific personnel of the Intermountain West have a real understanding of the problems and also the appropriate methodology in this particular environment. Yet, they are frustrated in that there is apparently so little allocation of the project costs to environmental and social research. Therefore, I submit that a valuable human resource is being ignored.

It is obvious from news reports that a great deal of public concern exists for the power plant construction. Some of this interest is highly emotional and is based on little fact. Other concerns that have been expressed are of an economic nature and although honestly generated may also have a poor base of information. Therefore, I urge you to request that an adequate program of research be included in plans for these power generating facilities that will guide decisions on questions of power plant construction and operation.

Sincerely,

C. M. MCKELL,

Director, Environment and Man Program.

SALT LAKE CITY, UTAH, June 8, 1971.

HON. HENRY M. JACKSON,
Chairman, Senate Committee on Interior and Insular Affairs, Senate Office Building, Washington, D.C.

DEAR SIR: I write to urge your committee to make Absolutely Sure. Before they are built, that the proposed power plants in the Utah-Arizona area are Required to eliminate All pollutants (99% isn't good enough!)

What is going to be done about them using so much water in an arid region and adding to the salinity of the water which is already too saline when it reaches Mexico?

I realize the importance of producing power but feel the importance of preserving the environment is just as great—hopefully we can have both but I don't think we should sacrifice the environment, and then perhaps find out later there was a better way to do it.

Can this letter be included in the record of your hearing?

Thank you,

Mrs. L. H. MAGAR.

SALT LAKE CITY, UTAH, May 26, 1971.

HON. HENRY M. JACKSON,
Chairman, Senate Committee on Interior and Insular Affairs, U.S. Senate, Washington, D.C.

DEAR SENATOR JACKSON: It is with grave concern that many Utahns view proposals to increase the number of power plants in and near southeastern Utah.

To those of us who have been in the Four Corners Area, the prospect of seeing it buried beneath smog to rival that of New York and Los Angeles is not a pleasant one; nor is the prospect of seeing parts of the Area used for strip mining.

To ruin even a part of the Four Corners Area for the sake of an artificially created demand for electric power is to place false priorities on "comfort producing" devices which exist only to eliminate physical effort and exercise—at a time when medical authorities are showing increasing concern over the debilitating effect of our sedentary mode of life.

And what of the Indians living in the area? The money which some Indians will receive is but a pittance when considered in terms of the loss of much of the clean air and available irrigation water upon which the Indian way of life

depends. It is impossible to see our treatment of the Indians as just, if we must permanently damage their homelands simply to enable people in faraway cities to watch "Gunsmoke" in living color and brush their teeth electrically. Since the people of the Four Corners Area will not be the ones to reap the advantages of the added power, why should they be forced to carry its burden?

If we must have such an addition in power to support our television sets and electric can openers, then perhaps we should learn to survive without them. If we lack the strength to endure without a few of our electronic gadgets, the prospects for America's future are bleak indeed.

In addition to reducing the use of unnecessary appliances, there are other ways in which our power consumption can be curtailed. A higher priority placed on the consumption of hand-made, quality products, instead of the products of automation, would offset the effects of increased unemployment due to a reduction in the production of electric power, appliances, and equipment. A shortened work-week could also offset the tendency toward unemployment due to a decrease in the quantity of inexpensive goods produced, besides giving Americans more time to enjoy the lands which would be saved by such a policy.

We hope that our government will show the foresight necessary to establish priorities and develop approaches which will prevent the desecration not only of the Four Corners Area, but the rest of America as well.

Yours truly,

GORDON J. SWENSON.

SANDY, UTAH, May 27, 1971.

HON. HENRY M. JACKSON,
Chairman, Senate Committee on Interior and Insular Affairs, U.S. Senate,
Washington, D.C.

DEAR SENATOR JACKSON: As a student of ecology and wildlife resources at the University of Utah, I wish to express my feelings in regard to the proposed power plants located in the four-corners and southern Utah regions.

After studying and reading about these plants and their effects both pro and con, I have come to the belief that: (1) A moratorium on building of power plants in the Four Corners area should be declared until the true need for power can be established, and until adequate pollution controls can be designed for any that must be built. (2) Los Angeles and other big cities should not be allowed to pollute the desert so they can have more power. (3) Strip mining should not even begin in the southwest. (4) This would be a poor use of water and in an arid region. (5) The Indians of this area should not be relocated again. (6) Advertising for increased use of electricity by utilities and appliance companies should be curtailed. (7) A more effective and non-polluting way to produce electricity should be given top priority.

I would like this statement to be part of the hearing record, and I urgently appeal to your committee to place a moratorium on the building of any more power plants in the southwest region of this country.

Sincerely,

JOHN L. WALL.

OGDEN, UTAH, June 17, 1971.

HON. HENRY M. JACKSON,
Chairman, Senate Committee on Interior and Insular Affairs, U.S. Senate
Washington, D.C.

DEAR SIR: I wish to go on record as opposing the building and operation of any more coal burning electric power plants in the southwest, and I request this statement to be included in the hearing record held May 26, 1971 in Salt Lake City, Utah, with Senator Frank E. Moss presiding as chairman.

Specifically I'm opposed to the Navajo, San Juan and the Kaiparowits plants, which though proposed and planned, have not yet been constructed. As the Mojave and Fruitlands (so called Four Corners) plants are already in operation, it would be appropriate to allow their continued operation, provided that a goal of 99.9% removal of all contaminants—fly ash, sulfur dioxide and nitrogen oxides—be accomplished by a specified date within the next three years.

I wish to mention but not elaborate on several points already alluded to, by previous reports. They are as follows:

1. Coal burning of electricity is inefficient. Coal is in such limited supply that it will be depleted in fifty years. This is hardly worth the effort for such a temporary project.

2. The waste products of coal burning cannot be effectively handled by present technology, also the cinder ash should not be unceremoniously dumped over the landscape, but should be used in the manufacture of building blocks or other such utilitarian uses.

3. Strip mining, as elsewhere in the U.S., is even more disfiguring on the desert and should not be allowed.

4. Unrealistic amounts of precious desert water will be needed by the plants. Better use of water is mandatory.

5. The Navajo, and especially the Hopi Indian cultures, will be encroached upon. The Hopi culture is unique in the world and should be protected rather than destroyed.

6. The colorful scenic Colorado Plateau should be preserved at all costs. The blue clear skies offering panoramic views would be spoiled by as little as $\frac{1}{2}$ of 1% total fly ash contamination. The Colorado Plateau Geologic Providence, so named by a geologist, is so scenic that John Muir, in 1890, complained that his predecessors had already used all the superlatives known, in describing the Grand Canyon at that time. Most of the Colorado Plateau is of such grandeur. The area has greater value as a near wilderness and recreation area than as an industrial site.

One last and most important aspect that the hearing of the proposed construction of coal burning electric plants on the desert has brought into focus and that is the meaning of the term "Progress". Progress has a completely different meaning for the proponents of the plants as compared to the opponents.

To the proponents, progress is the continued traditional use of natural resources as long as they are available for the manufacture of increasing amounts of industrial products. There is very little regard for adverse effect, physically or esthetically, of the environment, as long as profits are made, people are employed and there is a continued demand for the products.

To the opponents of the plants, progress is the frugal use of natural resources for the enjoyment of life, not at the expense of, but in cooperation with the environment. Natural resources must not be wasted and above all the environment must be protected.

The environment to the one is to be used regardless. To the other, the environment must be protected regardless.

The environment to the one seems to be harsh and unfriendly and in need of constant modifications, while to the other it seems to be gentle and supportive, with no need for great modification.

To the proponents the environment must be exploited because it is there. To the opponents it can yield, to a limited extent only, but not to unlimited demands. A healthy and natural environment is of great aesthetic value and a must for the continued humanity of our society.

In summary, I am opposed to the construction of any more coal burning plants for 6 specific reasons briefly mentioned but elaborated on at great lengths in other reports, but also because the term "Progress" has not been spelled out in regard to the best interests of wise land and resource use in this country, which has only a limited amount of nonrenewable resources: a fact not generally acknowledged today.

Respectfully,

AARON B. ROSS, M.D.

BRIGHAM YOUNG UNIVERSITY,
Provo, Utah, June 1, 1971.

SENATE INTERIOR COMMITTEE,
New Senate Office Building,
Washington, D.C.

GENTLEMEN: I would like the following written testimony to be added to the transcript of the recent hearings (May 26, Salt Lake City) concerning the development of power plants in southeastern Utah:

Many things must be considered prior to the approval for construction of several new power plants in southeastern Utah. Not the least of these is the burgeoning need for electrical power in the United States, and particularly the western United States. There can be no question that power requirements are now great and will become greater in the next few years. Further, one economical means of producing this power is to utilize the coal of the southwestern United States, erect power generating stations near the locations of this coal,

utilize the water from nearby Lake Powell and ship the electrical power via lines to population centers where it is most needed.

However, let us look a little longer at this proposal. First, the earth has been in existence for more than four billion years, and the coal of the southwestern United States was formed about 120 million years ago. Granted, these coal deposits are extensive, but it is now proposed by some to strip mine these for the next 35 years and convert the coal into several products, notably power, SO₂, fly ash and particulates, oxides of nitrogen and others. If we examine this critically, considering the age of the earth and projecting to future ages, we propose to use in a speck of time deposits which were millions of years in formation, and which are irreplaceable.

To continue, it seems as though we have some other things to consider as well. First, what will become of the power facilities when they have outlived their usefulness? This must not be considered lightly, and it must be realized that isn't in the unforeseeable future, but only 35 years. This is within my working life, and certainly within the early future of our children. Ghost plants and associated ghost towns are to be considered unwelcome guests on the landscape of the southwestern desert.

Second, it is true that most of the particulate matter will be removed from the burned coal. However, what will be the ultimate destiny of the dumped fly ash? I submit that the majority of it will end up in the bottom of Lake Powell regardless of statements to the contrary.

Third, there is no way of estimating the value or worth of wild, primitive land. No matter what statements are made to the contrary, the new power plants will do two things. First, the very presence of these plants on the landscape devalues these wild lands; and second, the smog produced by them will immeasurably reduce their esthetic value and actual dollar value from tourist trade.

So, if these things are taken into consideration, are there any feasible alternatives? Proponents of these power plants would have us believe there is none, or at least none as economically desirable. However, technology presently developed will allow us within the next few years to utilize nuclear or solar sources for electrical power generation. With breakthroughs in these areas on our doorsteps, it is neither prudent nor acceptable to tap the coal resources in southeastern Utah at the present time for the generation of power.

Sincerely,

SAMUEL R. RUSHFORTH,
Assistant Professor of Botany.

APPENDIX 4

Communications pertaining to the hearing held at Durango, Colo.,
May 27, 1971

ARIZONA PUBLIC SERVICE CO.,
Phoenix, Ariz., September 1, 1971.

Mr. JERRY T. VERKLER,
Staff Director, Senate Committee on Interior and Insular Affairs, New Senate
Office Building, Washington, D.C.

DEAR MR. VERKLER: I have enclosed a newspaper clipping concerning a statement released by Lane W. Kirkpatrick and Dr. Gerald P. Wood, who are associated with the Air Pollution Control Division of the Colorado Health Department. The statement revealed that a meteorological survey of southwestern Colorado indicated that stack emissions from the Four Corners Power Plant do not cross Colorado's southern border in heavy enough concentrations to violate the state's ambient air quality standard.

I would appreciate it if this clipping could be accepted as supplemental information to that presented by Arizona Public Service Company during the recent hearings held in the Southwest by the Subcommittee on Water and Power Resources of the Senate Committee on Interior and Insular Affairs. If possible, I would like this clipping to be entered in the record of the proceedings.

Sincerely,

TED DANDO,
Public Information Representative.

[From the Phoenix Gazette, Aug. 27, 1971]

COLORADO DROPS SUIT ON DIRTY AIR

DENVER.—The Colorado State Air Pollution Control Commission has been told the state has shelved any plans to join New Mexico in court action to reduce air pollution from the Four Corners electric power plant near Farmington, N.M.

Lane W. Kirkpatrick, technical secretary of the commission, and Dr. Gerald P. Wood, director of the Colorado Health Department's Air Pollution Control Division, disclosed the decision to the commissioners yesterday.

The suit filed by New Mexico and conservation groups July 7 charges that the coal-burning plant violates the federal Air Quality Act.

Wood said a meteorological survey of southwestern Colorado and a study of contaminant output and dispersion factors indicated that the Farmington's pollution does not cross the state's southern border in heavy enough concentrations to violate the state's ambient air quality standard.

Kirkpatrick said, however, that surveillance will continue and that when spring winds blow from the southwest they may bring illegal levels of contaminants into Colorado from the plant.

STATEMENT OF WILLIAM J. ROSE, MEMBER, EXECUTIVE COMMITTEE, ROCKY MOUNTAIN CHAPTER OF THE SIERRA CLUB

Senator Jackson and fellow members on behalf of the Rocky Mountain Chapter of the Sierra Club, I would like to thank you for the opportunity to appear before this committee.

What are the problems associated with the power plants in question? We see three major ones:

1. The six power plants will put a further strain on the already taxed water supply of the arid Southwest.
2. The areas stripped mined if unreclaimed will cause acidic rain runoffs and will accelerate erosion.

3. The power plants if not provided with the best air pollution abatement equipment, will degrade one of the major assets of the Southwest, the clean air.

We are not against progress, but we are against *blind* progress. Is the protection of the environment going to receive its due consideration or are "economic" factors going to rule exclusively? According to Black Mesa Defense 2,500 gallons of water a minute will be pumped out of the Black Mesa aquifer to operate the slurry line from the processing plant to the Mohave power plant. What effect will this pumping have on the Indian irrigation wells on Black Mesa? Should we allow these power plants to cause a reduction in visibility in our unique Southwest parks lands when good solid particle abatement technology exists?

The Rocky Mountain Chapter would like to see the following positive steps taken:

1. High quality scrubbers placed on the stacks of all power plants built in the Southwest.
2. Reclamation of the land after strip mining.
3. Federally financed studies on how to reduce gas emissions from coal burning power plants.
4. Federal regulations that would prohibit advertizing aimed at promoting electrical energy consumption.
5. More federal emphasis on the development of nuclear "fusion" processes as alternate power sources.

ASSOCIATED STUDENTS OF THE UNIVERSITY OF COLORADO,
Boulder, Colorado, September 2, 1971.

Senator HENRY M. JACKSON,
Chairman, Committee on the Interior,
Senate Building, Washington, D.C.

DEAR SIR: The attached petitions were signed during the summer session of the University of Colorado, with about 7,000 students in attendance at this institution. They were placed, unheralded on bulletin boards in the Student Union and left to the students to find and sign.

With a response of approximately 850 students under these conditions I think you can accurately extrapolate the response that would be forthcoming from an advertised campaign during our regular sessions with 21,000 students in attendance.

I trust you will recognize the concern expressed here and have your committee translate it into action.

Thank you for your time and consideration.

Peace,

GARY SVOBODA,
ASUC President.

STOP AIR POLLUTION—DEMAND ADEQUATE CONTROLS FOR COAL FIRED POWER PLANTS
STOP STRIP MINING—CONSIDER LESS ECOLOGICALLY DANGEROUS POWER SOURCES

Attention: Senator Henry M. Jackson.

We the undersigned wish to express our deeply felt objection to the effects of air pollution caused by the coal burning power plants in the Southwest. We wish to go on record as demanding strong Government action against all coal burning power plants in the Southwest. They must comply with the highest possible pollution control laws to protect our environment and health. The strip-mining of coal to feed these power plants may seem economically justified, however, in the long run its consumption of 100,000 acres of topsoil and grazing land on Hopi and Navajo reservations is devastating. We oppose any further construction of these plants and the accompanying transmission lines and strip mines of the Southwest.

This petition was signed by 14 concerned students of the University of Colorado.

THE COLORADO MOUNTAIN CLUB,
Denver, Colo., May 27, 1971.

HON. HENRY M. JACKSON,
*Chairman, Interior and Insular Affairs Committee,
 New Senate Office Building, Washington, D.C.*

DEAR SENATOR: This is the statement of the Colorado Mountain Club regarding powerplant construction in the Southwest. We request that this statement be included in the record of subject hearing.

From the information we have to date, it appears that this large power generation project could do extensive and unwarranted harm to the environment of the Four Corners area and beyond in the Southwest.

We are not convinced that these power generation facilities are needed, that their environmental impact will be tolerable or that reasonable alternatives have been fully explored.

We do know that this area of the Southwest has great scenic, recreational and natural values to Colorado Mountain Club members. Many of the Club's outings and the private hiking trips of its members venture into much of the beautifully unique desert country of the Four Corners area in the vicinity of the proposed plant sites.

These values must not be destroyed nor impaired.

In view of the magnitude of this project and its potential for serious environmental damage, we request that the following action be taken:

1. Stop further plant construction until it can be proven that environmental damage will be within limits which are tolerable—and tolerable to the people who live in and use the area affected.

2. Seek greater public involvement. Give citizens time to learn more about the full project and its effects. Even though—and because—the project has been on the drawing boards for many years, its risks and benefits must be weighed by the environmental standards which citizens are formulating in this period when it is becoming more apparent that there is a collision underway between our expanding population (with its technology and high energy consumption rate) and the limited capacity of our environmental resources.

3. Develop full facts on the adverse environmental effects of air pollution, strip mining, power lines, pipelines, thermal pollution and any other factors involved.

4. Study the national use of electrical energy. Formulate and enact a National Energy Policy which would contain the principle of non-degradation of the environment, which would establish methods to stabilize our energy consumption, which would control power plant siting, and which would determine the best sources of energy supply.

Our thanks go to you and your committee for conducting these on-site investigative hearings.

Sincerely,

SAMUEL ALFEND, *President.*

COLORADO OPEN SPACE COUNCIL, INC.,
Denver, Colo., June 14, 1971.

HON. HENRY M. JACKSON,
*Chairman, Senate Committee on Interior and Insular Affairs, 3106 East Senate
 Office Building, Washington, D.C.*

DEAR SENATOR JACKSON: The Colorado Open Space Council herein requests that the following endorsements to the testimony made by Dr. Ruth Weiner before the Senate Committee on Interior and Insular Affairs at the hearing on May 27, 1971, Durango, Colorado, regarding the Southwest Power Plants, be added to the record of that hearing.

Dr. Weiner's statement is endorsed by the following organizations and individuals, who are members of the Board of Directors of COSC:

Arapahoe Medical Society.

American Society of Landscape Architects, Colorado Section.

Association for Beautiful Colorado Roads.

Circle I, First Plymouth Congregational Church.

Citizens Concerned about Radiation Pollution.

Clear Creek Valley Medical Society.
 Colorado Citizens for Clean Air.
 Colorado Institute on Population Problems.
 Colorado Mineral Society.
 Colorado Mountain Club.
 Colorado State League of Women Voters.
 Colorado White Water Association.
 Denver Audubon Society.
 Denver Field Ornithologists.
 Environmental Corps—Colorado State University.
 Mountain Area Planning Council.
 Metropolitan Wildlife Association.
 Protect Our Mountain Environment.
 Rocky Mountain Chapter—Sierra Club.
 Women's Environmental Coalition.
 Zero Population Growth, Denver Chapter.
 Miss Kay Collins, 3300 South Washington, Englewood, Colorado.
 Mr. Stanley Kerr, 1250 Pontiac Street, Denver, Colorado.
 Hugh Kingery, Esq., 10 Emerson, Denver, Colorado.
 Martin Shore, Esq., 3745 South Forest Way, Denver, Colorado.
 Estella Leopold, Ph.D., 10350 West 13th Place, Denver, Colorado.
 Ruth Newlon, 1075 South Fillmore Way, Denver, Colorado.
 Robert Pressey, 1950 South Clayton, Denver, Colorado.
 Harry Swift, 14201 West 44th Avenue, Golden, Colorado.
 Edward Conners, 4 Cantitoe Lane, Englewood, Colorado.

Sincerely,

EDWARD CONNORS, *President.*

COLORADO SPRINGS, COLO., June 17, 1971.

HON. HENRY JACKSON,
Chairman, Senate Committee on Interior and Insular Affairs, U.S. Senate,
Washington, D.C.

DEAR SIR: Even more power plants are being considered for Colorado? Already we have several of the nations dirtiest in operation.

Surely by now everybody knows what pollution does to just trees, for example. Our forests will perish; our beautiful mountains will be hidden by an ugly gray death; our fresh mountain air will become stence.

Both climate and scenery made Colorado a paradise. How can destruction of a paradise be planned and permitted? You and your committee can prevent it. For God's sake do it.

Sincerely,

EVELYN M. HOLLOWELL.

COLORADO SPRINGS, COLO., June 18, 1971.

HON. HENRY JACKSON,
Chairman, Senate Committee on Interior and Insular Affairs, U.S. Senate,
Washington, D.C.

DEAR SIR: Please make our plea a part of the Durango hearings on additional power plants planned for Colorado.

We, like everyone who has heard of this unthinkable idea, are distressed over what might happen to one of the world's most ideal areas.

Surely the Committee will consider that people travel hundreds, thousands of miles to see our beautiful mountains—to spend a few blessed weeks or days enjoying our beauty and climate. It is such a rare thing to have both. And pollution caused by these plants will rob Colorado of her beauty, defile her atmosphere. Why do it? Can't these murderous objects be placed in an already barren, undesirable area?

It is a privilege to live in Colorado. You and your Committee have the responsibility of keeping it this way.

Sincerely,

J. L. BENNETT.

ASPEN, COLO., June 1, 1971.

HON. HENRY M. JACKSON,
*Chairman, Senate Committee on Interior and Insular Affairs, U.S. Senate,
Washington, D.C.*

DEAR SENATOR JACKSON: The Aspen, Colorado, Planning Commission has reviewed the statement of Rocky Mountain Center on Environment to your committee. We wish to express our specific concurrence with Part IV of their recommendations.

In addition, the Commission is particularly concerned with possible air pollution and coal dust resulting from such operations, and their effect on the environment and on our predominantly ski oriented industry.

Very truly yours,

ROBIN MOLNY,
Chairman, Aspen, Colo., Planning and Zoning Commission.

GRAND JUNCTION, COLO., May 12, 1971.

HON. HENRY M. JACKSON,
*Chairman, Interior and Insular Affairs Committee,
New Senate Office Building, Washington, D.C.*

DEAR SIR: As a resident of western Colorado I am opposed to the construction of power plants in the 4 corners area. If southern California wants more power let it also have the plants to produce it.

We in this desolate, desert area are rather partial to clean air, clear skies, and land unscarred by strip mining.

Surely a country that can put men on the moon has the technical know-how to produce power without ruining the environment of a substantial section of the southwest.

Please make this letter a part of the power plant hearing records.

Yours very truly,

REBECCA L. ROSKOWSKI,
Mrs. EDWARD F. ROSKOWSKI.

BOULDER, COLO., May 29, 1971.

HON. HENRY M. JACKSON,
*Senate Committee on Insular Affairs,
U.S. Senate, Washington, D.C.*

DEAR SENATOR JACKSON: We must reverse the direction of progress and encourage exploration of clean power. Please enter my request, namely, that no further development of the Four Corners Power Plants take place, into the hearing record.

Sincerely,

MADLINE DAY.

LOVELAND, COLO., May 26, 1971.

HON. HENRY M. JACKSON,
*Chairman, Interior and Insular Affairs Committee, New Senate Office Building,
Washington, D.C.*

DEAR SIR: I sincerely urge that you recommend a moratorium be declared on all power-plant construction in the Four Corners area until it can be shown that power plants can be operated without degradation of the quality of the atmosphere and that strip-mined land can and will be returned to its original state. I also urge your sponsorship of a bill to enact a national energy policy which would preserve the natural environment and restrict the wasteful use of energy. I request that this letter be made a part of the hearing record.

As you know, the Four Corners area encompasses some of the outstanding recreational and scenic segments of the United States. Places such as Grand Canyon National Park, Monument Valley, Canyonlands National Park, Glen Canyon National Recreation Area, and Mesa Verde National Park have long been a source of pride and inspiration to countless Americans. This area is also the home of many of the original Americans, the Indians.

In absolute disregard for the desires and rights of others, the power companies involved have chosen to build less expensive, dirty plants in the Four Corners

area; rather than more expensive, clean plants in Southern California, where the product of these plants is to be used.

It is my opinion that the operational plant at Fruitland, New Mexico, should be cleaned up to adhere to the standards that it would have been subject to had it been placed in Southern California and that the strip-mining operations, along with all other power plants under construction and proposed, be immediately halted.

Sincerely yours,

DERRAL D. SCHUESSLER.

BOULDER, COLO., May 12, 1971.

Hon. HENRY M. JACKSON,
Chairman, Senate Committee on Interior and Insular Affairs,
U.S. Senate, Washington, D.C.

DEAR SENATOR JACKSON: I wish to express my feelings concerning the thermal powerplant construction in the desert areas of the Pacific Southwest. I request that my comments be made a part of your committee's hearing record.

I strongly believe that electricity is our most wasted and misused form of energy. The American people and the public utility companies that supply electric power to the American people are guilty of great crimes against our environment to satisfy our gluttonous appetite for electricity. We dam great rivers, flood beautiful canyons, strip mine the earth, and build huge pollution producing plants to supply the power to run our electric toothbrushes, electric clothes dryers, electric dishwashers, electric can openers, huge and ugly electric signs, TV sets for every room and many other absolutely unnecessary devices.

The public utility companies that supply electric power to the people beg the people to buy and use more and more of these electric conveniences, and in the next breath they cry that they cannot meet the demands for electricity without building more powerplants or more dams. Why is the electric power industry growing almost ten times as fast as the population?

I demand that it is my right to refuse to have my environment degraded, my air polluted, my beautiful places flooded or dug up for the purpose of supplying more electricity to a people who do not need it. It is not more electricity that we need, but more concern about the wise use of the available electricity. Must we push our environment to the brink of disaster before we realize that clean air and water are more important and necessary than electric toothbrushes.

I oppose the building of any more powerplants in the desert areas of the Pacific Southwest and urge that the currently operating Four Corners and Mohave plants be shut down.

PAUL S. NORMAN.

DENVER, COLO., May 23, 1971.

Hon. HENRY M. JACKSON,
Chairman, Interior and Insular Affairs Committee,
New Senate Office Building, Washington, D.C.

DEAR SENATOR JACKSON: I am very concerned about the continued construction of super power plants in the Southwest. After much reading about these plants and the damage they will do to our environment, I believe an immediate moratorium should be declared on all power plant construction until it can be proven that there will be no significant degradation of the quality of the air, and that the strip-mining will be stopped.

We must do something to reduce the demand of electricity, possibly by banning such unnecessary things as neon signs. I am in favor of a surtax on wasteful uses of electricity, before it is too late, which will happen if we continue to ruin what is left of our environment.

I would like this letter to be included as part of the hearing record, and am sending a copy to my senators.

Sincerely yours,

MRS. JANE G. LEDDY.

BOULDER, COLO., May 25, 1971.

Hon. HENRY M. JACKSON,
Chairman, Interior and Insular Affairs Committee,
New Senate Office Building, Washington, D.C.

DEAR SIR: I urge you to recommend that an immediate moratorium be declared on all power plant construction in the Four Corners area until it can be

proven that there will be no significant degradation of the quality of the air and until it can be proven that the strip-mined land can be healed. I further urge that you sponsor a bill to enact a national energy policy which would have as its goals the preservation of the natural environment and the restriction of wasteful use of energy. I finally request that my comments be made a part of the hearing record.

As you probably already know, there presently exists a power plant at Fruitland, New Mexico, which emits over 300 tons of fly ash, 290 tons of sulfur dioxide, and 220 tons of oxides of nitrogen per day. The only conceivable explanation for placing this power plant where it is, is that it is too detrimental to the environment to be placed in Southern California, to whom its power is sent. In effect, because the power companies knew it would be more expensive to build a clean power plant in Southern California, they chose to build the dirty power plant in the Four Corners area.

The power companies failed, apparently, to see that what they would be doing is effectively destroying one of the prime recreational areas of the United States. Some of the many attractions of the area are Grand Canyon National Park, Monument Valley, Lake Powell National Recreation Area, Canyonlands National Park, Mesa Verde National Park, and Durango, Colorado.

To degrade the environment of these fine recreational areas so as to be able to supply power to Los Angeles for unrestricted (and often wasteful) use, shows a blatant disregard by the power companies for the total American environment. Decisions of this magnitude as to trade-off's between the environment and the power supply should be made by the people as represented in Congress and *not* by power companies. I, personally, am opposed to any "dirty" power plants anywhere.

For the above reasons, the power plant at Fruitland, New Mexico, should be immediately cleaned-up to adhere to the standards of pollution as presently required for power plants in Southern California, and all other work on power plants proposed and under construction in the Four Corners area should be immediately stopped.

Very truly yours,

HOMER L. KNEARL,
Attorney at Law.

DENVER, COLO., May 25, 1971.

HON. HENRY M. JACKSON,
*Chairman, Interior and Insular Affairs Committee,
New Senate Office Building, Washington, D.C.*

DEAR MR. JACKSON: My husband and I are most concerned about the deterioration of our Southwestern environment. We urge you to declare a moratorium on all power plant construction until it can be proven that there will be no significant degradation of the air. It is also important that it be proven that strip mined land would be healed—beyond all doubt!

Please include our concern in the Interior Committee Hearings on the Southwest. We should like this to become part of the hearing record.

Sincerely concerned,

Mrs. ALAN L. ROSENBERG.

DENVER, COLO., May 26, 1971.

HON. HENRY M. JACKSON,
*Chairman, Senate Committee on Interior and Insular Affairs,
U.S. Senate, Washington, D.C.*

DEAR SIR: As a concerned citizen I am writing you about the adverse environmental effects—including air pollution, stripmining, power line and pipeline construction, thermal pollution of lakes and streams, and possible harm to underground water tables, and to units of the National Park System—that would be caused if current plans to build the Four Corners Power Plants are carried through. In this era of great technical knowledge, it seems to me that a solution to this problem can be found without endangering the atmosphere. Already we have the visible evidence of the pollutants created by the two that are currently in operation.

I request that you do all that you can to help prevent further pollution and that you make my request a part of the hearing record. Thank you for your help.

Cordially,

KATHRYN E. DALY.

NORTHGLENN, COLO., May 27, 1971.

Hon. HENRY JACKSON,
Chairman, Senate Committee on Interior and Insular Affairs, U.S. Senate,
Washington, D.C.

DEAR SENATOR JACKSON: In regards to the power plants already under construction in the Four Corners area, and in regards to those already operating, and to all those planned, both in that area, and those planned in western Colorado, at Hayden, Paonia, and Craig respectfully: No!! No!! No!!

A resounding "No!" on all counts! I, as a citizen who is familiar with the incomparable and unique beauty of all the aforementioned areas, am unequivocally opposed to any and all of these. I will gladly do everything in my power to halt construction on those plants under construction, prevent the building of those plants now proposed, and shut down those in existence. I respectfully request that my comments be made a part of the hearing record.

Respectfully submitted,

Mrs. MARY ANNE JOHNSON.

WESTMINSTER, COLO., May 25, 1971.

Senator HENRY JACKSON,
Chairman, Senate Interior Affairs Committee,
U.S. Senate, Washington, D.C.

DEAR SENATOR JACKSON: Because it is being well publicized in the press and on TV, we in the West are aware of the hearings taking place on the matter of coal-burning power plants in the "Four Corners" area of the Southwest.

I wish to add my emphatic word of protest to the ghastly scheme the power companies are about to perpetrate on the people of the U.S.A.—if allowed to get away with it.

First, they are proposing to build giant powerplants at points far distant from and to supply the needs of states, especially California, where that type of plant is illegal.

Second, they propose to exploit the resources of lands either in Indian Reservations, or on Bureau of Land Management areas, both of which are under Federal jurisdiction, for *private* profit!

Third, they are already demonstrating the falsity of promises to keep pollution under control, for the plant not far from Farmington, N.M. is pouring vast tonages of fly ash and soot into the atmosphere already! What will be the Southwest's fate if these plants are multiplied? The great corporations must be forced by law to work out no-pollution standards, or denied any permits!

Perhaps most important of all, they are threatening to ruin the scenic and inspirational values of many National Parks and Monuments, which are concentrated in greater numbers in the Southwest than practically anywhere else in the nation. The one great strip mine on Black Mesa has already proved to be an eyesore and a blotch on the landscape. It is also raping the water supply, which depends on a sparse rainfall, and cannot sustain its current use.

Fundamental to the whole argument of the power plant builders is that they *say* we must have greater and greater energy supplies, based on stimulated consumer demand. It is time to reverse the whole American priority system, and *demand* less, *consume* less, *destroy* less for the sake of quality of life. We as 6% of the world's population must not go on consuming 50% of its resources.

I plead with you and your committee either to deny permits to build altogether (preferably); or enact laws with *absolutely foolproof safeguards* regarding air pollution and the restoration of areas to be strip-mined.

Why not explore the use of nuclear plants beside the Gulf of California or the Pacific Ocean, with proper laws regarding cooling of the sea water? Or better still, spend money on research into tapping solar energy, which is inexhaustible and *clean!*

Very sincerely yours,

ARVIN W. ROOS.

ORGANIC SOIL-FOOD ASSOCIATES,
Denver, Colo., May 25, 1971.

DEAR SENATOR JACKSON: It is my studied opinion that an immediate moratorium be declared on present and future power plant construction and use until the following criteria have been established and imposed:

1. The social impact of volume fly ash, sulfur dioxide, oxides of nitrogen, etc.
 2. Strip-mined coal and the questionable restoration of the land; the social degradation of Indian culture.
 3. The marring of scenic beauty by transmission lines, etc.
 4. Need to reduce demand for electricity-ban on promotional advertising by utilities; rate scales loaded for large user to demonstrate true environmental costs; imposition of surtax on wasteful uses such as neon, etc.
 5. Necessity for National Energy Policy to stabilize consumption, control plant siting, authorize research into alternative such as fusion power, thermal power (Imperial Valley), coal gasification, tax law revisions, preserve non-renewable fossil fuel reserves for future use, establish principles of non-degradation.
- Please include this in hearing record.

Respectfully,

J. H. FOWLER, *Executive Director.*

PALISADE, COLO., May 23, 1971.

HON. HENRY M. JACKSON,
*Chairman, Interior and Insular Affairs Committee,
New Senate Office Building, Washington, D.C.*

DEAR SENATOR JACKSON: I am greatly disturbed by the reports of pollution emissions planned for the coal burning plants of the desert areas around Four Corners.

To smudge the clear skies of this lovely vacation land and to add the proposed quantities of defilement to the atmosphere is to further endanger the physical and mental health of this nation and the world.

Here in lovely, green Palisade near Grand Junction we have days when the wind from the south west carries so much dust the skies appear to be totally overcast and the cliffs a mile from our home appear hazy. This is the result of overgrazing, primarily on public lands in the desert area.

Add to this pollution from electrical plants plus the additional ground dust that will inevitably sweep off strip mined lands and you will have a condition endangering the entire western slope of the Rockies (and the eastern slope of the Sierras when the wind blows the other way.)

To allow strip mining anywhere is to continue on the road to national suicide. You have to be, as I am, old enough to have seen the dreadful changes taking place all over the high country and western sea coast to realize the enormity of the crimes against nature that have already taken place.

The youngsters instinctively know these things are wicked. We older people who have loved this land with our whole hearts have seen the changes "progress" has wreaked.

This is frankly a prayer. Help call a halt, Mr. Chairman. Save us from our overgrowth and folly. Demand a reverse from our over use of power. Be fair to the Indians who are letting their homeland be destroyed.

It is later than we think.

MARGARET B. PEREGRINE
Mrs. C. A. Peregrine.

DENVER, COLO., May 9, 1971.

HON. HENRY M. JACKSON,
*Chairman, Senate Committee on Interior and Insular Affairs, U.S. Senate,
Washington, D.C.*

DEAR SENATOR JACKSON: I am appalled at what is being done to pollute the air and mar the scenery in the Four Corners region. It is inconceivable that this type of generating plant should be allowed to operate. I cannot believe the American people and the people of this country will allow such visual and scenic desecration. I urge that the present operating plant be forced to halt operations and that the proposed plants be *not* built!

Sincerely,

HAROLD H. MATHES.

MESA VERDE, COLO., May 10, 1971.

Senator HENRY JACKSON,
*Senate Office Building,
Washington, D.C.*

DEAR SENATOR JACKSON: As Chairman of the Committee conducting these hearings I would urge you to listen to the voices of those of us that live in the Four Corners area.

I am very much opposed to the construction of more power plants in this area until it can be demonstrated that air pollution can be controlled from the existing Fruitland plant. The fact that most of the particulate matter will soon be removed does not impress me. What about the immense quantities of nitrous oxides and sulphur dioxide which will not be removed. Are we to ignore that aspect of the pollution?

That the USA needs power cannot be denied. The power companies still spend more money on advertising than they do on research into methods of producing clean power. What is known of solar energy. The southwest could produce unlimited amounts of solar energy if the technology were available. Let's make it available. In the meantime, let's quit advocating the use of more and more power until we can produce it cleanly.

Sincerely,

JAMES V. COURT.

FORT COLLINS, COLO., May 30, 1971.

HON. HENRY M. JACKSON,
Senate Committee on Interior and Insular Affairs,
U.S. Senate, Washington, D.C.

DEAR SIR: I would like this statement to be recorded in the hearing as a vote against the power plant in the 4-corners area of Colorado, New Mexico, Arizona and Utah. I advocate its removal or at least pollution control methods to be put into effect.

Please include this in the hearing records.

Sincerely,

JUDITH M. HIATT.

DENVER, COLO., May 25, 1971.

HON. HENRY M. JACKSON,
Chairman, Interior and Insular Affairs Committee,
New Senate Office Building,
Washington, D.C.

DEAR SENATOR JACKSON: I am writing in reference to the hearings you are conducting on the proposed "electrification" of the Southwest. I have information which indicates that power plants in Fruitland, New Mexico; Joseph City, Arizona; and the Mohave Plant in Nevada, are extremely polluting and supply *not* the immediate areas but Los Angeles, Phoenix, Tucson, and Las Vegas, the "neon" cities. I understand further that more plants are being planned for Page, Arizona; Farmington, New Mexico; and Price, Utah, which plants promise to be just as polluting as the older ones and which will use coal obtained from strip-mining on land found in the Navajo Reservation.

There must be a drastic turn-about in the traditional American policy of *expansion*, particularly in the area of electrical power, while we still have some natural resources and breatheable air left. Otherwise, I am afraid that our children will no longer know the beauty of an untouched landscape or a clear horizon.

I live in Denver where we are subjected to advertising by the Public Service Corporation (gas and electricity) of Colorado to buy more electrical appliances in order to consume more electricity, so that PSC can build more polluting power plants and charge the consumer higher rates to pay for the advertising campaigns and the higher executive salaries. The time has come for this vicious circle to stop. I am confident that the American people can learn to become less consumer-oriented if there is strong leadership in the area of conservation from high levels of government.

Such leadership will take steps to reduce the demand of electricity, to make a thorough study of the national use of electrical power, and to establish conservation of natural resources as a top national priority.

I hope you will consider these points during your hearings and that they will be included in the hearing record.

Sincerely yours,

Mrs. MARY S. CLARK.

BOULDER, COLO., May 25, 1971.

HON. HENRY M. JACKSON,
Chairman, Senate Committee on Interior and Insular Affairs Committee, U.S.
Senate, Washington, D.C.

DEAR SENATOR JACKSON: I strongly urge that a thorough investigation be made of the environmental effects to be created by the large coal burning power plants

proposed for the Southwest. As a professional engineer with a masters degree in sanitary engineering, I am considerably involved in my daily activities with the environmental impact of man's activities. It is my opinion that the adverse effects which will be created by the power plants, such as air pollution, strip mining, increase in Colorado River water salinity, ground water mining, etc. will more than offset the beneficial effects of these plants. Alternate means of producing electricity such as geothermal energy plants, should be investigated, along with an active program to reduce per capita electricity use.

Please include this statement in the hearing record.

WILLIAM D. HAMANN, P.E.

BOULDER, COLO., May 11, 1971.

HON. HENRY M. JACKSON,
Chairman, Senate Committee on Interior and Insular Affairs, U.S. Senate,
Washington, D.C.

DEAR SENATOR JACKSON: Since we cannot be present at your hearings on Thermal Powerplant Construction in the Desert Areas of the Pacific Southwest, we would like these comments to be included in the hearing record.

These powerplants are clearly an example of an attempt by those benefiting from the power generated to avoid paying the cost of generation. Most of the power will be used outside the Colorado River Basin. The unpaid-for costs of thermal power generation, e.g., air pollution, depletion of water resources, etc., clearly will be borne by those living within the area of generation. Thus, those areas receiving the main benefit from new power clearly impose part of the costs of generation upon areas which benefit less.

Secondly, one of the main assets of the southwest is the clear, dry air of the desert. Many people flee from the city smog to vacation or live in these areas. The proposed powerplants endanger this resource.

The strip-mining of coal to be used in these plants has in the past been carried on in a way which results in unsightly scars on the earth and causes destructive erosion. Increased demand for coal for powerplants will simply accelerate the destruction of desert land by strip-mining.

Sincerely yours,

DR. WILLIAM LOEHR, Ph. D.
VIRGINIA LOEHR

GREELEY, COLO., May 8, 1971.

HON. HENRY M. JACKSON,
Chairman, Senate Committee on Interior and Insular Affairs, U.S. Senate,
Washington, D.C.

DEAR SENATOR JACKSON: I strongly object to powerplant construction in the Four Corners area.

The rejection Thursday, May 6th, by the Interior Department of a request to halt power construction of coal-fired power plants in the Southwest is shocking.

As an article in LIFE, April 16th, said, "Hello, Energy—Goodbye, Big Sky", and goodbye, too, Grand Canyon, Indians, and water!

Mother Nature! Who cares? Not the Interior Department.

Very truly yours,

JOSEPHINE B. JONES.

LITTLETON, COLO., May 23, 1971,

HON. HENRY M. JACKSON,
Chairman, Interior and Insular Affairs Committee,
New Senate Office Building, Washington, D.C.

DEAR SIR: We are writing this letter to express our concern and alarm over the current and projected power plants in the Four Corners area of the Southwest. After reading the amounts of sulfur dioxide, oxide of nitrogen, and flyash which are currently being literally "dumped" into the air and the amounts to be given off by further plants to be built, we can only say that something must be done to stop this desecration.

If Phoenix, Los Angeles, Tucson, and Las Vegas want to use so much electricity, let them build these plants on location. They have laws prohibiting this kind of pollution, so they essentially are shipping it off somewhere else. How ugly can you get? Why does the beautiful Southwest have to be ruined because Las Vegas has to be lit up 24 hours a day and because people in Phoenix and

Tucson want their water coolers and air conditioners running constantly. If they want to live in these cities, then they better learn to live with the environment.

Needless to say, we are very concerned, and we urge you to do everything in your power to stop this wholesale ruination of one of the few remaining unspoiled areas of this country.

Respectfully yours,

JOSEPH P. BRZOWSKI.
JUNE E. BRZOWSKI.

BOULDER, COLO., May 24, 1971.

HON. HENRY M. JACKSON,
Chairman Interior and Insular Affairs Committee,
New Senate Building, Washington, D.C.

DEAR SENATOR JACKSON: As a concerned citizen of the Southwest, I am appalled at the statistics of the quantities of pollution which are, and will be generated by the electric power plants built or to be built at the New Mexico, Utah, Arizona and Nevada sites, and the strip mining connected thereto.

I strongly urge and beseech you to consider alternates to this awful threat to the ecology and environment of this entire unspoiled area. Although I have no personal interests in any electric utility or fuels, perhaps an alternate would be nuclear power, which, I am informed is more adaptable to pollution control and abatement.

WILLIAM STASICK.

DURANGO, COLO., May 20, 1971.

HON. HENRY M. JACKSON,
Chairman, Senate Committee on Interior and Insular Affairs,
U.S. Senate, Washington, D.C.

DEAR SIR: I am one of the many citizens of this area who feels that there must be an alternative to the air-polluting power plant complex in Southwestern Colorado. This complex represents a threat not only in air pollution but to our total environment.

Please help us retain the pure air of this area!

Sincerely,

Mrs. CAROLYN KENDRICK.

DURANGO, COLO., May 20, 1971.

HON. HENRY M. JACKSON,
Chairman, Senate Committee on Interior and Insular Affairs,
U.S. Senate, Washington, D.C.

DEAR SIR: I am one of the many citizens of this area who feels that there must be an alternative to the air-polluting power plant complex in Southwestern Colorado. This complex represents a threat not only in air pollution but to our total environment.

Please help us retain the pure air of this area!

Sincerely,

Mrs. SHARON WILCOX.

COLORADO SPRINGS, COLO., May 24, 1971.

HON. HENRY M. JACKSON,
Chairman, Senate Committee on Interior and Insular Affairs,
U.S. Senate, Washington, D.C.

DEAR SENATOR JACKSON: Although I am particularly disturbed about the adverse environmental impacts that the proposed and existing Four Corners power plants have had and will have, my greater concern lies in the whole field of power generation. To be negative about the proposed plants without offering alternatives is useless since it is clear that our increasing power demands mandate immediate consideration of alternatives.

Until a thorough national study of power generation is concluded, I urge you to recommend the suspension of power projects in the Southwest.

Yours very truly,

VICTORIA M. GOW.

DENVER, COLO., May 23, 1971.

HON. HENRY M. JACKSON,
Chairman, Interior and Insular Affairs Committee.
New Senate Office Building, Washington, D.C.

DEAR SENATOR JACKSON: I am very concerned about the pending construction of super power plants in the Southwest. Already the tonnage of pollutants emitted into the air have reached incredible amounts and are affecting a large area of the Southwest and its recreational areas.

I urge you to declare an immediate moratorium on the construction of power plants until more is known about the degradation of air quality and the healing of strip-mined land. I urge you to take immediate steps to reduce the demand for electricity, particularly by imposition of a surtax on wasteful uses of electricity such as neon advertising. I would like my statements to be part of the hearing record, and am sending copies to my Senators.

Sincerely yours,

CHRISTINE LEDDY.

BOULDER, COLO., May 19, 1971.

HON. HENRY M. JACKSON,
Chairman, Senate Committee on Interior and Insular Affairs,
U.S. Senate, Washington, D.C.

DEAR SENATOR JACKSON: We must stop the damage to the scenic beauty of the Four Corners area by powerplants like the Mohave and Four Corners Plants.

We must demand that these plants and those under construction reduce their production of contaminants significantly, *no matter what the cost.*

Industries cannot be permitted any longer to operate in a manner so disrespectful of an environment which belongs to us all.

Respectfully yours,

A. L. JARVIS.

DENVER, COLO., May 19, 1971.

HON. HENRY M. JACKSON,
Senate Interior Committee,
U.S. Senate, Washington, D.C.

DEAR SENATOR JACKSON: Last night at our Sierra Club meeting, we were told of the serious ecological impact a complex system of power plants would have on the southwest area of our country.

The air pollution in tons per day from the Four Corners operation only, is mind boggling when compared with tonnage per day of New York City, Los Angeles and Chicago. Just one power plant, Fruitland, N.M., emits in tons per day, 384 SO₂ 119 to 182 of NO and NO₂ whereas the New Mexico regulation is under 38 tons per day.

There has been and there will be strip mining to provide the coal. As everyone knows, reclamation of the land, especially arid and semi-arid land is next to impossible after such an operation. To cite an example, up to now, virtually no reclamation of the "stripped" land has been done on the Navajo Reservation in the Four-Corners Area.

Just the thought of placing these power plants near our scenic areas is anti-conservation and the whole idea needs much more thought towards efficient allocation of our natural resources.

Sincerely,

NATALIE HECHTER.
 H. H. HECHTER.

PARKER, COLO., May 23, 1971.

HON. HENRY M. JACKSON,
Chairman, Interior and Insular Affairs Committee,
New Senate Office Building, Washington, D.C.

DEAR SENATOR JACKSON: I am absolutely opposed to the proposed power projects to be located in the Southwest. I consider them to be an ecological disaster and if they are considered necessary for the power needs of Los Angeles and Las Vegas, then locate them *in those areas.*

Sincerely,

ROBERT W. ELLINGSON.

DURANGO, COLO., May 24, 1971.

Hon. HENRY JACKSON,

Chairman, Senate Interior and Insular Affairs, U.S. Senate, Washington, D.C.

DEAR SIR: I wish this letter to be included in the Official Hearing Record for Power Generation in the Southwest, May 24 through May 28, 1971.

I wish to say I am much opposed to operation of the present plant or construction of any other plants until all pollution can be controlled. The plant in operation at Kirtland, N. Mex. keeps the air in the Durango area constantly hazy with pollution. At times this pollution is as thick as a severe dust storm for days at a time. Not only is this pollution harmful to human health, but also plant and animal health. This area depend upon agriculture and tourism for income, and both of these industries will suffer tremendously from further pollution.

I believe some interesting, and shocking facts would come to light if all data on respiratory infections in this area before and since operation of the Kirtland plant could be gathered. I want my children to live to adulthood. They *can* live *without* electric power, for people have far longer than they have lived with electricity. However, *no life can exist without clean air.*

I also wish to state that I support the Hipo suit against strip mining of their lands, and pumping water from their lands for power plants. These people have an ancient wisdom we would do well to heed. Further, the rights of the Hopi tribe have been violated by our government far too often already.

Very truly yours,

Mrs. LORETTA ANNALA.

LAKEWOOD, COLO., May 26, 1971.

Hon. HENRY M. JACKSON,

Chairman, Interior and Insular Affairs Committee, New Senate Office Building, Washington, D.C.

DEAR SENATOR JACKSON: I urge the suspension of power projects in the Southwest. Consideration must be given to the possible ill effects of coal-burning power generation and the impact of the strip-mining itself.

Immediate steps must be taken to find a means to reduce electrical demand and to more efficiently use and generate electricity.

It is requested that my views concerning these projects be included as part of the hearing record on this matter.

PATRICIA E. HUMPHREY.

BOULDER, COLO., June 3, 1971.

Hon. HENRY M. JACKSON,

Chairman, Senate Committee on Interior and Insular Affairs, U.S. Senate, Washington, D.C.

DEAR SIR: This letter is to express to you our displeasure and concern over the planned development of the Four Corners Power Plants in New Mexico and Colorado.

These plants, which will not serve the residents of either state substantially and will increase the pollutant quotient of both states, should not be developed without careful and thorough study.

Please add my name to those who are pleading for cancellation of construction of these plants as now planned.

Sincerely,

ANNE H. DYKSTRA.

BOULDER, COLO., June 5, 1971.

Hon. HENRY M. JACKSON,

Chairman, Interior and Insular Affairs Committee, New Senate Office Building, Washington, D.C.

DEAR SENATOR JACKSON: We would like to express our opposition to the Four Corners powerplant project. Last summer my wife and I drove through the Four Corners area and were dismayed to learn that one powerplant, and not a forest fire, was causing the sky of the (previously) scenic southwest to look like that on the New Jersey turnpike approaching Manhattan.

I am a scientist and realize the importance of an abundant supply of electrical power, but I believe that the federal role in this problem should be to support research for cleaner production methods and to force economical use of existing supplies. Long range solutions include vigorous birth control programs encour-

aging the stabilization of the population of the United States at or below the current level and to support a crash program to develop clean and plentiful electrical power by thermonuclear fusion. In the short run, laws against advertising electrical power need to be passed. Sales of non-essential electrical appliances and wasteful consumption of electricity (*e.g.* neon signs) must be discouraged by strong economic sanctions. What we do not need in one of the last unspoiled areas of the country is massive air pollution, strip mining of coal, and depletion of the desert water supplies.

Sincerely,

Dr. and Mrs. RALPH BOHLIN.

DURANGO, COLO., June 9, 1971.

HON. HENRY M. JACKSON,
*Chairman, Interior and Insular Affairs Committee, New Senate Office Building,
Washington, D.C.*

DEAR SIR: I would like to take this opportunity to register my objection to the Four Corners Power Plant at Fruitland, New Mexico in particular and all Southwest power plants in general—proposed, under construction or working.

I have grown up in Southwestern Colorado. I have taken in stride the backward ways, higher prices, limited selection of consumer goods, and low pay standards brought on by the isolated area. All this I have lived with because I was able to look at the mountains around Durango and feel that I could go there any time. In the last few years there have been days when I couldn't even see those mountains because of the smoke blown up from the Fruitland Power Plant. In years past I could go up onto the mountains and look out to the south and see for miles; this is no longer the case. The only reward I get for the climb is the view of a dense smoke cloud. For one who is used to clear skies this is a frightening experience.

Why is it necessary for the people in the Southwest to receive all the detrimental effects of these large polluters and not use any of the power generated by them.

I respectfully urge the suspension of power projects in the Southwest and a study of the effects on the environment of the Southwest.

Thank you for your time and consideration. I hope we will always have clear air in the Southwest through your efforts.

Sincerely,

HOWARD E. REX.

BOULDER, COLO., June 7, 1971.

HON. HENRY M. JACKSON,
*Senate Office Building,
Washington, D.C.*

DEAR SENATOR JACKSON: I am appalled by the Four Corners Powerplants Project. I believe that the rape of our environment by our "civilization" must be halted immediately. Those of us who live in Colorado do not want the Southwest to become like the polluted Northeast. The massive air pollution, the ugly strip mining scars, and the deterioration of the quality of water in this arid region cannot be tolerated. Reasons for preserving the quality of the environment in this area are numerous. There are many national parks and national monuments as well as other unprotected scenic areas that would be marred by the air pollution. Land set aside for the Indians as reservations will be harmed by the strip mining, the deterioration of the quality of the air, and by the consumption of scarce water resources, thereby adding another shameful chapter to the destruction of their habitat by the white man. Furthermore the concentration of heavy industry in the vicinity of these powerplants will compound the problem.

I believe that any further construction of powerplants in this area should be stopped. The present plants should either be shut down or drastically cleaned up. Having seen strip mines in the east, I hope that this form of mining will be outlawed. New and cleaner sources of electrical power should be sought, and unnecessary consumption of electrical power should be discouraged.

Sincerely yours,

STEPHEN JACKSON.

BOULDER, COLO., June 12, 1971.

Senator HENRY JACKSON,
Chairman, Senate Committee on Interior and Insular Affairs,
U.S. Senate, Washington, D.C.

DEAR SENATOR JACKSON: I wish to express my opposition to the operation and construction of large power plants in the Southwest without adequate pollution controls, which seem to be some years in the future.

We have no need for the devastation wrought elsewhere by strip mining and air pollution. If southern California wishes additional power plants, let them live with the end products.

Clean air and an unravaged landscape have far more value in the long run than any temporary economic benefit from these polluters. I wish to have my comments made a part of the hearing record. Thank you for your consideration.

Sincerely,

JACK BEAL.

COLORADO SPRINGS, COLO., June 3, 1971.

HON. HENRY M. JACKSON,
Senate Committee on Interior and Insular Affairs,
U.S. Senate, Washington, D.C.

DEAR SIR: I urge the suspension of coal-fired power projects in the Southwest. I am quite concerned about the adverse environmental effects including air pollution, stripmining, power line and pipeline construction.

Please include my comments as part of the hearing record. Thank you.

Sincerely,

HOWARD LAYHER.

CITY OF CORTEZ—RESOLUTION No. 4

At a regular meeting of the City Council of the City of Cortez, Colorado, at the City Council Chambers, on Tuesday, May 25, 1971, among other matters of business transacted, the following Resolution was proposed and after being put to the vote of the Governing Body was adopted, said Resolution being as follows, to-wit:

Whereas, this Governing Body being very mindful and appreciative of the scenic beauty of the Four Corners Region of these United States of America and the desires exhibited by others from metropolitan areas to be able to travel and visit in these clean, clear and wholesome environmental conditions; and

Whereas, these conditions in conjunction with the vast physical beauty of this region attracts many visitors annually which in turn have a very direct and realistic effect on the economics of this community; and

Whereas, said conditions allow for a very desirable and suitable environment for human habitation: Now, therefore be it

Resolved, That this Governing Body is of the unanimous opinion that any future additions and/or expansions of coal burning power plants in the Four Corners Region should be prohibited and postponed until such time that the Federal and State Governments establish adequate and favorable environmental air pollution protection standards and that these protection standards be applied equally to all areas of the Nation with strict enforcement in this region; and be it lastly

Resolved, That a true copy of this Resolution be forwarded by the Cortez City Clerk to those individuals interested in protecting the atmosphere from pollution and to the appropriate State and Federal Government Agencies assigned the responsibility of establishing protection standards and the enforcement thereof.

Approved and adopted this 25th day of May, 1971.

Attest:

JOSEPH G. JARVIS, *Mayor.*

JOHN GREENEMEIER, *City Clerk.*

LAKEWOOD, COLO., May 24, 1971.

HON. HENRY M. JACKSON,
Chairman, Senate Committee on Interior and Insular Affairs, U.S. Senate,
Washington, D.C.

DEAR SENATOR JACKSON: I am extremely concerned about the environmental effects of the present Fruitland, New Mexico power plant and the plants planned in the future for the Four Corners area.

The Fruitland plant at present is emitting around 250 tons of ash a day, New York City emits only 140 tons of ash a day. The smoke from this plant is the only man-caused feature observable from space craft photos. This is disgraceful. The majority of the power from this plant is used in California, where under present law the plant would be illegal because of the disastrous environmental effect. By their own admission the Fruitland plant is the most profitable power plant in the world today and also the greatest polluter. There is a definite discrepancy here.

I am specifically concerned with the following factors:

1. Plant air pollution: previously mentioned.
2. Water allocations: The Colorado River Basin is one of the driest areas in the country. The power plants will consume large amounts of water, enough to supply a city of over one million people. Besides reducing the quantity of water available in the southwest it will also decrease the water quality, by increasing the salt concentration in cooling evaporation. Pumping of ground water from the Black Mesa area will have destructive effects on the water available to the Navajo and Hopi Indians.
3. Siting policies: These power plants are polluting some of the clearest air in the United States. They also are located and already destroying the value of some of the finest scenic and recreational land in the world. There are twenty National Parks and Monuments within the area. The air pollution, the huge plants, the access roads, railroads, EHV transmission lines, and the strip mines have the potential of totally ruining the area.
4. The adequacy of enforcement and government policies by the interior department: The Fruitland plant stated it would only emit 38 tons of ash a day (A New Mexico regulation). At the present it is emitting 250 tons of ash a day. There is not an effective monitoring system of this plant and not enough control to make them reduce their pollution level. Strip mining could be the most destructive aspect of the plants in the long run. There has been no reclamation of the areas already strip mined in New Mexico and there is no evidence that land reclamation after strip mining can be done satisfactorily in the arid west. There should be very strict government control on the planning and operation of these plants if they are to be built at all.

In conclusion: I do not feel we need electric power bad enough to destroy the Four Corners of the United States. There are other alternative sources of power available, and rationing and rate regulation of the existing power could help. Why should we let the power companies destroy the countryside when they are still advertising for people to use more power, thereby creating more profit for them and more pollution for the citizens of this country. I believe government control of utility company advertising is in order and a complete investigation of the environmental and economic effect of their present operations and future plans.

Sincerely yours,

TIM T. SCHOWALTER.

COLORADO SPRINGS, COLO., May 11, 1971.

Senator HENRY M. JACKSON,
Chairman, Senate Committee on Interior and Insular Affairs, U.S. Senate,
Washington, D.C.

DEAR SENATOR JACKSON: I was pleased to read that your committee is investigating the construction of powerplants presently going on in the 4-Corners region of the Southwest. I strongly oppose the construction of these plants; I wish the existing ones could be shut down and dismantled; and I hope your committee will recommend that a study be made to determine if there is any possible alternative to the present plans. At the very least, I hope your committee will recommend withdrawal of Federal funds until an environmental impact statement is drawn up, and until some measures are found to mitigate the awful impact on the environment these plants are causing and will continue to cause in the future.

The plant presently operating at Fruitland gives some indication of what we can expect from the other plants in the future. NBC reported last year that the Fruitland power plant was the ONLY man-made feature on earth detected from the moon orbit of Apollo 12. The plant had a 230-mile long plume of particulate smoke. It produces 350 tons per day. I understand that the plant is now installing precipitators and scrubbers to cut down on this particulate smoke. But the visible pollution isn't always the worst. Fruitland discharges 380 tons per day of SO_2 . That's twice the amount produced in the entire state of Colorado. The sulphur dioxide becomes sulphur trioxide on exposure to the ultraviolet portion of the

sunlight; it then combines with water vapor to become anhydrous sulphuric acid. This acid has been known to eat holes in nylon stockings, and is believed to be lethal to certain types of vegetation. It is, at any rate, known that smog from Los Angeles has destroyed over 100,000 acres of ponderosa pine forests in the San Bernardino mountains since 1960. The clean air of the Southwest is one of our most precious resources. It cannot stand up long under the pollution bombardment it would experience when all eight power plants go into operation.

Another precious resource of the Southwest is water. We don't have much of it. If the power plants draw their needed water supply from the Colorado River, not only will they deprive this area of a certain needed QUANTITY of water; they will also contribute to a decrease in the QUALITY of the remaining water. The Colorado is already getting salty; the further evaporation which will come from using this water for cooling purposes in the power plants will only increase the salinity. That's an increase we can ill-afford.

One of the names given to this 4-corners area of the country is "The Enchanted Wilderness." The name is apt. Scarcity of water has held in check man's impact on the land. Large stretches of the region are wilderness areas—de facto, even if not protected as such. And the land, from its red sandstone coloring, and its surrealistic rock formations, to its peaceful solitude, is indeed enchanted. I shudder to think of the impact of coal mines—strip mining—on this land. But coal is what these power plants need; and it will be gouged out of this enchanted earth in staggering amounts to satisfy the appetites of electrical generators like the one at Fruitland. I do not believe the land can sustain this type of brutality. We in Colorado Springs are reminded every day of what strip mining has done to the Front Range. In the East, I have seen what it has done in various regions of Appalachia. Somehow we must find a way to avoid repeating the mistake again.

I do not have an answer to the problem of providing for the electrical needs of the country. I had not realized until recently how "unclean" much of electrical generation is. Nor had I realized the complexities involved in controlling the polluting effects of all sorts of plants: coal-burning, oil-burning, gas-burning, or atomically-powered. In fact, I think many of us had not realized until recently how extended the implications of a small perturbation in the total system can be. But while I may not have answers, I am aware of problems; and I do feel certain that construction of the power plants presently planned for the 4-corners region will create problems of a size we are unprepared to cope with.

I urge the committee most strongly to suspend any Federal funding of this project until all alternatives have been researched, and until we have some idea of how to mitigate the environmental impact which is presently threatened—in fact, already started.

Please include my comments in the record of the hearings.

Sincerely,

JAMES T. WOOD,
Faculty, Colorado College.

DURANGO, COLO., May 9, 1971.

HON. HENRY M. JACKSON,
*Chairman, Senate Committee on Interior and Insular Affairs,
U.S. Senate, Washington, D.C.*

DEAR SENATOR JACKSON: We have lived in Durango for over thirty years and are very alarmed about the impact the Fruitland, New Mexico, Power Plant has made on the southwest. The loss of esthetic value, tourism, and clean air is incredible. No one dreamed this plant would have such a devastating effect and be as far reaching as it is.

We are deeply concerned about the construction of other power plants in the Four Corners Area. Why does this have to happen to our beautiful recreational area and the people living here?

We feel that construction of these plants should be halted until technology catches up and there is equipment available to remove SO_2 and NO_x and particulate matter from the emissions.

We urge you to use your influence to save our beautiful country and perhaps save our Spaceship Earth. This is a world-wide problem and we can not afford to go on exploiting nature. Electric power can be generated without environmental degradation. If not, we had better learn to live with fewer neon lights, air conditioners and in general curtail consumption of power.

Thank you for your attention to this matter.

Sincerely yours,

Mrs. ETHEL STEWART.

BOULDER, COLO., May 30, 1971

HON. HENRY M. JACKSON,
Chairman, Interior and Insular Affairs Committee,
New Senate Office Building, Washington, D.C.

DEAR SENATOR JACKSON: Several years ago while traveling Route 66 through Northern Arizona, I encountered a black plume of smoke which trailed from west to east at least 25 miles. After reaching its source, I was dismayed to find that the cause of all this scenery destroying smoke was a power generating station, hundreds of miles from a city of even 25,000 people. I told myself that surely this was some mistake; they would never allow the Southwest's unique scenery to be destroyed by building any more of these smog producing stations.

Now I find that many more are being built and more are planned. I beseech you, as Chairman of the Interior and Insular Affairs Committee to halt further construction of any more coal burning power plants in the Southwest, or anywhere, until the effluents from these plants can be kept to very near zero. Furthermore, existing stations must be made to comply with smog control laws of neighboring states. Unfortunately, the discharge from these smoke stacks does not stop at state lines.

Your cooperation in these matters is genuinely appreciated. If it is not too late, I would like these comments to be included in the records of the hearings now being conducted.

Sincerely yours,

ROBERT F. WENDLER.

UNIVERSITY OF DENVER,
 DEPARTMENT OF HISTORY,
 Denver, Colo., June 1, 1971.

Senator HENRY M. JACKSON,
Chairman, Senate Committee on Interior and Insular Affairs,
U.S. Senate, Washington, D.C.

DEAR SENATOR JACKSON: I support a moratorium on further power plant construction and operation in the Four Corners area of Colorado, New Mexico, Utah and Arizona until these plants can be made pollution-free, and until the impact of strip mining upon the environment and upon the Indian peoples can be studied.

As author of *The Story of Man at Grand Canyon*, I am familiar with the Four Corners country. It is a highly scenic and historic area of many National Parks and Indian Reservations, an unmatched national recreational resource and until recently was known for its clear and health-giving air.

The pollution caused by these power plants would make them illegal in the very cities which will buy their power. To locate the power plants in the beautiful Four Corners area is a grievous insult to our natural environment.

The power plants consume huge amounts of water in an area where water is critically short. The land is torn up by strip-mining over thousands of acres; whether these areas can ever be restored is questionable. The power plants pollute the clearest air in our country. Is the power these plants produce worth the water, air and land they consume and pollute? What excuse is adequate in this day and age for the construction of power plants without adequate pollution safeguards?

I request that these comments of mine be made part of your committee's hearing records.

Sincerely,

Dr. J. DONALD HUGHES,
Assistant Professor of History.

DENVER, COLO., June 1, 1971.

HON. HENRY M. JACKSON,
Chairman, Senate Committee on Interior and Insular Affairs,
U.S. Senate, Washington, D.C.

DEAR SENATOR JACKSON: Since I am unable to attend in person the hearings on the pollution caused by the power plants located in the Four Corners Region, I ask that this letter be added to the hearing record in lieu of my appearance.

From 1949 to 1966 I was a resident of New Mexico, as were the members of my immediate family. Since moving to Colorado we have continued to visit New Mexico several times each year. However, when I visited New Mexico in 1968 I was amazed. The skies, once the bluest in the west, were clouded with a brown

haze. This was especially noticeable in the Santa Fe area: when you were in the surrounding mountains it appeared that you could look down on the haze which on some days obscured the ground.

After talking to people in Albuquerque, Santa Fe and Los Alamos, I learned the source of the pollution: the power plants near Farmington, New Mexico. The pollution produced by these plants must be stopped.

If the pollution from the plants, actual or proposed, in the Four Corners Region were in Los Angeles or New York City, it would serve to make a bad situation worse. But in New Mexico, it changes a magnificent climate into only a good one. That action is inexcusable. Please help to solve what is a very real problem to anyone that loves New Mexico, the southwest or the Rocky Mountains.

Thank you for your interest.

Sincerely,

GLENN W. S. KISSINGER.

LITTLETON, COLO., May 24, 1971.

Hon. HENRY M. JACKSON,

Chairman, Interior and Insular Affairs Committee,
New Senate Office Building, Washington, D.C.

DEAR SIR: I've stood outside on winter nights near White Sands, and gasped at the sight of millions of stars dotting the sky. I've walked with delight through the blooming spring desert near Tucson. I've stood in awe before the white purity of the Spanish missions. I've looked down on the indescribable canyons of the Colorado.

And all those things I've done and seen in the American South-West were made more beautiful, or indeed were visible at all because of the purity of the air.

Then, one day a few weeks ago, I flew from Los Angeles to Denver. Once the plane took off, the ground disappeared from sight, invisible beneath a yellow-brown blanket of smog. Indeed, the smog had backed up to the very peaks of the Sierras, and a few fingers of the creeping menace trickled over into the desert.

Here, in my own home in Littleton, Colorado, a suburb of Denver, I'm drawn again and again to the windows to view the vast panorama of the Rockies, a panorama that stretches from Pikes Peak to the South to Longs Peak to the north. And much too often, and too increasingly often, the view is smudged or sometimes entirely obscured by the pollutants in the air.

Please, please do what you can to stop the building of the coal burning power plants in the south-west. Is there to be no place left where the beauty of this world shines through? Are my grandchildren never to breathe clean air and know the loveliness of this land as I have?

You know well the deteriorative health aspects of pollution. I have concentrated on the beauty possible in unpolluted areas, of the things that raise the spirit of man above the concepts of animals.

No, I am not idiotic enough to dismiss the economic necessities of man. Man needs a sufficiency of things—of food, of clothing, of shelter—before he has either the time or the energy to contemplate the aspects of beauty.

But what is sufficiency, and what is excess? What is enough, and what is overabundance? Every human being on this earth should examine their conscience. What is really, truthfully, happiness for them? I doubt very much, if they are honest with themselves, that they will answer "a new color television set," or "a bigger air conditioner," or "an electric can opener."

We are seemingly fighting a losing battle in cleaning up the areas of this nation already polluted. Why, oh why, proceed to pollute one of the few remaining unpolluted spots?

I keep remembering what Christ said as he looked down upon the people at the foot of the cross. He looked down in compassion and understanding, and said, "Father, forgive them, for they know not what they do."

But we don't have that excuse. We know what we're doing, and who can ever forgive us?

I respectfully request that my comments be included in the hearing record.

Sincerely,

Mrs. LOIS GRIFFITH.

FORT COLLINS, COLO., June 1, 1971.

HON. HENRY M. JACKSON,
*Chairman, Interior and Insular Affairs Committee,
New Senate Office Building, Washington, D.C.*

DEAR SIR: The following are my views on the development of power plants in the Four Corners area of the southwest. I request that my opinions become a part of the hearing record of the U.S. Senate Committee on Interior and Insular Affairs.

I believe that there should be a moratorium on the further construction of power plants, especially those that threaten to have an adverse effect upon environmental quality as those in the Four Corners Region will. I believe that the justifications used by power companies for the further development of power sources based on expanding demand are spurious, especially since these companies are largely instrumental in increasing per capita use through promotional campaigns. It is shown statistically that per capita use of electrical power has increased and will continue to increase. This is certainly true so long as demand is irrational. Per capita demand, I assume, includes all power consumption. This means that the portion of the statistical demand that is mine includes power used to illuminate billboards, neon signs, and for excessive and unnecessary street lighting. I am sure that the electricity used by one large billboard in one night is more than I use in my home for an entire week or perhaps more. For power company spokesman to allot this usage as part of my per capita consumption and to assert that I will want more in the future is ridiculous, and I object to it strongly.

I understand that power to be generated in the Four Corners Area will go to the metropolitan areas of the southwest and southern California. Before such plants are built, I believe that the true power needs should be ascertained and then fulfilled to all practical limits by reducing irrational uses. Turn off lights on billboards. Discontinue unnecessary street illumination. Determine a reasonable power allotment for home use and charge prohibitive rates for that in excess of reasonable use to discourage unnecessary electrical gadgetry.

Development of power plants in the Four Corners will be an injustice to the Navajo and Hopi Indians. We have no right to destroy Indian lands for coal. I would hope we are becoming enlightened and civilized enough to discontinue the crimes we have and are committing against these Indians.

Sincerely yours,

PHILIP S. MILLER.

THE WOMAN'S CLUB OF DENVER,
Denver, Colo., June 1, 1971.

HON. HENRY M. JACKSON,
*Chairman, Senate Interior and Insular Affairs Committee, New Senate Office,
Washington, D.C.*

DEAR SENATOR JACKSON: The Conservation Committee of the Woman's Club of Denver protests the lack of concern for the environment by the companies that are building coal-fired power plants in the Four Corners area. These plants are and will generate electricity for Los Angeles, Phoenix, Tucson and Las Vegas. Such plants would be illegal in the Los Angeles basin.

So the power plant industry is "picking" on this unspoiled region—the last region between the Atlantic and Pacific, which doesn't have air pollution. This southwest area has had clear air and magnificent vistas. Colorado suffers from the air pollution from the plant in Fruitland near Farmington, New Mexico.

January 28, 1971, the chairman of the Conservation Committee attended a consultation in Denver. The Environmental Protection Agency proposed the establishment of eight intrastate air pollution control regions and one interstate. The interstate includes the Four Corners area: where Colorado, New Mexico, Arizona and Utah meet. Interstate will bring federal control.

April 5th, the chairman attended a forum held in Denver after similar meetings had been held in the other three states. This forum was also held by the EPA.

We wish to protest strongly also the use of advertising for using more electricity by utility companies. They should use such money for research to control air pollution. Companies should *not* advertise electrical tooth brushes and other

electrical appliances, air filters for removing the dirty particulates emitted by the same power plants which advertise the appliances. Then the utility companies will try to raise prices—even go to court as the Colorado Public Service Company has done.

Further, our concern is about the environmental impact from air pollution from these coal-fired power plants—the ugliness, the threat to health for humans and animals, the costs of cleaning, the effects on soil, water, trees and other vegetation, metals, art and weather. Our concern is about strip mining, power lines and pipeline construction, thermal pollution of lakes and streams, and harm to underground water.

We demand that an immediate moratorium be declared on all coal-burning power plant construction until it is proven that there will be no degradation of the quality of air; and until it can be proven that strip mined land can be healed. Even so we are afraid that this semi-arid region will not have sufficient water and that there will not be enough underground water.

We demand that there be 99.5% removal of particulates, ponds for recycling cooling water and 100% removal of the invisible, possibly more harmful chemical emissions. Low sulphur coal is not an asset, as we have learned from sad experience with Colorado Public Service Company.

Denver ranks with Los Angeles and New York as to air pollution. Colorado, because of its altitude, should have more strict air standards than the rest of the nation. We have heard that the companies plan to build twenty three coal-burning power plants in the Four Corners area. There is much coal in Colorado. It is said that future coal-burning plants being considered for Western Slope towns of Colorado, northwest towns of Craig, Hayden and Paonia, may create pollution problems as severe as Denver's.

Please include this letter in the Durango hearing record. The Durango hearing will be in Durango, May 27th.

Very sincerely,

(Mrs.) MARY H. HUNTINGTON,
Chairman, Conservation Committee.

LONGMONT, COLO., May 25, 1971.

HON. HENRY M. JACKSON,
Chairman, Interior and Insular Affairs Committee, New Senate Office Building, Washington, D.C.

DEAR SIR: I would like to urge the suspension of power projects in the Southwest. Also, I urge a thorough national study of the environmental ill effects of coal-burning power generation and of strip mining. I urge the enactment of a non-degradation policy for the air and land of the scenic Southwest.

An immediate national dialogue concerning power generation, and the environmental impact of our rising per capita consumption of electricity should be instituted. Methods for reducing electrical demand, to more efficiently use and generate electricity, and to reduce the environmental impact of power generation should be developed.

My firm belief is that:

1. A complete moratorium must be declared on all construction of power plants in the West and Southwest immediately.
2. The inefficient use of electrical energy must be stopped, (for example, neon signs, and the numerous useless electrical gadgets sold in the U.S.)
3. Strip mining in the Southwest and West must be stopped immediately. This area of the country cannot recover so easily from such devastation, as can areas in the East. (Even if the effort were to be made, which I doubt it would—as witness Appalachia.)
4. The developers and real estate men must be made to realize that this area of the country cannot support a large population. Instead of moving West, people in the East should clean up the environment they have created where they are.

Please include my comments and views as part of the hearing record—the hearings which are being held in the Southwest between May 24 and 28.

Sincerely,

(Mrs.) ESTHER B. JURGENS.

STEAMBOAT SPRINGS, COLO., May 24, 1971.

HON. HENRY M. JACKSON,
Chairman, Interior, and Insular Affairs Committee,
New Senate Office Building, Washington, D.C.

DEAR SENATOR JACKSON: On a family vacation three weeks ago to several Southwestern States we passed through the Four Corners Area and we were horrified at the air pollution we observed for hundreds of miles surrounding the coal-burning power plant at Fruitland, New Mexico. It is unbelievable and inexcusable.

Your Committee must do all it possibly can to stop the proliferation of such plants as well as the strip-mining that is necessary to provide fuel for those plants. Americans must put a stop to the contamination of our air, land and water if we are to avoid the inevitable damage to the human beings living in this vast area.

Senator, surely you are aware that this entire four-state area is being made uninhabitable because of the exploitation of its natural resources. This once-peaceful region is open territory for nuclear explosions sponsored by the Atomic Energy Commission to produce deadly radioactive natural gas, and now we are faced with long-range plans to build a network of power plants to produce electricity for the super cities.

Where does it all end? Is the loss of our health and our homes worth the development of more power to run gadgets and light neon signs for Los Angeles and the corrupt gambling interests of Nevada?

Please do what you can to stop the destruction of the only world we have. I am available to your committee to help in any way to put a stop to this mad development of resources at the expense of human beings.

Sincerely yours,

BRUCE J. POLICH.

LAKEWOOD, COLO., May 24, 1971.

HON. HENRY M. JACKSON,
Chairman, Senate Committee on Interior and Insular Affairs,
U.S. Senate, Washington, D.C.

DEAR SIR: Please include this letter as part of the hearing record on thermal powerplant construction in the desert areas of the Pacific Southwest.

Like many others here in the Rocky Mountain States, I am deeply concerned about what is happening to our environment. The thermal powerplants, in my opinion, are the greatest environmental threat that this region has ever faced.

I am quite familiar with the terrible pollution already being committed by the Four Corners Plant in New Mexico. This single plant has already seriously degraded air quality over a huge area of New Mexico, Colorado, Utah and Arizona. Its visible pollutants are apparent literally hundreds of miles away. From personal experience I have observed a noticeable decline in air purity as far away as the San Juan Mountains in southwestern Colorado. There is no question that this powerplant is the cause of the polluted air. Any pilot can easily spot the plant by tracing the ominous clouds of aerial garbage back to its source.

For years residents of Cortez, Colorado have been proud of their view of famous Shiprock in New Mexico (40 miles south). Today, Shiprock is almost never visible due to the polluted air from nearby Four Corners Powerplant.

As far as I am concerned, construction of all powerplants in the Pacific Southwest desert areas should be outlawed. The combination of strip mining damage, air pollution, and evaporation losses of the region's priceless water is too great a sacrifice in order to make cheap electricity for Phoenix and Los Angeles air-conditioners. In fact, I think it is almost a criminal act by the powerplant interests to locate their plants in this region and show so little regard for preserving the region's environmental treasures.

The Federal Government should immediately step in and impose strict air pollution standards on existing plants and carefully examine plans for any new plants now in design stage. The people now living in the southwest desert region are universally unhappy with the damage the plants have already done. They deserve to be protected from the greed-motivated powerplant interests who would gladly destroy this last unspoiled region in order to make a quick profit.

It is time the leaders of this country recognized that growth is not always progress. Our nation's appetite for material goods and pleasures is responsible for the destruction of so many irreplaceable resources that unspoiled and unpolluted environment is almost impossible to find anymore. The Pacific Southwest

desert is one of the few remaining unspoiled areas left in the United States. Let's keep it that way.

Respectfully yours,

CLINTON L. EDDY.

COLORADO SPRINGS, COLO., May 27, 1971.

HON. HENRY M. JACKSON,
Chairman, Senate Committee on Interior Affairs,
U.S. Senate, Washington, D.C.

DEAR SENATOR JACKSON: The very serious threat of air pollution in the Four Corners Region of New Mexico, Arizona, Colorado, and Utah has come to my attention as a result of publicity from your field hearings on that subject. If the facts are true as published, the people living in these four states have great cause for concern.

The operation of eight major coal-fired power plants planned for the region will increase by an order of magnitude the pollution now created by one plant already production power at Fruitland, New Mexico. That one plant now spews 830 tons of sulfur dioxide into the air each day. All sources of this known killer within the state of Colorado produce half the amount coming from that one plant. The Fruitland plant has already caused damage to vegetation as far away as Durango, Colorado, some 50 miles to the northeast. I'm sure your hearings will reveal all potential damage from this project.

No doubt, this country needs the power these new generators will produce. But who receives the benefits? The answer is an insult to the people within range of the fallout from the smokestacks of the power plants. The Los Angeles area will consume three-fourths of the power and Arizona another 20% leaving 5% for the people of New Mexico, Utah, and Colorado. So less than 5% of the power goes to the people living in the areas that will receive the major brunt of the resultant air pollution.

As I view the problem, two solutions exist. One involves shipping the coal from the mines of the Four Corners Region to the localities requiring the power. The second calls for reducing the pollution from the power plants to an acceptable level. To me, that level would mean no damage to plants or animals, no visible smoke, and no odor beyond a very local area.

This problem concerns me because we are already realizing air pollution problems here in Colorado Springs. I moved here two years ago from the Washington, D.C. area. One of my main reasons was to escape the foul air that city experiences. I'm certain you have seen it. It's going to take a large effort here to bring air pollution under control. We don't need contributions to our air pollution from outside sources. Some already comes from our neighbors in Denver and Pueblo.

The facts stated here about the Four Corners Region power plant project were presented by Mr. Charles House (Engineer for Hewlett Packard Co., and member of the Colorado Council for Pollution Control) at a recent Sierra Club meeting in Colorado Springs. Mr. Ray Nixon, Vice President of the Western Energy Supply and Transmission Associates, attended the meeting and did not refute Mr. House's statements.

Please add this letter to the official record of your hearings.

Sincerely,

EDSON F. GOODRICH.

GRAND JUNCTION, COLO., May 24, 1971.

HON. HENRY M. JACKSON,
Chairman, Interior and Insular Affairs Committee, New Senate Office Building,
Washington, D.C.

DEAR SIR: This letter is in regard to the power plant construction hearings currently being held in the four corners area.

I am an engineer who moved my family out of California two years ago. The pollution and congestion was getting to be too much. To live here on the Western Slope of Colorado I had to take a substantial cut in salary, but it was worth it to be able to enjoy the clean air and the wide open spaces. I fear now that our escape was short lived as the western slope of the Rockies is to become the garbage dump of the more populous areas of California and Arizona.

These two states have claim on a substantial portion of the water originating here. The power companies serving these areas are well on their way now to

destroying the land as a whole with strip mining, and the air with particulate and gaseous pollution. Has anyone inquired how the people who live not only here but also in Los Angeles feel about this? Must the whole environment here be destroyed because Los Angeles will not allow the power companies to complete the destruction there?

Scientific journals indicate that fusion power is on the verge of a breakthrough. It is substantially in the same state as our rocket industry was when the first sputnik flew. We were able to marshal our resources and manpower not only to catch up but to pass the Russians. Our pride is involved. Can't we put forth the same type of effort to produce pollution free power? The men are available from the space program and the S.S.T. Physicists are without jobs. All that is needed is a champion. The cause is to save the beauty of the west for the people of the United States.

Please include this letter as part of the investigative hearing records.

Yours truly,

EDWARD F. ROSKOWSKI.

COLORADO SPRINGS, COLO., June 6, 1971.

HON. HENRY M. JACKSON,
Chairman, Senate Committee on Interior and Insular Affairs,
U.S. Senate, Washington, D.C.

DEAR SIR: I wish to urge you to put a prompt halt to the plans for the Four Corners Power Plants. After considering the pros and cons it seems that the destructive potential of this project far outweighs the possible benefits. We must reconsider our values while we are still free to make such choices.

If possible, please publish my plea in the Hearings record.

Thank you for your kind attention.

Sincerely

JEANNE M. SARKIS.

BOULDER, COLO., June 4, 1971.

HON. HENRY M. JACKSON,
Senate Interior Committee,
U.S. Senate, Washington, D.C.

DEAR SENATOR JACKSON: We ask that you enter this letter into the hearing record for the 4-corners area power plants.

We object to these huge power plants, both operating and planned, in the 4-corners area of Colorado, Utah, N. Mexico, and Arizona on two basic counts.

First, we object because of the gross environmental desecration which they inflict upon the area. Our family has regularly taken vacations in the 4-corners area, primarily in S.W. Colorado and the canyon country of Utah, for some 11 years. It is a beautiful, unspoiled, and exciting part of our nation. The oil pollution, strip mining, and underground water use of these power plants would be an intolerable degradation of this clean, pastoral land.

Secondly we object on the social ground that the large metropolitan areas, with high per-capita use of electrical power, should be forced to pay the cost of that power, not just in dollars, but also in feeling the effect of the environmental degradation they cause. Siting of the power plants in the 4-corners area is analogous to dumping municipal garbage on someone else's clean land. This is an unacceptable form of social behavior.

We do realize the substantial problems which the industry faces in meeting rising demands for electrical power. We request that urgent national priority be given to the government's miniscule fusion power (Controlled Thermonuclear Reaction) program. This form of power generation, though yet unproven, promises to be far the least damaging to the environment in terms of raw material requirement, freedom from long-lived radioactive decay products, safety, and efficiency. Given a priority equal to that of the atomic bomb development in WW II, it is reasonable to expect significant progress towards this goal in 5 to 10 years. Without national priority status, this most desirable form of power generation may be several generations in the future.

Your truly,

Dr. and Mrs. VINCENT ARP.

STATEMENT OF ALBERT G. MELCHER, DIRECTOR OF FIELD SERVICES, ROCKY
MOUNTAIN CENTER ON ENVIRONMENT

My name is Albert G. Melcher. I am a professional civil engineer and Director of Field Services for the Rocky Mountain Center on Environment (ROMCOE). ROMCOE is a non-profit regional environmental service center dedicated to maintaining and enhancing environmental quality in eight Rocky Mountain states: Arizona, Colorado, Idaho, Montana, New Mexico, Nevada, Utah and Wyoming. We are headquartered in Denver, Colorado.

I would like to enter the following statement into the record of this hearing:

FOUR CORNERS POWER DEVELOPMENT

I. HISTORY AND BACKGROUND

Mushrooming demands for additional power have resulted in plans for a gigantic network of coal-fired electric generating plants in the desert Southwest. The complex of power and strip mines poses the threat of environmental degradation to an area of the nation now relatively unspoiled.

Major public utilities decided several years ago to turn to the Southwest's huge near-the-surface deposits of low-cost coal to meet growing power needs. The nation is facing its most critical power shortage in its history. And, while power needs for the nation as a whole double every ten years, the rate of increase is even higher in the rapidly-growing areas of the West, such as Los Angeles, Phoenix, Denver and Albuquerque.

In the 1960's, 23 western utility firms formed an engineering and planning organization known as Western Energy Supply and Transmission Associates (WEST) and developed a master plan calling for six gigantic power plants in the Southwest. WEST envisions that by 1985 its desert plants will produce 36 million kilowatts of electricity. The total would be three times as much power as the Tennessee Valley Authority turns out and 17 times that generated by the Aswan Dam in Egypt.

A particular storm of controversy swirls around the coal-rich Black Mesa, a highland covering some two million acres in northeast Arizona. The mesa begins rising gradually from the Little Colorado River to a peak altitude of 8,110 feet at its northern rim and then drops abruptly to the surrounding plain. Sagebrush, pinon pine and juniper trees dot the arid, romantic and timeless lands, the home of the Navajo and Hopi Indian tribes for nearly a thousand years. The dark appearance of stands of trees, especially in canyons, gave Black Mesa its name.

Black Mesa virtually was untouched by modern industrial technology until recently. The Black Mesa is a large part of the Navajo and Hopi Indian reservations. The Navajo reservation covers 20,000 square miles, mostly in Arizona but also extending into New Mexico and Utah. The Hopi Reservation is mostly on the Black Mesa itself.

Many Indians in both tribes long have regarded the Black Mesa as the spiritual center of the American continent. Many national parks and recreation areas, including the Grand Canyon, are on or near the Black Mesa. Southwest power development plans have raised the fear among a number of Indians and many conservation groups that ancestral Indian lands will be desecrated and the Indians' way of life destroyed.

Black Mesa was described in the February 1, 1971, issue of *The National Observer* as "an island of forest and grass in the desert, last outpost of ancient cultures."

Jack Loeffler, chairman of the Black Mesa Defense Fund, an organization based in Santa Fe, N.M., and set up to rally support to "save" the Black Mesa, has said, "Many environmentalists, scientists and other respected citizens have concluded that the sacrifice of the Southwest may be the most critical ecological issue of our time."

In an article in the June, 1971, issue of "Not Man Apart," Loeffler said the purpose of a round of Senate Interior Committee hearings in May, 1971, would be to gather and investigate testimony in order to determine the environmental impact of the power development on the Southwest.

"Should the collective testimony indicate that this type of power plant operation is not feasible, further construction could be denied and the Southwest, with its inhabitants and parks and recreation areas, would survive one of the most grim environmental crises in American history," Loeffler said. "The prob-

lem contains every type of ecological disaster, and when the entire complex of problems is viewed in context, it becomes what Stewart Udall has termed 'the classic example of environmental degradation.' What this means is that within the next 35 years . . . the environment of the Southwest will be completely exploited so that it may export its stored energy to metropolitan areas hundred of miles distant," Loeffler said. "In other words, a geographic areas is to be sacrificed in order that a cultural trend, which is none other than urban growth, may continue."

WEST and the U.S. Interior Department both have pledged to give environmental factors every consideration. However, many citizen conservation organizations believe economic factors will outweigh environmental factors too often.

As an example of the power firms' concern with environmental factors, the participants in the Navajo Generating Station issued the following Environment Policy:

"It is the intent of the Navajo Generating Station participants to make this installation an asset to the community of Page and to the state of Arizona by designing features for the station which will insure environmental protection. In constructing and operating the station, the Salt River Project as project manager will:

"1. Conduct those studies necessary to obtain a complete understanding of how any new facility or activity may affect the environment, and take appropriate action to protect the environment.

"2. Inspect and survey all new facility sites so that any historic or archaeological materials or any endangered species can be saved for posterity.

"3. Install the necessary air pollution control equipment at our facilities so that emissions of particulate matter and gases will meet or be less than established limits.

"4. Construct generating stations in a manner which assures that stack effluents, however small, will be adequately dispersed.

"5. Design facilities for return of water to lakes, rivers or streams so there will be no detrimental effect to the ecology of the area from heat, dissolved solids, or chemicals, as determined by ecologists, biologists and controlling agencies.

"6. Provide protection against pollution by dust.

"7. Build into all generating stations the appropriate facilities for noise abatement.

"8. Design and landscape all new facilities so that they will be harmonious with the surrounding area.

"9. Work harmoniously with all federal, state, and local agencies and groups responsible for or interested in the protection of our environment."

Irrespective of this declaration of intent, many citizen environmentalists express grave doubts that the companies involved will actually implement such a program; the credibility gap, present certainly on both sides of the controversy, widens with each day of construction, mining or plant operation.

In September, 1970, the Colorado Plateau Environmental Advisory Council (CPEAC) was formed. It is centered at the Museum of Northern Arizona, Flagstaff, and is comprised of representatives from academia, power and mining companies, conservation groups, and governmental agencies. Its basic responsibility is in coordinating environmental research, and it is conducting or coordinating a number of studies, most of which are environmental.

A number of other citizens' environmental groups, such as the Black Mesa Defense Fund and the Central Cleaning House, both of Santa Fe, N. M., have been formed for the sole purpose of opposing or expressing concern about Southwestern power development.

The plants, operating, under construction or being studies, include:

The Four Corners Plant.—Arizona Public Service Company (APS) originally built the plant at Fruitland, near Farmington, N. M., in 1963 with three generating units that developed 575,000 kilowatts. In 1966, APS, under a joint agreement with Southern California Edison, Salt River Project, Public Service Company of New Mexico, Tucson Gas and Electric Company and El Paso (Texas) Gas and Electric Company, built units 4 and 5 at the Four Corners Plant. The additions generate 755,000 kw. for a total of 1,330,000 kw. The cost of the plant was more than \$150 million. Coal for the plant comes from a strip mine nearby operated by Utah Mining and Construction Company.

The San Juan Plant.—Construction is underway by the Public Service Company of New Mexico and Tucson Gas and Electric Company on the San Juan Plant. It is located about 15 miles north of the Four Corners Plant. It will cost more than \$53 million and up to four 330,000 kw. units will be built. Completion is scheduled for June, 1973.

The Navajo Generating Station.—This massive facility is under construction near Page, Arizona. The participants and their percentage of participation are:

	Percentage of participation	Approximate kilowatts to be received
Salt River project.....	21.7	501,000
Los Angeles Department of Water and Power.....	21.2	490,000
Arizona Public Service Co.....	14.0	323,000
Nevada Power Co.....	11.3	261,000
Tucson Gas & Electric Co.....	7.5	173,000
U.S. Department of Interior, Bureau of Reclamation.....	24.3	561,000
Total.....		2,309,000

Source: From draft of environmental statement, Navaho Project, January 1971, Bureau of Reclamation.

The Salt River Project is the project manager for the Navajo Generating Station. The Bureau of Reclamation said its entitlement is "intended primarily for pumping purposes on the Central Arizona Project."

The Salt River Project reports that the Navajo Generating Station will be Arizona's largest electrical generating station and the third power-generating station to be built under the WEST concept. The station will consist of three generating units, each with a nameplate rating of 750,000 kw. and an estimated net output of 770,000 kw. The station will have a total net capacity of 2,310,000 kw. The first unit is scheduled to go on line in June, 1974, the second in 1975, and the third in 1976. The investment in the three-unit station will be approximately \$404 million. Transmission facilities will cost about \$172 million. A railroad will be built, at a cost of some \$42 million, to carry fuel to the station. About 800 miles of 500 kv. transmission lines will be constructed to carry power from the Navajo station to the participants' delivery points.

The fuel for the Navajo plant will be coal, mined by Peabody Coal Company from deposits at Black Mesa on reservations of the Navajo and Hopi Indian tribes. The railroad will carry the coal 80 miles from the mine to the station. When the three units are in full operation, they will consume approximately 24,000 tons of coal each day. The station will require up to 34,000 acre-feet of water for consumptive use annually. The water contract permits a maximum diversion from Lake Powell, about four miles from the plant. The present plans call for the cooling water to be disposed of in evaporation ponds and not to be returned to Lake Powell.

The stack emissions will constitute the major impact. With the total 2,300,000 kilowatts on line and a design efficiency of electrostatic precipitators, the fly ash emissions will total 7.25 tons per day or 2,650 tons per year, according to the Bureau of Reclamation. This design efficiency may not always be achieved in operation because of technical problems.

Sulphur dioxide emissions are estimated at 210 tons per day by the Bureau of Reclamation. A 40% reduction in SO₂ emissions is needed before the Arizona one-hour SO₂ standards can be met. Technology to accomplish this is not yet developed.

The plant, according to the Salt River Project, will produce 1,185 tons of ash per day at full-load operation.

Huntington Canyon Generating Station and Transmission Line.—Utah Power and Light Company plans to build the plant in Emery County, Utah, about 29 miles southwest of Price, Utah. The plant would be fueled with coal from an underground mine about 2½ miles from the plant and operated by the Peabody Coal Company. The coal will be transported to the plant by covered conveyor. The ultimate capacity of the plant may reach 2,000,000 kw. Cooling water will be taken from Huntington Creek. The energy from the initial unit will be transmitted principally over a 345-kv line to Camp Williams, near Salt Lake City, Utah, and to the Four Corners Area where it interconnects with the Arizona Public Service Company system. Plans call for the first 430,000 kw. unit to be on line in 1974 and the second in 1978. Scheduled dates for other units have not been established yet.

An estimated 1 million tons of coal and approximately 7,000 acre-feet of water will be used annually for each 430,000 kw. unit.

Kaiparowits Plant. This plant, still under study would be the largest of the six plants and would have an initial capacity of 2,000,000 kw. and an ultimate capacity of 5,000,000 to 6,000,000 kw. The proposed location is in southern Utah near the lower end of Glen Canyon. Southern California Edison, Arizona Public Service Company and the San Diego Gas and Electric Company would be the owner-operators. The initial cost would be \$36 million and could go as high as \$900 million. Production may begin between 1975 and 1980.

Mojave Plant.—The plant is owned jointly by Southern California Edison Company, the Los Angeles Department of Water and Power, the Nevada Power Company and the Salt River Project Agricultural Improvement and Power District. Southern California Edison is the project manager for the plant, which will cost \$189 million initially and more when a second unit is completed in the summer of 1971. The plant will have a generating capacity of 1,580,000 kw. Peabody Coal Company of St. Louis, the nation's largest coal mining firm, will supply coal for the plant. The coal will be transported from the Black Mesa to the plant in Nevada, near the state's southern tip, by a 275-mile underground pipeline in slurry form. The water for the 50-50 coal-water slurry will come from deep wells on Black Mesa, from an aquifer recharged from the plain north of Black Mesa. There is a dispute among geohydrologists as to whether the shallow Indian wells which draw from upper strata will be affected. If they are, or if there is a groundwater drawdown, the Hopi culture as well as the fragile vegetation will be seriously jeopardized. It appears that Indian wells in the plains north of the Mesa will definitely be affected.

The vegetation is sparse, and its destruction, with the cloudburst type of storms prevalent, can lead to twenty-foot deep arroyos in one or two decades. Roads, trails, and other disturbances can trigger these erosion results.

It is also of interest that Colorado Ute Electric Association, Montrose, Colorado, in cooperation with the Salt River Project, is building a 250,000-kilowatt plant at Hayden, Colorado. The \$70 million plant will be coal-fired. Colorado Ute already has a 168,000-kilowatt station at Hayden and a 39,000-kilowatt plant at Nucla, Colorado.

The Mojave and Navajo plants will produce enough power to meet the normal needs of a city of 3,750,000 people.

The 23 public utilities united in WEST are: Arizona Power Authority, Phoenix; Arizona Public Service Company, Phoenix; Arizona Electric Power Cooperative, Inc., Benson City; City of Burbank Public Service Department, Burbank, California; City of Colorado Springs Department of Public Utilities; Colorado-Ute Electric Association, Inc., Montrose, Colo.; El Paso Electric Company, El Paso, Texas; City of Glendale Public Service Department, Glendale, California; Imperial Irrigation District, Imperial, California; City of Los Angeles Department of Water and Power, Los Angeles; Nevada Power Company, Las Vegas, Nevada; Pacific Power and Light Company, Portland, Oregon; City of Pasadena, Municipal Light and Power Department, Pasadena, California; Plains Generation and Transmission Cooperative, Albuquerque, New Mexico; Public Service Company of Colorado, Denver; Public Service Company of New Mexico, Albuquerque; Salt River Project, Phoenix; San Diego Gas and Electric Company; Sierra Pacific Power Company, Reno, Nevada; Southern California Edison Company, Los Angeles; Southern Colorado Power Division, Pueblo, Colo.; Tucson Gas and Electric Company, Tucson; Utah Power and Light Company, Salt Lake City.

II. STATEMENT OF THE PROBLEM

The possible environmental problems associated with the massive power plant development in the desert Southwest are awesome.

While some environmental studies are being conducted on problems stemming from one plant or another and other studies are being contemplated, there currently are no plans for a cumulative study. The major reason for a cumulative study is the fact that a single plant, for example, might meet all federal and state air and water quality standards for environmental control, but a serious problem might result from the cumulative effects of other existing or potential plants, strip mines, roads, transmission lines and other impacts.

Unless a cumulative study is set in motion soon, or a moratorium is called on construction until many environmental questions are answered, the plants will be built and action to protect the environment will be on an "after the fact" basis.

Actual or potential environmental problems posed by the power development in-

clude: air and water pollution; esthetics of transmission lines, roads, buildings and other facilities; erosion; ground water alterations; disruption of vegetative patterns; effects of wildlife and wildlife habitat; possible destruction of Indian antiquities; and, perhaps most critical of all, the cumulative effects of air pollution and what it does to one of the "last of the wide open spaces," known worldwide for magnificent vistas and distances. On some days, a pall is reported by the National Park Service over Mesa Verde National Park and smog hides famous Ship Rock in a haze.

Another major problem is the potential destruction of the unique culture of the Hopi Indians because of an altered environment. The culture of the Hopi, the People of Peace, deserves preservation, for it adds a richness to America. It will be tragic if forces over which the Hopi have no control cause the demise of their culture.

All of the firms involved in the power development, without exception, pledge preservation of the environment—but only "to the greatest extent possible." Multi-million dollar projects of this type, with all the related transmission lines, highways and roads, strip mining, etc., cannot help but be viewed as "major actions," in the words of the National Environmental Policy Act, "significantly affecting the quality of the human environment." The best available information indicates that the air pollution effects will be felt in hundreds of thousands of square miles in the Four Corners area, the only location in the nation where four states touch. Draft Environmental Statements on the Navajo and Huntington Canyon plants filed under Section 102(2)(c) of the National Environmental Policy Act skirt this cumulative effects problem.

Another concern arises from action by the National Park Service in barring Mesa Verde rangers from discussing the environmental threats of the power plants with park visitors under threat of firing. Four rangers have resigned because of the attempted muzzling. ROMCOE has copies of the Park Service's memoranda to document the case.

A great social question also is raised by the power plant development: Should the relatively few people in the desert Southwest have to suffer possible major environmental degradation to their land and air and water to provide power for the continuation of urban sprawl hundreds of miles away in Los Angeles, Las Vegas, Phoenix and other population centers?

III. CONCLUSIONS AND OBSERVATIONS

1. The prospective effects of these developments—individually and cumulatively—constitute a major action significantly affecting the quality of the human environment.

2. None of the data yet received, reviewed or developed by ROMCOE verifies either the existing electrical energy demand or the projected demand contemplated by the Four Corners project. There has not, it seems, been a detailed, objective examination of the reasonableness and accuracy of these demand projections.

3. The Navajo plant cannot meet existing Arizona air quality standards, but construction of the plant is proceeding. The Huntington Canyon, Utah plant is not well sited from meteorological aspects. The considerable *interstate* effects of air pollution have not been adequately considered.

4. There seems to be a general "rush" to develop these power plants. Environmental research and fact finding is considered by some proponents only as a "delay" mechanism.

5. Despite the National Environmental Policy Act, which was enacted prior to construction of the plants, there has been little compliance with the *intent* and spirit of the Act, especially with the evaluation of cumulative effects of a number of plants, their transmission lines, mines, roads, etc. Also, work has started *before* impact statements have been drafted, even after the passage of the Act.

6. The study of alternatives appears weak; alternative sites and power sources do not appear to have been thoroughly evaluated except in terms of economics.

7. The decisions appear to have been made because coal and water "are there" and should be utilized.

8. There is no "social balance sheet" for the plants or their cumulative effects, or for the selection of alternatives.

9. Neither is there an effective presentation which will apprise the public of the facts and give them a feeling for the intangibles of the impacts, such as visibility distances in a polluted atmosphere. Citizen participation does not seem

especially potent or meaningful, nor has it achieved much. The majority of the publicity has been from conservation groups and part of the press.

10. Studies so far reviewed by ROMCOE (by the Colorado Plateau Environmental Advisory Committee, developers and others) are based on the assumption that the plants will be built as proposed and as presently located. Studies are oriented toward monitoring impacts or mitigation and minimization of environmental impacts. There are no studies asking: "Should the plants be built; if so, where? when?"

II. Alternatives were arrived at by traditional methods. There is not adequate evidence of sound environmental planning in:

- (a) plant siting
- (b) technology assessment
- (c) alternatives in meeting existing power demand (nuclear, geothermal, etc.)
- (d) alternatives to meeting projected power demand (does constructing for "projected" energy demand assure that demand materializing?)

IV. RECOMMENDATIONS

1. *Conduct a Comprehensive "Cumulative Impact" Study.*—The lack of consideration of the cumulative environmental effects of the entire power development complex is the most serious weakness in the current approach to environmental studies and "102" statements now being undertaken. The impacts of a road, a transmission line, a power plant, a strip mine cannot be considered in isolation from all roads, all transmission lines, etc., being constructed as part of an overall project.

The first step in such a study should be an Environmental Resources Inventory to inventory and evaluate all the area's resources to be impacted. An ERI would have at least these components:

bedrock geology
surficial geology
hydrology
plant ecology
wildlife (game)
climatology
air quality

wildlife (small mammals and birds)
scenic resources
recreation resources
off-site resources
archeology
cultural resources
water quality

It is indeed unfortunate that such a study did not precede actual construction of facilities so it could be used as a guide to environmentally responsible development. However, it is still not too late to make the results of such a study apply to future planning and/or construction. Such a comprehensive, regional study might be financed jointly by government, industry and other private sources. Preferably, it would be undertaken by a non-governmental, "independent" agency or group of agencies. Any such study of course could not be limited to mitigation and minimization of undesirable environmental impacts; it would also have to examine the question of whether or not the power developments should continue to be constructed at all.

2. *Consider a Moratorium to Allow Completion of the Study.*—If the proper decision-making process for these power developments had been structured, the Environmental Resources Inventory and Impact Study discussed above would have been completed *before* a final decision was made to go ahead with the developments. However, since the option of environmentally sound decision-making for the entire project has been foreclosed by premature action, the only alternative would be to declare a moratorium to exist until the total environmental study was completed—a moratorium which might preferably be self-imposed by the power companies or, if necessary, by the federal government. In considering such a moratorium, all of the costs and benefits of such action—social, environmental, economic—should be carefully weighed. It is recommended that the Congress appoint an independent, objective, scientifically competent "moratorium committee" to investigate the desirability of a moratorium and to report its recommendations to the Congress within six weeks.

A moratorium, if volunteered or imposed, could take several forms:

- (a) A complete "shut down" of all construction now in progress.
- (b) A "slow down" to some minimum level at which construction on site could operate without undue additional costs, with accelerated environmental and technological planning to start immediately.

(c) Least desirable, proceed with construction of those facilities on which construction is substantially completed. Declare a moratorium on all new "starts" and place a further moratorium on power plant operation until technology is tested or adequately developed to meet state and federal air and water quality standards. Concurrently, select an independent review team to study and recommend necessary environmental quality control measures with respect to all related facilities—roads, transmission lines, mining operations, etc. This alternative would, of course, be less effective.

3. *Create New Devices for Citizen Participation in the Decision-Making Process.*—Better public information and citizen review is imperative with respect to these developments. Until additional meaningful devices for participation by concerned and informed citizens are created—devices that have a chance of actually influencing decisions—the courts will remain the only avenue available for the redress of grievances. This does not merely mean to hold more "public hearings" or make more agency or industry "presentations" to chambers of commerce and conservation clubs. It does not mean engaging in regular, intensive dialogue in which industry, government and citizens are equal partners, and with meaningful efforts in informing the public and seeking their response (CPEAC apparently is one example of such a forum).

It is also recommended that there be established a special "scientific resource group," composed of an interdisciplinary team of scientists and other specialists from such fields as ecology, architecture, landscape architecture, regional planning, sociology, economics and law. Such a team would be drawn mostly from colleges and universities in the Four Corners states. Excepting for travel expenses, most members of such a team would volunteer their time and talents. The purpose of such a resource group would be to make continuing review of the social, environmental and economic aspects of the power developments.

Techniques on how to structure and conduct such environmental "forums" are available from the Rocky Mountain Center on Environment, which has had considerable experience in providing new devices for citizen input.

Finally, ROMCOE recommends that a rational and informed discussion of the dilemmas inherent in energy consumption and economic growth on the one hand and maintenance of environmental quality on the other be made a part of all deliberations concerning the Four Corners power developments. We suspect that the "right" solutions to these conflicts are not readily apparent to any of us without asking questions many of us have never dared ask before.

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COLORADO SPRINGS, COLO., June 6, 1971.

Hon. HENRY M. JACKSON,
Chairman, Senate Committee on Interior and Insular Affairs,
U.S. Senate, Washington, D.C.

DEAR SIR: I am definitely against the building of the Four Corners power plants. It is important that this project be stopped before one of the beautiful natural areas of our country is ruined.

Please publish my plea in the hearing records.

Thank you for your attention to this matter.

Sincerely,

ANNETTE E. DREW.

STATEMENT OF THE SOCIETY OF AMERICAN FORESTERS

Whereas the increasing quantities of air pollution in many locations in this country have been known to cause serious damage to human health, wildlife, and vegetation, and

Whereas the emissions from present and proposed coal-burning electrical power plants have the potential to harm agricultural and forest growth, and

Whereas the expected use of large quantities of coal and the concomitant disturbance of large areas through strip mining operations may create pollution problems and a reduction of the aesthetic values of the area: Now, therefore

We the Central Rocky Mountain Section, Society of American Foresters, in Session at Montrose, Colorado, on Friday, May 21, 1971, do hereby resolve that: Additional power plants in the Four Corners Region should be built only if and when they will be compatible with the air quality Standards of the Region. Existing power plants should be modified to meet the same standards. The air over the United States must be maintained at a quality compatible with healthy human, animal and vegetative life.

Surface coal mining operations must be conducted in such a manner as to provide stable soil contours in order to establish compatible and permanent vegetative cover. Such cover must be established at the earliest opportunity and concurrent with mining operations. Acid drainage and other stream pollution problems must also be solved prior to initiation of mining operations, and any increase of surface and underground water pollution should not be permitted.

ATHENS, GA., May 25, 1971.

Senator CLINTON P. ANDERSON,
Senate Office Building,
Washington, D.C.

DEAR SENATOR ANDERSON: This refers to the seven proposed projects being considered for the Four Corners Power Project in New Mexico but also involving the Black Mesa area of Arizona, Huntington Canyon of Utah, and a portion of Nevada, all of them sites surrounding the Grand Canyon and the Navajo and Hopi Indian lands.

The strip-mining for coal in the Black Mesa, the draft upon the scarce water in the region, the enormous loads of uncontrolled fly ash and sulfur dioxide emitted by the coal-burning plants will impose a gigantic ecological disaster upon the Southwest, destructive alike of the people and of vegetation. We must not allow this to happen.

I therefore urge immediate injunctions against further development of such projects. Other forms of power sources that do not have such devastating effects on the environment and its inhabitants must be sought.

I hereby request my statement of opposition be made a part of the record in the Senate Committee on Insular and Interior Affairs hearings now in process.

Very truly yours,

ALMA TOEVS WALKER.

WASHINGTON, D.C., May 25, 1971.

Senator CLINTON P. ANDERSON,
Senate Office Building,
Washington, D.C.

DEAR SENATOR ANDERSON: I am shocked to learn of the pollution and destruction being caused in our once beautiful Southwest by the operation of coal-fired power plants and by hideous strip-mining activities there. Long ago I spent a year on the Arizona desert, and will never forget the sparking clarity of the atmosphere and the dramatic beauty of the mountains. It is shattering to hear of the loss of these priceless natural resources.

May I strongly urge an immediate injunction against these practices and the building of the additional plants which have been proposed. Instead, let us undertake research on and development of less ecologically dangerous power sources. If we can repetitively send men to the moon, surely our technology is good enough to find ways of protecting our seriously threatened earth. I hereby request that this statement be made part of the official record in the hearings being held by the Senate Committee on Insular and Interior Affairs.

Sincerely

HOPE DENNIS ANDERSON.

DENVER, COLO., May 23, 1971.

HON. HENRY M. JACKSON,
Chairman, Interior and Insular Affairs Committee,
New Senate Office Building,
Washington, D.C.

DEAR SIR: I was absolutely appalled when I heard of the damage being done by power plants in the southwest!

The Kaiparowitz Station on the north shore of Lake Powell will emit 513 tons of SO₂, 450 tons of oxides of nitrogen, and 100 tons of flyash into the air per day. The air will receive more sulfur dioxide than New York City, more ash than Los Angeles, and oxides of nitrogen comparable to those emitted by all the autos in the city of Los Angeles.

The above mentioned station, the Jib Bridger Station in Wyoming, a super plant at Page, Arizona called Navaho Generating Station, the San Juan Station near Farmington, and the Huntington Canyon Plant near Price, Utah are still in the planning and can be stopped before they are allowed to destruct. If one station can do all this damage, what will happen when all of them are built? Colossal!!

Already poisoning our air is the power plant at Fruitland, New Mexico (four corners area). It emits over 300 tons of flyash, 290 tons of sulfur dioxide and 220 tons of oxide of nitrogen PER DAY.

Two additional plants, the Cholla Plant at Joseph City, Arizona and the Mohave Plant at the southern tip of Nevada are pouring their wastes into the open southwestern skies.

Is all of this worth a few gaudy neon signs in Las Vegas and Los Angeles? Or a few more badly needed (?) electric toothbrushes or electric brooms?

We are faced with an emergency. An immediate moratorium must be declared on all power plant construction until it can be proven that there will be no significant degradation of the quality of the air; and until it can be proven that strip mined land can be healed.

Immediate steps must be taken to reduce the demand of electricity. Such steps should include a ban on all promotional advertising by the utilities; the establishment of rate scales which charge the large user of electricity more per kilowatt hour than the more modest user (only in this way will the true environmental costs of electrical consumption be reflected in the final product price); and imposition of a surtax on wasteful uses of electricity such as neon advertising.

The nation needs the enactment of a National Energy Policy which would contain the principle of non-degradation of the environment, which would authorize power plant siting, which would authorize extended research into such alternatives as fusion power and coal gasification, and which would establish methods, such as tax law revisions, to preserve nonrenewable fossil fuel reserves for future generations.

Some people may argue that all these plants provide many jobs, but what good are these jobs if there is no environment left for people to live in, and eventually no people left to fill the jobs?

If you have children, Mr. Jackson, do you want them, or their children to be left with an environment like this? Did our forefathers do this to us? What would the pilgrims think if they could see what we've done with their beautiful country? It certainly is nothing to be proud of.

You are in a position to help prevent this ugliness. Please won't you help?

Yours truly,

Mr. and Mrs. R. M. TROASTLE.

EVERGREEN, COLO., May 25, 1971.

HON. HENRY M. JACKSON,
*Chairman, Interior and Insular Affairs Committee, New Senate Office Building,
Washington, D.C.*

DEAR SIR: An ad recently appeared in the Denver Post bringing to our attention the pollution being caused by power plants presently being built and other power plants in the planning stages. These include the ones in the Four Corners area plus others in New Mexico, Utah and Wyoming.

We are very concerned about the welfare of the environment in these areas which could be destroyed and is being destroyed by the air pollutants created by these plants and the strip mining of coal needed as fuel in these same plants.

As quoted in the ad:

"The national use of electrical energy must be thoroughly studied. The inefficiencies and environmental ill effects must be understood; and corrected and compensated for through national legislation. The nation needs the enactment of a National Energy Policy which would contain the principle of non-degradation of the environment, which would establish methods to stabilize our energy consumption, which would control power plant siting, which would authorize extended research into such alternatives as fusion power and coal gasification, and which would establish methods, such as tax law revisions, to preserve non-renewable fossil fuel reserves for future generations."

Thank you for your attention.

Sincerely,

MARIAN R. GIERASCH.

DENVER, COLO., May 22, 1971.

Senator HENRY M. JACKSON,
U.S. Senate, Washington, D.C.

DEAR SENATOR JACKSON: I am a college graduate who has just returned home to my beloved state after five years at school on the East coast. For a long time, I've been dreaming about coming home and settling down in Colorado to pursue my new profession and raise my own family. The beauty of our state has always drawn me back and I believe in its future and preservation.

However, today I was deeply shocked and saddened when the Denver Post ran a detailed article on "The Electric Environment"—the tragedy of the Four Corners Power Plant and coal strip mining going on right now. Not only is the present reality a horror to all of us, but the future plans of several more pollution factories in that area paints a nightmare too grim to imagine.

Are we to stand back and allow the creation of a black and sooted hell in the heart of "God's Country," far worse in scope to health and land than New York and L.A. combined? I simply can't believe that some other means of electrical supply from water or natural gas, or something, can't be made available. For what purpose can this sacrifice be made? More neon in Las Vegas, more air conditioning in Phoenix, more money in someone's pocket?

Excuse me for my vehemence, but damn to electrical expansion if it means the end of an era of ecological balance and safety! Not to mention the destruction of the Navajo's heartland in New Mexico and Southern Colorado. If you aren't aware of the extent of this, just make a brief investigation into the effects it will have on a people and a unique culture. Already, thousands of pounds

(over 800 tons, to be exact) of flyash, sulfur dioxide and other gaseous wastes per day, are being pumped into dense black clouds over New Mexico, slowly dimming the grandiose landscape.

I am asking you, please, if you have ever spoken for, felt, or truly stood up for this state, to stand up now, for us; the people, posterity, and the fate of all that is rich and truly good in America. I've never written to my congressmen before, and have never really believed in that great abstract of our government "as representative of the people", but trust me when I say that I only wish I could. I want something to believe in. Only this week, the farm people of England rallied and preserved an entire geographical area from destruction due to the planned creation of a third airport for London. It will cost the British government more to build on an alternate marshland, but the environment was saved. Shall I believe in them?

I'm sure thousands of others must share my sentiments and I only hope that they are writing too. In the name of America, Colorado, and Mother Nature, please try to help. I don't know what else to do.

Sincerely,

CORINNE MOSKO.

ASPEN, COLO., May 19, 1971.

HON. HENRY M. JACKSON,
Chairman, Senate Committee on Interior and Insular Affairs, U.S. Senate, Washington, D.C.

DEAR SENATOR JACKSON: I am writing as a resident of Colorado to express my deepest dismay at current plans, some of them already in process, to construct hyper-polluting thermal power plants in the Four Corners area. The devastation will spread far beyond the site of immediate impact, and it seems inconceivable that in the year 1971 we should plan to take so many steps backward at once.

One of the plants, already in operation at Farmington, New Mexico, distributes fly ash and poison gases over an area of over 100,000 square miles. The planned seven plants, operating at full capacity, will produce *daily* more than 240 tons of fly ash, 1300 tons of nitrogen oxides and 200 tons of sulfur oxides—more than the daily amounts currently polluting New York City.

To provide fuel for this, Black Mesa, the Hopi sacred mountain, is being strip mined for coal. The lease of the Peabody Coal Company was signed by the Hopi Tribal Council, which is not legally representative of the Hopi Tribe. To be legal, the council members would have to be appointed by the Kilmongwi, the hereditary chiefs of the Hopi. In addition, the Department of Interior has failed its legal obligations to the Hopi Tribe by breaking its constitutional guarantee to protect its shrines and sacred areas. Meanwhile the Navajo Reservation is being scarred by roads and power lines, and the water table is being lowered so as to threaten what agriculture is now possible.

As if this weren't ample, the Colorado River, already too overcommitted and saline to meet our obligations to Mexico, will be wasted on a lavish scale for cooling at the plants. The desert is the last place one can afford to misuse water.

Though perhaps in a different sense from the Hopi, I too feel that the American Southwest is sacred. I live here because I love it, and do not regard it as fodder to aggravate a distant urban blight. I find it incredible that a scheme this malevolent has proceeded as far as it has, and urge a total suspension of all further construction pending a review of all its aspects, goals as well as processes. The annihilation of the Southwest is not a price its residents will pay.

I would like this letter entered in the hearing record on the construction of thermal power plants in the desert areas of the Pacific Southwest.

Respectfully,

BRUCE N. BERGER.

ENGLEWOOD, COLO., May 20, 1971.

HON. HENRY M. JACKSON,
*Chairman, Senate Committee on Interior and Insular Affairs,
U.S. Senate, Washington, D.C.*

DEAR SENATOR JACKSON: I should like to add my voice to those raising objections to the power plants existing in and proposed for the desert areas of the southwest.

While it may be argued that Los Angeles, for instance, will be in need of additional power in the future, the answer to the problem, in my mind, does not lie in

continuing and probably irreparable damage to one of the last relatively unspoiled sections of the American landscape.

It is my strong feeling that, until all ecological problems have been resolved, no further development of these power plants should be undertaken, and further that the existing plants should be shut down within one year if they cannot comply with extremely strong standards.

These standards of which I speak should include (1) Being sure that no irreparable damage is done to the landscape. The permitting of strip mining of coal at Black Mesa to me indicates a serious negligence on the part of the agencies responsible, in view of the tragedies so painfully present in the eastern part of the U.S.; (2) No smog emission should be permitted; (3) It should be ascertained that any such power plant activity is entirely in accordance with the wishes of the involved Indian Peoples, to be assured that their way of life will be affected only to the extent that they wish it to be affected; (4) It should be carefully determined that there will be no thermal or other pollution to any involved bodies of water. And, further, it should be carefully determined that the water used and not returned by these plants is not and will not be needed elsewhere, which would then probably precipitate arguments for more dams if a later need should arise; (5) There should be assurance of solutions to any other problems brought up by conservationists or ecologists.

I personally feel that at least all of the above conditions must be met; I realize that probably none of the above can realistically be met. I hope, therefore, that any power plant activity in the desert areas in question will cease shortly; I sincerely feel that that type of activity is out of place in those desert areas.

I should like to inform Mr. Allott and Mr. Dominick from Colorado of my views, and I hope you will forgive me taking the liberty of forwarding a copy of this letter to each of them.

Thank you very much for your attention.

Yours truly,

DAVID WALSH.

VAIL, COLO., June 6, 1971.

HON. HENRY M. JACKSON,
Chairman, Senate Committee on Interior and Insular Affairs,
U.S. Senate, Washington, D.C.

DEAR SENATOR JACKSON: I would like to go on record as being opposed to the four corners power plants construction program. I do not believe that your committee has duly taken into regard the feelings and concerns of the public, nor truly realized the impact that pollution will have on the ecology and environment of the four corners region.

I am not opposed to advancements in technology to supply the needs of the people of our country. I am, however, opposed to anything this country does when the health and environment of these people are endangered.

I am requesting that my comments be made a part of the hearing records.

Respectfully,

PAUL D. ULRICH,

PUEBLO, COLO., June 10, 1971.

HON. HENRY M. JACKSON,
Chairman, Senate Committee on Interior and Insular Affairs,
U.S. Senate, Washington, D.C.

DEAR SENATOR JACKSON: We are writing to express opposition to the construction of power plants in the Four Corners region. The plants already in operation are producing pollutants that reduce visibility and endanger the ecology of the area. It would seem very tragic to sacrifice the clear air of one area of the country that still has it, to the excessive demands for power of large cities.

Besides the pollution, stripmining, construction of power and pipe lines, the effects of these plants on the economic and social life of the Indian people in the Four Corners should be a consideration of this government, which has been negligent and irresponsible in its treatment of the Indians in past years.

We hope it isn't too late to have this letter made a part of the hearing record, but at any rate wanted to express our opposition.

Sincerely,

STERNER and LOIS REMPLE.

DURANGO, COLO, June 10, 1971.

Senator HENRY M. JACKSON,
Chairman, Senate Committee on Interior and Insular Affairs,
U.S. Senate, Washington, D.C.

DEAR SENATOR JACKSON: Please include this letter with the testimonies against building more power plants in the Four Corners area—Arizona, Colorado, New Mexico, and Utah—until emissions are controlled within high health standards.

To someone who visited the Navajo Reservation often before the air was so polluted, the dirty skies now hanging where clean air and sunlight were once so natural, are a shock. Many tourists visit places like the Kayenta Inn and Canyon de Chelly, Monument Valley. They will no longer want to visit these places, and the income tourists provided the area will be lost, along with the beauty so many enjoyed.

As has been said often before, there are cleaner sources of energy than coal fired plants. Power plants should be placed where the power is used, and where they will have to maintain high standards in controlling stack emissions.

Very truly,

MARGARET LANG.

LITTLETON, COLO, May 23, 1971.

HON. HENRY M. JACKSON,
Chairman, Interior and Insular Affairs Committee, New Senate Office Building,
Washington, D.C.

DEAR SIR: We are greatly concerned by an escalating pollution of the Southwest area by coal burning power generating plants now in use or being built. We urge a thorough evaluation of what is obviously a degradation policy of the scenic Southwest.

We urge immediate steps toward reducing electric consumption by a planned program for diminished demand. Under present available power sources we obviously can't have both a beautiful natural environment and unlimited use of power.

We are faced with an emergency. An immediate moratorium is necessary on all power plant construction until it can be proven that there will be no significant degradation of the quality of the air and that strip-mine land can be restored to its original beauty.

We request that you include this letter as a part of the record for the hearings which your committee will hold in the Southwest this month.

Sincerely yours,

LAURENCE M. CURRIER, M.D.

Mrs. LAURENCE M. CURRIER.

CORTEZ, COLO., May 19, 1971.

DEAR SENATOR JACKSON: I request that my comments go on public record at the official hearing on Power Generation in the Southwest.

My first impression on seeing it was "How horrible but it may help the Indian." The ugliness soon made me investigate and by talking to many people coming into Cortez, I discovered that there were to be more of the monsters and that only a very few Indians were benefiting in any way. Not only are the benefits marginal but it also appears that the Indian was again "sold a bill of goods."

Perhaps the most significant objection I have to offer is the reaction of the many tourists who stay here. For the most part, these outcries have been from those who have lived or are living in areas where there has been strip mining and similar out belching chemicals. Their universal cry is "Do something, don't let this happen here. We have come to see your beautiful SW so we can go back to our homes and bear it between vacations."

I understand the Fly Ash problem is being tackled but what about the strip mining? Isn't this a problem that has no solution? And will the scrubbers that take care of the ash also eliminate harmful chemicals? Is someone's all electric home in Pasadena worth this destruction? Most of us here in the 4-Corners don't think so.

Please, please, please don't allow any more of these plants and help us clean up what we have.

Sincerely,

INGRID KAULEY.

LITTLETON, COLO., May 24, 1971.

HON. HENRY M. JACKSON,
*Chairman, Interior and Insular Affairs Committee,
 New Senate Office Building,
 Washington, D.C.*

DEAR SIR: We are faced with an emergency.

I urge that the committee examine the health effects and cultural impact of coal-burning power generation and strip-mining on the Indians of the Southwest.

I urge that you consider the environmental impact of power plant air pollution on the many recreational facilities which come under your jurisdiction.

I urge that you take the necessary action to halt present deterioration of the environmental quality of the Southwest.

JAMES F. MOEHLLENPAH.

UNIVERSITY OF COLORADO,
 Colorado Springs, Colo., May 25, 1971.

HON. HENRY M. JACKSON,
*Chairman, Senate Committee on Interior and Insular Affairs, U.S. Senate,
 Washington, D.C.*

DEAR SENATOR JACKSON: I am respectfully submitting the following statement for the hearings on Thermal Powerplant Construction in the Desert Areas of the Pacific Southwest. If possible, I should like the statement to be made a part of the hearing record.

I am deeply concerned over the adverse environmental effects, present and prospective, of thermal powerplants in the Four Corners region. This region contains a scenic resource unmatched anywhere, with some twenty National Parks and Monuments as well as countless other areas of equal scenic worth. Deterioration of this environment due to the powerplants—in the form of air and water pollution, strip mining, transmission lines, and railroads—is already obvious, and will become far more serious if planned developments are continued.

I firmly believe it is time that preservation of our environment be given *number one priority* in developing plans for supplying our needs for energy, transportation, and all other commodities and services. Without a decent environment, does it really matter whether our other needs are met?

In the present case, alternative methods for supplying the energy needs of our large population centers are available. If necessary, I believe these users must be asked to pay the cost differential that may result from using these alternative methods. It is time we stop asking our environment—and ultimately, all of us—to make this sacrifice.

Sincerely,

FRED R. McFADDEN,
Associate Professor of Management Science.

DENVER, COLO., May 11, 1971.

HON. HENRY JACKSON,
*Chairman, Senate Committee on Interior and Insular Affairs, U.S. Senate,
 Washington, D.C.*

DEAR SENATOR JACKSON: I am opposed to the construction of further coal-fired power plants on the Colorado Plateau for the purpose of manufacturing electricity for such places as Los Angeles and Phoenix. Alternative means of providing power, such as nuclear plants, are available. Furthermore, there are hints of an impending breakthrough in fusion-reactor technology—harnessing the power of the H-bomb to produce electricity without any noxious waste products. I love the big sky of the Southwest and the Southern Rockies, and I do not want to see it dirtied by obsolete fossil-fuel burning plants to benefit people hundreds of miles distant.

I request that my letter be included in the record of the hearings you are holding on these power plants.

Sincerely,

ROBERT C. MICHAEL.

LITTLETON, COLO., May 27, 1971.

HON. HENRY M. JACKSON,
Senate Committee on Interior and Insular Affairs, U.S. Senate, Washington, D.C.

DEAR SENATOR JACKSON: The construction of power plants in the four corners states has its obvious economic resources advantages for the power companies. Namely, large amounts of stripmine coal and water are available for the genera-

tion of electricity. However, the availability of such resources should not give the firms the right to misuse the land and pollute our skies. The amount of pollutants now being released and projected amounts to be released are of almost unbelievable magnitude. These pollutants would not be allowed in any major city; so why in the four corners?

The documentation of the environmental aspects has been made by many other individuals and groups, thus the basic question comes down to which is more valuable—the proper stewardship of our environment or the generation of electricity? For instance in Colorado, the electrical generating firms are allowed as monopolies to advertise and promote the consumption of electricity. There are no effective controls concerning this practice. Should these monopolies be allowed to promote electricity when their plants pollute our water and air and damage our land? These firms should be promoting the conservation of our resources. This is somewhat against the profit motive, but these firms should be showing prudence in their activities.

Let us conserve our resources and better our quality of life—no new power plants—stiff regulations concerning pollutants—no advertising by monopolies—conserve our water.

LOREN ZACHARY, *Chairman.*

TEMPLE BUELL COLLEGE,
Denver, Colo., May 19, 1971.

Hon. HENRY M. JACKSON,
Chairman, Senate Committee on Interior and Insular Affairs, U.S. Senate,
Washington, D.C.

DEAR SENATOR JACKSON: I am writing in conjunction with the field hearings on Thermal Powerplant Construction in the Desert Areas of the Pacific Southwest presently being held by your committee. I would request that my letter be included in the record of these hearings.

I would like to express my very great concern about the wisdom of the proposed siting of the power complex in this area and most particularly of the emissions standards for these plants. I am well aware of the power needs which our country will be obliged to fill if our power consumption is allowed to rise unchecked. It may be that an electric power complex in this area is unavoidable, but it is my strong belief that under the present plans, the natural resources and advantages of this area have been considered as "free goods" to be exploited primarily for the immediate convenience of distant areas with little thought for the interests of local residents or the legitimate interests of the nation as a whole in an area that contains more than twenty parks, monuments, and other reserves.

In particular, the water of the Colorado River Basin seems to have been considered as given and available with regard to prior claimants or to the excess salinity, already placing us in violation of our treaty commitments with Mexico, which the considerable water loss entailed by these plants would certainly increase. Even less excusable has been the apparent conclusion that the sparse population and semi-desert terrain of much of this area justify the failure to include the best emissions control equipment in existing and projected plants. The purity of the air of the Southwest is a resource in itself and the poisoning of the air anywhere in our country ultimately affects all of us and must be unacceptable. To construct in this area a complex which will dump more noxious filth into the air than does the entire City of New York would be a grotesque monument to meanness and narrowness of vision. I know this area from personal experience over a number of years; I have seen the visible deterioration of the clearness of the air in the Four Corners area. I most respectfully urge that the policies and practices which have brought this damage be amended before further damage is done.

Respectfully,

Dr. HENRY O. WHITESIDE,
Professor of History.

USAF ACADEMY, COLO., May 11, 1971.

Hon. HENRY M. JACKSON,
Chairman, Senate Committee on Interior and Insular Affairs, U.S. Senate,
Washington, D.C.

DEAR SIR: This letter is written in response to the announced Hearings on Thermal Powerplant Construction in the Desert Areas of the Pacific Southwest to be held May 24, 25 and 26 in Farmington, Page and Salt Lake City.

Sir, I am writing this letter as a concerned citizen worried about the adverse, long range effects that the construction of these thermal plants would have on the clear air of the great Southwest. When in full operation, they will produce more than 2000 tons of sulfur oxides, and up to 1300 tons of nitrogen oxides daily. These emissions surpass the total daily amounts that are currently dumped into the air of New York City (Sierra Club scientific study, April 19, 1971).

I urge your committee to consider alternatives. I am not aware of other feasible solutions, but I am aware that this nation's future and indeed the future of the entire planet's health and well-being will depend on man's sensible appraisal of how far he can go in the exploitation of its natural resources.

Thank You,

ANDREW D. PERONA.

DENVER, COLO., May 13, 1971.

HON. SENATOR HENRY M. JACKSON,

Chairman, Senate Committee on Interior and Insular Affairs, U.S. Senate, Washington, D.C.

DEAR SENATOR JACKSON: As a member of the Sierra Club and an interested conservationist I have been quite interested in the hearings on thermal power plant construction in the desert areas of the Pacific Southwest and ask that my comments be made a part of the hearing record.

As a conservationist I wish it were possible that the proposed power plants in some of our wild areas of the Southwest would not be built and were not necessary. However, as an engineer quite concerned professionally with some of our present fuel problems I feel that the available fuels are a resource which will eventually have to be utilized in order to produce the energy which we require.

Rather than to insist that these plants should not be built, I think it probably makes more sense to agree that they probably are going to be built but to insist that the proper precautions be taken for protection of the environment. There are no technical reasons against the mining of coal in the area, but mining should not be allowed without large, adequate bonding to be certain that the land is properly reclaimed after mining has been concluded and even during advanced stages of mining. This could best be done by requiring a royalty payment adequate to insure proper reclamation on all coal mined, this money to be placed in trust funds for the purpose. There is also no technical reason why the power plants cannot operate without excessive contamination of the atmosphere if control is made an essential part of the planning of the plants. Requirements for low emissions should be clearly specified prior to allowing plants to be built, together with provision that variances may only be granted for the first six months of plant operation to allow necessary shakedown adjustments.

With the above protection we can utilize our natural resources and still protect the environment. If the value of the power to be produced will not allow adequate environment protection then I do agree that it would be a very improper use of our mineral and environmental resources to allow plants to be built.

Sincerely yours,

WILLIAM O. BRANDT.

But I am writing this letter as a concerned citizen worried about the adverse consequences that the construction of these treatment plants would have on the clear air of the Great Southwest. When in full operation, they will produce more than 2,000 tons of sulfur dioxide and up to 1,000 tons of nitrogen oxides daily. These emissions surpass the total daily emissions of the currently burned into the air of New York City 150 times. This is a very serious matter. I urge your committee to conduct a thorough study and report on the health and safety of the citizens and the environment. I am sure that the health and safety of the citizens and the environment will be the primary concern of your committee. I am sure that the health and safety of the citizens and the environment will be the primary concern of your committee. I am sure that the health and safety of the citizens and the environment will be the primary concern of your committee.

Thank you very much.

Very truly yours,

John J. ...

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APPENDIX 5

Communications pertaining to the hearing held at Page, Ariz.,
May 28, 1971

STATEMENT OF F. J. MACDONALD, ADVISORY COMMISSION ON ARIZONA ENVIRONMENT

The Advisory Commission on Arizona Environment has existed since 1965 for the purpose of weighing both sides of environmental issues and reporting its findings and recommendations to the Governor.

The Commission believes that environmentalists need no longer picture themselves as huddled in the circle of their wagon train, white hats glistening in the sun, while a stampede of black-hatted industrialists threaten to run them into the ground.

Nor, does the Commission believe, on the other hand, that industrialists need to picture themselves as a small whipping boy, madly dashing with outstretched finger, attempting to plug leak after leak in the environmental dike, all the while white-hatted environmentalists glowering, whip in hand, waiting for his envitable mistake.

We believe that, by the vigorous use of the 2x4 as a club, environmentalists have finally gotten the attention of industrialists.

Furthermore, we see signs on every hand that industry has "gotten the word".

Hasn't the time come to stop screaming at each other and start trying to work out solutions together?

Isn't it time to put our minds and efforts toward finding ways to solve our problems—and not waste precious time retarding the discussions of the past?

Isn't it ridiculous to think that, as a nation, we are too stupid to solve the problems connected with the clean production of energy—or any other problems?

Isn't it ridiculous to think that we can't have Kaiparowitz, a shuttle to the moon, a pollution-free car, or whatever else we need?

We all need to stop wasting our time and money, on both sides of the environmental question, and get down to work.

Not a moratorium. We need to decide what we want, set the standards and enforce them.

We can have abundant energy and a pleasant environment. All we have to do is pay for it!

COCONINO COUNTY BOARD OF SUPERVISORS,

Flagstaff, Ariz., May 28, 1971.

SENATE INTERIOR COMMITTEE,
Public Hearing on Generating Plants,
Page, Ariz.

HON. COMMITTEE CHAIRMAN: The Coconino County Board of Supervisors would like to thank this committee for the opportunity to express our views with regard to the construction of the Navajo Generating Plant, in Page, Arizona.

Like many of our citizens we are deeply concerned with the environment and the maintenance of an ecological balance. On the other hand we would find ourselves in a hypocritical position if we failed to acknowledge the fact that the Navajo Generating Plant will give the Page School District, Coconino County, the State of Arizona and other governmental agencies in Northern Arizona a tremendous boost in their tax bases.

We would hope that by the time operation of the plant commences adequate technological advances will have been made and instituted in this plant to further protect the environment.

Even though we would like to see the chances of construction of power plants minimized, we realize that the influx of people, the internal population explosion, and their ability to buy and consume everything that is produced, including

electricity, is a trend that will continue to place increased demands on the power companies to produce more and more electricity.

At this point it appears that people will refuse to do without electrical conveniences such as T.V.'s, air conditioning, electric ranges, toasters, toothbrushes, razors, knives, can openers, ad infinitum to minimize the need for constructing other power plants. The population explosion only compounds the felony.

It is a consensus of the Coconino County Board of Supervisors that it is the Federal Government's responsibility to shift the emphasis on spending from existing programs to this domestic problem that is affecting the health and well being of our present and future citizens.

Respectfully,

TIO A. TACHIAS, *Chairman.*

MUSEUM OF NORTHERN ARIZONA,
Flagstaff, Ariz., June 1, 1971.

Hon. PAUL FANNIN,
U.S. Senate, Washington, D.C.

DEAR SENATOR FANNIN: I would appreciate it if this letter were placed in the Hearing Record for Power Generation in the Southwest. I attended the hearing in Page, Arizona and I would like to comment on a possible misunderstanding in communication between James Krieger of Peabody Coal Company and yourself. Your second question to Mr. Krieger, after his testimony, dealt with the relationship of the Navajo sandstone formation and the water wells north of Black Mesa around Kayenta. There is professional agreement that the Navajo sandstone, which is the aquifer for the five deep Peabody wells on Black Mesa (below 2000 feet), is much closer to the surface around Kayenta, and indeed, it is the aquifer for the local Indian wells in the Kayenta area. Now, the key question is the possible effect of pumping water from the Peabody wells, roughly ten miles away, on the water table around Kayenta. On this question, the geologists disagree and hence, the need for a monitoring well.

Sincerely,

ERIC G. WALTHER,
Coordinator of Environmental Studies.

FLAGSTAFF, ARIZ., May 21, 1971.

Senator HENRY M. JACKSON,
Chairman, Senate Committee on Interior and Insular Affairs, U.S. Senate,
Washington, D.C.

DEAR SENATOR JACKSON: This letter is my statement on Power Generation in the Southwest, and I would appreciate it if this statement were made part of the official Hearing Record on this subject.

The Southwest is a region with unique characteristics, some of which are in conflict with electric power generating stations, transmission lines, and the strip-mining of coal. Dryness is the most obvious characteristic of the Southwest; there is very little precipitation, between three inches and twenty inches, and the only river system in the area under consideration for power generation is the highly saline Colorado and its tributaries. The Southwest has several densely populated cities including Los Angeles, Las Vegas, Phoenix, Tucson, Salt Lake City, Albuquerque, and El Paso which are the dominant demand for electric power. Rapid growth characterizes these cities. For example, the Salt River Project service area is expected to grow 60% between 1971 and 1980. The overwhelming proportion of area in the Southwest is, in contrast, very sparsely populated, and it is in this area that the generating stations are being built. Because of its lack of water vapor and sources of air pollution, the Southwest has relatively excellent air quality including incomparable visibility. It is common for the visibility to be between 50 and 80 miles, which is rare in other parts of the country. For a long time, natural sources of particles (aerosol) such as sand storms have been able to reduce this visibility to less than 2 miles, but it is only recently that man-made sources can accomplish a significant reduction in the region's visibility. For example, I have stood at the Four Corners Generating Station at Fruitland, New Mexico and watched 30 degrees of view disappear as the plume moved downwind. While an obvious degradation of air quality can occur from point sources such as generating stations, area sources such as Los Angeles and Las Vegas destroy air quality over great downwind areas with more difficult to see plumes. The urban plume from Los Angeles has been observed from airplanes to cross the Mohave Desert.

Natural beauty is associated with good air quality, and good visibility is necessary to obtain the beauty value of all the national parks, monuments, and recreation areas in the Southwest. Here there is the fantastic beauty of: (1) the Grand Canyon, Petrified Forest, Bryce Canyon, Canyonlands, and Zion National Parks; (2) the Grand Canyon, Canyon de Chelly, Dinosaur, Arches, Natural Bridges, and Rainbow Bridge National Monuments; and (3) the Lake Mead and Glen Canyon National Recreation Areas. Here is, perhaps, the nation's greatest beauty and recreation resource. It is in the interest of every American, especially the urbanite, that much of the Southwest be nationally zoned for recreation with a plan that would prevent improper industrialization from destroying the beauty. Otherwise, when vacation time comes, the urbanite will have no escape from ugliness because the beauty of vacation-land will be gone.

Power generation in the Southwest includes the following components:

Generating Station:

- Buildings
- Stack plumes
- Cooling tower plumes
- Cooling water supply and return
- Ash disposal

Fuel Supply:

- Coal mining (extraction):

- Strip

- Underground

Transport

- Pipeline (slurry)

- Railroad

Transmission lines

There is an appreciable aesthetic impact from each of the above components except for the cooling water supply and return, the underground coal mining, and the pipeline. Air quality is degraded by the stack plumes. Any impact on water quality is from the cooling water supply and return, ash disposal, and coal mining.

In order to minimize the environmental destruction of power generation in the Southwest, I recommend:

- (1) Nationally zone much of the Southwest for recreation with a plan that would prevent improper industrialization from destroying the beauty;
- (2) Put a hold on the planned Kaiparowits generating station until the effect of the Navajo Generating Station is known and considered acceptable;
- (3) Require the best possible control of sulfur dioxide, nitrogen oxides, and fly ash at every generating unit;
- (4) Prohibit the return of cooling water to the Colorado River and its tributaries to prevent degradation of water quality;
- (5) Minimize the number of transmission lines and the corridors used for them; and
- (6) Allow strip mining only if excellent reclamation is possible.

Sincerely,

ERIC G. WALTHER, PH. D.,

*CPEAC Executive Director, Coordinator of Environmental Studies,
Museum of Northern Arizona; Research Associate, Atmospheric
Sciences Research Center, State University of New York at Albany.*

TEMPE, ARIZ., May 26, 1971.

HON. PAUL FANNIN,
Phoenix, Ariz.

DEAR SENATOR FANNIN: A few days ago I was informed by your office that there was no time left for oral presentations, but that you would include a written statement into the minutes of the hearing. I should be grateful if you would insert the following:

"COMMENTS ON SULFUR DIOXIDE POLLUTION FROM POWER PLANTS

"We have all heard of the toxicity of sulfur dioxide (SO_2), one of the contaminants of stack gases from power plants burning sulfur-bearing coal. Although we are told that Black Mesa coal contains relatively little sulfur, the amount of coal to be burned in the new power plants is so large that the SO_2 output of these plants would exceed that of all emitters in Chicago or New York.

"These figures are well known to you and have been argued many times. What is less well known is what happens to SO_2 over long distances of travel, i.e. while it is blown by prevailing winds over the Navajo country into Arizona and New Mexico. Researchers at the U.S. Department of Health, Education and Welfare have shown that SO_2 attaches itself to very fine particles, just the kind that are hardest to catch in a stack precipitator. There is changes chemically into sulfuric acid and sulfates. These small particles are carried by wind over hundreds of miles. When people breathe them, they go straight into the alveoli (the small air sacks) of the lung where they can cause up to 100 times as much damage as an equivalent amount of SO_2 . These findings have been reported by the National Institute of Health and are qualitatively confirmed by health statistics in towns that lie 100 or more miles downwind from SO_2 emitters.

What is the remedy for SO_2 pollution? Of course, the easiest way is not to burn the coal in the first place. However, there are other solutions, admittedly costly ones:

(1) SO_2 in stack gases can be caught and converted to sulfuric acid or elemental sulfur for sale or easy disposal. The estimated¹ installed cost for such plants is \$35-50/ton-day based on the dilute power plant gases.

(2) Use desulfurized fuel. Processes are now being developed for desulfurizing coal. Instead of advertising for more power consumption, utilities should spend money to speed up this development. New plants should not be allowed to start up until desulfurized coal is available."

Thank you for your courtesy in handling this request.

Respectfully yours,

ERNEST G. CHILTON,
Professor of Engineering,
Arizona State University.

PHOENIX, ARIZ., May 24, 1971.

Senator PAUL J. FANNIN,
Senate Office Building,
Washington, D.C.

DEAR SENATOR FANNIN: Would you place the following in the official record of the senate hearing on power plants at Page, Arizona on May 28, 1971.

It may be true as the executives of power utilities contend that Americans will not give up the comforts of electric living to get away from the detrimental effect of power generation. However, if this is the case I feel that those who enjoy the comforts of electric living should also enjoy the comforts of having power plants. Therefore, I believe that no generating plants should be built in the "Four Corners Area". They should be built in Los Angeles. It is ridiculous for the people of Arizona to be poisoned for the benefit of California. If future power plants were built in cities then the people of these cities might think twice about their use of "clean" electric energy and the electric utilities might be forced to spend more on environmental research and less on advertizing.

Sincerely yours,

RICHARD F. ROWE.

UNITED PRESBYTERIAN CHURCH,
Fort Defiance, Ariz., May 27, 1971.

HON. HENRY M. JACKSON,
Chairman, Committee on Interior and Insular Affairs,
U.S. Senate,
Washington, D.C.

DEAR SENATOR JACKSON: My wife and I have been residents on the Navajo Reservation for almost two years. We are appalled at the ring of power plants being built on or near the Reservation and wilderness areas. We feel that this will be a serious mistake. Why should we endure pollution for Los Angeles when California has outlawed such power plants?

In the December issue, 1970 of National Geographic magazine, Dr. Barry Commoner, Director of the Center for the Biology of Natural Systems of Washington University in St. Louis, gives three laws of ecology:

¹ Data from Stanford Research Institute.

1. Everything is connected with everything else.
2. Everything goes somewhere.
3. There is no such thing as a free lunch.

Please prevent the Utilities from getting a relatively "free lunch" at the expense of the Navajos and Hopis and our lovely Southwest. There must be other methods.

In making these important decisions please read the article mentioned above, "Our Ecological Crisis, Pollution Threat to Man's Only Home."

Please make this letter a part of the hearing record on Pollution and Electrical Power Plants In the Southwest.

Sincerely yours,

EDWARD ANGENY.

COTTONWOOD, ARIZ., June 1, 1971.

Senator PAUL FANNIN,
Washington, D.C.

DEAR SENATOR FANNIN: I want to commend you for your patient handling of the Interior hearing at Page last week. I was one of a group of about 40 persons from Sedona who attended the meeting, having come by bus. Since I was not permitted to express my opinions at the hearing, I would appreciate it if this letter could be incorporated into the testimony.

I simply do not believe the Peabody Coal Co.'s representative. I have lived in the east, and it is my opinion that land ravaged by strip mining cannot be restored to usefulness even in a humid climate, much less in our arid land. I think there was some fast footwork among the lawyers on both sides, and I do not believe the tribal councils expressed the true wishes of their people. Furthermore, I consider it inexcusable to use the deep well water for making slurry when the reservation is always in need of water, especially now.

I am not against developing electric power, with two reservations: it must be genuinely needed, without resort to high-powered advertising (and specifically not to permit bigger and gaudier signs in Las Vegas!), and it must be produced *without pollution*. In a technocracy such as ours it is incredible to me that such sights as the Fruitlands plant cannot be avoided, and I mean ALL the pollution, not just 95% of it. It seems to me that many of our troubles stem from money-greediness on the part of various organizations. If we can spend billions on space exploration, I feel that money should be spent on earth-problems to as great an amount, at least. I have given up using my lapidary equipment, to save my little bit of electricity, and it irks me to read in the paper that one witness in New Mexico testified that he saw lights on in every window of the huge Salt River Project building at *midnight*. What excuse is there for that?

Anything that gets started never lets go, like the Reclamation Bureau and the Corps of Engineers, even if outmoded, and the same is true of utilities priorities. I found the hearing very confusing.

Sincerely yours,

Mrs. J. T. WOOLFENDEN.

STATEMENT OF CLIFFORD C. TABOR, MANAGER-SECRETARY, WELLTON-MOHAWK IRRIGATION AND DRAINAGE DISTRICT, WELLTON, ARIZONA; CHAIRMAN, ARIZONA STATE WATER QUALITY CONTROL COUNCIL; MEMBER, POWER PLANT AND TRANSMISSION LINE SITING COMMITTEE, ARIZONA CORPORATION COMMISSION

I represent a small irrigation district in Yuma County, Arizona, that is also in the power distribution business. We have no generation facilities. We buy all our power under three contracts with the Bureau of Reclamation from hydroelectric plants at Hoover, Parker, Davis and Glen Canyon Dams.

Increases in our distributed power in the past ten years have been as follows:

Meters: 900 to 1500—67%.

Peak Kilowatts: 2490 to 6580—89%.

Kilowatt Hours: 10,500,000 to 25,700,000—145%.

This area records the highest summer temperatures in the nation. Every new house being built has electric refrigeration. We believe that our people have a right to expect this comfortable type of living if they are willing to pay for it. Commercial loads are also growing.

We realize that our 1500 customers are only about 0.2 of 1% of the number of electric customers in Arizona but that does not lessen the importance of electric energy to those 1500. Right now we do not have power contracts to meet the peak demand that we expect in 1973 and afterward, and we do not know where the power is coming from. And there are many other small electric utilities in the southwest that are in the same position.

We realize that there are environmental problems. We believe that these problems can be overcome with technology—and money. Somewhere there must be a reasonable meeting ground. We urge the Congress to take whatever steps need be taken to encourage the construction of more electric power generating capacity in the Southwest which will result in energy at a price which the consumer can afford to pay.

STATEMENT OF THE CITIZENS FOR BEST ENVIRONMENT OF PAGE, ARIZ.

The *Citizens for Best Environment* of Page, Arizona are a group of individuals bound together by a common interest in their environment. The proposed construction and operation of seven coal-fired electric generating plants poses a threat to our homes, our health, the beauty of this unique area, its recreational values, our water supply, and even our economics. For these reasons we oppose their continued construction and operation and urge an immediate moratorium be declared until electric power can be produced without adversely affecting our environment.

HEALTH

We think of the Lake Powell area as a healthful place to live. Many of us came here from other parts of the country where the air was not so clean and the water was highly polluted. To some of the Best Environment members it was a last resort when asthma and chronic bronchitis controlled the lives of their children.

THE GOLDEN CIRCLE

The Lake Powell National Recreation Area is a part of the Golden Circle: 16 National Parks, National Monuments, and National Recreation Areas whose wonder and beauty belong to all Americans. Last year five million, nine hundred eight thousand, nine hundred thirty-seven visitors came to this area.

The census figures for 1970 show that the state of Arizona has a total population of 1,770,900 (one million, seven hundred seventy thousand, nine hundred). This means that over three times the number of tourists visited the Golden Circle as lived in Arizona. Two million more people toured these parks and monuments than the combined 1960 populations of Colorado, Utah and Arizona. Over one million tourists visited the Glen Canyon Recreation Area alone. Since the Golden Circle surrounds both Lake Powell and the Colorado River leading into the Grand Canyon, all sixteen of these national shrines in Utah, Colorado, and Arizona would be affected by the generating plants.

It seems a shame to introduce heavy industry into an area so naturally suited to the pursuit of recreational activities. The tourists who come here camp on the shores of Lake Powell . . . ride the rapids of the Colorado River in rubber rafts . . . fish in the clear waters . . . explore the surrounding canyons by boat and on foot. To the naturalist and liberated city dweller alike, the miracle of discovery is always at hand when one can look up at a canyon wall to see an ancient Indian ruin or a pictograph.

WATER

We understand that a prime reason for building the power plants in this area is the availability of water. Power plants consume vast amounts of water. The Navajo Plant will require 34,000 acre feet of water annually; the Kaiparowits, 102,000 acre feet. Water, we find, is the life support needed most desperately here in the Southwest. We believe that the water allocated to Arizona should be used where most urgently needed. At present the river water is over-allocated and there are more claims to the water than there exists water to fill the claims. Can we afford the additional burdens of increased salinity and loss of water acreage due to evaporation which these power plants will place on the Colorado? Shouldn't we use this water for existing drinking, agricultural and industrial purposes? It seems rather paradoxical that the Salt River Project and the Central Arizona Project will be using 46% of the power produced by

the Navajo Plant, in order to pump water into southern Arizona. Our cities can not meet the needs of their people. The shortages go beyond the need for power and include health, crop production, and livestock. How great a standard of living can a people achieve when drinking water becomes limited?

GROWING DEMAND FOR POWER

The power companies insist there is a growing need for power, that their customers demand additional power. This may very well be true, but is it not also true that the power companies have promoted the home owner's desires through endless publicity of new products and additional services? In truth, power consumption is increasing nearly 10 times as fast as is the population. In what ways have the power companies told us how we can conserve our electricity? The president of Arizona Public Service maintains that growth is what made this country great. But we would point out to him that all things in nature cease growth at some point in time; otherwise they become malignant. Planning for the use of unlimited power is a luxury, not a necessity. As citizens and consumers we would like to make public here our willingness to do without an unlimited supply of power and to subject our use of it to rationing, if necessary. We hope others, both as individuals and as members of large corporations, will see the sense in this and follow suit. In the interim, we suggest that all available monies and effort be used to explore other means of generating power. Among these are the geothermal wells, solar batteries, and the establishment of a national power grid, where areas which are short of electrical power can borrow from those which have a surplus.

ENVIRONMENTAL FACTORS

The utilities claim they are devoted to protecting our environment but we have found that only through the insistence of individuals and organizations and state and federal regulations do the utility companies act. For instance the Navajo Power Plant was completely designed before the plant's air pollution problem was considered. Strip mining, the most devastating form of coal mining, is taking place at Black Mesa. According to a study made by Delta Laboratories of Rochester, New York, no provision has been made in these plans to handle pollution from the strip mined area. Delta Laboratories fears the consequences which may result when sulphuric acid is leached from the land during mining processes. The water being used in the mining operation at Black Mesa has taken thousands of years to accumulate. There is no prospect in our time of its replenishment. It seems unconscionable to use this water to slosh coal when thousands of Hopi and Navajo Indians struggle to survive in a desert economy.

To further show their interest in our ecology, the utilities are planning to build another plant near Lake Powell which will be twice the size of the Navajo Plant. Coal to operate the plant will be taken from the Kaiparowitz Plateau. The engineering required to prevent pollution of the waters of Lake Powell may prove extremely difficult. In such close proximity the Navajo and Kaiparowitz plants threaten the very existence of the Lake Powell Recreation area and the Navajo Reservation.

ECONOMY

The Citizens for Best Environment have no desire to turn off the electricity and go back to candlelight. Neither do we wish to inhibit the economic growth of this area. However, we do not believe in the continued promotion of greater and greater use of electrical power. Neither do we think it very farsighted to insist that a little air pollution is worth the added money in the bank.

We believe the best direction for economic growth in this area is toward our natural attributes: our climate, our scenic beauty, our air and water. Here is a natural recreation area of proven worth perfect for the development of tourism and the establishment of retirement communities. The large unskilled labor force available in the area could more easily be trained for hospitality services than for technical engineering jobs. With proper management our local merchants would prosper and so would the Navajo Reservation. With insufficient planning for long-range economic growth, this region will be destroyed forever as a natural recreation area and the Navajos will be denied the opportunity of developing self-sufficiency in their homeland.

PLANT EMISSIONS

A report from Los Alamos scientists tells us that the best pollution controls still limit visibility in 700 cubic miles to 50% of normal. It is our opinion that the prevailing winds in this area create a funnel which will take coal-fired pollutants directly over Lake Powell. When we who live here consider what man can do with a few empty beer cans and his picnic lunch we wonder what the daily view will be like through 15 tons of particulate matter, 222 tons of sulphur oxides, 204 tons of nitrogen oxides and 52,700 tons of carbon dioxide, which the Navajo plant will emit. With the addition of the Kaiparowitz plant these emissions may very well be tripled in the Lake Powell area. According to a study by the National Academy of Engineering, there exists no feasible means of removing sulphur or nitrogen oxides in significant amounts from power plant emissions.

The Lake Powell area is subject to at least 60 periods of temperature inversion a year. Taking into account prevailing weather conditions, it seems probable that the emissions from these plants will be trapped in the Lake Powell basin for extended periods of time and not dispersed by 775 foot stacks as the power companies would have us believe. Studies presently underway indicate that the delicate plant life of the area is certain to be adversely effected. We wonder how inhaling these vast amounts of irritants each day will affect the human inhabitants.

THE PRICE OF POWER

If it is the intention of the utilities to create power at all costs, we should be made aware of the price all Americans must pay for coal-powered electricity:

1. The pollution of the cleanest air in the United States.
2. The destruction of the Golden Circle as a recreation area for almost six million people a year. This area includes the Grand Canyon, Zion, Bryce, Navajo National Monument, Rainbow Bridge, Monument Valley, Glen Canyon, Wupatki, Natural Bridges, Arches National Monument, Mesa Verde and others.
3. The loss of water that cannot be replaced for human consumption.
4. The depleting of a coal supply that may be needed in the future for products other than fuel.
5. The surrender of long-term community and industrial planning to short-sighted economic values.

Before the beauty of our land disappears forever and the stars can no longer be seen because there are no clear nights, we urge you to stop and think. Let us find safe alternatives for rational use and production of electric energy. Let there be an immediate moratorium on all further construction and operation of coal-fired generating plants until electric power can be produced without adversely affecting our environment.

PHOENIX, ARIZ., May 26, 1971.

Hon. HENRY M. JACKSON,
U.S. Senate,
Washington, D.C.

DEAR SENATOR JACKSON: Because I may not be able to attend the hearings conducted by your Interior Committee in Page, Arizona this week I wish to submit the following thoughts for consideration by its members.

Many of us in Arizona are justifiably concerned about the amount of pollution that the projected power plants can produce. Somehow, I get the feeling that we are considering just our own small area. Nowhere, have I heard anything about the larger areas that may be affected by the flow of pollutants. Because I have seen smoke from the United Kingdom and the Low Countries actually reach Iceland at low levels I am concerned about the downward areas from the Four Corners area and wonder if any work has been done to ascertain what contamination at various levels will do. Have impact studies been made over the following areas?

1. The middle Western U.S. and in some cases, even the Atlantic Seaboard. During the winter months the middle and high level wind flows will be predominantly from the western quadrants and depending on speeds aloft could move a great deal of pollutants from the southwest to the already more polluted middle western and east coast population centers.

2. During the summer the very low velocity monsoon circulation over the southwest could result in moving pollutants out of the Four Corners area north to Utah, Colorado and sometimes southern Idaho.

I do not question our continuing need for power generation but now, more than ever, I submit that we must consider every possible eventuality. Therefore, I respectfully request that before any further construction is approved that impact studies to determine the end result be considered.

Sincerely yours,

CHARLES F. HADD, Sr.,
Major, U.S. Air Force (Retired).

STATEMENT OF STERLING BUNNELL, M.D., CALIFORNIA

My name is Sterling Bunnell. I was born in California, and am a practicing psychiatrist and environmental educator. I am a trustee of the Biological Field Studies Association, have lectured and taught at various colleges in California, and was a speaker at the UNESCO-sponsored conference on Man and His Environment held in San Francisco in 1969.

Recently I visited some of the traditional Hopi to ask what they think of the coal stripmining at Black Mesa. The information available to me indicates very strongly that this development is an immediate threat to the survival of the Hopi tradition and ultimately has serious implications for us non-Hopi also.

It seems to me that the Black Mesa controversy may be a pivotal point at which decisions made now can influence the direction in which enormous environmental and social forces will move in the future.

The Hopi are unique among American Indians in the degree to which they have been able to maintain the integrity of their culture and society to the present time. More than any other human culture they have learned to live in harmony with their natural environment. For many centuries they have successfully lived in an arid, difficult region and have developed what is perhaps the only stable system of dry-land agriculture in the world.

Their varieties of corn are genetically adapted to grow in the sandy desert soil, watered only by the sparse rains. The Hopi have thus avoided the salt deposition which has plagued all irrigated desert agriculture, whether ancient or modern. The Hopi Way has always made harmony of man with his community and with the earth which sustains them a central value. These ethical, functional, and esthetic relationships have been codified in an elaborate system of myth, symbol, and ritual which seem to give traditional Hopi an intuitive feeling for the integrity and balance of natural and human systems. Hopi religious concepts are not so much explicitly stated as they are expressed and contained within the annual cycle of ceremonies. Each ceremony is entrusted to a certain clan and the information which it represents is passed from generation to generation within the clan. The traditional clan initiates are thus the memory of the Hopi culture and (4), (7), (8) the understanding which they have is not available to those persons of Hopi ancestry who have not been in continuous contact with Hopi ceremonial life. This is an important point in considering the traditionalists' disputation of the Hopi Tribal Council's right to lease Hopi land, as will be explained later.

Traditional Hopi are not opposed to technical innovations per se but evaluate them on the basis of how they effect the equilibrium of their life and land. For example, some years ago they tried deep cultivation with tractors but subsequently decided this was having adverse effects on the soil and so returned to hoes and shallow mechanical cultivators. They have also resisted the adoption of new genetic varieties of crops and livestock which our agricultural experts have offered them because they felt that despite apparent short-term advantages these would be less well adapted to the pattern of local conditions than the ones they already had. (6) Many biologists would agree with these decisions.

Protecting the integrity of their land is fundamental to Hopi religious belief. Andrew Hermeguaftewa, of the Bluebird Clan and spokesman for the Chief of Shongopovi, said "The Hopi Land is the Hopi religion. The Hopi religion is bound up in the Hopi land." (7) The traditional Hopi say that this land was entrusted to their stewardship by the Great Spirit, Masau'u. He chose this dry plateau for them because its harshness would help them to adhere to their spiritual purposes and understanding rather than fall into easy living and preoccupation with wealth and external monuments, as their neighbors in tropical America did. Hopi prophecies state that if they can prove their ability to live on their land without destroying it, the Hopi Way will survive to give mankind spiritual guidance in the future, when all people re-evaluate their new knowledge. Keeping the Hopi Way viable until the whole human race becomes one family is their main reason for existence. If they fail in this they are not Hopi ("peace-

ful people") but Ka-Hopi ("not Hopi"). (6) The traditional Hopi do not consider themselves to be a race but derive their identity from being the guardians of a vital spiritual tradition. Therefore to them persons of Hopi ancestry who do not share their tradition were not Hopi.

The Hopi Tribal Council was established in 1936 by the Indian Bureau under authorization of the Indian Reorganization Act of 1934. The original intent was to provide the tribe with democratic self-government but in actuality the Tribal Council has never been representative of the Hopi because it is an institution alien to Hopi tradition and is not integrated with the real village government of clans and village chiefs. Tribal Council members are "progressives"—that is, Christianized Hopi who have adopted values encouraged by missionaries and Indian Agents, are alienated from the Hopi Way, and are often contemptuous of Hopi traditions, viewing them as obstacles to "progress". Although the Federal Government recognizes the Hopi Tribal Council as representative of the tribe, the traditionalists emphatically do not so recognize it. Election of Tribal Council members does not make it representative, for many traditionalists (1), (2), (6) refuse to vote since in so doing they would be recognizing the council, and many persons voting are living in cities off the reservation and are out of touch with village life. (1)

The traditionalists say that the Hopi Way was betrayed when the Tribal Council leased their sacred lands to Peabody Coal without even informing the village chiefs, who only learned of the lease much later when the stripmining had already begun. This is a violation of the Hopi Constitution by which the Tribal Council derives authority. The traditionalists hold that the lease is illegal and have recently filed suit against the Secretary of the Interior and Peabody Coal Company.

The stripmining of Black Mesa is both a physical and a psychological threat to Hopi life. Lowering of the water table and acid leaching into runoff may make their present way of life impossible, but the devastation of their sacred mountain and shrines will also do severe damage to their religious beliefs. If the mining of Black Mesa continues, the Hopi will know that they were tricked into allowing their sacred land to be desecrated and had thus forfeited their basis for continuing the Hopi Way. They would then be Ka-Hopi.

We know of other religiously-oriented societies, such as the ancient Egyptian and Mayan, which fell apart after outside forces had invaded and exploited their territory and sanctuaries. The traditional Hopi feel very deeply that this is the last chance for them and for mankind as well, since they believe that their tradition is vital for the spiritual health of the world.

In another sense, it may indeed be that the Hopi Way has something to teach us which is important for our survival. At a time when environmental scientists are warning us that the ecosystems upon which human life depends are showing evidence of coming apart under the logarithmically-increasing assaults we are making on them, many thinkers realize that we cannot solve the crisis by technology alone but must also find ways to make respect for the environment and for the integrity of natural systems a central value of our culture. (5) However, we do not know how to do this, for we know too little about the ways in which human cultures develop and maintain their values. Are not the traditional Hopi, who have long ago made such an adaptation in their terms and at their level of technology and maintained it throughout many centuries, a priceless cultural resource for the modern world? And should we not, even for selfish reasons, do whatever we can to allow the Hopi Way to continue?

Strip mining is an industry which uses advanced technology to further conceptually crude and ethically and environmentally blind objectives. As giant earth-shovelling machines have become a reality in recent years, stripmining has become increasingly profitable and destructive. Consider the appalling environmental and social degradation that stripmining has wreaked on Appalachia, where it is deeply entrenched in the economy and legislatures. (3) Talk of stripmine reclamation is mere window-dressing, for topsoil and natural vegetation are not easily replaced.

Now this primitive and ravenously destructive industry is being exported to the American Southwest where it jeopardizes the last intact American Indian societies.

Even if we assume that Las Vegas, Los Angeles, and Phoenix need more power and that their continued expansion is a good thing, there are surely better ways to produce that electricity than by stripmining coal for crude, polluting fossil fuel power plants.

Recently vast geothermal beds have been discovered in the Salton Sea region of California. Emission-free nuclear plants are becoming feasible and the waters of our big reservoirs would not be harmed by the thermal effects of such plants. Would it not be wiser to supply Southwestern power needs from such sophisticated sources rather than to turn this area over to a primitive technology which has already demonstrated its blind destructiveness in Appalachia and which will exhaust its resource base at Black Mesa in a mere 35 years? Stripmining this unique area for short-term power production is an outrage to a country which is becoming environmentally aware. If the coal-burning plants continue to be operated and built, we will see a coarsening and deadening of the environmental conscience of the Southwest. As this region becomes economically dependent on these monstrosities, their use will be rationalized and the environmental consequences will tend to be overlooked. We will be hardening ourselves in those very short-sighted attitudes which the environmental scientists tell us are making us candidates for extinction.

According to our traditional frontier values, there is nothing wrong with the stripmining and power plants because they produce power and profits and the future can take care of itself.

It is a general principle of environmental management that our habitat will deteriorate as long as short-term economic criteria predominate in decision-making. The biologist Potter has stated in his recent book, *Bioethics*, that ecological needs are on a collision course with short-term economics, but ecological needs are more basic to human survival. (5)

I would like to appeal to our senators and congressmen to reconsider the priorities under which these plants are constructed. A real moratorium on coal-burning power plants in the four corners area could establish a new direction in the American consciousness which could allow us to make a start in solving our environmental problems in the scant time we have remaining. In so doing we would help the Hopi Way to continue, but we would also be taking a big step toward our own survival, and future generations would thank us.

Not to act, not to change direction at this point would move us irrevocably toward a future none of us would want, could we foresee it.

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SUPPLEMENTAL STATEMENT OF UNITED MINE WORKERS OF AMERICA

We appreciate the opportunity to present additional testimony on southwest power development. At the recent hearings held by your Committee International Representative Thomas Shirley appeared for the United Mine Workers. However, since his testimony dealt mostly with the operation at Black Mesa, we felt it desirable to file a more general statement on the entire question of southwest power development.

We will, in this statement, deal with the total impact of coal production as it relates to the Mohave, Navajo, Kaiparowits and Huntington Canyon power stations.

The development of southwest coal is possible only because of the rapidly growing demand for electrical energy in the United States, and more specifically, in the southwest part of the United States.

National power demand is growing at the rate of seven to ten percent per year. The tremendous quantities of electric power consumed by America's industrial, commercial and residential consumers has placed a severe strain upon the electric power industry of the United States and has forced it into a major construction program.

The national pattern is repeated in the southwest. In many respects, southwest power demands have been increasing more rapidly than the national

average because of population shifts, the greater usage of such things as air conditioning, etc. in this part of the country and other economic and demographic factors.

Because of this demand the electric utilities in the southwest have had to engage in major construction programs. Even with this construction it has been suggested that there may still be a shortage of electric power in this region of the United States. In short, the question is not whether the plants should be built; the question is can the plants be built soon enough to preclude a major power shortage.

Throughout the hearings on southwest power development the groups opposed to the six major power stations returned again and again to one point, that is, that there should be steps taken to reduce the growth of electric power and demand and, if possible, to bring about an actual decline in the amount of electric power used by American consumers. Several methods were advanced for making this scheme possible.

It is not our purpose here to engage in a lengthy dialogue as to whether America should adopt a "no growth" policy on electric power. We do feel, however, that it is important that the Committee itself and indeed the entire Congress consider several basic questions relating to the matter.

First, can we have such a policy in the short run? Second, if in fact we can adopt a "no growth" policy, should we as a matter of national priority? Finally, will the adoption of a "no growth" policy aid in the fight on pollution?

We can assume, for the sake of discussion, that there can be a lid put on electric power growth for the long run. The question which is pertinent, of course, is whether or not such a limitation can be effective in the short term. Can we convince present day Americans who are enjoying all of the benefits of electric power growth to forego some of these benefits. Can we convince newly married couples who can afford the electrical gadgets which are so characteristics of our civilization not to have them, or if in fact, they do have them, to forego their use. Can we bend quickly the slope of the graph of electric power consumption.

Increasing energy usage is an American life style. It is a part of the historic national tendency to improve the material quality of our life. An abrupt change in this life style is probably not possible, or as we shall discuss later, probably not desirable.

Therefore, if the answer to the question of a limitation on power growth in the short run is "NO", America is faced with an obvious dilemma. Those concerned with the ecological effects of major power stations rightly point to the real and potential damage from such stations. On the other hand, the seemingly insatiable demand of Americans for increasing amounts of power must somehow be met. Meeting this demand requires the construction and operation of large power stations. It must be readily apparent that somehow these conflicting goals, the dichotomy between those who seek increasing electric power utilization and those who desire environmental quality must be resolved.

A far broader question, however, is should our nation even attempt to achieve a zero growth policy with regard to electrical power. This question has been raised again and again by conservationists, by government officials, and by plain citizens concerned with the ever growing burden of pollution upon their lives and the lives of their children.

We are obviously unable to answer the questions posed to any depth in a paper of this type. We would suggest, however, that in adopting a stagnant energy consumption standard we are turning away from the traditional American economic mores. In suggesting that our economic growth stop we are implicitly accepting a cost of such stagnation for present and future generations of Americans. Such stagnation will mean decreased job opportunities, lower incomes, inability to meet pressing social obligations and create the potential for a growing rift between the affluent American and those who are attempting to break the vicious cycle of poverty. This is especially true among our minority groups in cities as well as the rural poor, poor which for too long have escaped attention enjoyed by more fortunate Americans.

Finally, there is a question as to whether or not stopping the demand for electrical power will, in fact, stop pollution. It is a fact that with increasing population growth there will come increasing amounts of pollution. Whether or not homes are heated by coal, by oil, by natural gas or by electricity, pollution is in fact, created. However, pollution created at a central power station would seem to be far easier to control than pollution created at thousands and millions of homes using individual devices for heating and cooling as well as for the other energy requirements of modern life.

The question, then, is not whether we must have the plants and the power, but how we can best meet the demands of the citizens of the southwest for the power which they require.

The generation of large volumes of electric power is possible from five major sources.

COAL

Coal is by far the most abundant source of energy. It has been estimated that total coal reserves are in excess of one trillion tons. Moreover, coal resources account for over 80% of the total U.S. resources for energy. There is no question that coal reserves are adequate to meet the suggested demand.

Coal mining technology is widely known and well demonstrated. Coal is America's most efficient industry. Highly complex machinery and a well qualified work force have combined to make coal available in ever increasing quantities.

OIL

Domestic oil is not now a major factor nationwide in power generation. The bulk of oil consumption among electric utilities is along the east coast and is primarily foreign residual.

NATURAL GAS

Natural gas has had a rapid increase in consumption since the end of World War II. Large amounts of natural gas are currently used by electric utilities. However, in percentage terms the amount is still relatively small.

In recent years a gas shortage of increasing acuteness had developed. Serious thought is being given to supplementing our gas supply through the importation of LNG and the gasification of coal.

The net conclusion, therefore, must be that natural gas cannot be expected to meet future demands for electric power. When cost and availability are considered, it is obvious that natural gas will become increasingly less available as a bulk power source and will be utilized more and more for higher uses.

The United Mine Workers of America has long recognized this economic and technological fact. We have, for many years, opposed the burning of natural gas under utility boilers as a waste of a valuable natural asset. Our position has been borne out by developments of the last five years, developments which underscore the waste of natural gas which has been burned over the years as a utility fuel.

WATER POWER

Hydroelectric facilities are a familiar sight in the western part of the United States. However, it is now clearly evident that major hydroelectric facilities have exhausted the available sites. Most authorities in the energy field recognize that in the future hydroelectric power is certain to diminish in relative importance in total energy production.

NUCLEAR POWER

Much has been written about the growing importance of nuclear power. However, the bright promises of the atom have not been fulfilled in reality. Nuclear power has become a costly and uncertain source of energy at best and a highly dangerous and catastrophic one at worst. The construction and operation of nuclear power plants sufficient to meet the energy needs of the southwest is neither economically nor practically feasible. The time factor involved is too long, the uncertainty of nuclear power plants far too great, and the cost of building and operation much too expensive to permit nuclear power to fill this void. In addition, the serious question relating to the health and safety aspects of the atom have given pause to many conservationists and others concerned with the development of energy resources.

NEW METHODS OF ELECTRIC POWER GENERATION

For many years it has been obvious to the officers and members of the United Mine Workers of America that new techniques of power generation are urgently needed by our nation. Gasification of coal, magnetohydrodynamics, fusion power, and others will be required if America is to sustain her economic growth and at the same time prevent undue pollution of our environment. We have long supported both federal and private research efforts aimed at making new generation technology commercially available.

It seems unthinkable that in a nation characterized by technological excellence, our power generation techniques have remained relatively stagnant. For example, a modern coal fired station is only 40% efficient. That is, 60% of the energy input is wasted and not translated into electric power. On the other side of the coin, a nuclear power plant, supposedly the latest in technological excellence is only 30% efficient and wastes 70% of the total energy input.

Unfortunately, new generation technology will be a long time in coming. The building of the necessary research facilities, pilot plant operations and demonstration plant construction and operation will require many years. During that interim period, conventional generation technology will be required to meet our power needs. Such technology, admittedly inadequate, is the only answer to the energy needs of our country. Our dereliction in not developing new techniques cannot justify thwarting the legitimate demands of Americans for ever increasing amounts of electrical power.

On balance, therefore, the power needs of the west can best be met by the coal reserves of that part of the country. The bulk of the reserves of bituminous coal and lignite are located west of the Mississippi River. Utah, Arizona, New Mexico and Colorado contain billions of tons of recoverable reserves. One estimate indicates that on the Kaiparowits Plateau alone there is more than 1.5 billion tons of coal remaining in the ground.

This coal is available, it can be mined, and it can be utilized. When coupled with the latest pollution abatement technology and a firm resolve of the coal companies to do all that is possible in the reclamation field, this coal can be utilized without undue damage to the environment. Such utilization will mean much to the people in the western part of the United States, and more especially in the areas where the coal is to be mined, transported and consumed.

The plans for southwest power development envision the construction and operation of six large coal-burning electric generating stations.

Of the six plants, four will be supplied by coal that is surface mined in the State of Arizona. Two plants, one at Huntington Canyon, Utah and the Kaiparowits Plant to be located also in Utah will consume coal that is deep-mined in the immediate area of the power station. The construction and operation of these plants will mean a great deal to the economy of the areas involved.

Two of the plants under consideration, the Mohave Plant and the Navajo Plant will be supplied by coal from a mine operated by the Peabody Coal Company on the Black Mesa. This mine will produce approximately 13 million tons of coal per year over its 35 year life. The production of this coal will mean approximately three million dollars per year in payroll to the men employed there, many of them men who would not be able to secure jobs at a similar level in the immediate area. In addition, under an arrangement between the Navajo Tribe and Peabody Coal Company, more than 100 million dollars in royalties will be paid to the tribe over the period when the mine is in operation.

Economists tell us that payrolls in a general area tend to be multiplied as the people receiving income purchase goods and services with their wages and salaries. We estimate that the three million dollars per year payroll from the Black Mesa Mine will generate approximately nine million dollars a year of additional income. Our experience has been that most of this additional income will be spent in the immediate area, thus adding to overall economic benefit.

In addition to the employment at the mine, the Black Mesa operation will provide employment for men operating the railroad between the Mine and the power plant at Page, Arizona. Also, since the Black Mesa Mine supplies coal via pipeline to a power plant in southern Nevada, further employment will be generated. Finally, there will be employees at the two power plants, some of whom will be members of the Navajo Tribe, who will be trained to operate the highly complex power stations and will be paid accordingly.

This development represents a major net investment of hundreds of millions of dollars, an investment that must be considered vital to the southwest industrial development.

The mine developments on the Kaiparowits Plateau are another indication of the importance of coal money to the economic structure of the southwest. It has been estimated that investment in power plant and transmission facilities to be supplied from the Kaiparowits Generating Station will total approximately one billion dollars. In addition, the investment in the coal mine and transportation system to supply the plant will be approximately 60 million dollars, bringing a total capital investment to an economically depressed area of 1.1 billion dollars.

It must be remembered that the mines supplying the Kaiparowits Power Plant will all be underground, thus avoiding many of the problems relating to strip mining. An analysis of the economic impact, however, underscores the extreme importance of such a plant in an area such as southern Utah.

When completed and in full operation the Kaiparowits Mines will produce approximately 15 million tons of coal per year. It will provide employment in the mine alone of 2,230 men. When we add the additional employees required to provide service for the mines and the employees for the power station, we arrive at a total employment figure of 2,850 men. This figure represents five times the average, annual, non-agricultural employment in Cain County in 1970.

Moreover, total annual wages for these men will be approximately 27.8 million dollars, which is more than eleven times the total nonagricultural wages paid in Cain County in 1969.

There are additional benefits to be derived from the production of coal at the Kaiparowits Mines. Royalties will be paid to both the federal and state governments. The impact of these royalties were spelled out well in a statement by Elroy Nelson to the Senate Interior Committee on May 26, 1971. We found those statistics to be highly significant and we would strongly urge that they be given full consideration by the Committee in any action which it proposes to take on the Kaiparowits Operation.

Moreover, the development of the Kaiparowits Mine, as well as the development of the Black Mesa Mine and the mine to provide coal for the proposed plant at Huntington Canyon will mean millions of dollars in royalties to the United Mine Workers of America Welfare and Retirement Fund. Such royalties will mean much in the way of pensions, hospital and medical care, widows and survivors benefits for coal miners, their families and their survivors throughout the United States. It will bring an additional measure of security to the mining population of the United States and it will make possible the expansion of benefits to coal miners and their families, benefits which will, in turn, bring greater economic security not only to the mining regions of the southwest but indeed to mining regions throughout the United States.

Much attention has been focused on the ecological impact of southwest power development. A part of this question relates to the effect of strip mining on the area. Another problem involves the emission of various pollutants to the environment from the power plants themselves.

It should be noted that the question of strip mining is not involved at either Kaiparowits or Huntington Canyon. Both of these operations will be deep mines and thus, there will not be a substantial surface effect on the area. The mines in the Four Corners area and on Black Mesa, however, are surface mines. Therefore, they are the subject of legitimate concern by conservationists and others.

Of particular importance to the United Mine Workers of America is the Black Mesa operation. At that site there are several hundred employees of the Peabody Coal Company represented by the Union for collective bargaining purposes. These employees are, for the most part, members of the Navajo Tribe and residents of the immediate Black Mesa Area. Therefore, they have concern not only for their jobs but also for their living environment both during the stripping operations and after their completion.

Recently, representatives of the UMWA attended a meeting on Black Mesa. At this conference were representatives of the Navajo Tribe and many of the residents of the immediate stripping area. Those in attendance wholeheartedly supported the Peabody Mine with the clear understanding that the reclamation agreement entered into by Peabody would be honored.

We endorse this position. We have pledged to our membership on Black Mesa and to the citizens of that area the full resources of the UMWA to be used to see to it that Peabody reclaims the land as they have promised to do. This position can best be considered within the broader context of our policy on strip mining, a policy which is designed to protect both the jobs of our members and environmental quality.

We believe that the stripping of Black Mesa can be accomplished without any long-term adverse effects. We also believe that the undesirable consequences of stripping in the short run can be minimized if Peabody is held to its pre-stripping agreement. Indeed, in many ways the Peabody Agreement is a prototype of what should be done throughout the country to somehow reconcile the need for power with the need for environmental quality.

The question of emissions from power stations is somewhat beyond the scope of our jurisdiction. However, because environmental quality restrictions infringe

upon the welfare of our members we have devoted a great deal of study to such regulations and have appeared before federal and state agencies on matters of this kind. We support the application of the maximum available technology to reduce pollution emissions to a minimum. Such technology should be applied whether or not major pollution is present in the area. There can be no justification for degradation of environmental quality simply because of a small background level of pollution.

When technology is not available, we have long urged its development both by the federal government and by the industries directly involved.

Fortunately, southwestern coal is relatively low in sulphur. Fortunately, also, there is available technology to reduce particulate emissions to a significant degree. Such technology should be employed at the power stations involved. Congressional agencies concerned should use all applicable state and federal laws to see to it that it is, in fact, applied. As new technology becomes available and as it can be utilized, it should be.

The twin questions of environmental quality and energy demand are not amenable to easy solutions. It is obvious that we must continue to have energy growth. The existence of our very society and our industrial preeminence demands such growth. On the other hand, we cannot permit the further despoilation of our environment simply to generate additional dollars of gross national product. We can no longer tolerate the wastage of our precious natural environment as a sewer into which we dump the waste products of our civilization.

We, therefore, must move ahead to develop technology and to employ it as it is developed to preserve environmental quality and at the same time to permit continuation of economic growth. We believe that the west, which is rapidly emerging as a major center of power generation and which contains the major reserves of U.S. fossil fuels can be the testing ground for the thesis that power production and environmental quality are, in fact, compatible.

U.S. DEPARTMENT OF THE INTERIOR,
BUREAU OF INDIAN AFFAIRS,
Many Farms, Ariz., June 4, 1971.

STAFF OF HEARINGS OF POWER PLANTS IN THE SOUTHWEST,
Senate Committee on Interior and Insular Affairs,
Senate Office Building, Washington, D.C.

DEAR SIRs: These petitions were signed by persons from many parts of the Navajo Indian Reservation. We hope that you will accept them and place them in the official record of your hearings on Coal-Burning power plants in the Southwest.

Thank you.

GENE GADE.

(The signed petitions were retained in the committee files.)

U.S. DEPARTMENT OF THE INTERIOR,
BUREAU OF INDIAN AFFAIRS,
Many Farms, Ariz., June 4, 1971.

Senator HENRY JACKSON,
Senate Committee on Interior and Insular Affairs,
Senate Office Building, Washington, D.C.

DEAR SENATOR JACKSON: The following statements were written by representatives of the Pacific southwest region of SCOPE (Student Council on Pollution and the Environment). SCOPE is a young people's advisory group to the Environmental Protection Agency. The statements were discussed and approved by the SCOPE members who attended the monthly SCOPE meeting in San Francisco recently. They represent the official position of SCOPE in this region.

It is our understanding that the hearing record for your recent hearings on the Impact of Coal-Burning Power Plants in the Southwest is still open. If that is true, we wish to submit these statements as part of the official permanent hearing record.

Also, Senator Fannin asked me questions about the hydrology of the Black Mesa area when I presented my own testimony at the Page, Arizona session of the hearings on May 28. I would like to refer your staff to two documents which may help them in their research on the Black Mesa question. The first is

called *BLACK MESA BASIN* by the New Mexico Mining and Geological Society (Socorro, New Mexico) and the other is called *The Hydrogeology of the Navajo and Hopi Indian Reservations* professional paper #521a by the U.S. Geological Survey. Neither paper has all the needed data, but both are helpful.

Thank you.

Sincerely

GENE GADE,
Arizona Representative for SCOPE.

STATEMENT OF RON EBER, SCOPE REPRESENTATIVE NORTHERN CALIFORNIA,
YOUTH COORDINATOR OF SIERRA CLUB

Man's environment on this earth involves finite space composed of finite environmental areas of differing natural capability in support of man and other life. Here in the Southwest, are environmental areas unmatched anywhere in the world. This area includes 6 national parks, 28 national monuments, 2 national recreation areas and the Grand Canyon. Here the work of water and time has created incomparable beauty. At the 1972 United Nations Conference on the Environment, the United States is planning to nominate this area for World Heritage Designation (sort of an Earth Park). Yet these precious areas and the surrounding lands that maintain them, areas set aside by man to be protected for all time are now under subtle yet brutal attack. In fact the integrity of the entire national park system is under attack. You can't gouge the land by mining in a park; you can't clear the land by timber cutting in a park; you can't kill animals by hunting in a park; you can't flood canyons or tame wild rivers by building dams in a park—especially in the Grand Canyon—nor can you introduce uses into a park that are incompatible with the purpose for which it was established . . . preservation. In fact you can't do any of these things next to a park if it is going to destructively effect a park. Yet this is exactly what we are in the process of doing here in the Southwest. By allowing these power plants to be built, even with the maximum technological controls now devised we will destroy these parks and monuments.

The air pollution from these power plants will destroy one of the key components of these parks' incomparable beauty. The vast vistas and clear skies of the area, just as much a part of the park's beauty as is the canyon itself, will be violated. For a park is more than virgin forests, tall mountains, deep canyons or running rivers. They are total environments and to remove clean clear air is a violation of what the park was to protect.

We are in effect, destroying the areas Americans escape to in order to make more of what they escape from. We should ask ourselves how this situation was allowed to rise. Greed and insensitivity have not alone brought us to our present cross road. Neglect would be a more precise concept. We have taken for granted America's great open spaces and parks believing them safe from our touch of death. But our technology has moved too fast, our numbers have expanded rapidly and our planning has been nil until now even our great places have been backed up against industry's wall. Neglect, though, can be reversed with understanding, by studying and evaluating the land within the framework of a comprehensive national land use plan. We cannot decide upon the use of one area without understanding its place and value in conjunction with all other lands. Senator Henry Jackson's proposed National Land Use Policy Act (S. 632) sets forth a policy and planning criteria that are applicable in this situation and will provide a guide as to the evaluation necessary in judging the proposed land uses.

Section 302(b) states:

"(b) The Congress further declares that it is the national land-use policy to—

"(1) favor patterns of land-use planning, management and development which are in accord with sound ecological principles and which encourage the wise and balanced use of the Nation's land and water resources;

"(2) foster beneficial economic activity and development in all States and regions of the United States.

"(3) favorably influence patterns of population distribution in a manner such that a wide range of scenic, environmental, and cultural amenities are available to the American people."

Clearly from the testimony given at these hearings can the projects be considered, "in accord with sound ecological principles." The entire week has been

a discussion aimed at deciding how much of the southwest will be sacrificed to feed the electrical demands of a growing southern California. Compromise is unjustified when we are dealing with areas that belong to all people in all times as they were created.

The majority of the power generated from his project is destined for the L. A. basin which is an area invented in California and found not to work. By allowing more power to go there which allows in turn uncontrolled growth we will not be able to, "favorably influence patterns of population." Also by constructing the plants at their present locations we will be destroying a unique area and thus eliminate instead of make available scenic amenities.

The bill goes on to outline land planning criteria, none of which this project complex can meet. This in no way is meant to harm Senator Jackson's bill but rather to show what an effective tool it will be in planning a livable environment that will force us to truly evaluate what we are doing to this earth. To decide what is really necessary and what is merely fadish convenience will be necessary if we are to avoid such controversies in the future.

SECTION 3.—AESTHETIC CONSIDERATIONS OF W.E.S.T.

(Prepared by Claudia Ayers)

Nothing is more degrading to the aesthetic value of an expansive land than are power lines. The sight reminds one of a masterpiece of art defaced by the pen-knife of a lunatic. The aesthetic considerations in the Southwest, however, go far deeper. In the Southwest the aesthetic value which would be lost with power production is unique and irreplaceable.

This Big-Sky country is world-renowned for the purity and healing qualities of its air. Each year thousands of people are sent here by their doctors for recuperative purposes alone. The climactic conditions present are unmatched in the United States. Air quality has significant effects beyond visibility and health; it affects humidity, temperature, precipitation, and ultimately the overall climate.

If the power plants are built, great values to science will be lost. The proposed projects will affect wildlife living on what is referred to as a "marginal habitat", where even small changes in the ecosystem can have large-scale impact on the natural community. The fragile gene-pool in these natural communities may be sacrificed irretrievably. Astronomic observation, which once enjoyed near-perfect conditions in this area, will suffer severely from the impairment of visibility.

Tourists are attracted to beauty. Large-scale power production is entirely incompatible with the tourist industry. Who wants to come to Arizona to see more smog? A drop in tourism will hit especially hard at the natives of the Southwest, who are already badly damaged by the compromise of their land, water, and cultural rights and values. The human and social losses implied in this project are an unwelcome addition to the string of insults the natives of this land have suffered at the hands of exploitive whites. Trading craftsmanship and traditional life styles for work in power production is yet another cultural insult among the many to come out of our nation's addiction to the consumption of natural resources. The wonders of the Southwest are the heritage of the world; to give them up so that a few cities can grow bigger and have all-electric kitchens is an unbearable prospect to those of us with children yet unborn and unseeing.

Addendum by Tee L. Guidotti and Ron Eber

There exists in the regulatory priorities for water quality a guiding principle of "non-degradation" which stipulates that water quality standards must meet or improve the existing quality of the water. The same policy of "non-degradation" should be applied strictly to air as well as water, not only in concentrations of specific pollutants but in other air quality criteria such as visibility, which has considerable economic and aesthetic value.

SECTION 4.—IMPACT OF W.E.S.T. ON SOUTHERN CALIFORNIA

(Prepared by Tee L. Guidotti)

W.E.S.T. will sign and seal the death warrant of Los Angeles.

Providing this power will uncap existing natural restraints on the region's capacity; cheap power at the expense of the Southwest will inhibit desperately needed measures for conserving power and resources.

The supply of this great quantity of power will aggravate existing problems in Southern California. Industry will have no incentive for increasing efficiency; enormous amounts of energy will continue to be wasted. Private energy consumption will continue to rise beyond need with the promotion of expensive, unnecessary gadgets and minor appliances. Commercial districts will continue to shine their signs late into the night at full brilliance, for no good reason. Manufacturing and production will continue to ignore power-saving efficiencies and recycling processes. Urban growth will be quite as easy with cheap utilities, adding to the choking and massive pollution that is Los Angeles.

The project will make much of the future Southern California population, as it will be stimulated to grow, dependent on far distant power sources, with energy carried by long and vulnerable power lines. Strategically, a great part of the nation's second largest urban area will lie with its head on the chopping block, waiting for the final cut to come from any natural disaster (such as an earthquake), accidental disruption, sabotage, or attack. We are setting Los Angeles up for disaster.

The power which will come to Southern California via W.E.S.T. will be cheap for Southern California. The ultimate, and highly expensive, cost will be borne where the power is generated and the fuel is extracted. The people of the Southwest will be forced to *subsidize* the growth of an already overgrown city, by absorbing the staggering cost to their health, their culture, the quality of their lives, the land, and their natural environment. These people, who will foot the bill for urban growth, will not be allowed to participate in the decisions which will affect them most; the decisions to be made on growth, development, and planning in Southern California (and other Southwest cities drawing power from W.E.S.T.) will be made far away, with little or no consideration given to the rural and wilderness areas being expended.

Los Angeles is a city in crisis. Polluted nearly to saturation, services stretched to the breaking point, a nightmare to administrate, LA's fate will be sealed with a continued influx of population. The city cannot take it. And as it dies it will take the Southwest with it.

Our city, to its shame, has long shifted the impact of its population onto other areas, chiefly rural, throughout the region. We have destroyed lush valleys to get water and we now threaten the integrity of the finest natural bay and estuarine system in the world; yet, we are among the most wasteful cities in the world in our use of water. Los Angeles and its satellite cities pollute the air that blankets the entire Southern part of the state. For our own protection and for the protection of our neighbors, it is time for this to stop.

Alternative patterns of development do exist, and the Los Angeles City Planning Dept. has met considerable unfavorable public response for not aggressively and creatively searching out new ideas and practices. The growth-promoting Los Angeles General Plan concept has met great opposition in our city. The time is ripe for LA to rethink its basic priorities and to accept the fact that the pioneer days are over. A well-planned city, at an optimum population, with advanced transportation systems and environmental quality management is possible and within our grasp. But as long as the city and its residents can avoid facing their problems and can shift them onto another part of the country, they will do so, and our problems will grow bigger and bigger even though they may be temporarily out of sight. When the day of confrontation comes, LA will suffer far more than if it had met the problems honestly at an earlier time.

The crucial question, which is never asked, is what happens after 55 years? Will be proud of our maturity in solving our problems and enjoying our lives, or will we have lost our most precious heritage and have won nothing but a desperate addiction to consume more and more of our rapidly dwindling resources?

W.E.S.T. is a crucial test of our resolve and commitment, a test of how we value the Great American Southwest, and all it stands for, against electric toothbrushes and neon signs.

PHOENIX, ARIZ., May 26, 1971.

HON. HENRY M. JACKSON,
Chairman, Interior and Insular Affairs Committee, New Senate Office Building,
Washington, D.C.

DEAR SIR: We are greatly concerned about our environment and realize every step must be made to preserve it. We are not in favor of more electric plants in the Southwest! Man must be educated to limit his use of all natural resources. Advertising to promote electric's use must be stopped!

I wish that my remarks be made part of the hearing into this matter. You have our support in this area.

Sincerely,

DAVID and MARY ANN BRODERICK.

TUCSON, ARIZ., May 31, 1971.

HON. HENRY M. JACKSON,

Chairman, Senate Committee on Interior and Insular Affairs, Senate Office Building, Washington, D.C.

DEAR SIR: I am writing to you in the hope that you and your committee will take the necessary steps to see that *all* the costs of the exploitation of the Indian lands for power for Arizona and for Los Angeles (and which has already begun), be fairly considered and the public informed.

In brief, here are a few reasons:

1. As to the Indians, there is an invasion of human rights involved.
2. Land that has been strip-mined in an arid climate cannot be restored.
3. The drain on underground water (since the coal is to be transported to the plants by the "slurry" method) might be too great.
4. There would be too great pollution as to gases from the plants.
5. Supplies of the low-grade coal are known not to be great enough to justify the spoilation and the cost of installation. Good for only about 30 years.
6. There should no doubt be a moratorium placed on this now.

Assuredly, new sources of power must be found. *Exploration of solar power*, for one, should no doubt proceed without delay.

I hope this is not too late to be placed in the record.

Very respectfully yours,

ESTHER A. EICHENBERGER.

PRESCOTT, ARIZ., May 26, 1971.

DEAR SENATOR JACKSON: I would think by now the feeling would be well known that the American public in general wants to clean up and keep clean their environment. But you would not know so by the way the power plant projects are being handled in the Four Corners area.

I am opposed to any further development of these coal fired plants until some reasonable research and thought is put behind the use of technology for environmental protection and investigation of alternatives.

Thank you kindly. Please make this a part of any hearing record.

Sincerely,

RUSS MILLER.

PHOENIX, ARIZ., May 25, 1971.

HON. HENRY M. JACKSON,

Chairman, Senate Committee on Interior and Insular Affairs, U.S. Senate, Washington, D.C.

DEAR SENATOR JACKSON: Having been a resident of Arizona for most of my life I can say that this State is truly one of the greatest.

I am extremely perturbed that the future of this state may be in jeopardy due to the vast amount of energy that is planned for production.

I have recently been down the Colorado river and hope with all my heart that this area is not marred any more than it is already. I want to express my strong support for the proposed extension of the present park boundaries. I believe that there should be a limit on the amount of power boats and I am also in favor of limiting the air traffic below the canyon rim.

I mention this on my own behalf because I hope to continue enjoying this great State, but mainly because I hope that my two young girls will have the same opportunity.

May I request that my comments be made a part of your hearing records.

Very truly yours,

JAMES F. LUDKE.

HEREFORD, ARIZ., May 11, 1971.

HON. HENRY M. JACKSON,

Chairman, Senate Committee on Interior and Insular Affairs, U.S. Senate, Washington, D.C.

DEAR SIR: During the 1950's I spent many summers in the Four Corners area of our nation's desert Southwest. I believed then, and do now, that this area is one

of this planet's most unique and beautiful regions, well deserving protection from what we so often blithely and blindly call "progress".

It was with great concern, therefore, that I read of the existing and proposed thermal powerplant construction on this painted plateau. I question the use of the scarce, hence valuable, water of the Colorado River and its tributaries for this purpose; the pollution of skies which, when I last saw them, held the enviable distinction of being clear; and the placement of such plants far from the people they are to serve. I wonder about the effect of such powerplant accouterments as highways, power lines and strip mines upon the fragile desert environment; about the effect of the total upon the cultures of the Indians living in the area; and why one of the field hearing sites was not Phoenix, Arizona, a city far more accessible to the citizens of this state than Page. Above all, I wonder if it is not time to question our current usage of power . . . i.e.: electric carving knives, trivets, etc.

I hope you and your Committee will see that the Four Corners region has a higher usage value than that of an industrial site. Already the area contains many National Parks and Monuments, and has the potential for more. These are not compatible with spewing smoke stacks. This desert should remain, as far as possible, in its natural state for those who "want to get away from it all". And with a booming population and technology, that need constantly increases.

As such, the Committee on Interior and Insular Affairs should ban any further powerplant construction in the Four Corners area, and place restrictions on the existing plants which would result in the least damage to this unique environment.

Please make this letter a part of the hearing record.

Respectfully yours,

Mrs. Dawn T. Myers.

PHOENIX, ARIZ., May 14, 1971.

HON. HENRY M. JACKSON,

Chairman, Senate Committee on Interior and Insular Affairs, U.S. Senate, Washington, D.C.

DEAR SENATOR JACKSON: I am writing you regarding construction of thermal power plants in the desert areas of the Pacific Southwest.

I have been very dismayed in following the progress of the construction of the Four Corners power plant near Farmington, New Mexico. One would think that we would have learned from errors in the past, regarding construction of this kind. Not only will the power plant itself offer serious threats to our air and water environment, but the method to obtain the coal for fuel for the plant by strip mining, is deplorable.

I would certainly hope that your Committee bans strip mining in the entire country, as well as in this area, and that absolute control of air and water environment be made mandatory in construction of any plants in this region.

I know that you have shown great concern for environment in the past, and hopefully will continue to do so.

Very truly yours,

ALFRED F. MILLER, M.D.

SUN CITY, ARIZ., May 29, 1971.

HON. HENRY M. JACKSON,

Chairman, Senate Committee on Interior and Insular Affairs, U.S. Senate, Washington, D.C.

SIR: We are writing to let you know that we are very opposed to the power-plant construction in the desert areas. Even two years ago when we visited Arizona the air was much better than it is now. All the suggestions for curbing pollution here end up in just TALK.

Even the governor seems to care nothing that Arizona ranks first in emphysema deaths. We left California less than a year ago because that state has been ruined by too many people and too many power plants. It is our understanding that the Mojave plant is outlawed in California, so, greedy Arizona ruins their own fresh air to send power over to California.

It is a shame the way the Indians are not considered. Before long they will have neither water nor fresh air. The Four Corners area has scenery unmatched anywhere. So for the almighty dollar, the once clear air is to be turned into another smoggy L.A. How anyone can go there (L.A.) to live is amazing. Let people

be rationed for electricity, if necessary. Electric toothpicks, toothbrushes, knives and the rest are definitely not needed but fresh air and water are essential.

We hope some of our lawmakers have enough foresight and good sense to prevent any further pollution of the southwest. Goodness knows the smelters and car emissions are too bad now, without further air pollution.

Please make these comments a part of the hearing record. Thank you.

Sincerely yours,

BERT and PRISCILLA KEZAR.

PHOENIX, ARIZ., May 31, 1971.

Senator HENRY M. JACKSON,
Chairman, Committee on Interior and Insular Affairs, Senate Office Building,
Washington, D.C.

DEAR SENATOR JACKSON: Please make this part of the public hearing record concerning power plant development in the Southwestern United States.

I would like to say that I am strongly opposed to power plant construction in the Southwest. There are many reasons for my opposition of which I will state a couple. There will be a tremendous amount of pollutants released into the air. Not only does this affect the animal and plant life of the area but it affects the esthetic beauty of the area where it is located. A good part of the beauty of the Southwest is a result of the outstanding visibility. With this visibility and clearness gone, a good portion of the beauty of our Southwest is gone.

I think that we "white men" must also consider what the effects of the Navajo power plant will be on the Indians of our region. Coal is being strip-mined from Black Mesa on the Navajo Indian Reservation. This land will never be the same after the strip-mining is ended. Besides this, we are going to take the Indians' water as well as their once clean air and in return the Indians get a few jobs. I do not think that the Indians deserve this at the hands of Americans who already consume and waste too much electricity.

Please realize that we must stop destroying our once beautiful United States. A good place to begin might be with coal-fired power plants.

Sincerely yours,

JAMES S. ROMAINE.

SCOTTSDALE, ARIZ., May 26, 1971.

Hon. HENRY M. JACKSON,
Chairman, Senate Committee on Interior and Insular Affairs,
U.S. Senate, Washington, D.C.

DEAR SIR: I would like this letter to be made a part of the hearing record.

I protest very strongly the proposal to build any more power plants in the four corners area or any area where soft coal is used. There is no excuse for producing power that is so harmful to the environment. We must all learn to conserve our power and get along without so much. California should not be allowed to obtain power at the expense of the Four Corners environment, especially when their own government has passed strict laws to protect their environment.

Please consider the long range effects of the proposed plants, as well as the expense involved, and the time it will be useable. The coal supply is limited and the environment will not make it possible for long.

Today we must consider our environment at whatever cost or hardship.

Sincerely,

ELEANOR BEAN.

CHINLE, NAVAHO NATION, May 14, 1971.

Senator HENRY M. JACKSON,
U.S. Senate,
Senate Office Building, Washington, D.C.

DEAR SENATOR JACKSON: I wish to go on record as opposing the further construction of coal-fired power plants in the Southwest. I also support the bills being introduced in the House and Senate which will prohibit strip-mining on all public lands.

Right now the Four Corners power plant at Farmington spews out more particulate matter (350 tons) per day than New York City and Los Angeles combined. What will happen if six more plants go into operation? This land of unparalleled beauty will have more SO_2 (sulfur oxides) than New York City, more dust than Los Angeles, and oxides of nitrogen comparable to those emitted by all the autos

of Los Angeles. The Page plant will send Colorado River water south to Phoenix when its desperately needed to irrigate the parched lands of the Navaho. Again Indian people are asked to sell their natural resources for the white man's benefit.

Peabody Coal Company is strip-mining 14,000 acres on Black Mesa, the Navaho sacred mountain. A superdirt highway now scars the Mesa. Little thought to the ecology of the land is evident in the construction. Should we believe that Peabody will do better when they finish stripping in 34 years?

True, 300 Navahos will be employed at the mine, a few more at Page. The tribe will also receive \$55 million during the next 35 years. 52 families, over 600 people will be homeless though. Navaho air will be polluted, Navaho water depleted. The People were never informed of the total picture. Could not this beautiful land be developed in another way? What happens in thirty-five years when Peabody leaves?

There are alternatives to coal burning plants such as geothermal steam and nuclear power—especially fusion. The electrical companies can also develop a nationwide power grid. This would enable them to send surplus power in one part of the United States to over extended facilities in other areas—thereby eliminating brownouts.

I believe in progress, but I also believe in maintaining a balanced approach. This is not being done in the Southwest. There are hearings on this issue being held in the Southwest during May. I urge you to come and hear what the People of the land have to say.

Sincerely,

RICHARD JONES.

LAKE HAVASU CITY, ARIZ., May 5, 1971.

HON. HENRY M. JACKSON,
Chairman, Senate Committee on Interior and Insular Affairs,
U.S. Senate,
Washington, D.C.

DEAR SENATOR JACKSON: I am deeply concerned over the environmental effects of power plants in the Four Corners region. This region has 20 National Parks and monuments plus many other areas of equal value and beauty. Heavy industry has no place in such a region. It would be inexcusable to destroy it. It would also have adverse effects on the Indians, their air, land, and water, as well as their life-style. There must be more consideration of the ecological balance of things from now on before it is too late.

Three years ago the mountains across the river in California loomed sharp and lovely and vividly clear. Today they are fading rapidly, and some days are invisible. Never clear any more. The Mohave plant is in operation. Too late to do anything much about that. But it is a taste of things to come. Alternatives must be found.

Sincerely,

Mrs. J. M. BLACK.

PHOENIX, ARIZ., May 7, 1971.

Senator HENRY M. JACKSON,
Chairman, Committee on Interior and Insular Affairs,
Senate Office Building,
Washington, D.C.

DEAR SENATOR JACKSON: I am writing with regards to the grotesque environmental destruction in the Southwest in general and the Four Corners Area specifically. If you have visited northern Arizona and the beautiful Shiprock area you must be aware of its natural splendor and grandeur. It has long been once of the few strongholds of nature in our increasingly polluted area.

The new coal fired power plants and strip mining operations are quickly and violently ruining our environment. The Four Corners power plant produces as much particulate matter as New York City and Los Angeles County combined. In the process, it is wiping out sacred Indian shrines and emitting a veritable stench which is reaching the Grand Canyon, Lake Powell, Mesa Verde, and Monument Valley. What this means to all of us need not be delineated—this is a tragedy of immense proportions.

I respectfully request that you assist in the development of environmentally safe alternatives for production of electricity. The advertising of Salt River Project in Phoenix and similar power companies which have served to increase demand should be halted. Fossil-fueled power plants should also be banned.

With this letter, I wish to go on record as opposing any subsequent construction of coal fired power plants and strip mines in the Southwest. I hereby request this statement be made part of the record in the Senate Committee on Interior and Insular Affairs to be held May 24, 25, and 26, 1971.

Sincerely,

DONALD H. BAYLES, Jr.

PHOENIX, ARIZ., May 12, 1971.

HON. HENRY M. JACKSON,
Chairman, Senate Committee on Interior and Insular Affairs,
U.S. Senate, Washington, D.C.

DEAR SENATOR JACKSON: As a resident of the state of Arizona for the past five years, and more importantly, as a member of the human race who is aware of the importance of maintaining the ecological balance of our precious earth and of the fragility of its scenic beauty, I would like to go on record as strongly opposing the Four Corners Powerplants now being considered.

I know that two plants are already in operation (Four Corners Plant and Mohave Plant), that three more are under construction (Navajo Plant, San Juan Plant and Huntington Canyon Plant) and that several more are in the planning stage, including the largest of all, the Kaiparowitz Plant. But, it is still not too late to halt present construction and planning, and to close down the plants now already polluting our air and water.

There are, it seems to me, four ways in which these power plants will damage our natural resources in this southwestern part of the U.S. The first and most obvious way is the tremendous air pollution these plants will produce. These fossil fuel steam generating facilities will produce more emissions than the total amounts daily dumped in to the air of New York City, which in infamous for its air pollution problem. Already the plants now in existence produced a horrendous sight for our recently orbited astronauts, who reported the pollution produced by these plants as being the most visible landmark in this part of the U.S.!!!! That is quite a distinction. The power plants will produce all three dominant types of contaminants—particular matter, sulfur oxides and nitrogen oxides. What a grand way to treat the Southwest, which was once an area for its clean air, where asthmatics (and I had asthma as a child) and TB patients came for "the cure."

The second way in which these powerplants will damage this area is both by decreasing the amount of water and polluting the meager amount that will be left. It has long been acknowledged that this part of the U.S. naturally has a limited supply of water, a supply steadily being taxed by the increasing population of the southwest. The powerplants will use enough water to supply the needs of a metropolis of over one million people, and the industry needed to sustain that size population center. And being that much of the power produced by these plants will go to areas outside the southwest, basically the area will be exporting not only the power, but the water as well—often into areas endowed by nature with more abundant supplies of water. The plants will also tend to deteriorate the quality of the water in this area, resulting in crop and other unknown damage and side effects as far south as Mexico, and more certainly in the Navajo and Hopi Indian Reservations, which depend on the Colorado River Basin water for all their water needs.

The third damaging aspect of the Four Corners plants is the strip mining which will be involved in supplying the fossil fuel to run the giant generators in these plants. The Eastern U.E. has already experienced the damaging effects of strip mining. After those brutal lessons, we should not allow the southwest to repeat that vicious cycle, especially because of its arid climate, which will make it more difficult to reclaim the strip mining zones.

Fourth the Four Corners Plants will destroy one of the most scenic spots in the U.S. Twenty national parks and monuments are located in this area, and aside from polluting the air and water that surround and permeate these natural beauty spots, the power plants, by their very nature, will cause more roads to be built, and thousands of miles of EHV transmission lines to be constructed. The plants themselves will, at least in some cases, have boilers twenty stories high and towers that will be visible above and beyond the surrounding buttes. What will become of the classic lines and awe inspiring quiet of nature when interrupted by these incursions of man????

A last item to be considered is the right of the Indian peoples to protection from the white mans' arbitrary decisions. This Four Corners area is their home,

their enclave, with all its problems. Certainly one of the most important considerations should be the effect these tremendous changes in air, water, traffic, noise etc. will have on their way of life. And certainly their voices should be a dominant note in any final decision made regarding the Four Corners Power Plants.

It is most encouraging that at least the Senate Committee on Interior and Insular Affairs has seen fit to hold hearings on the continued construction of these powerplants, as a partial acknowledgement that something may be "rotten in the southwest", and as a sign of the right of the citizens of this great nation—as opposed to the special interest groups—to help determine the future of this land that we all must continue to occupy together.

It is my fond hope that the brief and relatively layman's arguments presented above will help you to decide that there are more pressing priorities than an increase in power for the southwestern U.S., and will influence you to render a decision curtailing the construction of the Four Corners Powerplants.

Sincerely,

Mrs. RIVKO KNOX.

PHOENIX, ARIZ., May 25, 1971.

DEAR SENATOR JACKSON: I urge you to consider all of the consequences of new power plant construction in the Southwest. Especially with regard to future generations that will only know of this country's beauty thru pictures if we continue in the direction we are heading.

Sincerely,

WILLIAM HERSCHEL.

MESA, ARIZ., May 22, 1971.

Hon. HENRY M. JACKSON,

*Chairman, U.S. Senate Interior and Insular Affairs Committee,
Washington, D.C.*

DEAR SENATOR JACKSON: (1) I request that this letter, including the enclosed reprint from the Christian Science Monitor of Wed., January 27, 1971, be made a part of the official record of the hearing to be held in Page, Arizona Friday, May 28, 1971 concerning fossil-fueled power plants in the Southwest. I request verification that the letter has been so entered into the record.

(2) In no event must startup of new plants and/or additions to old plants be countenanced unless they have efficient SO₂ recovery.

Respectfully yours,

HARRY L. TATE.

[From The Christian Science Monitor, Jan. 27, 1971]

POWER GOLIATH TRAILS SOOT ACROSS WEST

(By Jack Waugh)

FARMINGTON, N. MEX.—The moon-bound astronauts looked back to see what they could see—and all that they could see was pollution.

And the pollution they saw when they couldn't see any other man-made landmark was the plume of smoke and flyash drifting away from the electric power plant outside Farmington, near where four states meet—Arizona, New Mexico, Utah, and Colorado.

The tall stacks of the Four Corners plant wear their great gray-tailed plume with all the panache of a Don Quixote. It floats out over Shiprock, Ariz., dropping ash and blackening skies over part of the Navajo Indian reservation and across 200 miles of the United States West.

Every day the 2.1 million-kilowatt-capacity, coal-fired electric power plant blows out 250 tons of particulate matter (ash and dust).

That is as much as Los Angeles (110 tons) and New York City (140 tons) produce together on an average summer day. Add to the ash output of this one plant the plumes of all the power plants on the Colorado plateau, and it amounts to 350 tons a day.

The six million-plus-kilowatt-capacity, coal-fired power plants already built, now building, or blueprinted for the Colorado plateau in the next decade or more—if not forced to clean up—will throw out 2,160 tons of sulfur oxides a day. That is more than Chicago (1,920 tons) or New York City (1,077 tons) and many times more than Los Angeles (255 tons). Even so, Los Angeles considers its 255 intolerable enough.

Moreover, these Goliaths of the high plateau, in consort, will dump between 850 tons of nitrogen oxides, one of the coproducers of Los Angeles-type photochemical smog, into the Western sky every day. Los Angeles in the whole of 1968 only produced 950 tons a day with its millions of automobiles.

Los Angeles considers the threat of the coal-fired electric power plants so severe that it has banned their construction. And so have other cities. The plants have moved out into wide-open space.

Power interests say two things about the plumes that characterize their plants: They aren't as bad as they look, and when they are cleaned up, you will never know they ever existed.

But even when all the six giants are on the line and wet scrubbers are working to cut the fly ash, 240 tons of ash and dust will still be thrown out a day.

CORROSIVE TOUCH

And the plume could hardly be more noticeable now than the one at Farmington. The visible part—the plume itself—is the black flaky residue from the coal, burning in the plant ovens at a yellow-hot 1,100 degrees F. Combined with the invisible sulfur oxides, the ash is said to be dangerous to respiratory tracts and corrodes what it touches, reduces visibility, and diminishes sunlight.

But the visible pollution the electric power giants visit on the land isn't nearly so potent—even though it drops like black snow on homes over which it drifts—as the fellow-traveling sulfur oxides that go with it. Sulfur oxide is the most serious polluting creation of coal-fired electric power plants and the one least controllable. It damages plant and animal life and has been the villain in the acid rainfalls in the United States and Europe which have killed fish.

Control of sulfur oxides is the key to curbing electric-power pollution. Until it is controlled, there is no real control, even if the plumes disappear—as indeed present technology can make them do.

EFFECT FACTOR

The out-front statistics of power-plant pollution are deceptive, critics say. Nationally, electric-power plants claim to produce only 14 percent of the country's air pollution, far behind automobiles, which account for 61 percent.

But measured in what experts call the "effect factor"—how bad it is for the environment—coal-burning electric power plants are the most potent polluters of all—rated 30.7 percent on the "effect" scale.

They produce not only most of the nation's sulfur oxides, but most of its aerosols. And aerosols outrank any other known pollutant in their effect factor.

Aerosols and sulfur and nitrogen oxides flow virtually unchecked from the "teakettle towers" of the fossil-fuel-burning plants of the West.

Despite, that, the utilities that operate plants such as the one at the Four Corners move to stop the pollution only because the states are beginning to force them to.

New Mexico has come down hard on the polluter at Farmington: Clean up the fly ash and get the stacks 99.2 percent pure by the end of this year or close down. The Arizona Public Service Company, which operates the Farmington plant for a combine of six utility companies and takes 44 percent of its power, is installing wet scrubbers they say will more than meet the standards.

SUPPRESSION EXPENSE

The Salt River Project, the lead company for a combine of utilities building the new 2.3 million-kilowatt plant at Page, Ariz., which will start generating in 1974, insists its stacks will be virtually plumeless from the start—only 15 tons of fly ash will escape each day. It is spending \$90 million no pollution suppression which is to include stopping the escape of sulfur oxides from its second—but not its first—stack.

Why not the first stack? The company argues the time factor and the urgent demand for power.

But one environmentalist says: "Purging the other stack of its sulfur oxides is a realistic goal. The power companies don't want to do it because they don't want to delay their timetable. But they would have to if the people would demand it. But the people won't."

PARADISE VALLEY, ARIZ.,

May 23, 1971.

DEAR SENATOR JACKSON: We realize the need for power plants in the Southwest, but we are concerned about "fossil-fueled" power plants and what they will do in polluting the environment.

May we ask that before these plants are built, that all rational alternative methods of making power be investigated so that there is a *minimal* environmental damage.

Sincerely,

Mr. and Mrs. W. H. HARKER.

TEMPE, ARIZ., May 20, 1971.

Senator HENRY JACKSON,
U.S. Senator Interior Committee,
Washington, D.C.

DEAR SENATOR JACKSON: *Please!* In regards to the Four Corners area Power plants:

Consider alternate methods to generate electricity. Such as Senator Fannin's suggestion to investigate geothermal energy. Possible advantages: No fuel cost. Minimal Environmental damage. Could augment rather than diminish Southwest's water supply.

Request additional hearings. Give citizens a chance to consider the issues and react. All citizens, and from hearings held in such cities as Tucson and Phoenix. Pretty sneaky to have the hearings so removed from the population centers.

It should be considered as a world wide problem—Air pollution and water depletion, that is—and not just a local or regional matter.

A moratorium, please, on the construction of fossil fuel plants until:

1. An ecological impact study has been made.
2. The completed study has been printed and widely published for 90 days.
3. A public hearing is held.
4. The steps 1 through 3 are affected for alternate modes of generating electricity, including use of geothermal energy.

If, after alternate methods are investigated and the need for additional uses studied, there is no choice but more Coal-fired plants. Push for maximum pollution control.

Urge conservation of electricity and reforms of advertising by suppliers of electricity to stimulate demand.

Thank you for your consideration and this opportunity to present a statement for the official record.

Sincerely,

JOAN B. HALE.

PHOENIX, ARIZ., May 23, 1971.

Hon. HENRY M. JACKSON,
Chairman, Interior and Insular Affairs Committee,
New Senate Office Building, Washington, D.C.

DEAR SENATOR JACKSON: Please be advised that I support the position that has been taken by the Navajo Indians, the New Mexico Citizens for Clean Air and Water, Zero Population Growth, Friends of the Earth, Sierra Club, and Central Clearing House. My position on pollution free power through active, immediate development of solar and geo-thermal steam for electrical power generation is stated in the letter which I have attached. I urge you to include it in the hearing record of the Senate Interior Committee Hearings now in progress. I urge immediate action to halt the pollution and strip mining now despoiling the southwest. Continuation of power production from coal will cloud our skies and may prevent use of our major source of pollution free energy—SOLAR POWER.

Sincerely,

CURTIS E. BRADLEY. II

TUCSON, ARIZ., May 18, 1971.

Hon. HENRY M. JACKSON,
Chairman, Senate Committee on Interior and Insular Affairs,
U.S. Senate, Washington, D.C.

MY DEAR SIR: I neither approve of, nor feel it necessary to have, large power plants in the four corners area of this state. This is a scenic area which will not be improved in the least by soot and assorted chemical pollutants.

The facts which lead me to this belief are as follows: first, I have lived on the East Coast long enough to appreciate the clean air that we still have here in the southwest; my personal experience indicates that the proposed power plants will do little to improve this air. Second, northeastern Arizona and the Colorado River both have little enough water without taking still more for cooling and running slurry. Third, and to me the most important, is that strip mining, of the type proposed to feed these plants, creates one of the ugliest of man's blots on his landscape, causes erosion, and has been found to be almost totally unsatisfactory in the East; why, then, should we have this imported to us out here?

It seems totally irrational to me that all of the various power companies should advertise heavily for "total electric living" and the wonders of electric canopeners and electric pencil sharpeners, and then lobby and campaign equally loudly for more generating stations to meet the increased demand. Is it at all possible that there would be less demand if the power companies tried less hard to create a demand?

I sincerely hope that your committee will not approve the further construction of power plants in this area.

Yours truly,

HARRY C. LABELLE.

SEDONA, ARIZ., May 19, 1971.

Senator HENRY M. JACKSON,
Chairman, Committee on Interior and Insular Affairs,
Senate Office Building, Washington, D.C.

DEAR SENATOR JACKSON: I wish to go on record as opposing any further construction of coal fired power plants, and accompanying transmission lines and strip mines in the southwest.

I want to demand development of environmentally safe alternative for rational use and production of electric energy. Utility profits should alter the problem through research rather than magnifying it with increased advertising.

Also I want to require banning construction of all fossil-fueled power plants.

Respectfully,

JAN STORSAND.

FLAGSTAFF, ARIZ., May 19, 1971.

Senator HENRY JACKSON,
U.S. Senate,
Washington, D.C.

DEAR SENATOR JACKSON: My husband and I moved to Flagstaff from Los Angeles and are well aware of the environmental consequences of uncontrolled industry.

We urge you to consider the environmental pollution and cultural destruction which will result from the proposed Black Mesa Power Plants and strip-mining in the southwest.

We request that you work for an injunction against further construction and mining operations, and ask that you aid the consideration of less ecologically dangerous power sources.

Thank you for your consideration and help in this important matter.

Sincerely,

LAURA VAN GORDER.
 JOEL VAN GORDER.

PHOENIX, ARIZ., May 20, 1971.

Hon. HENRY JACKSON,
Chairman, Interior and Insular Affairs Committee,
U.S. Senate, Washington, D.C.

SENATOR JACKSON AND MEMBERS OF THE COMMITTEE: Environmental impact studies including alternative methods of power generation are vital before any further fossil-fuel burning power plants are authorized. The situation relative

to the proposed plants near Four Corners is obscured by lack of complete public information. There are certainly grave implications in adding any further load to the environmental pollution, particularly the invasive, persistent, respirable smaller particles. This is only one area of impact causing concern. Further, it has not been established that the health of the nation must be further jeopardized in this way.

There are many other unanswered questions today on environmental impact and on possible alternative solutions to the need for electrical power.

The potential for possible use of geothermal energy has not been completely established, although it looks promising. Another possible alternative lies in trying to capture the thermal energy from atomic "wastes" which are reported to cause serious problems. Use of a closed freon-type generating system should be explored to use the heat from atomic "waste" instead of wasting it. Finally, what is the status of efforts toward gasification of coal?

Studies in at least these three areas of alternative technology should be completed prior to any further authorization for power plants. We may not need further fossil-fueled plants such as are proposed for Four Corners. If they are needed, perhaps they should be constructed for use of gasified coal. We must not proceed blindly any further down traditional roads at this time. Unless the facts are established prior to further building, industry may face major losses through building plants the country cannot allow to be used.

To gain time for a reasonable, intelligent approach to the overall power production problem, industry and citizens should be encouraged to cut back voluntarily on use of electricity. Certainly advertising designed to increase the use of electricity should be curtailed. A heavy tax on advertising and an end to low rates for industry could be used to provide incentive.

We are firmly against the authorization of any further fossil-fueled power plants until the environmental impact studies and studies of alternatives are completed, published, advertised, distributed, and time allowed for public study. Then we should have another public hearing where both the government and the people would have enough information to proceed with the democratic setting of public policy toward the generation of electrical power.

Yours truly,

BARBARA P. KERB.

TEMPE, ARIZ., May 7, 1971.

HON. HENRY M. JACKSON,
Chairman, Senate Committee on Interior and Insular Affairs,
Washington, D.C.

DEAR SIR: The people of the midwest and eastern areas of the U.S. harbor a myth that keeps them believing that "The Great Southwest" is still a land unspoiled, unpolluted, and empty. Having lived in the Phoenix area for nearly a year, and having seen the mountains surrounding "The Valley of the Sun" completely obscured by air pollution Gary, Indiana would be proud of, I can say that this myth is a gross error.

Therefore it is with great concern that I am witnessing the further despoilation of this area through the construction of coal-burning plants in the Four Corners region.

Ironically, just as the eastern states are sorrowfully learning the error of permitting strip mining and the burning of fossil fuels to go unchecked, the southwestern states seem determined to repeat these same mistakes for themselves.

However I believe that the effects of strip mining on the desert ecosystem may be even more damaging than these effects were on areas such as Appalachia. The scarcity of the regenerating elements of rainfall and fast-growing greenery make it all the more difficult for the fragile desert to heal its own scars.

In view of the many harmful effects such installations would create, and considering the relative inefficiency and near-obsolence of this method of power-generation, I believe that further construction of coal-burning plants in this area would be a great mistake.

Sincerely,

MARCIA VERA STUCKI.

ARIZONANS IN DEFENSE OF THE ENVIRONMENT, INC. (AIDE, INC.),
Tempe, Ariz., May 24, 1971.

HON. HENRY JACKSON,
Chairman, U.S. Senate Interior Committee,
Washington, D.C.

DEAR SENATOR JACKSON: Before further construction of fossil-fueled power plants in the Southwest is permitted to proceed, we ask that the following items be considered:

A. Alternative methods of generating electricity must be thoroughly investigated.

We agree with Arizona Senator Paul Fannin that, for instance, the possible use of geothermal energy to generate electricity deserves serious investigation. Some studies seem to indicate that use of steam turbines in this respect may be impractical because geothermal steam is not of sufficient quality. If this is the case, the possibility of using a Rankine-cycle type engine as an alternative should be carefully considered. This application of Rankine type engines is currently under study by Wallace Minto of Kinetics Corporation, Sarasota, Florida. We wish to emphasize that, in comparison to fossil-fueled plants, the use of geothermal energy for generating electricity would have the following advantages:

1. *No fuel costs.* This suggests that electricity derived from geothermal energy could be cheaper than that generated from fossil fuel. This becomes especially important in view of the often repeated claim of various power industries that millions of dollars must be invested to minimize environmental pollution from fossil-fueled plants, and that (as they claim) this increased cost must be passed on to the consumer.

2. *Minimal Environmental Damage,* far less than from fossil-fueled plants. As a case in point, the claim is made that the release of oxides of nitrogen cannot be avoided from fossil-fueled plants. There would be no such byproduct from geothermal sources.

3. *Potentially the use of superheated water or geothermal steam could augment, rather than diminish, the water supply in the Southwest.* In this regard it may be desirable to use solar stills to increase the yield of high quality water—a byproduct almost as valuable, in arid lands, as the electricity itself.

B. Our organization is aware that the May 28 hearing was expanded to a full day. Nevertheless, many persons and groups (including Arizonans in Defense of the Environment, Inc.) wishing to present statements have been denied the time to make an oral presentation, because of the previously filled schedule. We therefore request that additional hearings be scheduled.

The many persons and organizations interested in presenting statements should be able to do so in a central location, rather than having to travel to a peripheral location such as Page. We therefore request that additional hearings be held in Phoenix and/or Tucson. We wish to point out that Phoenix is no further from some of the proposed plants than is Salt Lake City.

C. The problem of air pollution is not a state, regional or even national problem. Rather, it is worldwide. (Regarding this, there is an excellent article in the January, 1971, issue of SCIENTIFIC AMERICAN.)

In order to portray the enormity of the loads of contaminants which these plants are putting, and which projected plants would put, into the air, we quote the following from the April 1971 bulletin of New Mexico Citizens for Clean Air and Water.

"At present, power plants of the Colorado Plateau emit about 350 tons of particulate matter each day. For comparison, Los Angeles produces 110 tons per day, and New York City 140 tons on an average summer day. Present regulations should reduce this emission figure to 240 tons per day in a few years, providing no variances are granted. The proposed six power plants will emit 2,160 tons of sulfur dioxide per day—more than Chicago (1,920) or New York City (1,077), and several times Los Angeles (225)—if the utilities continue with their present plans to use no emission controls for sulfur dioxide. Also, the six plants will produce oxides of nitrogen ranging between 850 and 1,300 tons per day. An exact figure cannot be projected because these gases combine in variable amounts. For comparison, in 1968, the whole Los Angeles area produced only 950 tons per day, with automobiles contributing 695 tons per day. Los Angeles considers its problem with nitrogen oxides so severe that it has banned any further construction of large fossil-fuel power plants. Plants burning natural gas produce oxides of nitrogen as significant pollutants, although this contaminant is produced in quantities only half as large as those from burning coal."

In view of the above, we ask a moratorium on the construction of fossil-fueled plants in the Southwestern United States until such time as: (1) an environmental impact study has been completed; (2) the availability of the completed study, in printed form, has been widely publicized for at least 90 days; (3) a public hearing is held; and (4) the same steps (1 through 3) are effected for alternative modes of generating electricity, these modes to include the use of geothermal energy.

D. We wish to make it very clear that AIDE, Inc., is fully cognizant of the urgent need for production of ever-increasing amounts of electrical power. The issue is not whether additional energy will be generated, but rather the mode of generation and transmission of these increased amounts. We feel that the plea of various suppliers of electricity that they are hard-pressed to meet the ever increasing demand would have more credibility if their advertising were used to urge conservation of electrical power, rather than to stimulate the very demand of which the suppliers complain.

E. Finally, after alternative methods have been investigated, and the need for additional uses studied, if there then remains no alternative but more coal-fired plants, we urge absolute candor concerning what is technically feasible to control pollution. Investigations by *Research Cottrell* indicate that electrostatic precipitators placed between the combustion chambers and the heat exchangers ("hot" precipitators) DO PERFORM EFFICIENTLY on coal with a sulfur content of less than 1%. We note further that Monsanto is prepared to guarantee recovery of "100%" (over 99.9%) of particulate emissions in the so-called "Monsanto Process". Maximum recovery of particulates is especially important since the last few tenths of the particulate contaminants consist of submicron particles, and these are the ones which can bypass mucus protection and damage lung tissue. The seriousness of this property of the submicron particle is heightened by their very long residence times in the atmosphere—perhaps weeks or months, rather than minutes or hours as for larger particles.

Thank you for this opportunity to present a written statement for the official record.

Sincerely yours,

SHERRY COLE, *Secretary.*

STATEMENT OF ANN E. COLBY, PHOENIX, ARIZ.

Senator Jackson, Members of the Interior and Insular Affairs Committee, gentlemen: I hope we can agree that we as a people are inclined to champion "causes". Sometimes our ardor in promoting our "cause" leads us to completely lose our perspective. Perhaps this is part of the present problem.

It was only a couple of years ago that a serious effort was made to bring power to the Southwest via a couple of dams to be built on the Colorado river, below Page. In spite of the fact that this would have been fairly clean power, the idea was bitterly fought down on the theory that the beauty of the Grand Canyon would be spoiled. This theory was never really proved, and in my mind, this was a case of zealousness over-shadowing the objective.

I am not, nor have I ever been, employed by a power company, and own no stock in any of the participating companies. I lived on the East coast prior to coming to Arizona to live. Even twenty-five years ago, insufficient power was a problem in the East. The problem has grown considerably over the years, with no solution in sight. Had the power companies made adequate plans for growth, and had they been able to implement the plans they made, I am sure much of this could have been avoided. Since coming to Arizona to live twenty-five years ago, when Arizona and Phoenix in particular, were little more than desert areas whose chief claim to fame was the extreme heat, and having seen the area grow into a thriving and beautiful part of the Southwest, I am truly concerned about the future.

Arizona cannot continue to grow without additional power. It would seem to me that the power companies, instead of being criticized, should be commended for their foresight and planning. People continue to pour into Arizona to live. Surely these people are entitled to power for their homes, their hospitals, and their places of business. Surely the home-maker, whose work is unending, is entitled to power so that she can use the appliances that make her tasks easier. I suspect the static would be tremendous if she were asked to return to the boil and wring method of doing her family laundry to save power.

No one is more concerned about pollution than I am, gentlemen. I want to see our air kept clean and clear, our mountains kept sharp and beautiful, so that future generations can enjoy the beauty that is Arizona. I believe the people of the power companies want the same thing. They breathe the same air and enjoy the same beauty that I do, and they have the same concern for their children and grand-children. These are the same people who have allocated almost a fourth of the proposed investment to protecting the environment, using all the latest control devices. Surely we can give them an opportunity to prove that they will do as they say. Delays are costly and too often result in too little being done too late. This the Southwest cannot afford.

I would suggest that the time has come to be reasonable. We need to take a calm look at what is necessary to the health and welfare of the *majority* of the people who live in the Southwest. I do not wish the families who live in the Southwest for reasons of health of one member of the family, and the thousands of us who live here because we love it, to suffer because the power companies were not permitted to expand so that the needed power could be furnished. The time has come for a consideration of priorities, bearing in mind that power is an essential and necessary part of growth. Let us not allow our zealotry in promoting a "cause" to cloud our clear thinking.

I am grateful to you, gentlemen, for permitting me to express my opinions, and I thank you for courtesy.

Mrs. ALBERT B. COLBY.

CONTINENTAL HOMES, INC.,
Phoenix, Ariz., May 25, 1971.

HON. HENRY M. JACKSON,
Chairman, Interior and Insular Affairs Committee,
U.S. Senate, Washington, D.C.

DEAR SENATOR JACKSON: As the president of a major home building firm in the Metropolitan Phoenix area, I wish to make a statement relative to a Hearing on the Navajo Project. I understand that the Interior and Insular Affairs Committee will hear testimony at Page, Arizona on May 28. Although I do not wish to personally testify, I do request that this letter be included in the record of the Hearing.

My firm, Continental Homes, Inc., built 1,070 total-electric units in 1970 and will increase this total by approximately 500 this year. Looking to the future, Continental Homes plans 10,000 new units in the next five years.

These new homes will require abundant and reliable supplies of electricity, especially for air conditioning during the extremely hot summers so typical of Arizona.

As I think about the published reports on attempts to delay construction of the Navajo Project, it becomes apparent that any shortage of power in the future will be detrimental to Continental Homes, the businesses of fellow builders, the various construction workers and subcontractors, families who have a large investment in their total-electric homes, and the thousands of newcomers and Arizonans who wish to buy new homes. A shortage of power would be an economic disaster to home builders.

The utilities of Arizona have been very conscientious about their public responsibility to provide power. I am sure that they will be equally conscientious about protecting the environment. I am certain a reasonable solution to the problem of providing power along with doing the least possible damage to the environment can be worked out at the Navajo Project.

Sincerely,

G. L. PENNINGTON, *President.*

TUCSON, ARIZ., June 3, 1971.

HON. HENRY M. JACKSON,
Chairman, Senate Committee on Interior and Insular Affairs,
U.S. Senate, Washington, D.C.

DEAR SENATOR JACKSON: If possible, I would like this letter to be included in the record of the Hearings.

The United States indeed has an energy shortage. Our life style has allowed us to use our mass media to convince ourselves that we need countless electrical gadgets, every one of which itself requires great amounts of electrical energy to manufacture. We are therefore on the verge of turning the country's last nearly unspoiled region into an industrial wasteland. We are sacrificing this symbol of our country's vastness, rather than rethinking our national goals and re-ordering our priorities.

One cannot deny that nature has stored large amounts of energy in the Four Corners area. But, as a physicist, I cannot deny the fact that the laws of thermodynamics require changes in the environment to get this energy. Our limited technology (and more importantly, our economic structure) makes these environmental changes far more harsh than need be.

I do not oppose the use of natural resources. I do oppose our present method of obtaining them, a method which bears a striking resemblance to the fairy tale of the Goose That Laid the Golden Egg. We need far more studies on the effects of these large scale projects. Our R and D budget for such studies is pitifully small.

A moratorium on plant construction and operation in this area is in order until the definitive studies have been made. The export of energy from this region is certainly not justified when other (admittedly less economical) means are available.

We of the Southwest are being asked to sacrifice our most renowned and precious assets—clean air, blue skies, vast open spaces—for a few more neon signs, air conditioners, and bric-a-brac manufacturing plants in LA.

If need be, lets go back to rationing until we get our thinking in order and see the road ahead. The situation is serious enough to warrant such drastic action. At the very least, we should postpone the construction of any more power plants in this area and the existing ones shut down or at least make to conform to strict air and water quality standards.

Sincerely,

ROY T. EMBICK.

STATEMENT OF COMMITTEE ON THE POPULATION EXPLOSION, GRAND CANYON, ARIZ.

The Committee On the Population Explosion is strongly opposed to the construction of thermal powerplants in the desert areas of the Pacific Southwest. To avoid serious power shortages, we suggest population and demand regulation.

The proposed network of thermal powerplants in the Southwestern United States again calls attention to the need for some basic decisions. We are faced with a choice between the present upward spiral of living standards which make a few people wealthier and no one very happy, and a decreasingly consumptive life style more in keeping with the Laws of Nature.

The authors of *Draft of Environmental Statement Navajo Project* would have us believe that the Navajo Plant is necessary to fill projected public demand. Specifically, they say:

"The utilities serving the Southwest have forecast a critical power shortage in the region within the next five years, based on their projection of population growth and energy demand, unless immediate steps are taken to greatly increase generating and transmission line capacity."

We feel that while such foresight on the part of public servants is laudable, it would be more appropriate to expend some time and money on the problem of demand regulation and control of population growth. It might also be desirable to heavily fund research in plasma physics in the hope of developing a safe fusion reactor to replace present fossil fuel and hydroelectric generators.

We are strongly opposed to the 'development' of desert areas, whether it be the expansion of cities or the building of power generating stations. The fragile desert ecosystem features extremely low biological productivity such that any damage persists for years. This is not simply a matter of human aesthetics but of ecological incursion. In a land of great aridity it seems particularly ill-advised to locate industrial operations which require large amounts of water.

The builders of Glen Canyon Dam used as a selling point the scenic and recreational values of Lake Powell, in spite of the priceless beauty sacrificed. We question the right of the Bureau of Reclamation and the public utilities to encroach upon even these values with the Navajo and Kaiparowits plants. The encroachment is not limited to the physical presence of the generating stations. It includes the enormous amounts of air pollutants the plants will emit even after treatment, the degradation of cooling water through evaporation and concentration of salts and the construction of an elaborate array of ancillary facilities. The encroachment also includes the desecration through strip mining operations of Hopi ancestral lands—lands belonging to a people who have been assiduous ecologists for many generations. We find this wholesale destructiveness in the name of the 'needs' of the people to be unacceptable.

We feel the conventional alternatives for electric power production to be equally unacceptable. Present nuclear fission powerplants waste sixty percent

more energy than fossil fuel plants, emit radioactive isotopes and create thermal pollution. Safe standards for the control of potential mutagens, threatening the future quality of the human species, are lacking. Hydroelectric dams with evaporation losses in the backed up water worth more than the power generated, the increased salinity of remaining water, their effect upon river flow with disturbance to plant and animal communities and their lack of aesthetic value are unacceptable. In the case of the Grand Canyon region, further dam building would accelerate the already irreparable damage in process for several endangered species of fish and mammals as well as inundating miles of canyon lands.

A more realistic approach to the power generation problem appears to be the selection of the least deleterious solution: producing no power beyond the capacity of existing facilities. Consumption should be discouraged through education rather than the present practices of utilities organizations such as Arizona Public Service Company who actively engage in 'hard sell' advertising to increase demands for something they can't deliver without great environmental cost. Greater awareness of the price of electricity could assist in checking unlimited population growth, and industry could stop foisting electrical toys and gadgets on the consumer. Las Vegas could initiate the campaign for more responsible living by turning off a few lights.

The facts seem to indicate that a simplification of living standards is now highly desirable and in the future will be essential. The people of the United States, constituting six percent of the world's population, but consuming forty percent of the world's resources, are not going to be able to sustain the current life style much longer. To avoid widespread disruption of human societies it is necessary now to place technology back in the context of its cultural development. It is undemocratic and short sighted to allow our lives to be dominated and directed by the public utilities.

ARIZONA ASSOCIATION OF MANUFACTURERS,
Phoenix, Ariz., May 20, 1971.

Hon. HENRY M. JACKSON,
Chairman, Interior and Insular Affairs Committee,
U.S. Senate, Washington, D.C.

DEAR SENATOR JACKSON: Please be advised that the following resolution was unanimously adopted by the Board of Directors of the Arizona Association of Manufacturers at a special meeting of the Board held May 20, 1971, in Phoenix, Arizona.

Whereas the Arizona Association of Manufacturers represents 154 of the major employers throughout the state of Arizona; and

Whereas these employers have on their payroll, 75,000 employees; and

Whereas these companies and their employees are dependent upon a steady, dependable, adequate supply of electric energy; and

Whereas a power shortage in the future would seriously impair the ability of these employers to continue to operate; that the state, the nation and members of this association cannot stand the jolt of a power shortage; and

Whereas this Association has confidence in the progress of technology, and in the utility industries commitment to conquer the pollution problem; that delays of new steam generation facilities is not the answer to the pollution crisis; that electricity is needed to improve the environment: Now, therefore be it

Resolved, That the power projects under consideration by the Senate Committee on Interior and Insular Affairs be permitted to proceed as scheduled, recognizing of course that they must be constructed within appropriate environmental standards and regulations.

Sincerely yours,

GORDON MARSHALL, *President.*

SOUTHERN ARIZONA HIKING CLUB,
Tucson, Ariz., June 1, 1971.

Hon. HENRY M. JACKSON,
Chairman, Senate Committee on Interior and Insular Affairs,
U.S. Senate, Washington, D.C.

DEAR SENATOR JACKSON: We of the Southern Arizona Hiking Club propose that a moratorium on building of power plants in the Four Corners area be declared until the true need for power can be established and until adequate pollution controls can be designed for any that must be built.

To carry on strip mining operations and do irreparable damage to the land, to once more force Indians from their lands, to use water for cooling in power plants in one of the most water-short areas in the country, to end clear skies with pollutants in the scenic Southwest, and to mar the vistas with miles and miles of transmission lines are reasons enough not to build power plants that are intended mainly for exporting power to Los Angeles, California.

Please make this letter a part of the Senate hearings on thermal power plant construction in the desert areas of the Pacific Southwest.

Sincerely yours,

LEROY H. ZIMMERMAN,
Chairman, Conservation Committee.

STATEMENT OF THE ARIZONA WILDLIFE FEDERATION

Mr. Chairman, my name is Tim Griffith and I am Chairman of the Environmental Quality Committee of the Arizona Wildlife Federation, a State affiliate of the National Wildlife Federation. The Arizona Wildlife Federation is comprised of thirty-five (35) State Affiliate clubs, representing approximately 5,000 Sportsmen-conservationists in the State of Arizona.

The following comments were drafted for the purpose of expressing publically the sentiment most commonly voiced by the members of the Arizona Wildlife Federation, concerning the subject of power development in the southwest. They admittedly represent a biased point of view. Indeed, a primary purpose of the Arizona Wildlife Federation dictates that it should oppose any development regardless of its origin or purpose, which disrupts the natural environment to the point that the already tragically depleted fish and wildlife resources of this country are further pushed towards the brink of extinction.

The organization is, on the other hand, composed of reasonable men, who individually and collectively wish to contribute to, rather than impede the continuing development of our society. It is sufficient to say that these two motivating forces too often appear to be in conflict. The following statements attempt to demonstrate that this organization will continue to make an effort to achieve its primary purpose, the preservation of wildlife for the enjoyment of all, and at the same time fulfill its obligation to live realistically in and with a developing social structure.

For the most part, comments of a technical nature have been avoided since they would only duplicate testimony already offered and because the organization represented does not have available the staff or facilities to carry out the necessary research. With this limit in mind, the following concerns are voiced:

1. Fossil fuel fired generating facilities are at best only a temporary solution to the purported demands for electrical energy.
2. The geographic areas adversely affected by the construction and operation of these facilities will receive the smaller share of power available to the general consumer.
3. Physical damage to the ecology appears to be considerably more lasting than the benefits derived.

FOSSIL FUEL GENERATING FACILITIES

Since this type of generating facility requires the use of an expendable power source not replenishable within practical time limits, the term "*planned obsolescence*" is adequately descriptive. As a matter of record, the projected economic life of the Mohave and Navajo plants is reported to be thirty-five years.¹ The question raised is whether the country can indeed afford to continue to depend on temporary solutions to permanent problems or whether it would be eminently more desirable to utilize the advertising budgets, for example, (which generate artificial demand for the product in question) to finance research directed toward finding a more lasting solution.

¹ Page 68, "Status Report Environmental Planning for the Navajo Generating Station", prepared by Bechtel Corporation for Arizona Public Service, L. A. Department of Water, Power and Gas, and Salt River Project.

GEOGRAPHY AND POWER

Those construction sites which have been selected are concentrated in such a way that, when considering environmental impact, it is necessary to review their capacity for water and air pollution cumulatively rather than as separate entities. If, for example, the 250 tons of particulate matter presently emitted each day by one plant (the Four Corners Plant) is multiplied by six, the sheer quantity involved represents a questionable addition to the existing problems of atmosphere and soil stability in the surrounding areas. Consider the chemical components of this particulate matter and the necessity to exercise extreme caution becomes obvious. The question raised is whether the people affected directly should be expected to run the known and unknown risks involved in living with one's environment instead of being able to live in it.

Although the projected quantity of water to be used seems small when standing on a bluff overlooking Lake Powell, the 102,000 acre feet of water which could be consumed each year by the projected Kaiparowits Plant is adequate to serve the personal needs of all the people living in the State of Arizona for one year. Couple the consumption of water with the salinity problem of the remaining supply, which cannot help but be aggravated by facilities of this nature, and the question is raised as to whether it is worth it to possibly sacrifice one resource to gain another.

THE LASTING EFFECT OF PHYSICAL DAMAGE

Probably the most emotional point of the issue is the method by which fossil fuel will be obtained for at least two of the facilities. This organization does not feel it has the right to speak for the people living in the areas to be "strip mined", but it does feel that a rather strong sentiment should be expressed. Although the companies involved have, in good faith, entered into agreements to reclaim the land altered by stripping, there has been too little documentation of the success of such programs, particularly in areas with similar soil structures. The question here raised is: Are the values gained from the resulting power production worth the gamble that reclamation will work?

To summarize: It would be unrealistic to deny need for additional electrical energy. It would be unfair to be totally critical of the utilities, for in fact they have in many instances spent time, effort and money to clean up an operation which is, by nature, unbelievably dirty. (This individual claims the privilege of expert testimony on the above point, having lived the first twenty-five years of his life in the Monongahela and Ohio River Valleys of southwestern Pennsylvania and West Virginia.)

On the other hand, to ignore the dangers inherent to, and the real damage done by fossil fuel fired generating plants is just as unrealistic and unfair. It therefore seems appropriate to go on record as saying that:

1. Methods of power generating immeasurably more acceptable than those under consideration should be proven totally impossible before facilities of this nature are constructed, and

2. The population most affected should be the final authority to decide whether facilities of this nature are built in the future.

These two concerns will represent the minimum acceptable standard this organization will support.

Thank you for the opportunity of presenting this statement of position on behalf of the Arizona Wildlife Federation.

VALLEY OF THE SUN ELECTRIC LEAGUE,
Phoenix, Ariz., May 14, 1971.

HON. HENRY M. JACKSON,
Chairman, Interior and Insular Affairs Committee,
Washington, D.C.

DEAR SENATOR JACKSON: We respectfully submit the following information that we believe is vital to the Southwestern desert area that should concern your committee in its hearings to be held in the Four Corners area within the next few days.

The Valley of the Sun Electric League is an association of all segments of the electrical industry and its trade allies in central Arizona—joined together to conduct advertising, sales and educational programs focusing on the intelligent,

conservative use of electrical energy. Our organization is the spokesman for—electrical supply distributors, electrical contractors, manufacturers' representatives, electrical engineers, comfort conditioning dealers and distributors, appliance dealers and distributors, and many who service these products. The great majority of our members are small businessmen who will personally be affected by any cutback in the electrical energy supply in our area. We are talking about some 300 firms and in excess of 7,500 families whose livelihood depends on adequate electrical power.

In the desert area of Arizona we find the home and office environment as important as any other area of the environment. History will show you that no substantial development came in this area until electrical energy was readily available.

We suggest that your committee seriously consider the environmental and economic effect of the need for electrical energy in the Southwestern desert area. Personally, I can say, in the many years I've spent in this industry I know of no area where the utility industry has shown more interest, or spent more money, to solve the environmental and ecological problems we all face today.

Hopefully, you will realize that any decisions made by your committee are not decisions affecting only the utility industry but many more people whose livelihood rests on a dependable supply of electrical energy.

Electrically yours,

R. N. RUECKER,
CAE Executive Director.

HOME BUILDERS ASSOCIATION OF CENTRAL ARIZONA,
Phoenix, Ariz., May 21, 1971.

HON. HENRY M. JACKSON,
Chairman, Interior and Insular Affairs Committee,
U.S. Senate,
Washington, D.C.

DEAR SENATOR JACKSON: Hearings starting May 24th are being held, gathering detailed information about electrical power production and environmental protection on the Colorado Plateau. As a result of these hearings, we ask that this letter be a part of the record.

The home building industry in the Phoenix metropolitan area is growing at a fantastic rate. Over 20,000 residential units were completed in 1970 and in 1971, the industry is running approximately 25% ahead of last year. Researchers predict that building will stay at a high level for the next 5 to 10 years. This means that many new families are coming to Arizona to live and the need for electrical power is increasing rapidly and the local power companies are being overloaded in keeping up with the demands. Increased electrical power production is the only answer.

This Home Builders Association representing 85% of your building volume in the Phoenix area urges that this future demand for electrical power be given consideration in formulating your decision.

Respectfully yours,

RICHARD E. METTLER,
Executive Vice President.

TUCSON, ARIZ., June 19, 1971.

HON. HENRY M. JACKSON,
Chairman, Committee on Interior and Insular Affairs,
U.S. Senate,
Washington, D.C.

DEAR SENATOR JACKSON: I am writing to express my feelings regarding the Four Corners Power Plant controversy. I believe, after having visited this area several times recently, that anything that needs to be done to stop the building of these plants, should be done.

This area should be protected at any cost from twentieth century man. Surely, the Four Corners area is more valuable to our country in its present state, than it would be turned into a polluted area as bad as or worse than Los Angeles and New York. I, for one, have lived in the Chicago area with its high pollution level many years, and, only now know the value of unpolluted air. That people, no matter who they are or what their reasons, would want to turn

the Four Corners into a mess like any of the above mentioned cities, is, in my mind, unthinkable and unforgivable.

Why cannot other methods of power generating be explored? Geothermal power is a readily accessible and a relatively unexplored area. We owe it to ourselves to explore new ideas rather than to take the easiest, but certainly not the best, way out.

Another point to consider is the health factor involved. It is common knowledge that the American Indian has a significantly higher rate of lung disease than the white American population. To put these power plants on or in close proximity of their reservations is the same as willfully inflicting ill-health and death on America's native citizens. This aspect alone should be enough to stop all building; however, when it is joined by other equally important reasons, it appears to be utter folly to even consider continuing the project.

Even though some Indians may be in favor of the plant construction, a significant amount of them (as is indicated by the number of lawsuits filed against the southwest power plants by Indians) indicates that the Indians were not represented fully when the decisions regarding the construction of the plants were made.

These are my primary reasons for urging you to cease immediately the operation and construction of all fossil-fueled power plants in the southwest.

Sincerely yours,

CHRISTINE LEE OLER.

NORTHERN ARIZONA UNIVERSITY,
Flagstaff, Ariz., May 22, 1971.

Hon. HENRY M. JACKSON,
Chairman, Interior and Insular Affairs Committee,
U.S. Senate, Washington, D.C.

DEAR SENATOR JACKSON: We understand from news accounts in local papers that a hearing is being held during the week of May 24th concerning electric power projects in the western United States.

All of us recognize the need for proper and adequate environmental controls. And here in Arizona, which is one of the fastest growing areas of the country, we recognize equally the great need for adequate supplies of electric energy.

At Northern Arizona University, we have 9,000 students and 1,100 employees. Our institution, our students and our employees need electric energy, not only in the educational process for which we have a responsibility but also in all aspects of their lives.

Arizona needs the expertise of the utility companies to develop power from our natural resources to meet the needs of a growing state. At the same time, we believe in the use of modern technology in protecting the environment. We believe these two objectives are not incompatible and are essential. Based on past experience, we believe that Arizona Public Service Company will meet its commitments to solve the emission problems at their generating stations.

We are hopeful, therefore, that you will give the Arizona Public Service Company the direction to move ahead to develop power, with the stipulation that the environment is an important resource for the people of the Southwest. I am confident that Arizona Public Service has the expertise to meet the above objectives.

Sincerely,

J. LAWRENCE WALKUP, *President.*

TEMPE, ARIZ., May 25, 1971.

Hon. HENRY JACKSON,
Chairman, Senate Interior Committee,
Washington, D.C.:

Please make this part of official hearing record at Page, May 28, 1971. Power brownout or even blackout preferable to smogout such as already threatens Salt River Valley. Let's not do the same to air over Grand Canyon. Please support New Mexico Governor and Senator in urging moratorium on powerplant building until environmental protection completely certain. We appreciate air-conditioning and electric lights but dirty air is too high a price to pay even for them, especially if most power goes to California.

Mr. and Mrs. L. E. COLE.

TEMPE, ARIZ., May 25, 1971.

Senator HENRY JACKSON,
Chairman, Senate Interior Committee,
Washington, D.C.:

For record of powerplant hearing at Page, Ariz. Moratorium on further powerplant construction needed until clean air can be guaranteed. Senator Montoya and Governor King of New Mexico deserve praise for putting health of their citizens first. We hope Arizona officials will do no less.

Mrs. M. O. WILSON.

PHOENIX, ARIZ., May 26, 1971.

HENRY M. JACKSON,
U.S. Senate, Washington, D.C.:

For record in Page power plant hearing we endorse moratorium proposed by Senator Montoya and Governor King protection of health and safety of vast numbers of people is of primary importance.

Mr. and Mrs. TOM WADE.

PHOENIX, ARIZ., May 25, 1971.

Senator HENRY M. JACKSON,
Washington, D.C.:

For the record, Page, Arizona power plant hearing. I support Senator Montoya and Governor King of New Mexico. A moratorium should be imposed until technology can protect an optimal environment. Protection of human health must receive first priority. Alternative ways of generating electricity must be investigated. Public officials who are less emphatic about protecting the environment do not represent my views.

DAVID W. ADLER.

PHOENIX, ARIZ., May 26, 1971.

Senator HENRY M. JACKSON,
Chairman, Senate Interior Committee,
Senate Building, Washington, D.C.:

For the record of the Page Arizona hearings on power plants I support views of Senator Joseph Montoya and Governor Bruce King. Trust that moratorium will be sustained until impact studies are made and public hearings held concerning these studies.

HARRIET MCINTOSH.

BAGDAD COPPER CORPORATION,
Bagdad, Ariz., May 21, 1971.

HON. HENRY M. JACKSON,
Chairman, Interior and Insular Affairs Committee,
U.S. Senate, Washington, D.C.

DEAR SENATOR JACKSON: Permit me to briefly describe our operations here at Bagdad, Arizona. The Bagdad Copper Corporation operates a medium sized copper mine, producing on the order of 18,000 tons of copper annually. About 520 employees are engaged to achieve this production. Our employees reside in Bagdad, which is isolated insofar as urban centers are concerned.

Our power, which is most important to us, is being furnished by Arizona Public Service Company. Currently we are using about 11,000 kilowatts. Any reduction here would surely be most serious.

Furthermore, we are presently making plans to increase the capacity of our concentrator four-fold at a capital cost of approximately fifty million dollars.

We are depending on the Arizona Public Service Company to furnish us with the additional power required to make this project possible. The proposed expansion would require an additional 21,000 kilowatts.

It is felt that failure to proceed with this project would result in a negative effect on the economy and our company.

We have every reason to believe that the Arizona Public Service Company will put forth its serious endeavors to protect our environment as swiftly as technology permits. Your earnest consideration of any potential problem we may be facing is solicited.

Sincerely yours,

GEORGE W. COLVILLE,
Executive Vice President.

MESA, ARIZ., May 19, 1971.

HON. HENRY M. JACKSON,
Chairman, Senate Committee on Interior and Insular Affairs, U.S. Senate, Washington, D.C.

DEAR SIR: The Four Corners Area is unique in the following respects. It is one of the more pollution free areas of the United States. It is of incomparable scenic value containing twenty National Parks and Monuments and will, in the years to come, become one of the great recreational areas of the country.

The existing and proposed power plants and coal strip-mining operations would permanently degrade the area in several ways. Marked air pollution would result if plants obeyed present emission standards, strip-mining would permanently scar the landscape and use of already scarce water supplies would alter vegetation over wide areas.

A large part of the power produced will be for Southern California, an area which has prohibited generator facilities of this type proposed for the Four Corners Area through pollution standards. In effect, it is proposed to turn the last unpolluted and most scenic area of the United States into a dumping ground for power generator pollutants for the reason that this is the last area where such a practice is not prohibited.

For the above reasons, I would like to register my opposition to any further generator plant construction and request that the strictest emission standards be applied to the existing facilities. I also feel that strip-mining operations should cease and that impetus be given to research into alternate methods of power production.

Sincerely,

ROBERT F. GREEN, M.D.

PHOENIX, ARIZ., May 23, 1971.

HON. HENRY M. JACKSON,
Chairman, Interior and Insular Affairs Committee, New Senate Office Building, Washington, D.C.

DEAR SENATOR JACKSON: I missed you the other night in Phoenix. But I hope you had an opportunity to pick up from the people here our very real concern about our environment.

It is certainly time to put the interests of all the people over and above those of any specific industry. No longer can we say "What's good for GM or GE (or any corporation you want to name) is good for the country." In fact, it's just the opposite, and it is time management at the highest levels developed a sense of social and moral responsibility—for what they do affects all of us, and will affect materially life itself in a very few years.

I think we should take time to assess the full impact of any additional power plant construction in the Southwest. Let's slow the build-advertise-sell syndrome and see what can be done to diminish the demand for power. And what about the possibility of geothermal power production?

Give our young people a chance. Call them in; see their very real concern. Most are not bent on violence and destruction—but they are upset, discouraged, and filled with a sense of futility. We need their ideas, enthusiasm, and energy. I ask you to make a special point of reaching out to the young people in this whole discussion. They are our kids, you know.

Your consideration will be appreciated, and please include my comments as part of the hearing record of your Committee.

Sincerely yours,

AUDREY E. KASLO
 Mrs. Max Kaslo.

MESA, ARIZ., April 23, 1971.

HON. HENRY M. JACKSON,
Chairman, U.S. Senate, Interior and Insular Affairs Committee, Washington, D.C.

DEAR SENATOR JACKSON: This letter is written to support the proposal of Senator Joseph Montoya (N. Mex.) for a power plant construction moratorium until environmental protection is proven accurate. I emphatically support Sen. Montoya's stand that environmental protection is the number one consideration, and must be given precedence over other considerations.

Specifically 1.) Alternatives to fossil fuel generation (and especially geothermal generation of electricity) must be comprehensively investigated as to environmental desirability and technological feasibility. 2.) At the very least, gasification

of coal should be employed (rather than direct coal combustion), since gasification is not as severe in air contaminant emissions.

I request verification that this letter and the enclosed clipping from the May 16, 1971 *Arizona Republic* (newspaper) have been made a portion of the official record of the Page hearing.

Respectfully yours,

HARRY L. TATE.

[From Arizona Republic, May 16, 1971]

FTC UNDERTAKING PROBE OF OIL, ELECTRIC MERGERS

WASHINGTON.—The Federal Trade Commission has begun a study of longstanding allegations that mergers among the nation's leading energy producers are being used to reduce competition, raise prices and increase profits unjustifiably.

The FTC told key Senate committee chairman late last week it has completed preliminary planning and launched an investigation into concentration among corporate producers of oil, natural gas, coal and electricity which will last at least two years and absorb much of the commission's staff and time.

The FTC chairman, Miles W. Kirkpatrick, said the investigation will include specifically an analysis of the effects of the merger of the Continental Oil Co. and Consolidation Coal Co. That merger took place five years ago, at a time when Consolidation Coal accounted for a reported 11 per cent of all coal sold in the United States.

In letters to Sen. Philip A. Hart, D-Mich., chairman of the Senate antitrust and monopoly subcommittee, and William Proxmire, D-Wis., chairman of the Joint Economic Committee, Kirkpatrick said the investigation will cover four special problems:

- The determination of present market boundaries in the energy producing field, a study Kirkpatrick said is "most important in terms of antitrust merger enforcement police";

- An analysis of trends of concentration in the field with the use of production and sales data;

- A study to learn if concentration causes profits to rise or fall, and

- An examination of the effects of concentration on new investment, research and development among the major energy producers.

In addition, Kirkpatrick said a specific antitrust investigation is well under way revolving around what he called the possibility of collusion and unlawful conduct involving natural gas reserves in southern Louisiana.

Kirkpatrick said the FTC does not have the resources to explore adequately two related issues in the field. He urged the Congress to undertake them on its own.

The first, he said should be a study aimed at learning the exact ownership and control of the nation's energy reserves; the second, would be "a general exploration of long-run energy supply problems," for the nation as a whole.

The Senate has passed a resolution authorizing such a complete energy study.

"The commission has great interest in seeing that the energy sector receives the careful economic study it demands and that the relevant competitive issues are given appropriate attention in the process," Kirkpatrick said.

It has been estimated the nation's largest oil companies now hold 20 percent of the nation's coal producing capacity and 80 per cent of all uranium production.

TUCSON, ARIZ., May 18, 1971.

HON. HENRY M. JACKSON,
Chairman, Senate Committee on Interior and Insular Affairs,
Senate Office Building, Washington, D.C.

DEAR SENATOR JACKSON: This is a comment on the planned thermal power plant construction on which your Committee has scheduled field hearings. I request that this comment be made part of the hearing record.

I share the concern of most people for the ecological impact of the planned power plants. However, my concern is not one-sided and obstructive in the sense that I negate the need for a growing production of electric power. Rather, I strongly question the wisdom of considering fossil fuel steam-generating plants at a time when other sources of energy are within technological sight. I urge the Committee to consider very carefully the alternatives to existing methods.

Among these alternatives, solar energy ranks high. Unfortunately, the popular evaluation of this concept is biased by the failures of previous unsuitable approaches. Lists of national goals and high-level comments on the energy crisis either ignore solar energy or deal with it in an almost utopian fashion.

Through a recent re-evaluation of the technology available in 1971, the situation has changed drastically within the past few months. As outlined in a proposal by Dr. A. B. Meinel, Director of the Optical Sciences Center of the University of Arizona, the technological developments of the past decade make the conversion of solar energy on a large scale a feasible project. A 1-megawatt Research Facility could be in operation within 36 months. A 100-megawatt Demonstration Power Facility could be installed within 60 months.

Climatic conditions require that these plants, and the larger commercial facilities planned thereafter, be located in the desert areas of the Southwest. The possibility of ever using solar energy conversion in these areas will depend critically on an atmosphere that is free of the pollutants that conventional power plants produce. In this sense, approval of these conventional plants in the desert areas will decrease the efficiency of solar energy production thereafter. The solar power plants themselves are of minimal ecological impact. Their "fuel" supply is unlimited, and large amounts of water are produced as a byproduct.

This comment cannot offer a description of the project. It must be pointed out, however, that the proposal by Dr. Meinel has met with strong interest on all levels of the Federal Government. The U.S. Office for Science and Technology is presently evaluating the proposal in view of a \$10,000,000 funding request covering the first three years of the development. The National Science Foundation, notorious for its careful scrutinizing of applications, granted \$64,000 for a feasibility study, within 48 hours of the submission of the proposal.

In view of this widespread attention, it would be highly irresponsible for the Committee to consider conventional plants as the only possible solution to our problem. The harmful long-range effects of these plants, their pollutive impact over a projected lifetime of 30 to 40 years, their need for cooling water in the face of an increasing scarcity, their requirement for large-scale strip mining of unknown ecological influence—all this requires that the Committee give more than cursory consideration to other approaches. It should make a careful evaluation its principal task. If some of the alternatives, such as solar energy, are considered feasible within the next few years, it should find financial and political solutions to bridge the gap, without setting the pace for the next 30 to 40 years in a direction known to be harmful.

If, in the face of these better solutions, the Committee gives the conventional approach its blessing, it had better be prepared to defend its decision 10 years from now, when these alternative solutions have proved their value and the conventional plants are still deteriorating our life for another generation.

Sincerely,

BERNHARD O. SERAPHIN,
Professor, Optical Sciences.

THE COLLEGE OF GANADO,
GANADO, ARIZ., May 25, 1971.

Hon. HENRY M. JACKSON,
Chairman, Senate Committee on Interior and Insular Affairs,
U.S. Senate,
Washington, D.C.

DEAR SENATOR JACKSON: Navajo people are worried about their *land*, their *water*, their *air*. Other Americans, too, are saying, "Why doesn't our government stop this flagrant disregard?" America is again becoming divided between "profiting Corporations" and the PEOPLE—*of, by and for* whom our government exists. Thus, SOCIAL DISCONTENT and UNREST are fostered! *Taxpayers* want a bigger voice as to how their tax dollars are spent.

Powerplants: Our government must protect the rights of *all* the people. Wet scrubbers can control the flay ash—but there's no control known for sulfur and nitrogen oxides, which cause *acid rain*. Los Angeles County won't allow power plants without controls; why should the Four Corners people?

Strip-Mining: The original contracts don't provide for *restoring* of mined-out land; terms of recent revisions are *too vague*, saying "if profits allow". PROFITS NEVER ALLOW. If restoration costs enough to cancel profits, it just won't be done, face it. Where are the *representatives of the People* when these sellouts occur?

Transmission Lines: these ruin the esthetic value of the land; they ruin the tourist-value of the land—the only way some people can earn a living! Solution: use existing corridors or “underground”.

SUMMARY: for the above reasons,

1. *Power plants'* emissions must not be allowed to poison people or plants or animals which the people depend on to live. Either have strict control over emissions or don't allow construction.

2. *Strip Mines:* Outlaw, or raise prices; allow less profit.

3. *Transmission Lines:* use present corridors.

Respectfully submitted.

HOWARD I. JUMP, *Science Department.*

PHOENIX, ARIZ., May 25, 1971.

Senator HENRY JACKSON,
Chairman, U.S. Senate Interior Committee,
Washington, D.C.

DEAR SIR: I would like to express my support of the proposition of Governor King and Senator Montoya of New Mexico that there be a moratorium on the building of power plants in the Southwest until the technology is sufficient to insure protection of the environment. Governor King and Senator Montoya have taken a firm stand to protect the health of their citizens. I hope Arizona officials will do the same.

Please include this letter in the written record of the May 28 hearing at Page, Arizona. Thank you.

Sincerely,

BONNIE KURTZEMAN
Mrs. Ron Kurtzeman.

MUMMY MOUNTAIN OBSERVATORY,
Scottsdale, Ariz., April 13, 1971.

ARIZONA STATE DEPARTMENT OF HEALTH,
DEPARTMENT OF ENVIRONMENTAL HEALTH,
Phoenix, Ariz.
(Attention Norman Schell, Dr.).

GENTLEMEN: Continued observations of visibility of various mountain peaks as seen from Mummy Mountain Observatory, in particular the degree of obstruction to visibility in viewing Superstition Mountain 32 miles distant to the southeast at 8 AM every morning from December 1966 to date, have confirmed the fact that visibility greatly improved during periods of Copper Smelter shutdowns during July 1967 to February 1968 (underlined with heavy black line), and again during the short period of gas shortage caused by the cold wave of January, 1971, (circled in red on the accompanying chart).

Before the Smelter shutdowns and again resuming after the shutdowns, the prevailing visibility was POOR; whereas, during the Smelter shutdowns, the prevailing visibility was GOOD to EXCELLENT.

Note the striking difference between the Januarys of 1967, 1969, and 1970, and the Januarys of 1968, and the short period in 1971, when the Smelters were shutdown.

The chart further sadly shows that so long as the Smelters are operating and continuing to increase smelter production discharges through further high stacks, that there is a continuing and increasing frequency of POOR and NOT VISIBLE conditions prevailing.

It is most important to note the great sensitivity to improvement in visibility of our Arizona air, even during a relatively short period in the let-up of Smelter output, as again demonstrated in the shut-down period of January 1971. This clearly indicates that great rewards may be expected by promptly putting an end to the Smelter discharge of particulates and sulphuric acid mist aerosols into our beautiful Arizona sky.

Respectfully submitted.

WILLARD L. GROENE, *Director.*

MUMMY MOUNTAIN OBSERVATORY

WILLARD L. GROENE, DIRECTOR

8102 NORTH MUMMY MOUNTAIN ROAD
SCOTTSDALE, ARIZONA 85251
(602) 948-6870LAT. 33° 33' 16" N
LONG. 111° 57' 28" W
ELEVATION 1421 FT.
MOUNTAIN STANDARD TIMEASTRONOMY
SEISMOLOGY
METEOROLOGY
AIR POLLUTIONTOO MUCH
AND TOO GOOD

The basic problem of air pollution, particularly in the low southern deserts and the heavily populated communities of Arizona, is primarily due to its fine climate. There is just too much good weather practically all the time.

The writer's interest in weather and air pollution goes back to March 11, 1917, at Cincinnati. At 7:05 p.m. on that Sunday evening, in the suburb of Hyde Park, a real independent of a tornado, hit the writer's home and in less than four minutes, the results were those of Fig. 1. Thanks to a sturdy iron radiator in the kitchen to which the writer clung, he is here today in Arizona writing about air pollution.

The tremendous fear generated by that tornado soon changed to curiosity and then to scientific study of weather. Since 1942, the writer has been associated with the U. S. Weather Bureau as a Cooperative Weather Observer, operating the Mt. Lookout and Ault Park weather stations at Cincinnati and the LeMay Road and present Paradise Valley weather stations at Phoenix.

Back in the early 1940's, Charles Gruber, now head of the Cincinnati Air Pollution Control Dept., began early studies and technical observations of the smog situation at Cincinnati. In those days glass jars 8" in diameter and 18" high were exposed for a month at a time and

the particulate matter collected, (usually in a non-evaporating oil in the bottom of the jar) analyzed, and studied.

The Robert A. Taft Sanitary Engineering Center was established in Cincinnati and in 1953 one of the main functions of the organization was to set up and operate the National Air Sampling Network with the main object to provide the necessary data to characterize the problem of air pollution on a nationwide basis. The objectives were:

- Determine the extent and nature of air pollution.
- Study the trends in the levels of various atmospheric contaminants.
- Investigate the relationships between air pollution and socioeconomic, geographic, topographic, meteorological, and related factors.
- Utilize the information so acquired to aid planning epidemiological investigations.

e. To provide background evidence against which more intensive community and statewide studies of air pollution can be conducted.

National Air Sampling Network
The National Air Sampling Net-

At each of these stations is the basic tool of air sampling, the high volume air sampler shown in Fig. 3 and Fig. 4. These devices are simply vacuum cleaners which suck air through a specially prepared 8" x 10" spun-glass filter capable of removing practically 100% of all particulates of 0.3 microns or greater in diameter. During each scheduled sampling period the high volume sampler is operated for 24 hours.

At most urban stations, such as Phoenix and Tucson, airflow rates through the filters averages about 40 to 50 cfm. At nonurban stations, such as Paradise Valley, and particularly Grand Canyon, the rates are higher, usually averaging in the 55 to 65 cfm range. Since airflow progressively diminishes as particulates accumulate on and increase the flow of resistance of the filter, all samplers are set to operate initially at about 55 to 65 cfm. On the assumption that the flow rates decrease uniformly during the sampling period, the volume of air filtered is taken as the product of the time interval and the average of initial and final flow rates observed during each sampling period.

In urban areas of Phoenix and Tucson, with high levels of particulate air pollution, the loading on the filter builds up quickly and some types of particulate matter cause clogging of the filter. This clogging may result in a nonlinear decrease

from such a nonlinear reduction in airflow, flow regulators were used experimentally in Baltimore, Dayton, and Pittsburgh during 1960. The flow regulator maintains a nearly constant airflow of 35 to 40 cfm over the 24-hour sampling interval. Based upon the favorable experimental results observed in the three cities mentioned previously, air samplers in other cities will be equipped with these flow regulators.

The shelter for the sampler, which may be converted readily into a shipping container, is shown as it is mounted at a typical sampling site at the Paradise Valley station, Fig. 4. To insure a high degree of uniformity in filter exposure, the sampler is oriented so that the filter is horizontal and facing upward, Fig. 4 (lower). Data from 10 cities for a year show that the average sampler flow results in an average velocity of 64 fpm across the horizontal air inlet portal of the shelter. Since flow is vertically upward, collection at this velocity is limited to particles 100 micron and less in diameter.

As soon as possible after collection, the filter is folded carefully, placed in a manila folder, Fig. 3 (upper) and mailed to the network laboratory in Cincinnati. Upon receipt, the filter is weighed and divided into aliquots of suitable size for chemical analyses.

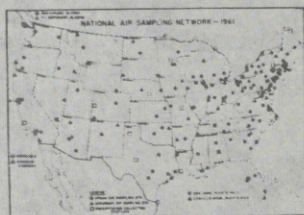


Figure 2.

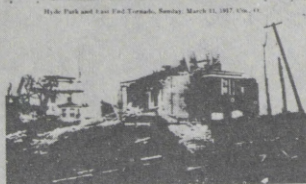


Figure 1.

work has stations established as shown in Fig. 2. There are four primary stations in Arizona as follows:

Location	Elevation
Phoenix (Urban)	1025
Paradise Valley (Nonurban)	1421
Tucson (Urban)	2400
Grand Canyon	6955

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Maricopa County Health Dept.
Willard L. Groene

University of Arizona
National Park Service

in the airflow and the average airflow computed as stated above may differ considerably from the true flow. To evaluate the error resulting

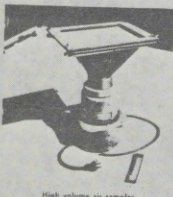
Sampling Schedule

The sampling schedule used by the network calls for the collection of one 24-hour sample during each 2-week sampling period, or 26 samples per year. Schedules are prepared in advance for a full year and sent to each station in the network. Currently the sampling procedure provides for the collection of a sample during the first week of the 2-week sampling period. If for some reason a sample is not collected on the specified day, a makeup sample may be taken during the second week.

Briefly, all possible starting times



Figure 3 — Filter and mailing container



High volume air sampler

(the hours 8 a.m. to 3 p.m.) for each of the 7 days in a week are listed and numbered sequentially. From a table of random numbers, 26 numbers are selected. Each number is then interpreted as an hour and a day of week from the listing just described. Finally, the day of week is converted to the appropriate calendar day. The station operator is free to start the sampler at any time during the designated hour.

Nonurban station locations such as Paradise Valley and Grand Canyon include various topographical categories such as farmland, desert, forest, mountain, and coastal. The nonurban stations were not specifically selected to be "clean air" control sites for urban areas, but they do provide for a relative comparison between some urban and nearby nonurban areas.



Figure 4

Atmospheric Pollutants Measured

Pollutants may be classified as follows:

- a. Gases or vapors.
- b. Particulate matter comprising solid particles and liquid droplets. (1) Large particles that settle rapidly. (2) Small particles that remain in suspension in the air for varying periods of time.

These latter, called suspended particulate matter, are the type of particulate matter collected by the National Air Sampling network.

Suspended Particulate Matter
Polluted atmospheres contain varying quantities of suspended particulate matter, known technically as aerosols. This suspended particulate matter consists of smoke, dust, and fumes, which are solid, and droplets of viscous liquid. Suspended particulate matter varies in size from well below 1 micron to approximately 100 microns, a micron being approximately 1/25,000 of an inch. Among the effects of particulate pollutants are reduction of visibility, soiling and deterioration of materials, plant damage, irritation of tissue, and possible damage to health.

This particulate matter may arise from a great many sources: incomplete combustion of solid, liquid, or gaseous fuels; wastes from metallurgical, chemical, and refining operations; incineration; and numerous other processes; and natural phenomena such as dust storms, volcanic eruptions, sea spray, etc.

The determination of the composition of suspended particulate matter in the atmosphere sheds light on the nature of particulate pollution. A detailed chemical analysis of particulate samples from urban and nonurban areas provides basic data that is valuable in the overall attack on air pollution. Such data may be useful in pinpointing sources of pollution and in predicting potential health effects.

Organic Pollutants

That fraction of particulate matter that is soluble in benzene is classified in this report as benzene-soluble organic matter, or simply organic matter.

A wide variety of liquid and solid organic materials are poured into the atmosphere. Among these are substances that may cause irritation of biological tissue. Compounds that produce cancer in experimental animals have been isolated from atmospheric organic matter.

Inorganic Pollutants

In contrast to the "larry" organic matter, inorganic solids in the air are gritty, ashlike, or crystalline. A very large number of such pollutants have been identified. Since many inorganic materials can be related to specific industrial processes and operations, their presence in the air can often be used to ascertain sources of pollution.

Sulfates — In addition to the liquid sulfuric acid contributed to the atmosphere by various industrial processes, particularly the copper smelters and foundry operations, a considerable amount may result from that portion of the atmospheric sulfur dioxide which is converted to the trioxide and then to sulfuric acid in the presence of water vapor. This acid reacts with other substances in the air to form sulfates. Most of the sulfur dioxide arises from the combustion of fuels. Therefore, the particulate sulfate level may reflect the fuel consumption of a community. Since many sulfates are acid, they generally have corrosive properties.

Nitrates — Nitrates arise in the air in a manner similar to sulfates. Nitric acid and oxides of nitrogen come from industrial operations and various combustion processes. The presence of nitrates increases the corrosive property of the atmosphere.

Metals — A large number of metals, metal oxides, and salts are released to the atmosphere from a wide variety of industrial processes, urban activities, and natural sources. Since the effluents from a particular industry is limited to the raw materials involved, identification of metals in atmospheric samples may be of use in detecting sources of pollution.

Many metals are known to be toxic at certain concentrations. Potential problem areas may be defined on the basis of data obtained by the analysis of samples of suspended particulate matter. Emission spectrographic procedures are employed for the measurement of metals, and it is possible to analyze a single sample for a large number of metals with little more effort than required for a few. This has made possible the accumulation of a great deal of basic information on the concentrations of many metallic pollutants whose hygienic significance has not as yet been determined.

Radioactive Materials

The rapid increase in the use of atomic energy for industrial, medical, and military purposes in the testing of atomic and hydrogen bombs has caused great interest in the measurement of the radioactivity in the atmosphere. Radioactive materials are unique in that they may be detected from sources several thousand miles distant. This detection is made possible by the supersensitive methods available for the determination of radioactive materials, as compared to the lower sensitivity of the chemical methods used for the other analyses reported here.

While the determination of B-radiactivity is not a major objective of the National Air Sampling Network, these measurements have been made since the early days of the network and for a time represented the major source of such information. Since 1956 the National Radiation Surveillance Network has collected information on the radioactivity in the atmosphere. Generally the sources of such contamination are beyond the control of city and state agencies.

Since the beginning of the National Air Sampling Network, measurements of beta-radioactivity have been made on most particulate samples collected. The mean monthly level of atmospheric radioactivity on a national basis for urban and nonurban stations combined for 1957 to 1961 is shown graphically in Fig. 5. Information concerning this activity is available from the Division of Radiological Health, Public Health Service, U. S. Department of Health, Education, and Welfare, Washington 25, D. C.

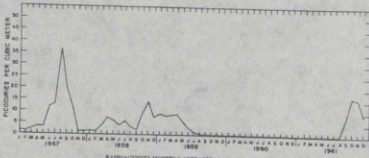


Figure 5

MUMMY MOUNTAIN OBSERVATORY

WILLARD L. GROENE, DIRECTOR

8102 NORTH MUMMY MOUNTAIN ROAD
SCOTTSDALE, ARIZONA 85251
(602) 948-6870ASTRONOMY
SEISMOLOGY
METEOROLOGY
AIR POLLUTIONLAT. 33° 33' 16" N
LONG. 111° 57' 28" W
ELEVATION 1421 FT.
MOUNTAIN STANDARD TIMEArizona's Fine Weather
the Smog Culprit

The greatest problem confronting the control of air pollution in Arizona is the substantially endless procession of near perfect weather. As pointed out in the last issue, there is just too much and too good a climate persisting in our state. No one can properly and intelligently discuss and attack the smog problem without a clear, and fundamental knowledge of the factors that bring about the ideal conditions that bless our state. A thorough knowledge of the physical basis of the science of world-wide meteorology is vital to a proper understanding of air pollution in any area, especially of the peculiar nature of the Arizona environment.

The atmosphere may be considered as a turbulent fluid subjected to strong thermal influences moving over a rough, rotating surface. The energy that drives the atmosphere is obtained from the sun's radiation. Just outside the atmosphere, an area exposed at right angles to the sun's rays would receive radiant energy at the rate of about 2 (Langley's) gram-calories per square centimeter per minute.

The earth is approximately spherical, and its surface area is therefore four times as large as the cross-section area intercepting the sun's rays. It follows, therefore, that, on the average, each square centimeter at the outer boundary of the atmosphere receives about one-half of a gram-calorie per minute.

Part of this radiation is reflected back to space from the upper surface of clouds in the atmosphere, and part is lost through diffuse scattering of the solar radiation by air molecules and dust. The remaining radiation passes through the atmosphere without much absorption and finally reaches the surface of the earth, where it is absorbed generally without much loss through reflection.

The atmosphere serves as a protective covering providing a "greenhouse" effect which raises the mean temperature of the earth's surface and also requires that the atmosphere as a whole must be colder than the ground. In the upper portions of the outer atmosphere is an ozone layer whose temperature appears to exceed the mean air temperature next to the ground.

Solar Radiation Not Uniform

It is important to note that incoming solar radiation is far from uniformly distributed over the surface of the earth. Because of the low angle of incidence in the polar regions, a given horizontal area in high latitudes receives far less solar radiation than an equal area

closer to the equator. As a result (disregarding the rotation of the earth for the moment) of the greater heat income in low latitudes, the temperature there would rise until the increased temperature of the atmosphere results in increased infrared radiation toward space with the result that the heating of the atmosphere in low latitudes causes the air there to expand vertically, while the cooling in high latitudes would result in a vertical shrinking.



Fig. 1

Considering the northern hemisphere only, the inequality in heat income between latitudes causes, on a nonrotating globe, south winds aloft and north winds along the ground.

The poleward flow of warm air aloft and the trans-

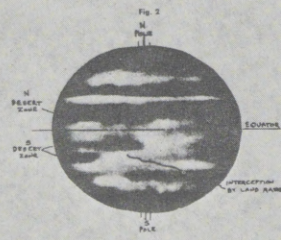


Fig. 2

port toward the equator of relatively cold air next to the ground has the further effect of bringing about a reduction in the vertical temperature decrease. This instability is cut down and vertical convection is reduced in middle latitudes, such as Arizona, making for calm steady air conditions. In such a simplified situation as recited above, other factors cause considerable discrepancy from the true situation observed in the atmosphere.

Rotation of The Earth

While the earth does not appreciably change its speed of rotation and on the average it neither receives momentum from nor gives off momentum to the atmosphere, it nevertheless profoundly affects the character of the flow patterns observed in the atmosphere.

A ring of air extending around the earth at the equator, at rest relative to the surface of the earth, spins around the polar axis with a speed equal to that of the earth itself at the equator. If this ring is pushed northward over the surface of the earth, its radius is correspondingly reduced so that the absolute speed of the ring from west to east increases. Since the speed of the surface of the earth itself from west to east decreases northward, it follows that the moving ring, in addition to its northward velocity, must acquire a rapidly increasing speed from west to east relative to the earth's surface.

There is thus established west winds in northward moving rings of air and east winds in southward moving rings to thus modify the previously described north-south circulation scheme considerably.

It is found that in the northern hemisphere steady winds always blow in such a fashion that the air pressure drops from right to left across the current for an observer facing downstream. If, in any horizontal plane, lines of constant air pressure (isobars) are drawn, it may be that the air follows the isobars and moves counter-clockwise around regions of low pressure (cyclones) and clockwise around regions of high pressure (anticyclones).

Arizona In Horse Latitudes

Fig. 1 illustrates the cellular meridional circulation on the rotating earth with upward convection currents near the equator, a clear zone of descending air motion north of it at about latitude 30° north and heavy slanting cloud masses with the accompanying precipitation in the polar front zone at 55° to 60° north latitude.

The climatic zone at 30° north latitude, in which Arizona is located, is known as the "horse latitudes," a region characterized by high barometric pressure, calms, light baffling winds in which descending air currents have lost a great deal of their moisture. The descending motion leads to warming by compression at intermediate levels so that in spite of relatively high surface temperatures, the vertical temperature drop is

fairly weak and the air itself is so dry as to prevent convection. This region is necessarily characterized by an arid, or semi-arid climate.

It is further evident that zonal circulation and regions parallel to the direction of rotation are an inherent characteristic of any rotating planet orbiting around the sun. Note in Fig. 2, the planet Jupiter has the same cloudless desert "horse latitude" zones that we observe here. In observing the earth from the moon, we will see the same climatic bands on our planet and of course will see the dark cloudless regions of the Arizona desert areas.

Continents Modify Climatic Zones

The great continental land mass of the earth modify, interrupt and intensify zonal climatic bands around the earth. The "horse latitude" regions are very specially modified in that great desert areas develop over the western portions of each continent and extend westward great distances from the contiguous west coasts of each continent.

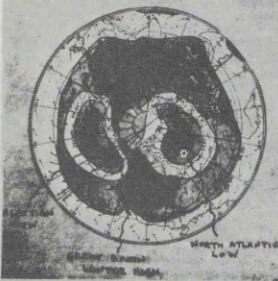
In Fig. 3 is shown the desert areas of the earth. The area "A" is the Arizona-Sonoran desert, the greater part of which extends westward into the Pacific ocean to the eastern end of the Hawaiian Islands; "B" is the deserts of Chili and of the west coast of South America; "C" the Kalahari desert of southwest Africa; "D" the Australian desert; and finally, "E" the great desert area of Eurasia, starting with the Gobi desert of China, across the Thar of India; the Arabian; and finally the great Sahara desert which extends far to the westward across the Atlantic Ocean.

Two features are notable; one, the greatest part of each desert area lies over the ocean to the west of each continent in the 30° N and S latitude region; and two, the larger the land mass, the more extensive the desert area. Continents thus actually accentuate the desert area off their west coasts in the "horse latitudes." Even the planet Jupiter shows the effects of interfering land masses on the arid zones, note Fig. 2. Thus, Arizona, because of its location, must forever be a desert.

Pinched Between Air Masses

Arizona is unique in respect to its location relative to the great atmospheric pressure systems of the northern hemisphere. Figure 4 shows the sea level normal barometric pressure distribution in the northern hemisphere in mid-winter while Fig. 5 is the situation in mid-summer. It is important to note the influence the nonzonal distribution of oceans and continents in the northern

Fig. 4
HIGHER AND
PREVAILING WINDS
JANUARY



hemisphere have in causing the extremely asymmetric normal pressure distribution.

During the winter months, Fig. 4, Arizona is pinched between two great low pressure systems — the Aleutian Low lying off the Gulf of Alaska over the North Pacific ocean, and the North Atlantic Low. Between these two great low pressure systems a substantially permanent Great Basin High is present just to the north of Arizona and centered about Salt Lake City and the central Rockies.

Since high pressure systems rotate clockwise in the northern hemisphere, the winds in the southern portion of this Great Basin High over Arizona are characterized from the east and southeast. This Great Basin High is further characterized by little or no change in position for long periods of time and with persistent calm and stable weather conditions resulting in the fine winter conditions we enjoy in Arizona.

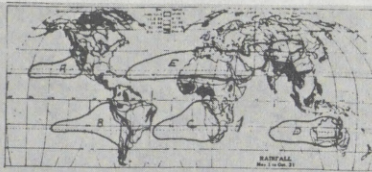


Fig. 3

A substantially reverse condition pertains for Arizona pinched between the two great high pressure systems — the great Eastern Pacific High, centered north of Hawaii and the famous Bermuda High in the central Atlantic. A substantially permanent thermal low develops between these two high pressure systems centered just slightly to the north of Arizona.

Remembering that low pressure systems rotate counterclockwise in the northern hemisphere, again the summer season is characterized by east and southeast winds. Further, Arizona benefits from summer rains and thunderstorms when the western end of the Bermuda High is sufficiently strong to feed most tropical air northwestward into Arizona into the stationary thermal low existing over Arizona. In the last several years this condition has been relatively inactive resulting in deficient summer rains and severe drought, a definitely aggravating element in air pollution matters.

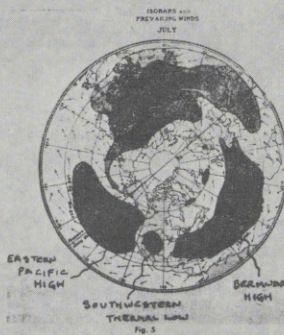


Fig. 5

Greener Pastures Elsewhere?

Everyone is looking for greener pastures somewhere else and this is particularly true in trying to find the ideal climate in which to live. But let us first compare the other fellows' product before jumping to conclusions. Fig. 6 clearly sets forth the essential factors in comparing Arizona with other significant areas of the United States.

The first column shows the average monthly temperature, relative humidity, and rainfall for Cincinnati, Ohio, typical of the eastern part of our country (which

most of us left). High summertime temperatures with cold show shoveling winters, (solid line) high humidity all the time (broken line) and plenty of rain every month of the year (with long spells of diurnal overcast).

Compare this with Tucson and Phoenix where we have very hot long summers with cool to mild winters, low humidity, and scanty to little or not long spells of rain and gloominess. Note Tucson is about 5° cooler than Phoenix because it is about 1500 feet high in elevation and the higher close-in Catalina Mountains cause increased summer rainfall in Tucson over that of Phoenix.

What's it really like on the coast at San Diego? Cool summers, mild winters, warmer than Phoenix and Tucson in winter but high humidity and lots of fog and gloomy weather. Rainy winter months but dry summer months, dryer than Phoenix summers.

Finally, how does Miami, Florida, fare? Here we have hot summers, not as hot as Phoenix or Tucson, and very mild fine winter months. But what humidity, especially in summer, and rainfall from 10" to 35" a month during the hurricane season of July to November. But one thing for sure, when Florida is having 150 miles per hour hurricane winds and 35" of rain they do not have any dust or smog problems. Florida is one of the cleanest states smogwise while Arizona is one of the dirtiest.

In Summary

Arizona's fine weather is the smog culprit because:

- Endless procession of near perfect weather.
- Low rainfall with very long periods of substantially no rainfall at all, low humidity and very high summer temperatures.
- Arizona peculiarly located in world weather pattern.

d. Arizona located in the "horse latitudes" of calms and infrequent weather activity.

e. Arizona on the eastern edge of the permanent Arizona-Sonoran desert region of the earth.

f. In winter Arizona is located between the Aleutian Low and North Atlantic Low south of the Great Basin High over western United States resulting in general upper level southeast and east winds.

g. In summer Arizona is located between the Pacific High and the Bermuda High on the southern edge of the Southwestern Thermal Low resulting in general upper level southeast and east winds.

h. Arizona has the best all around climate over other comparable United States areas because of a combination of maximum sunshine, low rainfall, and low humidity together with mild winter temperatures.

i. Arizona has very high concentration of particulate matter (smog) in its low southwest desert areas and particularly in the main metropolitan areas located in the desert areas.

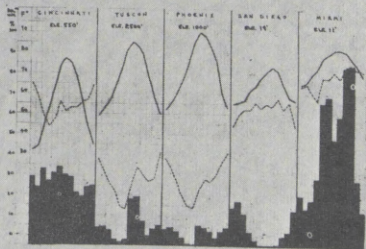


Fig. 6

MUMMY MOUNTAIN OBSERVATORY

WILLARD L. GROENE, DIRECTOR

8102 NORTH MUMMY MOUNTAIN ROAD
SCOTTSDALE, ARIZONA 85251
(602) 948-6870LAT. 33° 33' 16" N
LONG. 111° 57' 28" W
ELEVATION 1421 FT.
MOUNTAIN STANDARD TIMEASTRONOMY
SEISMOLOGY
METEOROLOGY
AIR POLLUTIONWhere it
Comes From

Fig. 1 — Paradise Valley — Clean.

From the chimneys and dumps of our cities, from the vehicles that crowd our roads, from chemical and mining operations, pollution is being dumped into our otherwise wonderful Arizona air in greater and greater volume with every passing day.

Paradoxically, the great majority of people most intimately enveloped in the most polluted atmospheric areas are least aware of its presence. This is due largely to the surroundings in which they live and work. One whose home is in the densely populated irrigated areas of our main cities seldom can see horizontally more than a few hundred feet distant and looking straight up does not disclose the



Fig. 2 — Paradise Valley — Smog.

Fig. 3 — Paradise Valley — Dust storm.



its geographical location relative to the particular source under a particular set of weather conditions. In many instances, areas which originate major pollutants may be relatively free of them while sparsely populated areas producing no significant pollution are subject

to a major smog attack from these remote areas.

Fig. 1 is a view across Paradise Valley, looking northeast toward the McDowell mountains on an all too infrequent clear day. Fig. 2 is the same view when a southeast wind brings contamination from



Fig. 4 — Paradise Valley — Field burning.

real filth and dirt in the lower levels of the air.

If one goes out in the foothills of the desert surrounding our cities or goes up in our new high-rise buildings and looks off over the area, the enormous and wide spread extent of serious air pollution is all too apparent.

Coupled with this general lack of appreciation and understanding that there is actually any air pollution problem is a still greater lack of knowledge of actually where such pollution is coming from.

There is practically an unlimited number of sources of atmospheric contamination in the low desert areas of Arizona. It is impossible to point a finger at any one source and say that it is the worst or the most over this area. Any such consideration must necessarily be limited to a specific spot location and



Fig. 6 — Unpaved dirt road.

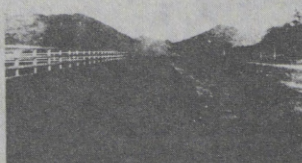


Fig. 5 — Scottsdale Road dust.

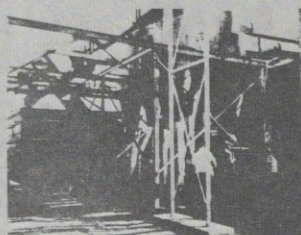


Fig. 7 — Trash and dust recovery system.

the Phoenix/Tempe-Mesa area and from the copper smelters to the east and southeast into this otherwise non-industrial area.

Destruction of Natural Desert Pavement

The very first thing man does in our desert areas to initiate a major dust and air pollution problem is his destruction of the natural desert pavement. Many of us have wondered why the natural undisturbed desert has so many rocks and chaparral scattered about which appears to remain unchanged year after year. This is due to thousands of years of balance between wind, rain, plants and the desert surface to adjust and accommodate each other to a common stable condition.

The moment this natural desert pavement is altered or destroyed by converting it into farm land, building a road, or scraping it clear for a subdivision, the wind can go to work on the now unprotected silt lying bare on the ground surface and carry it off in great dust storm clouds until visibility becomes zero. Note Fig. 3 showing Paradise Valley during a recent dust storm.

Trash Burning

Trash burning is literally one of the most "flagrant" causes of wide spread air pollution. It is easily accomplished and almost everyone at one time or another participates in its practice in the burning up of small piles of leaves, grass and waste paper in the back yard — to the more extensive practices of burning off fields, Fig. 4, intermittent and perpetual dump burning, burning old tires and industrial refuse, melting down old aeroplanes, burning out old automobile bodies, and the use of incinerators for one or more of the above purposes.

Incinerators do not eliminate air contamination. Though they may reduce visible black smoke to some extent, the burned and hostile gases and particles still enter the air. After all something had to go into the air, else you would not have such a small pile of ashes after burning up the big pile of refuse.

This major source of air pollution, however, can be completely prevented by simply stopping it, and that means everyone, no matter how small the proposed fire would be.

Crop Dusting

Crop dusting is one of the most insidious contaminants man puts in the air and it is particularly harmful to those people with respiratory illnesses. The airplane crop dusting techniques are particularly objectionable because the slightest wind will carry the larger part of the crop dust into other areas far from the field being treated. This material contaminates not only the air over wide areas but every object over which such contaminated air blows, coating the roofs, porches, door handles, walks, trees, shrubs and lawns of residential and business areas miles from the scene of the actual crop dusting operations.

A notorious infraction of good practice in dust control in paving roads is the intersection of the paved surfaces of two roads without adequate radii being provided to prevent running off of the pavement in making a turn from one road to the other. Even brand new roads are being constructed poorly in this regard so that the benefit of the dust-proof pavement is largely lost. Here again, control of specifications and good engineering, without major financial cost, could remedy this serious air pollution source.

Crop Processing

The Phoenix-Tucson area is blessed with a wonderful agricultural area of tremendous size and output. Many of the most modern processes are utilized in getting the crops ready for world markets. In these processes, much discharge is sent into the air. Cotton ginning produces large amounts of ground up refuse and lint which is not always properly restrained at the gin. Cotton harvesting and mulching machines produce dust and contaminants in field operations. The burning of this refuse and lint at the gin is also a hostile practice to clean air.

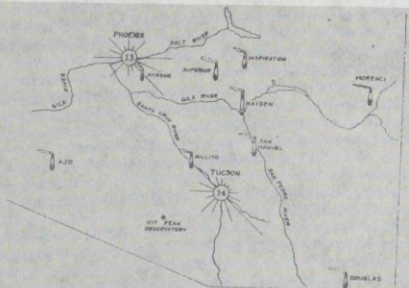


Fig. 9 — Wind direction and smelters.

At the locations of Phoenix and Tucson are indicated the wind roses for the prevailing winds at these cities and it can be clearly

seen that these great sources of pollution are technically controllable and should be brought under careful scrutiny and mitigated for a great deal of valuable sulphuric acid and other valuable chemicals and by-products are being "thrown-to-the-winds" while at the same time destroying our otherwise beautiful Arizona desert. These discharges may also be causing an insidious constant contamination of large areas greatly affecting and causing respiratory illnesses and cancer over long periods of time.

Hydrocarbon Burning Apparatus Not Controllable

The portable hydrocarbon burners in the form of motor vehicles and aeroplanes, and the fixed hydrocarbon burners such as power stations and residence and business heating and cooling apparatus are very large contributors of oxidized hydrocarbons and their effects are directly proportional to the concentration of the metropolitan area.

Sanitation by Dilution and Health

While many people now see the smoggy filthy air around them, many are inclined to say, so what! It indicates big business and high industrial activity! A fundamental problem has arisen from increasing air pollution that transcends all other considerations. That is the effect on the health and well being of the people.

Up to now the theory of getting rid of aerial wastes was based on the idea that the total supply of air is limitless, whereas we now find that it has only very limited capacity to dilute and disperse the endless amounts of contaminants being discharged from many sources — only the major ones of which have been pointed out above.

Strangely enough, with each passing year, polluted air becomes more and more out of place in comparison with the clean and healthful amenities required and demanded by everyone in other facets of civilized life. The fact that cancer and respiratory diseases occur much more frequently and with much more severity in urban than in rural populations is a compelling reason for cleaning up our atmosphere.

We live at the bottom of a shallow sea of air surrounding our earth. If we mess it up, there is no other. It is impossible to pipe fresh air from somewhere else — nor can we store a supply of clean air for future use. We cannot rely any longer on sanitation by dilution but only by prevention of pollution.



Fig. 8
Downtown Phoenix smog.

When strong winds blow, the dust is removed not only from the plants treated in the field but from the above objects, it has coated ready to be directly breathed in by the residents in those areas. Here again is an area of air pollution that can be completely controlled by stopping the practice.

Unpaved Roads

The extremely high particulate matter (solids) readings in air samplings in Phoenix and Tucson are attributable in large measure to the preponderance of unpaved dirt and gravel roads, Fig. 5, serving densely populated areas. Because of the infrequent rainfall and no severe winter snows and ice, these areas "get by" without adequate pavement in residential, business and industrial areas in a manner which could not possibly be tolerated in communities of equal concentration elsewhere. While this may save costs in doing the job properly, it leads to a major and more apparent air polluting situation than is found anywhere else.

These primitive roads in densely populated communities in desert areas create a bad low ground permanent dustiness in the air at night and early morning hours with calm wind conditions and further create wind conditions and further create strong windy conditions, Fig. 6. One of the contributing factors is poor engineering and inspection of the completed paved roads.

While this is a relatively major cause of air pollution, it can and is being controlled in many instances such as by the highly efficient products and fines recovery apparatus developed by the Community Cln. Co. on Pima Road in Scottsdale, Fig. 7.

Ringed by Smokestacks

The great industrial development in the Phoenix-Tucson area has resulted in a new and enormous smog producing element in addition to the factors discussed above, Fig. 8. Close in to Phoenix are the foundry operations at Kyrene, and the tin canner operations near South 7th St. and Pima. Other large smoke and fume producing operations near the central metropolitan area of Phoenix are the aluminum foundries near 35th Ave. and Van Buren, and 23rd Ave. and McDowell, and the scrap iron foundry operations near Thomas Rd. and Grand Ave.

Downwind from Copper Smelters

Referring to Fig. 9, there is shown the unfortunate location of Phoenix and Tucson downwind from the great copper smelter complex of southeastern Arizona. These major operations are located at Morenci, Inspiration, Superior, Hayden, San Manuel, and Douglas. The smelter operation at Ajo is located southwest of Phoenix and west of Tucson. The cement plant operations at Rillito are an important contributor to air pollution in the Phoenix-Tucson areas.



Fig. 10 — Smelter stacks at Hayden.

seen that the longer lines indicate that the prevailing wind is from the east and southeast at Phoenix and from the southeast at Tucson, unfortunately downwind from the major portion of the copper smelter smokestacks to the east and southeast. The numbers in the circles show the high percentage of no wind for the cities.

All of these smelters operate day and night every day of the year discharging sulphur dioxide and other fumes of combustion from the large amounts of natural gas used in the smelting processes. The stacks utilized are for the most part very high, 500 ft. or more, for efficient operation and for the greatest diffusion of the gases into the atmosphere so as not to cause a major health problem in the immediate area at the smelters.

In recent years great expansion in smelting operations utilizing very high stacks have been installed at Morenci and Ajo, and within the last few years, at San Manuel and particularly at Hayden, Fig. 10 — the latter two practically at the back door of Tucson and Phoenix, which explains the greatly increased smelter discharges in these cities.

This vast number of high smelter discharge stacks continuously operating create the vast, wide spread gray white haze which now exists substantially continuously throughout the southeastern and south-central desert areas of our state. While the pollution from this source does not appear to be highly concentrated in the Phoenix-Tucson area, it is nevertheless almost constantly present to the extent of greatly altering visibility and the all-important esthetic values and appearance of the area so vital to our tourist business.

SCOTTSDALE, ARIZ., May 11, 1971.

Senator HENRY M. JACKSON,
Chairman, Senate Interior Committee, U.S. Senate, Washington, D.C.

DEAR SIR: This letter is to protest the pollution of the air by the existing and the to-be-built coal-fired electrical generating plants in the Four Corners area. Please include this letter of protest as part of the permanent records of the Senate Interior Committee hearings.

I am thoroughly disgusted, frustrated, dismayed and downright angry with the attitude both of the power industry and government (all levels). These days we are all aware of pollution in any form not because all of a sudden we are endowed with noble foresight; rather, it is 20-20 vision in pure hindsight—we have had our noses rubbed in it so long and at an increasing volume, that all but the slow-witted are outraged.

I would like to repeat: I, and many of my friends and neighbors, are thoroughly disgusted, frustrated and dismayed with the attitude both of the power industry and the attitude of many of our government officials. Are the arguments of the people of no importance? Let me remind industry and government, that in other parts of our country, this disgust, frustration and dismay are readily apparent in the increase in bombings, campus upheavals and so on. Just as with the radicals, there is a growing belief among ordinary citizens like myself that social change can not be accomplished by working within "the system."

Having reminded both industry and government of their social responsibility, permit me to proceed to list reasons which are the basis of my protest.

AGAINST INDUSTRY

1. It has been said that industry has taken every practicable step known to modern technology to minimize particulate emissions. It is apparent to me that this is not so. Here in Arizona, Arizona Public Service Company's Area Development Department has been hard at work for years attracting new businesses. They credit their department with establishing 27,000 new jobs in Arizona during the last ten years. In those same ten years, have they had as many people and funds allocated to eliminating pollution from electrical generating plants which would be needed? Let me remind them that it took ten years to land man on the moon and bring him back safely. The power industry has not eliminated pollution because it has been UNWILLING to do so.

2. What industry in the country has increased its dividends every year since World War II and missed only one year of earnings increase? The utilities. It is apparent from this that the utilities plow back little money into research and development which would eliminate pollution not only of the air by the coal burning but visual pollution (by the ever-offensive high-voltage transmission lines).

3. Who is a prime beneficiary of a building boom? The utilities. The Phoenix building pace is second in the nation and of the 12 hot markets, 4 are in California. Let me say here that the Salt River Project which was originally set up to furnish water and irrigation, is now primarily in the power business. In 1969, SRP revenues included \$63.7 million from sales of electrical power and \$1.4 million from water and irrigation. I say it is high time and PAST THE TIME for the utilities who are profiting from an area and its growth to invest in its future. Why should the utilities be allowed to ruin what the people came out here to enjoy?

4. To what industry does the government allow a higher rate of return because of vulnerability to high interest rates (which go up and down)? The utilities. I would like at least the same consideration for the people's welfare.

AGAINST GOVERNMENT

1. I contend that the government has helped to put the citizens in the middle and therefore, government should help to get us out. These plants could be operating on non-polluting natural gas. The federal government is, and always has been, fully aware that energy is the basis of U.S. economy. Yet, it is the government's fault that there is presently a very serious national shortage of natural gas due to the Federal Power Commission's control of producer prices.

2. The federal government is, and always has been, fully aware that energy is the basis of U.S. economy. It is also aware of the fossil fuel limitations. Yet, government has failed to push two promising means of electric power, (1) fusion power which would harness the H-bomb reaction, and (2) development of the fast-breeder nuclear reactor.

3. The U.S. Department of the Interior has developed a new process for converting coal to non-polluting pipeline gas. Why is this not being implemented at the Four Corners set-up?

4. Technological expertise in this country has unlocked the atom and put man on the moon giving us dramatic evidence of U.S. ingenuity, dedication, courage and money. I say the federal government should provide the same type leadership to eliminate pollution from a simple electrical generating plant.

I would also like to register a protest in behalf of the Indians on the Navajo Reservation. Once again in this country's history, he has been infamously abused and I ABHOR IT. The Indians are temporarily happy with their economic gain but they, too, will rebel after having their noses rubbed in pollution. But because they are a timid people maybe they won't. Industry and government should be ashamed.

Last, but not least, I want to impress upon both industry and all government officials that growth, progress, pointless luxuries and all the rest is less—MUCH LESS—important to me than preservation of clear skies. I would rather have the government control the number of kilowatts my family could use than give up my enjoyment of a clear earth, water and air.

Sincerely,

Mrs. CAROLINA BUTLER.

SEDONA, ARIZ., June 5, 1971.

HON. HENRY M. JACKSON,
*Chairman, Senate Committee on Interior and Insular Affairs,
U.S. Senate,
Washington, D.C.*

DEAR SENATOR JACKSON: I attended the hearings of the Senate Committee on Interior and Insular Affairs held at Page, Arizona on May 28 concerning the construction of additional coal-fired power plants in the Four Corners area. I wish to express—for the record, please—my strong opposition to the construction, ever, of more fossil-fuel power plants in that region.

1. At the *operating* efficiency of particulate-removal devices, the amount of solid matter discharged from several large plants in the area is intolerable.

2. No satisfactory device is yet available for removal of sulfur and nitrogen gases. Absolutely no coal-burning plants should be contemplated until an efficient noxious gas-removal system has been developed and proved. No such system is in sight.

3. There must be no risk of degrading the unique scenic values of the Four Corners states. This is a precious heritage that must be preserved for all peoples for all time.

4. The Indians from whose land the coal is being mined oppose the mining operation. The Councils that did give nominal approval is a device imposed on the Indians by the white man. An issue of this importance to the Indians should have had the approval, by vote, of all the Indians of both the Hopi and Navajo tribes. Not only was this not done but the Indians were not told or could they find out about the leases. Further, the lands involved are sacred to the Indians. Disturbing these lands is comparable to giving some organization the mineral rights under Arlington Cemetery.

5. Strip mining, particularly in an arid region where opportunity for regrowth is nil, should not be allowed. We cannot afford to destroy land anywhere.

Please, Senator, vote not for a moratorium on additional coal-fired plants in the Four-Corners area, but for a complete abandonment of further plant construction, and for placing load limits on existing plants.

Respectfully,

CHARLES A. SCARLOTT.

McCULLOCH PROPERTIES, INC.,
Scottsdale, Ariz., May 15, 1971.

HON. HENRY M. JACKSON,
*Chairman, Interior and Insular Affairs Committee,
U.S. Senate, Washington, D.C.*

DEAR SENATOR JACKSON: Regarding the hearing your committee will hold May 28, 1971, in Page, Arizona, on the Navajo Project, I wish to make a few comments on behalf of McCulloch Properties, Inc., and to request that you make this letter a part of the hearing's record.

I am certain that the U.S. Bureau of Reclamation, along with the utilities participating in the construction of the Navajo Project, will fully inform the committee of current and future plans to protect the environment in both the construction and operation of the power generating plant and its related facilities. There is no question for us that the Bureau and the utilities will meet their present environmental commitments, and that they will in the future take all the steps necessary to provide the fullest protection for both the people and the land.

Nor should it be necessary to repeat the arguments about the need for expanded electric generating capacity. As a westerner, and as Chairman of the Interior Committee, you are as familiar as anyone with the growth of the West and of the necessity to meet people needs. Here in Arizona, as you may know, debate has raged about the state's growth. There are some few persons who would close the state's borders to new people and to new industry, an attitude which we consider shallow and demeaning. There are others, and we consider ourselves among them, who recognize that electricity has made a better life possible for hundreds of millions of Americans and that sufficient generating capacity must continue to be made available for the present and future improvement of that life.

Simultaneously, we and the organizations involved in the Navajo Project are aware of the absolute need to protect the environment. No one questions this. Nonetheless, it is absurd to propose, as some individuals and organizations have done, that the future of the West and of the people who live here and who are coming here should be denied. McCulloch Properties, Inc., which is currently building the new communities of Lake Havasu City and Fountain Hills in Arizona, considering a third project and the location of a fourth, has a profound interest in the adequacy of electric generating capacity and in the protection of the environment. In its own developments, ecological protection and enhancement is a major consideration. As McCulloch Properties, Inc. itself has demonstrated, so does it feel confident that the Bureau of Reclamation and the power utilities in the Navajo Project will meet their responsibilities to the people and to themselves, for they are one and same.

We trust that, at the conclusion of the hearing in Page and at the other hearings you will hold on power production and the environment, you will find the Bureau of Reclamation and the utilities are acting in a manner consistent to meeting the requirements of the people, both as to the production of electricity and as to the protection of the environment. We believe you will share the high confidence we have in them.

Should you or your committee members wish to visit our Arizona developments at some future date, we will be pleased to have you as our guests. Meantime, if you should require further data or information about them or our views on the Navajo Project, please let us know.

Very truly yours,

FREDERIC V. SCHUMACHER,
Vice President.

INSPIRATION CONSOLIDATED COPPER COMPANY,
Inspiration, Ariz., May 19, 1971.

HON. HENRY M. JACKSON,
*Chairman, Interior and Insular Affairs Committee,
U.S. Senate, Washington, D.C.*

DEAR SIR: This letter is written relative to hearings to gather detailed information about electrical power production and environmental protection on the Colorado Plateau. We understand that hearings will be held in Albuquerque (May 24), Las Vegas (May 25), Salt Lake City (May 26), Durango (May 27), and Page, Arizona (May 28). We request that this letter be made a part of the record of these hearings.

Inspiration Consolidated Copper Company is a corporation which owns and operates mines and facilities located in Gila County, Arizona, for the production, refining and fabricating of copper. Production of copper is a very important activity in Arizona, since more than half of all the copper produced in the United States is produced in this state. Small quantities of other minerals are produced by this company as by-products. It presently employs approximately 1,950 employees in Arizona with an average monthly payroll of approximately \$1,250,000. In addition to employees, many other people, such as employees of suppliers of fuel, supplies and equipment and persons engaged in transportation and construc-

tion, are directly or indirectly dependent upon the industry for their livelihood.

Substantial quantities of electric power are required in every aspect of Inspiration's mining and related operations, ranging from electrically operated shovels in the open pits to electrolytic cells for the refining of copper. Without electric power the operations could not continue. For over half a century this company has been supplied with electric power by the Salt River Project. In fact, we are very proud of the fact that this company played an important part in the construction of a series of dams on the Salt River which was the genesis of the Salt River Project, and which has made possible the irrigation of the Salt River Valley. When the construction of the Roosevelt Dam was completed in 1911, Inspiration Consolidated Copper was one of the industries which contracted to purchase hydro-electric power, the revenue from which was used to help defray the expense of constructing the dams and other facilities which have proved to be so important to Arizona.

For over 50 years this company has relied upon the Salt River Project for its electric power and continues to do so today. A curtailment or interruption of electric power would result not only in the loss of well over 2,000 jobs in Gila County, Arizona, but a serious curtailment of economic activity elsewhere because this company purchases millions of dollars worth of equipment and supplies which contributes heavily to the economic activity of Arizona and elsewhere.

During the year 1970 the use of electric power by this company, furnished by the Salt River Project, amounted to 19,000,000 kilowatt hours per month.

This company, along with other industries in Arizona, is cooperating in the fight against air pollution. Millions of dollars have already been spent, and many more millions are committed. Control of smelter smoke is a primary objective. Contrary to popular belief, there is no single solution which is applicable to all smelters. In our case, careful and extensive research has led us to believe that at our operation this can be accomplished by installation of new facilities including an electric furnace, at a cost estimated to be at least twenty-five million dollars, and this is being done. Vital to our program to conform to applicable emission standards, however, is an adequate supply of electricity. As we have done in the past, we look to the Salt River Project for electric power.

Not only the livelihood of our employees and others dependent upon our operations, but compliance with air pollution laws, is dependent upon an adequate supply of electricity. Any act which interferes in any way with production of electricity by Salt River Project (or any other producer of power with whom the Salt River Project is connected) inevitably will have an adverse economic effect not only on this company, its employees and those dependent upon them, and its suppliers, contractors and others and those dependent upon them for a livelihood, but also in a larger sense on the welfare of the public as a whole who will benefit from compliance by us with air pollution laws.

We appreciate this opportunity to present our views.

Very truly yours,

R. C. COLE,
Vice President and General Manager.

GRAND CANYON, ARIZ.,
May 27, 1971.

Hon. HENRY M. JACKSON,
Chairman, Senate Committee on Interior and Insular Affairs, U.S. Senate,
Washington, D.C.

DEAR SIR: Please make my statements a part of the hearing record on Thermal Powerplant Construction in the Desert Areas of the Pacific Southwest.

I am a mechanical engineer, trained in the design of thermal power plants. At present I am involved in maintaining public utilities. The work includes predicting future needs, population trends, and utility rates.

Easily available fuel reserves are now used up, and we are exploiting secondary or distant resources. These are more expensive to obtain and result in more pollution. Thus, for several decades our country has been borrowing from future generations. From whom will our children borrow? Already their standard of living is on the decline. Unless we act now to change the pattern of expansion and consumption the United States faces a disaster—of poverty, disease, and hopeless despair.

To build more power plants in the desert areas of the southwest is shortsighted folly. Instead, we must change our practices, now, while we are still in control. By legislating to conform more closely with natural laws we can stay in control.

FIRST, we must *stop building power plants*. Power rationing will probably result. But we will be saving some fuel, and some environment, for future years. We must learn now to do without clothes dryers, frost-free refrigerators, color TV, and decorative lighting. Whether atomic, hydro, or thermal, a power plant destroys environment. When the environment is gone, we die.

SECOND, we must *change utility rate structures*. They are now backwards. Rates should climb as consumption increases, to discourage unnecessary use.

THIRD, we must *stop allowing power companies to advertise* their product. This practice encourages people, most of whom seem to be sadly near-sighted, to rob their own children of a decent standard of living.

FOURTH, (but very important) we must *stop population growth*. The income tax, many health plans, and a reluctance to use practical birth control measures now encourage growth. This kind of growth is no longer good—we are rushing headlong toward a calamity.

These measures are quite simple, but putting them into practice will require great strength. It is within the power of America's lawmakers to avert the collapse of our great country. I hope you will accept the challenge.

WILLIAM N. MATTESON.

SCOTTSDALE, ARIZ., May 24, 1971.

Senator HENRY M. JACKSON,
Chairman, U.S. Senate Interior Committee,
Washington, D.C.

DEAR SENATOR JACKSON: While I am fully aware of the necessity for more power requirements, I believe that the headlong effort in creating fossil-fueled power plants in the Southwest should be curtailed and reconsidered. This is one of the few remaining spots in the United States with insignificant air pollution. The Grand Canyon of the Colorado, a unique canyon on the face of the earth, will undoubtedly suffer from the results if efforts continue as they are now. The whole idea of putting power plants in the low population areas to serve the populated areas needs to be reconsidered.

Possibly a significant step could be taken if power companies were to restrict their advertising of additional electrical power appliances. For example, yes, we need air conditioners but why use mass media advertising to make everyone want air conditioning? The same could be said for "All Electric Living."

I believe that the use of geothermal energy deserves investigation.

It is felt that the all-day hearing in Page was not adequate to hear all of the interested people and organizations in this area. I also object to holding such hearings in areas over three hundred miles from the large population centers of Tucson and Phoenix.

Thank you for your consideration of these views.

Regards,

DONALD L. SHEPPARD.

APPENDIX 6

Communications received from concerned citizens across the Nation.

LOS ALTOS, CALIF., June 1, 1971.

HON. HENRY M. JACKSON,
Chairman, Senate Committee on Interior and Insular Affairs, U.S. Senate, Washington, D.C.

DEAR SENATOR JACKSON: We wish to express our grave concern over the mammoth electrical power generating plants and associated transmission lines which have recently bloomed in the southwest region of the United States. In our view these plants have been and are being constructed in the desert regions of the southwest because their owners and operators do not wish to pay the economic costs of generating this electrical energy in a manner environmentally acceptable to the communities they serve. Yet the environmental effects of these plants on their present surroundings is just as unacceptable and destructive as if they were located in downtown Los Angeles or Phoenix.

In addition to the aesthetic blight that these giant plants and their transmission lines produce upon these relatively untouched desert wilderness areas, the accompanying increased water salinity of the Colorado River and its utilized tributaries, the grossly increased air pollution in a heretofore unpolluted, clean, air shed, and the importation from Appalachia of strip mining techniques, man's most destructive exploitation of land, are all unacceptable.

We strongly protest the rapid destruction of the most valuable assets of one region for the short-term and questionable gain of another region. Appropriate federal standards and regulation which would curtail the dumping of waste heat into the Colorado and its tributaries, prevent the surface mining of coal, and not allow the deterioration of air quality beyond the level of that existing over the prior ten years, would prevent the inexcusable activities we are now observing.

Power companies, just as any other industry, must be required to bear the full economic costs of treating our air, water and land as a valuable trust, not to be mistreated or altered in character. If they attempt to dodge this responsibility by moving farther away from the urban centers they serve, then it must be the federal government's job to deal quickly and firmly with these violators of the public trust.

Please make this letter a part of your hearing record.

Sincerely yours,

LOWELL SMITH, *Chairman.*

BELMONT, CALIF., May 31, 1971.

Senator HENRY JACKSON,
*Chairman, Senate Interior Committee,
Senate Office Building, Washington, D.C.*

DEAR SENATOR JACKSON: I am truly sorry that I did not learn of your committee's hearings regarding the proposed power plants in the Four Corners region before the date of those hearings. I hope it is not too late to add my voice to those protesting the development of those plants and of the necessary exploitation of the land by strip-mining.

I was fortunate to have grown up in your beautiful state of Washington and am now unfortunate to be living in an area of California rapidly being destroyed because of increasing population and resulting consumer wastefulness of natural resources. I can think of nothing which teaches the necessity of considering man in balance with nature better than moving from your state to this one.

Our natural resources are not infinite; the quality of life does not depend on electric combs, tooth brushes, blankets; the desire for more gadgets is infinite. It is time we say we cannot support such trivialness.

I support the idea of a moratorium on power plant construction until a national energy policy is developed.

Yours truly,

JOLINE BETTENDORF.

ST. LOUIS, Mo., May 31, 1971.

HON. HENRY M. JACKSON,
Senate Committee on Interior and Insular Affairs,
U.S. Senate, Washington, D.C.

DEAR SENATOR JACKSON: My letter is to urge that a moratorium on the building of power plants in the Four Corners area be arranged so that power needs can be studied and the need carefully established and adequate pollution controls can be designed before construction takes place.

I have visited the Lake Powell area and I cherish the beauty and smog-free skies of that region. I further feel the Navajo and Hopi people in those areas must be respected regarding their land rights.

I believe that all other alternatives need study before the power plant program goes through.

May I ask that my letter be made a part of the hearing record as per the May 26, 1971 hearing in Salt Lake City.

Thank you for this.

Respectfully,

PAUL DAVIS.

BATTLE CREEK, MICH., June 2, 1971.

Senator HENRY M. JACKSON,
Chairman, Senate Interior and Insular Affairs Committee,
U.S. Senate, Washington, D.C.

DEAR SENATOR JACKSON: I am writing to state my strong opposition to the chain of power plants being built in the "Four Corners" area of the Southwest.

The environmental destruction associated with these plants is much too great to tolerate. It would be far better to develop a power conservation policy and reduce the need for more power than to continue constructing such plants across the country—and especially in the Southwest, a region of national parks and wildernesses.

Please include this letter in the hearing record in opposition to the construction of these power plants in the Four Corners area.

Sincerely yours,

WILLIAM DICKERMAN.

MORRISTOWN, N.J., June 2, 1971.

HON. HENRY M. JACKSON,
Chairman, Senate Committee on Interior and Insular Affairs,
U.S. Senate, Washington, D.C.

DEAR SIR: As an admirer of the Southeast, in particular the Four Corners Area, I strongly urge, in fact demand, that the building of power plants there be stopped until it is assured that there will be no air pollution resulting.

Living in the New York megalopolis, I am in a position to appreciate the virtues of clean air, and know that no amount of electricity produced justifies such exploitation.

Is it not a fact that the large dams such as Hoover and Glen Canyon have never used all the power available for their generators? Hopefully the coal burning utilities will not be allowed to become a fiasco such as the Bureau of Reclamation has in this area.

Please include this statement with the May 26th hearing record.

Very truly yours,

MARY ELLEN BLAIR
Mrs. Laurence R. Blair.

LOS ANGELES, CALIF., May 20, 1971.

HON. HENRY M. JACKSON,
Chairman, Committee on Interior and Insular Affairs,
Senate Office Building,
Washington, D.C.

DEAR SENATOR JACKSON: It is appalling that power generating plants and their accompanying strip mines are proposed for the four-corners region. Even more appalling is that two of these plants have already been built without the issue being brought to the public's attention.

I have been in the area, its unspoiled vistas and unpolluted air have made it justly famous. Now that air and the scenic environment is threatened by

the continued existence of the Farmington Plant, which, until recently, put out more fly-ash and soot than Los Angeles and New York combined. This plant is bad enough—we must not allow others to be built in the four-corners area.

The power industry has created a vicious circle to justify continual expansion of fossil fuel plants. They propagandize the people toward greater and greater consumption of electricity and then use this artificial demand to justify further generating facilities. We need a rational energy policy. Destroying the aesthetic values of the four-corners region and impinging upon Indian land is not a rational way to manage resources.

I urge that Federal legislation or administrative action prohibit the proposed generating plants in the four-corners area.

Please include this letter in the record of your Committee's hearings on the four-corners power plants.

Sincerely,

JOSEPH TASKER EDMISTON.

STOUGHTON, MASS., May 14, 1971.

DEAR SENATOR JACKSON: To me, the Four Corners region does not seem the best place to construct multiple power plants.

1. The existing plant at Fruitland has proved ecologically damaging. Tons of fly ash daily cloud the air, reducing visibility in an area of unparalleled scenic beauty, location of 20 National Parks and Monuments. Do we want air the quality of that found in Los Angeles?

2. Present laws have proven ineffective to prevent this insult to the environment.

3. The Colorado River Basin can ill afford to provide water to provide power for distant communities which have a more abundant source of cooling water. Withdrawing large amounts of water will further increase the concentration of salts which is already at a high level, adversely affecting its use in Mexico.

4. Most crucial, ecological damage from these power plants threatens the water supply, even the very survival of the life and culture of the Hopi and Navajo people. Strip mining, roads and careless construction are already ruining the land at Black Mesa.

I am firmly opposed to continued construction of power plants in the Four Corners region. If existing plants continue operation, I urge that they be required to reduce emissions.

Please examine alternatives to building these plants. Very important is to educate people to use less power. I am unwilling to sacrifice the air which gives the life to pop-up toasters and electric toothbrushes.

Each of us must learn responsibility for the resources which we all share.

Thank you very much for holding these hearings.

Sincerely,

HERMINE HURLBUT.

BOSTON, MASS., May 15, 1971.

DEAR SENATOR JACKSON: I want to express my opinion and opposition to the project of setting up multiple power plants in the Four Corners region. It involves 20 National Parks and Monuments—playground of nature and the home of wild animals. It can destroy the ecology and beauty of the area.

The existing plant at Fruitland has proven an ecological failure. The fumes cloud the sky, cover your lungs with soot. It can become another L.A., N.Y. or Boston. Present laws have proven to be ineffective to prevent this insult to the environment.

The Colorado River Basin cannot afford to provide the water for the power plants. Withdrawal of water will increase the concentration of salt, which is already at a high level.

The ecological damage to the environment from the power plants threaten the life of the inhabitants—Hopi and Navajo Indians. Strip mining, roads and careless constructions are already ruining the land at Black Mesa.

The continuous increase in construction of power plants will insure a quick death of the beauty of this planet. People should be educated to use less power and more effectively. We are using electricity without consideration that it has to be produced at the expense of the air and other national resources. We don't need to have every road, shop lit up all night. We don't need all the super powerful stereo, stoves, lights, TV—by using less power, we will not need the new power plants.

We should all go to sleep when it gets dark, or else be thrifty in the use of light. Every room in the house does not need to be lit up so that you could watch TV in the living room.

Thank you very much for holding these hearings. Please make every effort to give nature and man a chance to survive. Please include this statement in your hearing record.

Yours Truly,

VICTOR KULVINSKAS.

HOUSTON, TEX., May 30, 1971.

HON. HENRY M. JACKSON,
Chairman, Senate Committee on Interior and Insular Affairs, U.S. Senate,
Washington, D.C.

DEAR SIR: I regret the delay in writing you of my views on the installation of coal fired power plants in the southwest desert country. I ask that my comments be made part of the hearing testimony.

As I have been in the area many times, including WW II military service, it is difficult for me to write without some emotion. It is not the kind of subject to be felt in terms of facts. Perhaps, though, we are at a point in the despoilation of the land and the misuse of its resources where emotion has a place—to get attention.

The message that we must come to understand as a people is that there are limits to the size of our land and the extent of its resources. And that there are other than economic values. Part of the cost of the electricity is the damage done to the area. Society must put all of the cost elements into the equation, for industry has repeatedly shown that it will ask only one question—"Is it profitable, now?"

Planning and regulation is essential in any balanced approach to the use of resources and it seems clear that it must come from the Federal Government. Local governments have repeatedly demonstrated a lack of both authority and interest necessary to bring about a balanced view. In summary, I urge a very careful weighing of all the factors in the equation of needs.

Sincerely yours,

J. S. PORTER.

SCARSDALE N.Y., May 21, 1971.

Senator CLINTON P. ANDERSON,
Senate Office Building, Washington, D.C.

DEAR SENATOR ANDERSON: We oppose further strip mining and further construction on the Four Corner Power Project in the South West.

Immense areas have already been stripped in Western New Mexico and the Black Mesa region of Arizona. Consider the environmental damage of seven power plants emitting tons of fly ash and noxious gases in the wide open spaces of the area. Consider the cultural destruction of the Hopi and Navajo Indians. Haven't our so called great pioneers created enough damage? Did they really make America Great? Are we to continue in their noble tradition to make it great for us at the expense of future generations? Did they listen when in 1864 George Perkins Marsh published a book called "Man and Nature, Or Physical Geography as Modified by Human Action"? This great Vermont scholar's words went unheeded and huge dustbowls were created by the greed of the buffalo hunters to mention only one of the dangers he saw as we "progressed" westward.

Can this Congress show the world that man can be noble, that he is willing to pay the price for his scared way of life, that he is willing to concede that the Indian is a noble creature who wants to keep his cultural ways and be truly proud of his heritage?

Or will this Congress do what previous ones have more or less done—that is—do what is politically expedient and what is politically expedient is what the powerful lobbyists are pressuring Congress to do? Can Congress listen to a small voice which has I am certain a lot of echos but not powerful enough to present a lobbyist's pressure?

If Congress can appropriate monies for space ventures, which I approve, and if it can stop the foolish expenditures on the S.S.T. (congratulations!), surely it can appropriate monies to find less ecologically dangerous sources of energy to supply our needs. I would not object to being taxed for the true cost of administering services in our country. I only object to the immense "defense" costs affecting our economy, the Vietnamese people, and the untold price we will have

to pay in the future, mental illness for instance, as a consequence of our involvement. But I am straying from my subject. I urge a stop to the Four Corner project.

Sincerely,

YVELINE HARVEY.

PORCUPINE, S. DAK., May 20, 1971.

DEAR SENATOR ANDERSON: I realize that the country's population must have power to satisfy its needs, but question if this need be done at the expense of losing one of the precious remaining areas of beauty and natural charm. It would seem that some type of control could be used to prevent the irreversable action of destroying land and air needed by all man kind, not only for health but for spiritual rebuilding.

Why must the progress of one part of the population, result in the destruction of items of such great meaning for another group, even the life style—of the Navajo and other Indians of this area.

I sincerely hope that something can be done to bring this pollution problem under control now before it is too late, before we can only remember the glory of before.

An important period of my life was spent living on the Navajo reservation among the reassuring beauty of nature, with the magnificent big blue sky and the happiness of the Navajo people. The hopelessness I feel when I see the destruction and waste in the name of progress is overwhelming. I can only speak out and make my voice known in the hopes of helping bring about sensible control before it is too late. I'm positive that something can be done to control the pollution and still allow for reasonable progress. For the sake of eternity, don't let prices become an issue. What amount of money can purchase the marvel that has already been lost.

Sincerely yours,

EVELYN M. HOYT.

NEW YORK, N.Y., May 20, 1971.

Senator CLINTON P. ANDERSON,
Senate Office Building,
Washington, D.C.

DEAR SENATOR ANDERSON: As a graduate of the University of New Mexico, and joined by my husband, we wish to register our strongest opposition to the continued construction of coal-fired power plants and destructive strip mining.

Sincerely yours,

Mr. & Mrs. F. CINQUEMANI.

SOUTH AMHERST, MASS., May 19, 1971.

Senator CLINTON P. ANDERSON,
Senate Office Building,
Washington, D.C.

DEAR SENATOR ANDERSON: I wish to go on record as opposing any further construction of coal fired power plants and accompanying transmission lines and strip mines in the southwest. Either we must find other ways of generating electric power, or we must find ways of economizing that which is already available. It will not do for us to scar the landscape and the lives of those who could call themselves Americans before we white settlers invented the American dream.

Before we build new power plants, let us curb extravagant usages of electricity. We must not sacrifice our land to the appliance or the neon sign. What is saving us time right now may make all the time in the world someday futile, if we have not that balance in our lives that makes the air worth breathing, and the land worth preserving.

Yours sincerely,

WILLIAM MOEBIUS.

AKIBA HEBREW ACADEMY,
Merion Station, May 20, 1971.

Senator CLINTON P. ANDERSON,
Senate Office Building,
Washington, D.C.

DEAR SENATOR ANDERSON: We, the Student Association of the Akiba Hebrew Academy Lower School, strongly oppose, and urge an immediate injunction against, any further development of coal-fired power plants and strip mines in the

Southwest. We ask your committee to consider less environmentally destructive sources of power, and measures more economically beneficial for the Navajo and Hopi Reservations.

Respectfully,

MIRIAM HARTMAN,
Secretary.
RUTH S. KAPLAN,
Sponsor.

SANTA BARBARA, CALIF., April 20, 1971.

HON. HENRY M. JACKSON,
Chairman, Senate Interior Committee,
U.S. Senate, Washington, D.C.

DEAR SENATOR JACKSON: The flagrant rape of our environment by special interest groups is accelerating with such speed it staggers the imagination and arouses the righteous anger of concerned citizens everywhere. A hideous example is the open pit mining of the Black Mesa of Arizona where the top of the sacred mountain of the Hopis and Navajos is being ripped, torn, and gouged to install an assembly of monstrous electric power plants. The resultant smog blight will smother an area a thousand miles wide.

Four Corners is one of the very few areas left in the country where one can still breathe clean air and experience the exhilaration of clear and uninterrupted vision. When this is lost, and the Grand Canyon can no longer be viewed, what will be left for current and coming generations of Americans?

Some of the Indians who think they will see revenue rising from this operation have been brainwashed by the Bureau of Indian Affairs. When their country not only loses its unique beauty, but also its water supply and its crops, they will truly feel that they have made a poor deal, and one which is irreversible. The heritage of their generation will be lost forever. What more can the white man do to the Indians?

Our Congressmen, the overseers of our nation, must halt this power grab which is threatening to envelop the entire Four Corners area and rob all Americans of their last great refuge from devastation and smog.

Respectfully yours,

Mrs. RICHARD M. PAGE.
DOROTHY C. PAGE.

GREENBELT, MD., May 6, 1971.

HON. HENRY JACKSON,
Chairman, Senate Interior Committee, Senate Office Building, Washington, D.C.

DEAR SENATOR JACKSON: I'm sure you must be besieged with mail concerning the Four Corners power plants. At least, I would hope that the American people are up in arms about this "wasting" of the Southwest.

I was born and raised in the Southwest and my love for the land is intrinsic and profound. When I think of this beautiful and unique ecology purchased so cheaply for the sake of MORE energy to fuel our already overtechnologized metropolitan areas, I feel bewildered and terribly discouraged.

When, I wonder, will the people have some input in the decision-making processes regarding use of the land? When will the objectives and priorities be other than economical?

I have researched the background history in land-use policy in this country and I am aware of the dearth of concern for using the land in the "public interest." I am also aware of the national land-use policy bill that you submitted recently and I support this piece of legislation whole-heartedly.

I am sure you already know the issues of concern regarding the Four Corners plants—the fact that a significant portion of the scarce water resources of the Colorado Basin will be consumed, the effects of extremely heavy air pollution, the extensive strip mining of Indian lands, etc.

Building six additional generating plants which will provide energy for people in Los Angeles to brush their teeth with their electric toothbrushes at the expense of the fragile desert ecology is, perhaps, the most wanton misuse yet of our shrinking natural resources—the most valuable resource being our land.

Sincerely,

Mrs. KATHLEEN WORD.

WOODLAND HILLS, CALIF., May 12, 1971.

Senator HENRY M. JACKSON,
Chairman, Committee on Interior and Insular Affairs,
 Washington, D.C.

DEAR SENATOR JACKSON: I sometimes think we, the public, shouldn't have to write our Congressman to tell them what we think or what they should do. Shouldn't we expect our representatives who are much better informed than most to know the right thing when they see it? I am speaking now of the Black Mesa power problem.

My wife and I seriously object to the erection of steam generating plants on the Indian reservation. This is an attack, for one thing—an unconscionable attack—on an age old culture that rivals in insult and destruction, the old attacks on Indian life in the last century.

But what about the pollution? It is idle to insist that the nation needs more power. Especially in this area where so much power is being wasted. A trip we made to Las Vegas where gambling machines were lighted all night and all day without being used startled us. High rise buildings too, needn't be lighted at night. We don't need to waste so much power.

We urge you to act to halt the erection of coal fired power plants in this area. Will you kindly put this letter on record for the hearing on May 24.

Sincerely yours,

EDWARD and NELLIE NEWMAN.

FORT GULICK, CANAL ZONE, May 19, 1971.

Senator CLINTON P. ANDERSON,
Senate Office Building,
 Washington, D.C.

I wish to go on record as opposing any further construction of coal fired power plants, strip mines and accompanying transmission lines in the Southwest of the United States. I cannot find the words to express my surprise and disgust in tearing the Indian land. After so many years we are still taking land and life away from the first Americans.

Sincerely,

PAUL R. FRANSDEN.

CAMBRIDGE CITY, IND., May 24, 1971.

Senator CLINTON P. ANDERSON,
Senate Office Building,
 Washington, D.C.

DEAR SIR: I would like to go on record in the strongest terms in direct opposition to any further construction of coal fired power plants in the southwest or any other location in the U.S. Please let us stop fouling our air with the pollution from coal and destroying the land with strip mining to provide the fuels.

Sincerely yours,

LEONARD BUCK.

ROCK SPRINGS, WYO., MAY 24, 1971.

HON. HENRY M. JACKSON,
Chairman, Interior and Insular Affairs Committee, New Senate Building,
 Washington, D.C.

DEAR SENATOR JACKSON: Both my wife and I view with great apprehension and disapproval the threat to the American Southwest environment coming from the producers of electrical energy. We urge the suspension of power projects in the Southwest. We urge a thorough national study of the environmental ill effects of coal-burning power generation and of strip mining. We urge the enactment of a non-degradation policy for the air and land of the scenic Southwest. We urge the government to take IMMEDIATE steps to REDUCE the DEMAND for electrical energy.

We are not against progress, but neither are we such fools that we cannot make the distinction between that which is palmed-off by the business world as "progress" and that which we know as "quality of life."

Thank you Mr. Jackson for hearing our feelings on this matter and we ask that our views expressed here be included as part of the hearing record.

Sincerely,

ROBERT and JANICE DOSER.

SAN FRANCISCO, CALIF., May 24, 1971.

Senator HENRY M. JACKSON,
Chairman, Committee on Interior & Insular Affairs, Senate Office Building,
Washington, D.O.

DEAR SENATOR JACKSON: It is my understanding that you are holding field hearings this week on thermal power plant construction in the Four Corners region.

In each of the past two years I spent a week's vacation near Mexican Hat, Utah, using Farmington, New Mexico as a starting point. Both times I drove past the Four Corners Power Plant. It pumps out an astonishing amount of debris which lingers as a yellow haze in the sky and is visible for over 50 miles.

To envision that this sight is to be multiplied several times over with the construction of additional power plants is discouraging if not downright outrageous. At some point it seems we must draw the line and stop desecrating the few remaining places where our citizens can enjoy open space and clean air.

Consequently, I oppose any further construction of power plants in the desert areas of the Pacific Southwest and believe that "zero" pollution controls should be imposed on those that do exist. I urge you to take the same position in the name of all of us, now and to come, who are looking for a cleaner, healthier tomorrow.

Will you please see that this letter becomes a part of the official hearing record.

Sincerely yours,

GLENN B. MEAGHER.

MONTEREY PARK, CALIF., May 24, 1971.

DEAR SENATOR JACKSON: The establishment of a moratorium on the building of power plants as planned in the Southwest is certainly a wise procedure to follow. To me it would seem that much more consideration and research should be put into these plants. Why, I asked, should places like the Grand Canyon, Monument Valley, Lake Powell and Lake Mead etc. be polluted unless it is absolutely necessary. And I doubt if it is absolutely necessary. There are many other possibilities which should be looked into. Even if these are not feasible at the present, I am sure that the utmost in technology is not planned for use on these plants in the way of environmental control. This at least should be required.

I sincerely hope our government will keep its word and show us that it really is committed to cleaning up the environment by stopping this project until all environmental considerations are solved and researched.

Thank you for your consideration and please include this as part of the record.

Sincerely,

ROGER McCONNELL.

HOLDEN, MASS., May 18, 1971.

HON. HENRY M. JACKSON,
Chairman, Senate Committee on Interior and Insular Affairs,
U.S. Senate, Washington, D.C.

DEAR SENATOR JACKSON: No further construction of coal-fired thermal power plants in the Four Corners area of the southwest should be permitted. The catalog of adverse environmental impact from such plants on this area reads like a horror story. Virtually every natural resource would be degraded; scenic beauty, clean air, land, and especially the already-overburdened Colorado River.

We urge that the Four Corners Power Plant program be terminated.

Please include the statement above in the hearing record.

Thank you.

Mr. and Mrs. JAMES S. DEMETRY.

DISTRICT HEIGHTS, MD., May 18, 1971.

Senator HENRY M. JACKSON,
Chairman, Senate Interior and Insular Affairs Committee,
U.S. Senate, Washington, D.C.

DEAR SENATOR JACKSON: I oppose building more fossil fuel electricity generating plants in the Four Corners region than are absolutely necessary for the needs of the immediate area. Generating power here for use in other distant areas is needlessly and senselessly detrimental to the area.

Is this land famous for clean air to be polluted like the populous East Coast? It could easily happen if all or more of the seven proposed plants are built.

The result could drastically affect the lucrative tourist and recreation business. I think the beautiful scenery of the area would be seriously damaged by the smoke stacks that will pierce the sky.

In a land already needy of water, it doesn't make sense to use it to populate and pollute the area. Generate your electricity in the neighboring relatively water rich areas, such as western Colorado.

I further fear that strip mining, unregulated in this area, will run rampant over the landscape. The lessons learned in Tennessee, Kentucky, West Virginia, etc. should be applied here before things get out of hand.

Sincerely,

MICHAEL L. HILL.

BERKELEY, CALIF., May 17, 1971.

HON. HENRY M. JACKSON,
Chairman, Senate Committee on Interior and Insular Affairs, Senate Office Building, Washington, D.C.

DEAR SENATOR JACKSON: Seven times before the dam was built, I floated through Glen Canyon of the Colorado River to enjoy the wilderness solitude. Scanning the vastness of the area from high points above the river, I thought this part of our country would remain undefiled for people to enjoy it.

At various times I had relished the serenity, clean air, and the beauty of the Navajo country around the Four Corners. Now comes "Progress" in the form of strip mining, ground water depletion, air pollution from coal burning, and destruction of superlative scenery by those who believe in material things.

Let us just assume that the areas of the Four Corners and Glen Canyon are *not there* and that we *can* live without more electric power—especially from materials and plants in what has been one of our last great beautiful, clean areas.

Imagine that magnificent Kaiparowits Plateau scarred with transmission lines and overlaid with a cloud of pollution! The heart of the Escalante treated the same way!! All for the benefit of people jammed into cities in other areas!!! It boggles the mind.

Very sincerely yours,

Mrs. HAROLD C. BRADLEY.

STATEMENT OF STAN STEINER, SANTA FE, N. MEX.

I am a writer. My name is Stan Steiner.

As a young man I came to the Navajo and Hopi lands. That was in the summer of 1945. For years I have wandered on these roads, before there were roads, where there are no roads. Through the years I have heard and seen the history of this land, and the death of this land. I would like to tell you what I have heard and seen.

Let me begin at the beginning.

Not too long ago there was a drought here. It did not rain for four years. The earth became very dry. Many plants and animals died of thirst. The people had little food. In fear, the Earth People asked their animals friends why this had happened. They were told: "The Water People had planned to take the rain away from the Earth People because the Earth People had forgotten to respect sacred things. The Earth People had become dishonest and were destroying many holy things". The Earth People knew in their hearts they had behaved in this way. And so, they agreed to respect sacred things. And "not to do things that were wrong and dangerous". And "to be kind to each other and not to be selfish". And then it rained. It rained hard.

This is how the Old People of the Diné, the Navajos, tell the meaning of their "Ceremony for Rain". This is what happened to them. This is what is now happening again.

Once more it began with the water. Not too little water, in the form of a drought. But too much water, in the form of snow.

In the winter of 1947 there was a blizzard. To this Act of God was added an Act of Congress, in the form of the Long Range Navajo and Hopi Rehabilitation Act. Some may remember that was the time of the Berlin Airlift. It was as well the time of the Navajo and Hopi Airlift, when food was parachuted to starving humans and starving sheep. Congress was so grieved that it passed the Long Range Act (of 1950) providing \$88,570,000 to "rehabilitate" the tribes. Of this \$500,000 was designated for "Surveys and Studies of Timber, Coal, Minerals". Of this \$197,000 was given by the Navajo tribe, in 1952-1954, to the College of Mines, at

the University of Arizona, and the New Mexico Institute of Mining and Technology for "Mineral Resources Surveys". At the time, I remember a tribal official telling me, half elated, half troubled, "They say we have more coal than the State of Pennsylvania". He was not exaggerating.

"Almost simultaneously with the passage of the act (the Longe Range Act), private industry began to extract sub-soil riches from the reservation" noted Dr. Lawrence Kelly, in *"The Navajo Indians and Federal Indian Policy"* (University of Arizona, 1968). So it was that in 1951 the Navajo Tribal Mining Department was established, with the paradoxical goals of: "(1) protect Navajo mineral resources", and, "(6) promote mining and milling operations", by giving out "free drilling permits". In a few years, mining operations on the reservation increased from 3 or 4 a year, to 133 in 1954, (*Navajo Yearbook*, 1957).

The Coal Rush was on!

One evening, in the late fifties, I was invited to the home of my friend, John McPhee, the Administrative Assistant to the Chairman of the Navajo tribe. He was not a Navajo. He was not even an Indian. He was a former officer of the Arizona Mining Association, and he wanted to get the coal mined.

At a meeting of the tribal Advisory Committee someone had asked me if I was writing another "*Laughing Boy*". Maurice McCabe, then the Executive Secretary of the Navajo tribe, had pointed to McPhee, the only white man in the room beside myself, and had said, "John McPhee is the only '*Laughing Boy*' we have around here these days".

McPhee was angry. He said that he had recently asked the chairman of the Santa Fe Railroad if a track could be laid to Black Mesa. So the coal could be transported out of the reservation. "I wouldn't touch that coal", the railroad man told him; "No one would touch it".

It was a low grade coal. It crumbled in the hand. It was too poor to be profitably shipped, by rail or truck. Coal of such cheap quality cannot be burned, by local ordinances, in Los Angeles, or New York City. Yet there were hundreds of millions of tons of this coal.

Some way had to be found to use the coal. Why, McPhee didn't say.

Now we know why. In those years, fifteen years ago, the surveys and the plans for the urbanization of the Southwestern scenery were already being prepared. The huge power grid systems that were to use our water and energy to generate more smog and electricity for Los Angeles and San Diego and the Las Vegas strip were already on the drawing boards. For it is for this that the several billion dollar complex of power plants and strip mines, from the San Juan to the Mohave, across the sacred and beautiful lands of the Navajos and Hopis, are to be built.

This is why when I requested of a Vice President of the Salt River Project, a prime contractor on the "Navajo" Power plant, that he tell me what he thought of the fears of the Navajo shepherders that their pastures would be ruined, he scoffed. "We don't merely manufacture electricity. We manufacture progress", he said; "It's what we call the 'Total Package' concept, that built Phoenix.

In the virgin deserts of Western New Mexico a second Phoenix has already been planned. The "Super City" of one quarter of a million people has been blueprinted by the Westinghouse Corporation, at the request of the Four Corners Commission, as a "Model City for Indians", (*U.S. News & World Report*, June 23, 1969). But, the Indians were not involved in its planning. They were not asked. They were presented with the "Total Package".

This is why fears of the pollutants from a single power plant, or even the whole power project, are but shadows of the smog that will befall the land. One talks of the urbanization of the Southwest, and one talks of the genesis of New Jersey in the desert. And then the red buttes of Monument Valley will indeed pale before the grey cliffs of the Hudson. And Lake Powell, like Lake Erie, will be "Too thick to swim in, but not thick enough to walk on".

This is why the vast project had to be kept confidential. No public hearings were planned, though the planning has been going on for fifteen years.

That is why the Salt River Project could proclaim, with a straight face, that it sought "garden-type industry (that) is smokeless and non-pollutant in nature". And that is why the Senior Vice President in Charge of Operations of the Peabody Coal Company, Mr. E. R. Phelps, could write in the "*Navajo Times*" (September 3, 1970), that "any open pit left after the (strip) mining will tend to collect and hold water and should make acceptable lakes for recreational purposes". On Black Mountain? In the Southwestern desert? Had the Senior Vice President in Charge of Operations ever visited Arizona?

This is why the desecration of the sacred lands of the Navajos and Hopis by the strip mining operations was provided for, by law, from the very beginning. In Section 5 of the Long Range Navajo and Hopi Rehabilitation Act of 1950 it was written: "Any restricted Indian lands owned by the Navajo tribe . . . or by the Hopi tribe . . . may be leased by the Indian owners with the approval of the Secretary of the Interior . . ."

This is why in 1956 the Public Law 485 was enacted "To Authorize the Secretary of Interior to Construct, Operate and Maintain the Colorado River Storage Project, and Participating Projects, and For Other Purposes". Some said these projects were to supply water for Navajo farmers. But, the "*Navajo Yearbook*" (1957) noted, "This Act authorized the construction of the Navajo Dam and Reservoir, to provide necessary irrigation water, but it did not provide for the construction of the Navajo Irrigation Project". In that same year, 1956, the building of the Glen Canyon Dam began. Both these dams were planned to supply water for the future power plants. So was the proposed dam in the Grand Canyon. One month after the Peabody Coal Company was granted its "drilling and exploitation contract", in 1966, the Secretary of Interior recommended federal legislation to sanction use of the Glen Canyon water. Soon after the "*Navajo Times*" reported the Interior Secretary favored cutting back water for the Navajo Irrigation Project by 198,000 acre feet.

"We have been skinned too many times, and we are getting skinned again", said Carl Todacheene, a Navajo Tribal Councilman.

This is why the Navajo and Hopi Tribal Councils were deceived. "It was done without adequate deliberation", complained Navajo Tribal Councilman, Keith Smith, of the vote on the coal mining contract; "The Council never has good discussion on it. We were asked, in effect, to say yes or no to the proposal".

One day last summer, when I was compiling the "*Black Mesa Fact Sheets*", at the request of several Navajo and Hopi leaders, I visited the Hopi Tribal Office, in New Oraibi, Arizona. A tribal official was laboriously reading through the pile of documents on his desk. He looked up wearily.

"What's that?", I asked.

"The coal contracts", he said.

"You signed them a year ago. Why are you reading them now?", I asked.

"Oh", he said; "The Tribal Chairman told me. You better read them thoroughly. We signed them, but no one read them thoroughly".

"And what do you think?"

"I think we could do better".

This is why the Salt River Project could order the generators for the "Navajo" Power plant in December, 1967, almost two years before the Navajo Tribal Council voted to permit the construction of the power plant, in September, 1969. Knowing the tribes were kept in the dark about the breadth of the project, and ill-informed about its particulars, the planners treated them with disdain. If not simple contempt.

This is why a recent issue of "*Dine Baa Hani*", a Navajo tribal newspaper, had the headline, "YOU ARE BEING ROBBED! !"

In a sense, everyone living in the Southwest has been kept in the darkness that was imposed on the Indians; the Chicanos, the Anglos, the scientists, the ranchers, the local government officials. The plans to unalterably change the environment were being made, privately and secretly, without the people knowing.

But, the earth cannot be kept in darkness.

An old Southwesterner, who was an official in the Bureau of Land Management years ago, tells this story: When the city of Phoenix was being built, he accumulated 300 requests for wells. He refused to sign them. One day an order came from Washington: Sign them! He telephoned his boss. And I told him, he says, that our hydrologists tell us that if we permit that many wells in twenty five years the water level will be so low, it will be prohibitive to drill for water. But, the order came back from Washington: Sign them! You can't stop progress!

Well, he winks: That was fifteen years ago. I guess we got ten years left. After all, the earth don't care how foolish human beings are. Does it?

Instead of ornery, old Southwesterners and tribal Indians and archaic Chicanos who still believe in the sacredness of the Mother Earth, the canyons and mountains, the rivers and deserts, our beautiful land is to be transformed into a chemical formula of electricity to run a technological euphoria of bulldozers powered by computers and Sunset Cities for the dying and nostalgic television Westerns. For those who dare to remember other days.

This is the "Total Package".

And so we come in the ending, once more, to the beginning. The Earth People had forgotten to respect sacred things. The Earth People had become dishonest and were destroying many holy things. The Earth People were desecrating the Mother Earth. So a drought fell upon the land.

This was said, not too long ago, by the Old People. It was said that the Indians listened and they learned. Will the Whiteman listen and learn?

CHICAGO, ILL., May 28, 1971.

HON. HENRY M. JACKSON,
Chairman, Senate Committee on Interior and Insular Affairs, U.S. Senate,
Washington, D.C.

DEAR SENATOR JACKSON: Just a short note to inform you of my feelings toward the proposed construction of thermal power generating plants in the Colorado Plateau. I strongly oppose such construction on the grounds that past performance has alerted us all to the dangers imposed upon our environment by such plants and their associated supply activities. I fail to see the rationale behind constructing power plants in one of the last remaining wilderness areas of our country to supply power to consumers living hundreds of miles away from the plants, except perhaps that realized by the power consortium that they would not have to install strict pollution controls and other measures that would reduce their profit.

Personally, I love this part of our country more than any other area I have been in, and if its magnificent grandeur, wildlife, and native population is despoiled any further, I don't see how I can have faith in the future of our nation.

Very sincerely yours,

DAVID L. SCHEIN.

COMMITTEE FOR TRADITIONAL INDIAN LAND AND LIFE,
Los Angeles, Calif., June 4, 1971.

Senator HENRY M. JACKSON,
Chairman, Committee on Interior and Insular Affairs,
Senate Office Building, Washington, D.C.

DEAR SENATOR JACKSON: Our Committee for Traditional Indian Land and Life in Los Angeles is a group of concerned individuals working to preserve and further the traditional ways of life which the Native Peoples of North and South America practiced and are still practicing. We have been aware of the strip-mining of Black Mesa and of the opposition of the traditional Hopi Religious Leaders to this mining for over a year and a half. We have become aware of traditional Navajo Medicine Men who also oppose the strip-mining of Black Mesa and exploitation of their natural resources. And, as the signed petitions (Commitment To Protect the Earth and the Peoples of the Southwest) which we enclose for inclusion in the record indicate, many more Native People and non-Native People are concerned about the exploitation of the Peoples and land in the Southwest.

Almost 800 people signed that Commitment to express their responsibility as people living on the earth to protect and care for the environment which sustains all of us and to protect the right of all people to live in their natural relationship with it. They deplore and oppose:

The strip-mining of coal at Black Mesa by Peabody Coal Company with drastic depletion of the desert water table, which threatens to destroy the Sacred Cornfields of the Hopi and the grazing lands of the Navajo sheep herds.

The several coal burning power plants of the Four Corners Development Project which will fill the clear desert air with thousands of tons of smog daily, covering thousands of square miles including Monument Valley and the Grand Canyon, and one of which will further pollute the Colorado River, damaging crops in the Imperial and Mexicali Valleys.

We who signed the Commitment feel that this entire project has been conceived with total disregard, if not contempt, for the aboriginal rights of the First People who have lived there for centuries, and that this Project is being executed despite the clear warnings and protests of their true traditional leaders. Further, we feel that it must be stopped and totally reconsidered, and these people dealt with honorably before yet another irreversible episode of national shame and devastation of the earth is allowed to take place.

We have seen slides of reclaimed strip-mined land in Appalachia, land on which the best methods of reclamation were used by Peabody Coal Company, and we are appalled by the complete lack of visible plant life and by the orange and red rivulets of water running down into brown streams. This was in an area where there is a considerable amount of rainfall per year compared to the scant 12-14 inches per year of the Black Mesa area. It is absurd to believe that any successful reclamation of the strip-mined areas of Four Corners and Black Mesa can succeed with so little rainfall when reclamation has utterly failed in other areas with much rainfall.

These power plants and coal mines were planned many years ago when it wasn't so obvious that the Earth wasn't inexhaustible. Unless we stop this wanton taking from the Earth now, the people living in the future will suffer greatly the pain of hunger and disease which we are only now beginning to experience. We have polluted our water, poisoned our air, defiled our earth, and contaminated our food. It is time we let the First People on this continent care for their land again, because the newcomers from Europe and other lands have succeeded in almost destroying it.

Today it is known and recognized by many people that Black Mesa and the area around it is part of the heart of Mother Earth. It is land which is held in trust in a spiritual way by the Hopis for the Great Spirit, and it is like the sacred inner chamber of a church. It is the sacred center of the world. The Hopi Religious Leaders say that the Great Spirit told them that the great wealth and resources beneath the lands at Black Mesa must not be disturbed or taken out until after purification when mankind will know how to live in harmony among themselves and with nature. They were given special guidance in caring for their sacred lands so as not to disrupt the fragile harmony that holds things together. Hopis were given the responsibility by the Great Spirit to be the caretakers for all the world, for all mankind. Hopi lands extend all over the continents from sea to sea, with the lands at the sacred center (where the Hopis live) being the key to life. By caring for these lands in the Hopi way, in accordance with instructions from the Great Spirit, they keep the rest of the world in balance.

Now, Black Mesa is being strip-mined and great quantities of water are being taken from beneath Black Mesa against their permission. Water under the ground has much to do with rain clouds. Everything depends upon the proper balance being maintained. The water under the ground acts like a magnet attracting rain from the clouds; and the rain in the clouds also acts as a magnet raising the water table under the ground to the roots of the Hopi crops and plants. Drawing huge amounts of water from beneath Black Mesa in connection with the strip-mining will destroy the harmony, throw everything that the Hopis have strived to maintain out of kilter. If this happens, the Hopi lands will shake like the Hopi rattle; land will sink, land will dry up. Rains will be barred by unseen forces, because the Hopis will have failed to protect the land given them, as they were instructed. Plants will not grow, and their corn will not yield and animals will die. When the corn will not grow, they will die; not only Hopis, but all will disintegrate to nothing.

We are doing this to them. We are preventing them from protecting their land, and we must stop it, or be prepared to share in their fate. We urge and demand an immediate cessation of all strip-mining and associated water withdrawal on Black Mesa, a shut down of all coal burning power plants in the Southwest until they can be made non-polluting, and a cessation of all construction of all power plants planned and in progress.

The hour is already very late, but not too late for you to act.

Sincerely,

NICKOLAS BOISVERT.

CLAREMONT, CALIF., May 20, 1971.

SENATOR HENRY M. JACKSON,
Chairman, Committee on Interior and Insular Affairs,
Senate Office Building,
Washington, D.C.

DEAR SENATOR JACKSON: It is our wish that we go on record in opposition to additional construction of coal fired power plants and accompanying strip mines and power lines in the Southwest.

In an age when we have come to understand what the environment can tolerate and what it cannot, it seems rather foolish that we yet fail to research and

develop environmentally safe alternatives for rational use and production of electricity.

Smog is a poison. Strip mining wreaks ecological havoc to large land areas in fragile desert communities. Besides this, sacred Indian shrines are threatened; Navajo and Hopi grazing land is being rendered unproductive; large amounts of desert water will certainly be lost through evaporation and contamination. The damage is practically permanent.

These are facts. That they are played down is criminal. That they are ignored or their solutions over-ruled in order to provide power now for cash customers in Los Angeles, Phoenix, and Las Vegas is very short sighted. That immediately available cash be considered more desirable than a future higher standard of living and the safety of life forces on earth is suicidal.

We hereby request this statment be made part of the record in the Senate Committee on Interior and Insular Affairs to be held May 24, 25, 26, 1971.

Sincerely yours,

JERI J. COLBY.
GARY S. COLBY.

SOUTH PASADENA, CALIF., May 20, 1971.

HON. HENRY M. JACKSON,
Chairman, Senate Committee on Interior and Insular Affairs,
U.S. Senate, Washington, D.C.

DEAR SENATOR JACKSON: I am deeply concerned over the environmental effects of power plants in the Four Corners region. Use of soft coal to create power causes vast amounts of air pollution. In rainy weather the great amounts of sulphur in the soft coal becomes sulphuric acid and is returned to the land in the rainfall. It will leach out the color in the rocks and soil and kill the vegetation.

If Congress and the citizens of the United States feel that all automobiles should have air pollution controls, then so should the power plants have controls. Therefore, I feel that power companies wherever they build power plants should observe the strictest possible air pollution controls and should not be permitted to strip mine for soft coal and burn it in their power plants ANYWHERE, and most particularly in the beautiful Four Corners area.

I do not see any need for the power plants to be built in this area where they will destroy a magnificent wilderness belonging to all the people of the United States—not to just a few power companies.

Please make this letter a part of the hearing record.

Very truly yours,

JEAN SULLY.

PRINCETON, N.J., May 18, 1971.

HON. HENRY M. JACKSON,
Senate Committee on Interior and Insular Affairs,
Washington, D.C.

DEAR SENATOR JACKSON: I want to express my deep concern about the strip-mine operation on Black Mesa in Arizona and the existing and potential increase of air pollution from power plants in the southwest region.

As a family, we have been regular summer visitors to the southwest, including several summers, since 1962. We have visited, explored, camped, toured and hiked extensively throughout the entire region. We feel well acquainted with this extremely scenic part of the U.S.

On our first visits, we were constantly aware of the clear air which permitted awesome long-range scenic views. It was an extraordinary experience for us to see so far into the distance and to breathe deeply with unrestrained pleasure.

More recently, however, we have witnessed a drastic change. A huge area of air is polluted. For instance, the air from Alamasa, Colorado, south to Santa Fe is so hazy the mountains are no longer distinct. We have noted mining operations just south of the Colorado-New Mexico border that obviously contribute considerable pollution, but of course, they are not the main polluters. We have seen the huge pollution plume emanating from near Shiprock. I understand that most of the power generated by that plant is exported to other states with more stringent pollution codes. We have seen the deplorable effects of that plants' emissions on a wide area in the Four Corners region. It was shocking to see the density and volume of that plume.

We have read extensively about the actual and potential damage caused by the strip-mine operation on Black Mesa. We have talked with friends who spent last summer in the area and watched the operation. They were horrified. The disruption to and callous disregard of the Hopi's and the Navaho's and the on-going destruction of Black Mesa is bad enough. But that this is being done to supply coal to power plants which in turn will greatly increase air pollution, in order to generate electricity for distant cities is not only outrageous—it is morally wrong.

The utilization for cooling purposes, enormous waste through evaporation and certain degradation of Colorado River water is shortsighted. It is also grossly unfair—and should be illegal to do—to Mexico. The possible depletion of the water table in the Black Mesa region should preclude the heavy use of that water.

If cities and other states insist upon increasing their populations and insist upon meeting all the power demands of such thoughtless and unrestrained growth, they should be required to pay the true costs. They should pay for acquiring power from less environmentally destructive sources and by less destructive methods. If this is not now possible, rationing is a real possibility that should be seriously considered. Only then will the cost of rampant growth and unrationed use of valuable resources be realized. In addition to the Hopi's and the Navaho's and their cultures, one of the southwest's most valuable assets was its once pure air.

I urge you to bend every effort to reverse the unhealthy trend now becoming so obvious in the Four Corners area. Not only must the smoke be stopped, but the gases, which are worse, should also be stopped.

I further urge you to do whatever is necessary to halt at once the Black Mesa strip-mine operation and the power plant construction in the region. Until there is some rational environmentally sound energy supply policy, such dangerous and destructive activities must be stopped. For workers, there are environmentally useful jobs that need to be done in the region. The Indians, and indeed all Americans, have a stake in the return and relentless protection of the southwest's clean, clear air.

Thank you for your attention.

Sincerely yours,

DIANE T. GRAVES
Mrs. James F. Graves.

BERKELEY, CALIF., June 1, 1971.

HON. HENRY M. JACKSON,
Chairman, Senate Committee on Interior and Insular Affairs, U.S. Senate,
Washington, D.C.

DEAR SENATOR JACKSON: It has come to my attention that hearings are being held on the proposed power plants in the Four Corners Region. Having spent time in the Escalante River area and being very saddened by the flooding of Glen Canyon, I strongly oppose further destruction of this lovely and, as of yet, relatively untouched area. I strongly support the conservationists who feel that such plants are unnecessary and detrimental, and that the construction should be halted until the true need for power can be established and until adequate pollution controls can be designed AND ENFORCED for any plants that must be built.

I am a resident of Northern California, and I object to the fact that overpopulated and ruined areas such as Los Angeles can demand that other areas, this time the Four Corners region, must now supply these places with power and water, so that they can go on growing and polluting. Los Angeles should not be allowed to have cheap electricity at the expense of polluting the air and endangering the health of people in the Four Corners area. This region does not now have the tight restrictions on industrial development that Southern California has, and what laws do exist are not enforced even where there are problems. Do we want the whole country to become like Los Angeles?

I am against the strip mining which would be employed to feed the coal fires. Many other areas, particularly in the East, have banned strip mining because of the damage to the land. This activity should not be allowed to start in the Southwest. Roads, fly ash, disposal areas, railroads, pipelines, transmission lines and dams and reservoirs add to land destruction and should not be encouraged but rather discouraged.

I believe that energy and time should be spent in re-educating the American public to consume less rather than to consume more. It is obvious that our priori-

ties of growth and massive consumption can no longer be supported. More electrical appliances means more electricity which means more dams and power plants. America's resources are dwindling, and her natural beauties are being destroyed faster than we can even think of them. I am vehemently opposed to anything that contributes to this process, and I believe that the power plants would be disastrous. It is time to stop destroying in the name of progress and public necessity.

Sincerely,

SHELLEY MCINTYRE

BERKELEY, CALIF., May 23, 1971.

Senator CLINTON ANDERSON,
Senate Office Building,
Washington, D.C.

DEAR SENATOR ANDERSON: We are writing to protest the strip mine operations at Black Mesa. I am entering a PhD program this fall in Natural Resources Sociology and so have some measure of awareness of the Natural Resource problem and have worked on human development projects on an Indian reservation and am aware of the Indian's "white man problem".

We would like to suggest: that strip mining, while it may return short run dollar profits, may destroy the Hopi's ability to live indefinitely on the land they love; that the present operation has not been done by consent of the whole tribe (only by a fast buck minded faction); that the Indian people have the human and legal right to determine their own future and the use of their own land, a land that they love and respect more than we seem to; that a society that allows the continued violation of a people who have been violated to a pitiful degree just to provide extra bright lights in Reno is perhaps just maybe a bit sick by some human standards. We urge you to do all you can to stop the very damaging strip mining at Black Mesa.

Respectfully,

PATRICK AND SUSAN WEST.

JACKSON, WYO., May 23, 1971.

Hon. HENRY JACKSON,
Chairman, Senate Committee on Interior and Insular Affairs,
U.S. Senate, Washington, D.C.

DEAR SENATOR JACKSON: America, and particularly the West, has finally come to the critical point in its future. The 1965 Blackout on the East Coast and their summer "brown-outs" were only a prelude to crises of the future. The west coast is seeking new power resources in the arid and fragile Four-Corners area. This must be stopped.

We all realize that energy needs are so great because of man's rampant population growth. Control of numbers of people has not yet come, but it's inevitable in the future if man is to survive in a quality environment. So we must be patient and protect what is left until the time of population control arrives.

I urge you to declare a moratorium on building of power plants in the Four-Corners area. These power plants would emit colossal amounts of sulfur dioxide, nitrogen dioxide, and fly ash. Strip mining has unbelievable consequences; and water is already too precious in the high desert.

I have backpacked in the Escalante country near the site of the proposed Kaiparowitz Plant. I know the fragile ecosystem could not withstand the consequences of 880 tons SO_2 , 450 tons NO_2 , and 98 tons of fly ash per day. Can you picture the small lizards negotiating this layer of ash?

I realize power needs are valid to a certain extent. But, with increasing population, we, once again, must examine our attitudes. Do we need that electric toothbrush, knife, clock, light, heater, blender? Just yesterday I gave up my electric clock and replaced it with a spring operated version. So let's work on attitudes by limiting the advertising gimmicks which coerce the ugly American into using an electrically operated shoe shiner.

Please, let us not be short-sighted in developing power plants that will rape the land, water, and air of the Four-Corners area for electricity to be transmitted far away. Construction must be stopped before it's too late to save ourselves from the unrealistic plans of Western Energy and Supply Transmission Associates (WEST).

Sincerely,

BRUCE SIMON.

MIDLAND, MICH., June 1, 1971.

HON. HENRY M. JACKSON,

Chairman, Interior and Insular Affairs Committee, U.S. Senate, Washington, D.C.

DEAR SENATOR JACKSON: We are deeply concerned by the burgeoning development of power plants in the unique American southwest. We have read several detailed accounts of this development, particularly in the Four Corners area, and are deeply disturbed.

Must we sacrifice some of the purest air in our nation, in an area of numerous national parks and monuments? Must we gobble up yet more land in remote natural areas for ugly transmission lines? Must we place an even greater burden on our rivers for cooling water? And must we continue to utterly despoil vast areas with our greedy, cheap strip mining techniques? Is this what we mean by "progress"?

We urge the development and implementation of a policy which, instead of catering to the economic demands of polluters, make protection of the southwest's natural and scenic resources a major factor in decision-making regarding power plant siting and management.

Please include our comments in the hearing record.

Sincerely,

E. LeROY BJERKE.

KATHLEEN A. BJERKE.

MAY 31, 1971.

HON. HENRY M. JACKSON,

Chairman, Interior and Insular Affairs Committee, U.S. Senate, Washington, D.C.

DEAR SENATOR JACKSON: We have recently learned of the hearings about the proposed development of the Four-Corners Area and request you to include this letter in the record of the hearings.

Life Magazine for April 16, 1971 had an excellent article on the problems caused by this proposed development and pictures showing some of the damage it caused to this region. We strongly oppose this development because:

Most of the power produced would not be used here but would go to the Los Angeles area—it is not right to destroy one section of the country for the sake of another section as all of our states are supposed to have equal rights.

We should first establish how much power is really needed. The utility companies are constantly crying about the rising demand for power but neglect to mention that much of this demand is not real but is artificially produced by the utility companies. They constantly encourage the invention of new electric gadgets which we do not need and constantly run costly advertisements in all the mass media urging people to use more electricity all the time.

Senator Clinton P. Anderson is very much disturbed by the conditions in this section. We have started legislation to stop stripmining elsewhere because of the way it ruins the countryside. It would be better to stop it here before any more damage is done.

Burning the lowgrade coal of this region produces smog which does not all remain here but travels to help ruin the air in other sections for many miles around. It is injurious to the health and while there are not as many people here as in the large cities their health should be protected as much as that of people in other regions.

The Indians have been sold a bill of goods on benefits to them but some are realizing that the bulk of the benefits go elsewhere and they get only the crumbs while they are being displaced and their lands ruined. This most recent example of the white man's contempt for Indian rights and his disregard for interracial justice will only deepen the bitterness already felt. It is not just or right to treat them in such a callous manner so some utility companies can make profits.

Instead of ruining the desert which should be saved as a heritage to be preserved we should spend the money to develop harmless, nonpolluting sources of power. Fuel cells and "Fluidics" could be perfected and instead of squandering millions to send men to the planets the space agencies would be better employed in finding practical ways to harness solar energy—this would save our country from stripmines, our rivers from dams, and our air from smog and would furnish us with power without depriving anyone else of it.

Yours truly,

ETHEL W. THORNILEY.

And others.

LOS ANGELES, CALIF., June 8, 1971.

Hon. ROGERS MORTON,
 Secretary of the Interior,
 Washington, D.C.

DEAR SIR: In view of the recent hearings concerning the "Four-Corners" utilities developments in the Southwestern United States, and in view of your recent statements to the effect that environmental considerations must, at times, take second place to resource consumption, I feel compelled to reply.

Regarding the specific project to exploit the coal resources at Black Mesa and other nearby areas toward the production of electricity for distant urban centers, and disregarding other projects which you apparently support to the profound detriment of our environment, such as the Alaskan Pipeline, we should, I think, take a look at the forces that brought about the construction of the "Four-Corners" generating plants in the first place.

Utility company spokesmen have widely promulgated the notion that the United States is in danger of widespread power shortages unless additional generating facilities are immediately constructed. It has been in the context of this "crisis" atmosphere that the utility companies have been able to coerce governmental agencies into approving the construction of obsolete fossil-fuel systems when we are all agreed that these methods produce unacceptable amounts of environmental destruction, both in terms of pollutants produced, and in terms of the destruction caused by strip mining for the coal, or drilling for the oil.

The notion that we face a power crisis is true in a limited sense, however, it is a state of affairs created by the utility companies themselves, and one that could be easily solved without the construction of a single additional generating facility. According to testimony given before congress by Federal Power Commission Chairman John N. Nassikas, the net dependable capacity of the 48 contiguous states is 326,667 megawatts, with an estimated *peak* demand of 257,419 megawatts. This leaves us with a surplus of 27%, and inasmuch as reserves of from 15% to 20% are considered sufficient to guard against unforeseen equipment failures, or unusually high demands, it is clear that *as a nation* power insufficiencies are a myth. The reason that we have shortages in the face of surplus is that electrical demands *in a specific region* occasionally exceed the supply in that region. Elsewhere in the U.S., what with time differences, and seasonal variations we have much more electricity produced (fuel burned) than can be used (or justified).

The fact that governmental officials such as yourself have been so deficient in the performance of their duties as to allow this situation to develop is in itself insufferable. However, non-destructive solutions do exist for these problems, and they can still be implemented at minimum cost.

The first step solution is, of course, a national grid, and the utility company executives have known this for years. This simple expedient would in itself solve our present electrical problems with no additional expenditures. Yet policy makers continue to persist in the belief that the solution is to continue to build more generating plants. The fact that supposedly intelligent adults could expect that the solution to a problem could be found by repeating the mistakes that led to the problem is unbelievable. Neither you nor the utility company executives are that stupid.

The public is not the victim of stupidity so much as it is the victim of greed. The utility companies view the problem as essentially a choice between environmental considerations and their profits, and for them the choice is easy.

The choice is equally easy for me.

However I do not feel that the solution is to eliminate the profit motive or personal gratification—quite the contrary. I would be happy to see all of us get very rich, starting with the American Indian. However, in any group of humans there is one simple rule that must guide all interaction and personal gratification seeking, and that is that your right to swing your fist ends at my chin.

The fact that in their lust for profits the utility company executives with the active assistance of governmental officials have made decisions that have: Resulted in the wholesale destruction of entire species of plants and animals; that have destroyed vast tracks of land in this country and abroad; that have threatened with destruction hundreds of other species (including, and especially man: The best information to date indicates that at present rates of destruction there will be no more oxygen left to breathe in the world in 15 to 30 years) is intolerable and must stop. Furthermore I do not feel that it is reasonable or even necessary that we deny ourselves important technological benefits and luxuries in

order to save ourselves. The construction of a national grid would (even with rising population and with rising per capita consumption) give us enough time to develop the other environmentally non-destructive electrical generating systems that are now in various stages of development: I refer of course, to the Fast Breeder Fission reactors which will themselves barely give us enough time to perfect the relatively "ideal" controlled Fusion systems now being feverishly studied both here and abroad.

Anyone who has attempted to assess the projected electrical needs of a technologically advanced world knows that neither fossil-fuel, nor hydro-electric nor simple non-breeding fission reactors, are being considered as possible ways of meeting the demand. All of these three methods will become inadequate in a few years and everybody knows it. In light of these facts it is a little incredible that you and others could claim that the construction of the "Four-Corners" project or the exploitation of the Alaskan Oil Fields is necessary to national security. At best these statements are short sighted—they may be conscious lies. How can any project or attitude which is demonstrably destroying our nation be considered essential to its security? It is a little like the officer in Viet Nam who claimed that a village was "destroyed for its own good".

It is clear then that the "National Security" claim in defense of the exploitation of either of these two areas is not to be taken at face value. (The Army Corps of Engineers has, as you know, suggested that the Alaskan Oil be left in the ground).

The cries of national security are obviously what those in the private sector feel are the most effective strategy available to force regulatory agencies into allowing the continued plundering of resources that actually belong to all of us. You and other officials are well aware of the extent to which the Oil, Coal, and Power industries are being brought together with large banking institutions in a concentration of wealth and power that poses a terrible threat to the public. Yet you have not moved in any effective way to either halt these monopolistic trends, nor to prevent these people from carving up the natural resources "pie" as they please. Indeed you have eagerly assisted in this effort. This is a basic violation of your responsibilities to the public you are sworn to serve, and as such you have behaved in a way that is extremely destructive to true National Security, which we all know must come from within.

Your attitude makes even less sense when we realize that you, like all the rest of us must breathe the air you have poisoned, drive the crowded freeways, eat polluted and nutritionally valueless food, and view our dying planet. Your official position and personal wealth mean only that the consequences of your decisions come to you a little later than to the public at large.

Please help us and yourself. Call a moratorium on the "Four-Corners" project, as one of the neighboring governors has suggested, and start doing the job the public expects you to do.

Respectfully,

ALLAN B. BRANSCOMB.

NEW YORK, N.Y., June 9, 1971.

HON. ROGERS C. B. MORTON,
Secretary of the Interior, Interior Office Headquarters,
Washington, D.C.

DEAR SIR: In reference to the Four Corners power project, I wish to register a strong protest. This really is the last straw. I just spent a month's vacation in New Mexico recovering from the air pollution of New York. Is no corner of this nation to be spared this abomination?

And after all the outcry and breastbeating about our unspeakable treatment of the Indians, this is the last and worst affront, in a way a worse crime than any of the others since we know better, know that we should be making some sort of restitution. Instead we proceed to rob them again, of their God-given air and water. Beyond description vile!

Why, in a country so rich and great it can launch space probes and wage lavish wars do we not have the world's first solar energy project? Why are our southern coasts not the sites of seawater desalinization plants? Why are we wasting time and money, when both are running out? Why not do something that makes sense, for a change? No, we must rip up the earth for coal, blacken the skies with soot, pump up the last of the water, so that city dwellers can plug in their electric carving-knives.

Believe me, sir, this cause is uniting right and left, old and young, rich and poor. I implore you to study the matter very carefully, so that the necessary steps (backwards!) can be taken.

Sincerely,

CILE LORD.

DUKE UNIVERSITY MEDICAL CENTER,
Durham, N.C., May 31, 1971.

Senator HENRY JACKSON,
Chairman, Senate Interior Committee,
Senate Office Building, Washington, D.C.

MY DEAR SENATOR: I am against the building of new power plants in the 4-Corners region. I think you should shut down the two present power plants until such time as they cease polluting and fouling the atmosphere. I do not see why the government must have new power plant construction at this time. We have no national energy policy. Why must we keep stepping up the construction of power plants such as those that are now going to destroy one of the most beautiful parts of America. I refer to the 4-Corners region. Why must we continue to destroy such beautiful parts of our country and of this planet for momentary personal gain? Strip mines around the 4-Corners are an abomination in the sight of man. We do not live on a planet that has an infinite supply of resources and we must establish some kind of balance between ourselves and the planet upon which we live. The constant per capita growth of power use and the building of power plants, industries, and these abominations known as strip mines will destroy us and our planet. There is so little clean air and water left and so little natural beauty that remains that we must do everything we can to prevent further destruction.

Many of us have devoted our lives to expanding human, intellectual, and biological horizons. We have worked to increase the grasp man has of himself and of the natural universe in which he lives. Can we not get some help from our politicians to prevent the destruction of the planet upon which we live by shortsightedness displayed in the present attempt to turn the 4-Corners region into an abomination on the face of the planet?

I beg to remain,

Yours very truly,

JOHN BUETTNER-JANUSCH,
Professor of Anatomy, Anthropology,
and Zoology, Director, Primate Facility.

BERKELEY, CALIF., June 7, 1971.

HON. HENRY M. JACKSON,
Chairman, Senate Committee on Interior and Insular Affairs,
U.S. Senate, Washington, D.C.

DEAR SIR: I have read, with great concern, the published reports concerning the existing and planned coal-burning power generating plants in the Four-Corners Region of the Southwest. I feel it is abhorable that you, the government, allow such inconsiderate and destructive plundering of one of this country's most scenic and natural areas. The lessons learned in Kentucky with respect to strip-mining of coal ought to be enough to halt this entire project, especially considering that Peabody Coal Co. apparently plans to allow the open-pit mines to fill with water, thus eliminating great expanses of already scarce Indian grazing land. And the air pollutants predicted for the plants certainly exceed limits dictated by common sense. To create a smog-filled wilderness to supply excess energy to an already over-crowded, polluted eyesore (Los Angeles) is incomprehensible, in the least, and totally alien to recognized environmental priorities.

I hope you will enter my plea to stop this wanton desecration of a beautiful country, and work toward greater control over blatantly irresponsible power companies in the immediate future.

Sincerely yours,

ROBERT J. MILLER.

Moose, Wyo., May 28, 1971.

HON. HENRY M. JACKSON,
Chairman, Committee on Interior Affairs,
Senate Office Building, Washington, D.C.

DEAR SENATOR JACKSON: I cannot believe that our smart technical people, able to devise machines to send men to the Moon, cannot devise effective devices to control pollution. And I don't understand how a crime like the smog factory at the Four Corners was ever allowed to be built.

Now this cannot be allowed to continue and of course it will cost more millions to improve the situation.

In any case surely there should be a moratorium on any further such construction until truly effective pollution control is invented and proven.

I understand your Committee is to hold hearings on this question, and I should very much appreciate it if this letter could be made a part of the record, as one more small voice against the reckless, unforgivable things we are doing to our beautiful planet.

Sincerely yours,

Mrs. Olaus J. Murie.

MRS. OLAUS J. MURIE.

WASHINGTON, D.C., May 25 1971.

SENATE INTERIOR COMMITTEE,
U.S. Senate,
Washington, D.C.

DEAR SIR: I wish to make an official protest to be a part of the hearing record on the current hearings by your Committee to the further construction of power plants in the area of Four Corners in the Southwest.

Having just returned from a week vacation in Santa Fe I know the pristine and magnificent environment which is gradually being harmed by the first plants which are now in operation. Completion of the construction plans as they now stand will surely mean devastation. When in Santa Fe the people of the area were concerned about the air pollution and this was a matter which was bad enough. On returning the newscasts of the hearings indicated that the plants were coal burning and strip mining was the means of retrieving the coal from the land. Today there is *no excuse* for such action. American technology is always reputed to be the finest (except, it appears, when environmental protection is concerned.)

Please work to end this project; or, at the very least, the means of its operations and the implementation of the finest pollution abatement equipment.

Mr. and Mrs. DAVID MacKINNON.

LARAMIE, WYO., June 2, 1971.

HON. HENRY M. JACKSON,
Chairman, Senate Committee on Interior and Insular Affairs,
U.S. Senate, Washington, D.C.

DEAR SENATOR JACKSON: I understand that the hearing record on the Four Corners proposed installation of coal-fired thermopower units will be open until June 7th. As you are well aware, this is a portion of the continuing conflict between society's demand for energy and all that it represents and the environment in which we live. Personally, I have joined the ranks of those who feel that we have at least as great an obligation to succeeding generations as to our own. The ecology of the Rocky Mountain environment is fragile and vulnerable. The combination of high altitude and low rain fall set the stage for irreversible changes in the land in which we live. Until such time as the power industry can clearly demonstrate their capability for providing energy without harming the environment, I would urge that a moratorium on further installations be declared.

Respectfully yours,

LAWRENCE F. McCARTY, M.D.

FEDERATION OF WESTERN OUTDOOR CLUBS,
San Francisco, Calif., May 18, 1971.

HON. HENRY JACKSON,
*Chairman, Senate Interior and Insular Affairs Committee,
 Senate Office Building, Washington, D.C.*

DEAR SENATOR JACKSON: Our president, Frank Fickelsen sent to you last fall a copy of our Policy Statement adopted during the 1970 convention. Resolution No. 31 concerned the Navajo Power Projects, and I would like to call it to your attention at this time.

The Navajo and Kaiparowits power projects will strip mine low grade fossil fuels in Northeast Arizona and Southwest Utah and construct six power plants to supply power to Los Angeles. Plans for these facilities include construction of massive power line developments through scenic areas, plant facilities involving the building of 800-foot tall smoke stacks in the open desert, and construction of transport systems for moving coal to the plants.

The two projects would create extreme air pollution problems through the release of great quantities of particulate matter, devastate by strip mining the forested Black Mesa of Arizona and the Kaiparowits Plateau of Utah, destroy desert scenic values and open space amenities in a several hundred square mile area near Four Corners, dangerously lower the already precariously low water table, and force the relocation of perhaps thousands of Navajo and Hopi Indians from their traditional homelands, and effectively destroy their way of life.

The Federation of Western Outdoor Clubs therefore opposes the construction of the Navajo and Kaiparowits projects, and urges a declaration of policy by the Four Corners Commission and public land management agencies in the area to oppose all industrial public utilities projects that may contribute to air and water pollution, destroy scenic values, and open space amenities, and disturb the traditional culture and way of life of the Southwest Indians.

There has been no change in our opposition to the construction of Four Corners' power plants since that time. We oppose the stripmining that would fuel the plants, planned to supply power to Los Angeles, Phoenix and Las Vegas, and urge that your Committee study seriously the far-reaching destruction of such strip mining on the Four Corners country.

Far too much of the land and water resources of the west have already been given to Los Angeles. The city is now almost uninhabitable and the lives of its people will not be helped by additional power to allow further cancerous growth. Phoenix and Las Vegas, too, must not be allowed to expand at the expense of the citizens of other states.

The over-all need for power must be assessed, and a recognition by government officials involved in making such vital decisions that our resources are finite, and that our power needs must be geared to fit the resources available. The health and well-being of the citizens of the western states must not be sacrificed for power to fuel additional neon signs in western tourist cities.

Western parklands and deserts are vitally necessary to provide open space for people from all of this country, and will be increasingly important in the future. There is no more frontier into which to move—we must use more carefully the land and water we have here in the western states.

There is poverty in the Indian reservations, and jobs are needed by the young people, if they are to remain in their homeland. But before a western Appalachia is built in the spectacular Four Corners country, much more thought and planning is needed, and I urge that you not give your approval to the construction of additional power plants now planned.

Respectfully submitted,

Mrs. HASSE BUNNELLE,
Secretary.

LA CANADA, CALIF., May 26, 1971.

Subject: Steam generating facilities, Four Corners region.

HON. HENRY M. JACKSON,
Chairman, Senate Committee on Interior and Insular Affairs, U.S. Senate, Washington, D.C.

DEAR SENATOR JACKSON: I attended a Sierra Club meeting the other night and heard about the above subject, but to induce you to read on it is believed the approach delineated below differs somewhat from the classical Sierra Club position.

BACKGROUND

Ohio was my home for 31 years and I was directly involved in the engineering and design of power plants for some 5 years. Later I was involved in the operation of steam plants. I am, unfortunately, quite familiar with strip mining, both in Ohio and Pennsylvania.

THE PROBLEM

I differ with the Sierra Club on one important aspect, in that there must be a recognition that more Americans are each using more electricity each year. Because in the foreseeable future there will be no magical formula which will ameliorate this fact of life, it seems to me we must address ourselves to imposing reasonable constraints upon the facilities and resources associated with producing the required electrical power.

THE UNACCEPTABLE APPROACH

This citizenry of this country have sharply arrived at a point where they are interested in the quality of life. Communities are endorsing this by their willingness to pass bond issues to improve the environment. I submit that the states of Pennsylvania and Ohio wish they could turn back the clock with regard to their posture on strip mining. Have you and your committee actually seen these ravaged lands? The states in the affected subject region do not have adequate regulations concerning strip mining.

There is existing off-the-shelf designed equipment to handle the combustion effluents from these plants; it is a problem only of economics. Similarly, the problem of concentration of salts in the water supply has solution in current technology.

Surely it is recognized this country must change its posture with regard to a continuing policy of laissez-faire exploitation of its resources and beauties.

RECOMMENDATION

Allow expansion of power generation facilities in the Southwest, but institute a *firm management and siting policy*. And provide means to continually audit the policies to assure they encompassed the best decisions, with provision to change policies if appropriate.

Over the years the Power Companies will sell all the power they can produce—there is really no competition. The increased costs for capital equipment and resource protection will be justifiably added to the cost of electricity. I submit that the American people are willing to pay for an improved environment. It is much cheaper to not destroy the environment than buy it back; in many cases it is impossible to do so.

In summation, a firm policy must be imposed to preserve the rapidly dwindling resources of this country, and you and your committee are being paid by the taxpayers to do just that.

Very truly yours,

G. P. KAUTZ.

DAVIS, CALIF., May 26, 1971.

HON. HENRY M. JACKSON,
Committee on Interior and Insular Affairs,
Senate Office Building,
Washington, D.C.

DEAR SENATOR JACKSON: I have on a number of occasions presented testimony to House and Senate subcommittees as something of an "expert witness" on matters relating to power production and scenic resources in the Southwest. Rather than doing so in this case, however, I am simply making a very personal statement of strong opposition to allowing the emission of *any* visible or potentially visible matter from power plants in the Southwest and to the construction of high stacks that are visible at great distances. I particularly oppose the proposed Navajo (Page) and Kaiparowits plants because of their location in a particularly scenic area. No open-system use of water at plants or use of water for slurry should be permitted in this water-scarce area. No strip-mining should be allowed that does not provide for complete control of runoff that might contain silt or acid, and for as complete restoration of mined areas as technically feasible.

Sincerely yours,

STEPHEN C. JETT, Ph. D.,
Assistant Professor of Geography.

CEDAR RAPIDS, IOWA, May 25, 1971.

HON. HENRY M. JACKSON,
Chairman, Interior and Insular Affairs Committee,
New Senate Office Building,
Washington, D.C.

DEAR SIR: I am writing in regard to the electric power plant operations, construction, and associated strip mining in our southwest; and particularly the Four Corners Plant at Fruitland, New Mexico. I feel so strongly that we must not allow this massive pollution that I urge that all production at this plant be stopped immediately and not resumed until technology has solved the problem completely. I will not be satisfied with half-way, temporary, or any other stop-gap measures.

I am 27 years old, a middle-class house-wife and mother of four young daughters who fell in love with our southwestern United States 12 years ago. Finally, after 6 years of planning, our family is moving to Arizona in July of this year. I am willing to accept a decrease in available electric power, an increase in cost, brown-outs, black-outs, bans on electric household conveniences, lack of air-conditioning even in the hot Arizona summer—anything—to stop this pollution. I am not an activist, but the frustration and despair I feel can not be assuaged by anything other than a positive response for once from the high public officials who are supposed to represent us, the American people. Please, I beg of you, use your power to do what you must know in your heart is the right thing, and do not allow the greed of a few to destroy what is loved by so many, our country.

Even though this letter is more of an emotional appeal than an actual statement of facts and figures, I request that it be included as part of the hearing record. Thank you.

Most sincerely,

SHARON KENNEDY
 (Mrs. Donald L. Kennedy).

OLIVETTE, Mo., May 27, 1971.

HON. HENRY M. JACKSON,
Chairman, Senate Committee on Interior and Insular Affairs,
U.S. Senate,
Washington, D.C.

DEAR SENATOR JACKSON: Many of us Missouri Sierran have camped in the Southwest and know what it was once like in purity of air, and what it will be like if more power plants are built there. We protest the building of more of these plants which will pollute the air even more with high sulfur coal—as these plants invariably do.

It seems senseless to build plants in a semi-arid area where water is at a premium. These plants will simply guzzle-up more water. Then, too, the emissions of particulates, sulfur and nitrogen oxides will exceed that of New York City when all seven plants are in operation.

There are twenty national parks and monuments in this southwest area whose scenery would be destroyed by more roads, rail spurs, and transmission lines. These lovely places were set aside as a refuge from the so-called progress of civilization, and erecting more power plants would create suburban slums.

Consequently the intrinsic values would be lost if more power plants are allowed to be built and add to the ecological problems. (We, in St. Louis, know for a fact what's upwind when our utilities make electricity).

We ask therefore that you consider with utmost care the pollution problems that will arise if all seven proposed power plants are built.

Sincerely,

LEO KLUESNER,
Corresponding Secretary of the Missouri Sierra Club.

COLLEGE STATION, TEX., June 13, 1971.

HON. HENRY M. JACKSON,
Chairman, Interior and Insular Affairs Committee,
New Senate Office Building,
Washington, D.C.

DEAR SIR: We would like to express our extreme concern for the environment of the southwestern United States, an environment imperiled both by the presence and planned construction of coal-burning power plants without adequate

pollution controls, and by the strip-mining of coal to feed these plants. We have had first-hand experience of the effects of air pollution on the scenery of the southwest. On a visit to California in May, 1970, we found that we could see nothing of the beautiful 10,000-foot peaks of the Sierra Nevada Mountains when we were only 40 miles west of them—because of the smog from the Los Angeles basin. And we have seen the dreadful scars of the earth from strip-mining in West Virginia. No other human activity, except war, causes such total destruction of the land. We want to insure that the Southwest, which we have loved and enjoyed for so many years as one of the cleanest and most beautiful areas in the United States, does not fall victim to the destruction of air and land already imposed on many parts of our country.

It is our understanding that the coal-burning power plant at Fruitland, New Mexico, already emits over 300 tons of flyash, 290 tons of sulfur dioxide, and 220 tons of oxides of nitrogen per day. The Navaho Generating Station under construction at Page, Arizona, will daily emit 220 tons of sulfur dioxide, 200 tons of oxides of nitrogen, and 15 tons of flyash. Also under construction are the San Juan Station near Farmington, New Mexico, and the Huntington Canyon Plant near Price, Utah. The Kiaparowitz Station in Utah and the Jim Bridger Station in Wyoming are in the planning stages. At the Lake Powell Recreation Area, visited by more than one million people per year, the air will receive more sulfur dioxide than New York City, more flyash than Los Angeles, and oxides of nitrogen comparable to those emitted by all the autos in the city of Los Angeles. These emissions will irritate the lungs of those who breathe them and hide the magnificent vistas of the Southwest from those who would see them. Furthermore, since the Southwest is in large part desert-type land, healing the scars left by strip-mining will be much more difficult than in the Northeast with its greater rainfall—and the job is not easy there.

In our opinion, an emergency exists. An immediate moratorium should be declared on all power plant construction until it can be proven that there will be no significant degradation of the quality of the air and until it can be proven that strip-mined land can be healed. And existing power plants should be provided with effective emission controls.

Steps should be taken immediately to reduce the demand for electricity. Such steps should include a ban on all promotional advertising by the utilities, the establishment of rate scales which charge the large user of electricity more per kilowatt-hour than the more modest user, and imposition of a surtax on wasteful uses of electricity such as neon signs.

Our national use of electrical energy should be thoroughly examined, immediately. The nation needs the enactment of a National Energy Policy which would contain the principle of non-degradation of the environment, establish methods to stabilize our energy consumption, control power plant siting, authorize extended research into such alternatives as fusion power and coal gasification, and establish methods, such as tax law revisions, to preserve non-renewable fossil fuel reserves for future generations.

We request that these comments and statements be included in the record of the current hearings on this subject. Thank you very much.

Sincerely,

Mr. and Mrs. JAMES T. BURNETT, III.

LOS ANGELES SECTION NATIONAL COUNCIL OF JEWISH WOMEN,
Los Angeles, Calif. May 27, 1971.

Senator HENRY JACKSON,
Chairman, Senate Interior Committee,
Senate Office Building,
Washington, D.C.

DEAR SENATOR JACKSON: The Environment and Ecology Committee of the Los Angeles Section, National Council of Jewish Women is concerned about the construction of power plants and strip mining in Arizona. We do not support the efforts of the Los Angeles Department of Water and Power to export pollution that we can no longer afford in California.

We oppose strip mining for the damage it does to the natural environment and the establishment of power plants until their air pollution is controlled and their emissions comply with the Federal Clean Air Act. Power plants which are designed to serve Los Angeles County ought also to comply with our State regu-

lations. We oppose any strip mining which is not followed by a complete rehabilitation of the environment.

It is time for use to develop a national commitment to preserve our diminishing natural resources, our land and our pure air.

Sincerely,

ELIZABETH B. SEE, Ph. D.

Chairman, Environment and Ecology Committee.

LAFAYETTE ENVIRONMENTAL ACTION FEDERATION,
West Lafayette, Ind., May 21, 1971.

Senator CLINTON P. ANDERSON,
Senate Office Building,
Washington, D. C.

DEAR SENATOR ANDERSON: Good for you, conducting hearings on the dastardly Four Corners Power Project! Will you please add LEAF (representing over 600 persons in the Greater Lafayette area) to the list of those organizations opposing coal-fired power plants, strip mining and overhead transmission lines in the southwest.

It is vital that we learn to tighten our belts, give up frivolous uses of electricity and wait until a better source of power can be found than any we have to date.

Sincerely yours,

DAVID S. PAGE,
President.

SOUTHERN CALIFORNIA ENVIRONMENTAL COALITION,
Los Angeles, Calif., June 2, 1971.

HON. HENRY M. JACKSON,
Chairman, Senate Committee on Interior and Insular Affairs, U.S. Senate,
Washington, D.C.

DEAR SENATOR JACKSON: The Southern California Environmental Coalition (SCEC) represents approximately forty college environmental action groups in southern California. As residents of southern California we have become increasingly alarmed at the continued environmental destruction of the Southwest by the establishment of the Four Corners coal-fired power plant and the Mohave plant. Our disapproval has increased with each effort to continue with any plans to build the Navajo plant, the San Juan plant, the Huntington Canyon plant, the Kaiparowits plant and others. This degradation must be stopped, and it must be stopped now. No more plants can be allowed to be built and all existing ones must be closed, while we have time.

The environmental impact of the two plants in operation now have been tremendous. The Four Corners plant alone emits more particulate matter than all stationary sources in Los Angeles and New York City combined. The smoke has covered up to 10,000 square miles and was the only man-made object visible in a 1966 photo taken from Gemini 12, at an altitude of 170 miles. This air pollution directly affects at least six National Parks, including the Grand Canyon, three National Recreation Areas and twenty-eight National Monuments. The National Park Service recorded more than 11 million visits to these areas in 1970. However, this number will undoubtedly decrease as the air pollution increases. It will be quite a dilemma we will face when we find residents leaving Los Angeles for a vacation in the Southwest only to find that the air is worse there than the smog in Los Angeles. How paradoxical it will be for the Hopi and Navajo Indians to have to come to Los Angeles to breathe "good" air.

The destruction of the quality of the air of the scenic region is further elaborated in *Air Pollution Associated with Colorado Plateau Power Plans* by Mike Williams. We request that report and this letter be contained in the Hearing Record.

It has been purported by the operators and future operators that the essential reason for locating in the Southwest was that it was the most efficient location in which to provide power for Phoenix and southern California. But the truth is that they knew that they had to build there because they knew it would not be possible for them to meet the stringent emission regulations of the Los Angeles City Air Pollution Regulations, which restricts particulate emission to

240 pounds per day per plant. And to insure that the regulations in the Southwest never become as stringent as those of Los Angeles the power men have worked to prevent that stringency, and also to prevent the enforcement of the existing regulations.

We of the SCEC will no longer tolerate the wholesale destruction of the Southwest in order that Los Angeles can receive power it does not need and does not deserve. This destruction will no longer be permitted on the false premise that it provides for economic growth. There is no ethical reason why there should not be stronger air pollution standards in the Southwest. The strengthening of those standards would have a negligible effect on their economic growth as pollution control expenditures faced by new industries. Until those standards are set and enforced all coal-fired power plant activity must be stopped indefinitely, for the protection of the people and the environment of the Southwest, including southern California.

Sincerely,

CARY HINTON,
Executive Secretary.

TIME, INCORPORATED,
New York, N.Y., May 18, 1971.

Senator HENRY JACKSON,
Chairman, Senate Interior Committee,
Senate Office Building, Washington, D.C.

DEAR SENATOR JACKSON: I must register a strong and I hope not futile protest against the proposed power plant construction in Four Corners.

I am a New Yorker, born and bred, so that I know better than most the insidious effects of pollution. We are told that New Mexico has more rigorous pollution controls than any other state; this may be so. We are told that these proposed power plants will have the latest anti-pollution devices; I don't doubt it. But the inescapable fact is that no control can prevent poison air from spreading throughout the Southwest. They may be able to decrease it. But they cannot stop it. And the great cities of this country bear strong, shrouded testimony to the effects of unchecked pollution.

There is only one way to save the Southwest. Stop Four Corners. Else the last safe harbor in this country, where people can still see as far as they were meant to and breathe what they were given to breathe, will be everlastingly destroyed.

Most sincerely,

JAY COCKS,
Contributing Editor.

PITTSBURGH, PA., May 26, 1971.

Senator HENRY JACKSON,
Chairman, U.S. Senate, Interior Committee,
Washington, D.C.:

Please add following letter in hearing record of May 28 in Page, Arizona, regarding Four Corners area power plants in an attempt to create an ecologically sound environment. Pennsylvania Environmental Action, Zero Population Growth urgently requests a moratorium be declared on the construction of Fosse fuel plants in the Southwestern United States until a complete environmental impact study has been made. We cannot afford any further degrading of that little natural environment which remains by hastily unleashing man's technology without sufficient proof to guarantee that it will not lead to further destruction. Therefore we urge you not to embark on the construction of the Four Corners area powerplants until scientists can absolutely guarantee their safety beyond any reasonable doubt. This may in fact mean never. Please respond immediately.

NARC HILLER,
Pennsylvania Coordinator, Environmental Action, Zero Population.

ALTADENA, CALIF., May 20, 1971.

Hon. HENRY JACKSON,
Senate Committee on Interior and Insular Affairs,
U.S. Senate,
Washington, D.C.:

Consider all environmental aspects as Four Corners powerplant. This is urgent.

JEAN GNAGY.

TORRANCE, CALIF., May 19, 1971.

HON. HENRY JACKSON,
Senate Committee on Interior and Insular Affairs,
U.S. Senate,
Washington, D.C.:

Urgent no environmental degradation be permitted as Four Corners power-plant site. Care and caution.

JOSEPH AMBROGIO.

EUGENE, OREG., May 20, 1971.

HON. HENRY M. JACKSON,
Chairman, Committee on Interior and Insular Affairs,
U.S. Senate, Washington, D.C.

DEAR SENATOR JACKSON: I am writing to you on behalf of the University of Oregon Outdoor Program, and the University of Oregon student conservation group known as Nature's Conspiracy. We are roaring mad about the awful plans for massive installation of coal-burning electric power plants in the starkly, terrifically, fantastically beautiful desert country of the American Southwest. We are delighted that the Senate Interior Committee has seen fit to hold five days of field hearings in the area concerned; widespread public concern is obvious.

It is our strong feeling that the immediate and long-range effects of fossil fuel steam generating facilities upon the air, the water, the land, and the scenic resources and desert ecology would be disastrous. It is especially unthinkable that a plant would even be considered for the Escalante, an area which is outstandingly suited for protection in the National Wilderness Preservation System. A dam on the Escalante River to supply water to the proposed facility would be located in just about the middle of the conservation organization' proposed Escalante Wilderness!

The clean air of the Southwest is a spiritual resource to us all; the Four Corners region's scenic resources are unmatched in the world. This area is in need of water for its own immediate purposes; and strip mining at Black Mesa and the Navajo mines is sickening. (Can it really be true that in full operation these plants would produce, each day, 2,000 tons of sulfur oxide, 240 tons of fly ash, and more than 1,000 tons of nitrogen oxides? These emissions surpass the total daily amounts dumped into the air of New York City!)

There are so few places left in this world that are true wilderness, where a person can experience the feeling of nature unmodified by man. The areas which are not significantly modified by human activity, while more numerous, are nevertheless in short supply as well. The Four Corners area must be protected.

We request that this letter be made a part of the official Hearing record. Thank you very much.

Sincerely yours,

ROGER MELLEEM,

University of Oregon Outdoor Program Nature's Conspiracy.

STATEMENT OF FREDERIC A. LANE, M.D., F.A.C.A., BAKERSFIELD, CALIF.

On March 31, 1971, large fossil fuel fired steam generators (such as those used in electricity generating power plants) were included on the first list of stationary source categories which the Administrator of the Environmental Protection Agency has determined may contribute significantly to air pollution which causes or contributes to the endangerment of public health or welfare.¹

As a physician, I am very concerned about endangerment of public health by the continuing deterioration of our air resource, especially regarding the air contaminants emitted in the process of electricity generation.

I am particularly concerned about the southwest desert Black Mesa power plant project, and the *precedent* that may be established virtually exempting new electricity generating plants from accepting responsibility for pollution control.

You may wonder why the Black Mesa-Mohave project would concern someone in Kern County, California. There are several reasons.

¹ Federal Register, Volume 36, Number 26, Wednesday, March 31, 1971.

1. The Mojave Desert portion of our county is the home of two major military installations, both of which require optimum visibility conditions. The continuing decrease in visibility in the desert has caused great concern, and investigations are underway to determine the cause of the problem. Re-location of these facilities would be a serious financial matter for the county. Both bases are closer by approximately 100 miles to the Mohave, Nevada power plant than that plant is to its own fuel source, the Black Mesa coal mine in Arizona.

Although prevailing winds favor dispersal of pollutants away from the military facilities, the rising background level of pollution in the desert is sufficient cause for examination of all potential and actual polluters.

2. The activities of the Southern California Edison Company and Los Angeles Department of Water and Power in particular concern me.

When the Los Angeles Air Pollution Control District enacted their stringent Rule 67, the Edison Company began to conduct inquiries about the availability of water for fossil-fueled plant sites in our county, which is immediately adjacent to Los Angeles but does not have any oxide of nitrogen regulations. Additionally, there were reports that the Department of Water and Power was considering construction of coal-fired plants in the Owens Valley, just north of the Kern County desert area. As these two companies are the primary participants in the Black Mesa project, the precedents they establish there are of great interest.

And what have these precedents been?

Much promising research has been reported on controls for particulates, sulfur oxides and nitrogen oxides. Large-scale application of these controls is dependent on the willingness of the power providers to accept the concept that **THEY HAVE NO RIGHT TO POLLUTE, AND THAT EVERYONE MUST BE RESPONSIBLE FOR THE DAMAGE HIS POLLUTION CAUSES.**²

Did the Black Mesa power plant project developers grasp the opportunity to apply or test new methods of converting the power in coal to electrical energy without deteriorating the air resource? **THEY DID NOT.**

According to Philip Fradkin's report in the *LOS ANGELES TIMES*, Sunday, October 18, 1970:

"Neither Fruitland or Mohave have any controls for nitrogen or sulphur dioxide emissions. Plans for the Page plant include controls for sulphur dioxide. Presently the Fruitland plant pours out 320 tons of particulate (black or gray smoke) matter a day into the atmosphere, thus making it the largest single stationary source of smog in New Mexico. Mohave will emit 14 tons, and Page from 7 to 14 tons. Under Los Angeles County's standards power plants are allowed to emit only 240 pounds of particulate matter a day. Edison's Mohave plant, it is calculated, will emit 13,000 pounds of sulphur dioxide and 12,000 pounds of nitrogen dioxide an hour. In Los Angeles County, such a plant would be limited to 200 pounds of sulphur dioxide and 140 of nitrogen dioxide an hour . . ."

On March 6, 1971, United Press International reported in the *LOS ANGELES TIMES* that the Southern California Edison Company had been served with a FIFTH notice of violating air pollution standards at its MOHAVE generating plant. The company claimed problems during the "shakedown" phase of control equipment installation. The company IGNORED the central question—why was such equipment not designed into the operation from the beginning?

IF THIS IS AN EXAMPLE OF THE "VOLUNTARY APPROACH" TO INDUSTRIAL EMISSIONS SOURCE CONTROL, THEN THE NEED FOR SWIFT AND STRONG GOVERNMENTAL ACTION IS CLEAR.

I respectfully recommend to your Committee that:

1. All legal remedies under the Clean Air Amendments of 1970 should be explored, including the establishment of standards of performance for new stationary sources and regulations for emission standards for existing sources which would *force* the Black Mesa power plant facilities to utilize the degree of emission limitation achievable through the application of the BEST system of emission reduction available. Federal enforcement actions should be utilized if necessary to gain compliance with the standards.

2. The companies involved should be required to:

(a) Add additional control equipment for particulates and gases as improved systems become available, and

² "Restoring the Quality of Our Environment"—Report of the Environmental Pollution Panel, President's Science Advisory Committee, The White House, November 1965.

(b) Conduct experimental work on new methods of coal preparation, combustion techniques, and stack effluent treatment for control of particulates and especially sulfur oxides and nitrogen oxides. Issuance of permits to operate should be contingent upon this willingness to conduct experimental work.

In the exact words of the Southern California Edison Company advertisement in the LOS ANGELES TIMES of May 26, 1970:

"IT TAKES MORE THAN WORDS AND PROMISES TO CLEAN THE AIR. IT TAKES ACTION . . . AFTER ALL, A BETTER ENVIRONMENT MEANS A BETTER LIFE FOR EVERYONE. TO US, THAT'S IMPORTANT."

BIOGRAPHICAL DATA OF AUTHOR

Frederic A. Lane, M.D., 5101 Ojai Drive, Bakersfield (Kern County) California 93306.

AB—Stanford University, California; MD—Stanford University Medical School; Military Service—3 years active duty, 7520th USAF Hospital, England; Specialty—Anesthesiology, private practice.

Fellow of the American College of Anesthesiologists; Fellow of the Royal Society of Health (Great Britain).

Member: Technical Advisory Committee on Air Pollution to the Kern County Air Pollution Control Board; American Medical Association, California Medical Association, Kern County Medical Society (former Chairman and presently member, Environmental Health Committee); American Society of Anesthesiologists; California Society of Anesthesiologists; International Anesthesia Research Society; Air Pollution Control Association.

COLUMBUS, OHIO, May 24, 1971.

Senator CLINTON P. ANDERSON,
Senate Office Building,
Washington, D.C.

DEAR SENATOR ANDERSON: This is to indicate strong opposition to any further construction of coal fired power plants, accompanying transmission lines or strip mines in the southwest.

Very truly yours,

ERNESTINE B. POWELL.

JOHNSTON COLLEGE,
Redlands, Calif., May 21, 1971.

Senator HENRY JACKSON,
Chairman, Senate Interior Committee and Insular Affairs, Senate Office Building, Washington, D.C.

DEAR SENATOR JACKSON: We as college ecology professors in Southern California, have been following the development at Black Mesa with incredulity and dismay! The Southwest has meant a great deal to those of us in California as a place to go to for fresh air, clear skies and quiet. We know the area and we are shocked at the difference the new plants have made to the quality of the air.

We urge your Committee to insist that NO new power plants be built in the Four Corners area and that the operation of the 2 existing power plants be suspended until adequate pollution controls are installed. We do so for the following extremely compelling reasons:

1. The air pollution associated with the planned coal fired power plants will be phenomenal and such plants would never have been approved in the Los Angeles area for which the electrical power is intended. This would ruin the scenic attractions of the S.W. and reduce income from tourism and from people having to move out of the Los Angeles Basin for smog-associated medical reasons.

2. At the time the Peabody Coal Co. and Western Energy Supply and Transmission Associates negotiated the lease of the land from the Indians, (late 50's, early 60's), it seemed apparent that the electrical needs of Southern California and Phoenix would become increasing rapidly. Since then, many are moving out because of the smog and there is developing a strong move to curb the influx of people into this area. Therefore, the need for these power plants is no longer as urgent and there is time to find ecologically feasible alternatives.

Furthermore, since the power companies themselves help to create the demands for electricity to mushroom, they can stop advertising so heavily; the present levels of per capita consumption are worse than adequate for the comfortable "American way of life" and increases due to natural increases in population should provide adequate profits to the company.

3. That open strip mining is being planned any where in the U.S. in the near 1971 is a disgrace! The scars from the mines and access roads, of other mines are in every ecology textbook as examples of terrible land management for which there is no justification and from which only a wealthy few profit.

4. Water has always been precious in the Southwest. The loss of 2,000 gallons of water per minute from the Mesa will lower the water table considerably and affect not only human activities, but all the plant and animal life on which man depends. Besides, this water will pollute the Colorado River with S and other contaminants from coal.

5. The people of the Navaho and Hopi Reservations are being exploited to a degree and thought inconceivable in the U.S. of America, in 1971. True the Indians will be paid 2 million a year, but that works out to only \$7 per year per person. Negotiations occurred between the mining company and the tribal *leaders*. The *people* were not told the whole story of the mines, the power plants, the smoke in the air, the salt in the water and how few jobs there really would be for them, the Indians. With the approval of the Department of the Interior, the tribal councils signed the leases without complete understanding of the proposals and adequate deliberation of the economic and ecological changes which would result. The Indian people now do understand what's happening. One Navaho has put it this way :

"It's an old story. Our water and our land resources will be drained, taken out of the reservation and in exchange we get a handful of jobs and a small payoff. What will be left of our way of life? No resources, no pastures for our sheep, no jobs when the Mesa is gone. They say the Indians must join the market economy, but they force us into a colonial economy. This is not economic development. This is economic termination of the reservation."

It seems that again big, white, corporations are taking advantage of the "little man" who isn't completely knowledgeable. Except this time it is worse—the lands of the U.S. really belong to the Indians—*all* of it. Indians have been treated shamefully and we declare that we, as Anglos, demand that the Anglo companies stop exploiting Indians and forcing them to change their ways of life. Other means will have to be found to improve the economic plight of people on The Reservations.

Therefore, we oppose power plants and strip mines around 4-Corners region. We also urge shutdown of two present plants until they can be made non-polluting. The government must stop new plant construction until a national energy policy is developed, reflecting that we live in a finite natural system and must establish balance with nature. Per capita growth of power use, and endless proliferation of power plants, cities and industry will destroy what little open space, clean air and water we have left.

Very truly yours,

ISOBEL CORNEIL, Ph. D.,
PAUL H. CORNEIL, Ph. D.,
Fellows in Environmental Studies.

FRANKFORT, GERMANY, June 10, 1971.

Senator HENRY M. JACKSON,
Chairman, Committee on Interior and Insular Affairs,
Senate Office Building,
Washington, D.C.

DEAR SENATOR JACKSON: I wish to go on record as opposing any further construction of coal fired power plants and accompanying transmission lines and strip mines in the Southwest.

M. MÜLLER-FRICKEN.

NAS CECIL FIELD, FLA., May 24, 1971.

Senator CLINTON P. ANDERSON,
Senate Office Building,
Washington, D.C.

DEAR SENATOR ANDERSON: I would like to voice my objection to the Four Corners Power Project.

It is incredible to me that, at a time when man has become capable of recognizing the seriousness of his pollution-creating activities, such a project could even

be considered. As I understand it, the seven plants will pour disastrous amounts of sulfur dioxide, oxides of nitrogen, and fly ash into the environment. Not only that, the strip mining and the pumping of water from beneath the Mesa may threaten the entire area ecologically. Can we afford to take a chance? Perhaps we spoiled Americans would be better off doing without our electrical gadgetry. In fact, many of my friends join me in believing that we definitely would be and will have to be!

Please support an immediate injunction against any further construction or mining operations in this part of the southwest.

Sincerely,

LORA GUDBRANSON
Mrs. L. G. Gudbranson.

MORONGO BASIN CONSERVATION ASSOCIATION,
Yucca Valley, Calif., June 11, 1971.

Senator HENRY M. JACKSON,
Chairman, U.S. Senate,
Committee on Interior and Insular Affairs,
Washington, D.C.

DEAR SENATOR JACKSON: We in the Morongo Basin of California are greatly concerned and opposed to the further development of coal fired power plants and strip mines in the 4-corners region. I believe that in the recent hearings relating to this matter it was amply brought out that such use and further development should be halted by the government.

Let's not destroy what we have left of open space, clean air and water.

I hereby request that this letter be made a part of the hearing record.

Sincerely,

FRANK H. COWGILL, *President.*

TWENTYNINE PALMS, CALIF., June 2, 1971.

HON. HENRY M. JACKSON,
Chairman, Senate Committee on Interior and Insular Affairs,
Washington, D.C.

DEAR SIR: I attended your hearing at Las Vegas, May 25, and was much impressed with the interest, patience, and Fairness of the acting chairman.

There were many voices crying in the wilderness. But little practical advice on how to get out. Some would seem to want to throw the baby out with the bathwater. Even Mr. Howard P. Allen of Southern California Edison admits the baby is dirty. But they are using the best cleaner available, with which no one is satisfied.

Which re-inforces my belief that the old expression "can't see the forest for the trees". Explains why no solution has been found.

The scientists and engineers have been saying much about precipitators breakthroughs, etc. But we still have the pollution.

I am no engineer, but am a practical man, who has reclaimed hundreds of tons of particulate matter to profitable use. With a comparative simple and economical system, which the reclaimed material would do much to pay for.

I see no reason why this system could not be adapted to any stationary polluting facility.

If my brainstorm proves feasible there would be no tall smokestacks and no pollutants escape into the air. Regardless of the kind of fuel used.

Nature has demonstrated over the centuries, the double system I am suggesting. Wind and Water.

The wind has dispersed the contaminates. Until man began dumping such tonnage into the air that this system was overloaded.

Water again natures way. Even now the air is clean a few hours after a rain. First the cyclone dust collector, used by all feed mills, grain elevators, lumber finishing plants, etc. They can be made in any size. Even small enough to use in the home, Sears sell one for this purpose. The wind concentrating the contaminants to usable form.

Second water. Another simple system used by poultrymen to keep the chickens from dying from heat. A fogging system. This would be installed at top of dust collector, where air exhaust would be carrying some particulate matter and most of SO₂ and NO_x. The intensity of the foggers could be increased until it

produced a small rain forest if necessary, bringing all contaminants down. The water could be sedimented and recycled. In other words producing the acid rainfall that Mr. Mike Williams speaks of. But under controlled conditions.

We should commend the Power Companies for supplying the fantastic amount of electricity that we use at a reasonable price monetarily. But we and they must find a way to reduce the cost in pollution.

In our area this means Southern California Edison.

I am retired and could devote much time to this project. If Edison chooses to implement it. If it doesn't work they owe me nothing. If it works they still decide if they owe me anything.

Yours Respectfully,

M. E. KIRK,

ALBANY, CALIF., June 6, 1971.

HON. HENRY M. JACKSON,
*Chairman, Senate Committee on Interior and Insular Affairs,
Senate Office Building, Washington, D.C.*

DEAR SENATOR JACKSON: I am very concerned with the plans for more power plants in the Southwest (Four-Corners area particularly), which will use coal to produce electrical power, the coal to be strip-mined from areas in Arizona, Utah, and other southwest states.

The consequences stagger the mind. The most devastating kind of mining—strip mining. The pollution of the atmosphere (pure, desert air no longer) to an incredible degree. The forcible eviction of the Navajos and Hopis from their lands; compensated, it is true, but the traditional web of their lives and customs shattered. The resource of coal definitely limited, to decades if all power plants are built. These are just a few of the consequences of environmental and resource disruption on such a monumental scale.

I hope deeply that controls can be made on this destructive process of the ruination of the environment. It's the only environment we have; when it's resources are used up, what do we do?

What about the great scenic wilderness resources of the Southwest? Are they to be sacrificed so that Los Angeles can "grow", so that there will be no limit to the electric power available?

Somewhere, somehow, we have got to stop using up our precious heritage, life-giving as it is.

Will you please make this letter a part of the hearing record?

Respectfully submitted.

Mrs. HELEN K. SHARSMITH.

SAN FRANCISCO, CALIF., June 4, 1971.

Senator HENRY JACKSON,
*Chairman, Senate Interior Committee,
Senate Office Building, Washington, D.C.*

I wish to go on record as opposing the present and proposed coal fired power plant system and accompanying strip mining in the 4-corners area of the Southwest.

Having recently visited the 4-Corners area, I witnessed some of the severe drought conditions the Indians there are now facing—a distinct threat to their livestock and what little agriculture they have. Since the water required for power plant cooling purposes and for strip mining and ore transfer operations must be diverted from existing water sources critically needed by that area, the drought conditions are likely to be perpetuated. Also, there is strong evidence of a serious erosion cycle beginning in that region, which can only be aggravated by the power plant and mining operations. Clearly, the welfare of the Navaho and Hopi Indians and their environment is in danger.

The air resources of the area are also threatened. Although the visible cool ash particles can be reduced to some extent from plant emissions, it is still not technologically possible to significantly monitor or reduce the far more poisonous INVISIBLE emissions such as the sulphur dioxides and oxides of nitrogen. Such contaminants can cause critical environmental damage as is already evident in LA and New York.

Furthermore, the strip mining operations are damaging the sacred land of the Hopi, demeaning a cultural and religious heritage more important to them than any material benefit.

The present per capita power consumption in this country is wasteful, unnecessary and dangerous. A national energy policy must be developed as soon as possible which will be in accord with our finite natural system, and which will conform to our basic needs and not our wasteful excesses. In accord with this, an economic development policy must also be enacted which will permit the Indians to meet their economic needs without damaging their environmental resources.

The current strip mining and power plant operation and construction must be stopped immediately. To continue with present policies and methods will be to turn the Southwest into a wasteland, endangering the survival of the Indian communities, and perhaps all of us.

Sincerely,

CHRISTIE H. HAKIM.

PALO ALTO, CALIF., May 18, 1971.

Senator HENRY M. JACKSON,
Chairman, Senate Interior Committee,
Senate Office Building, Washington, D.C.

DEAR SENATOR JACKSON: We have six children. One boy is studying for his Ph. D. at U.C.L.A., in Industrial Management. One girl is secretary to a State Senator in Hawaii. A second girl is practice teaching at San Francisco State College. Another boy is majoring in Art at the University of Santa Cruz. One boy is going to work following his high school graduation, and our last son is planning on living in the forest as soon as he is able to "get out" of high school.

I describe our family that you may wonder with us at this last boy, probably fifteen years of the most disillusioned, turned-off, depressed, and unhappy human protoplasm one might find today. True, he has no historical perspective at fifteen years of age. But true, also, that his chances of assimilating a perspective are negated by the barrier which builds itself each day about him. He sees only facts which point to the abandonment of the world he hopes awaits him. The specific issue most urgent to him is the possibility there may be no world, no forest, no stream, left when he is finally finished his high school years. This view of our society is not unique to fifteen year old children, but it seems most to have permeated their age group.

If we could but point to some intent on the part of government to cope with the environmental deterioration, we might herd these young people, so young and ignorant, toward a mass complement of their education, assured that the world in its physical health would be waiting for them when they had finished their studies. Was not this assuring knowledge part of the reason that our generation, yours and mine, the reason we were able to meet all tremors and calm all fears and deal with two wars, in strength and with assurance? But instead of this knowledge, our son sees a life style reflecting a willingness to let the lakes, the rivers, and the air be contaminated by industry, perhaps irrevocably lost to his generation, whether we do it for money, or because we have not the time to try to stop it.

I do not sense we alone have thus alienated a child. Teaching high school English, I visit with other children. Most of them have a dual feeling about our life style. In most of their minds there is a fragile hanging-on rather than any strong support for the managers of today's earth-world.

Could you not take into account the possibility of this potential fragmentation of our society? Even the suspicion that children are noting our stewardship of the natural earth's elements, and counting on our saving the rest of it for them, however gigantic our effort must be, is a step forward. They have the illusion we are going to make the effort, and honor us so much they feel we cannot do less. Believing, in addition, that much of what passes for support from children in today's society is delicately balancing on the thread of hope they keep that we will have their green world for them is an added positive element. But more than both, would be the willing agreement on your part, to listen to those who would ask you to consider bringing the strength of your office to bear and oppose additional power plants and strip mines at, and around, Black Mesa, Arizona, and to bring the power of your office to support the conservation of the six national parks, 28 national monuments, Lake Mead and Lake Powell recreation areas, and Grand Canyon, by opposing the installation of power plants, and the digging of strip mines in the Four Corners region of the southwest.

Sincerely,

MARGERY ROBERTSON.

WINSTON-SALEM, N.C., May 31, 1971.

Senator HENRY M. JACKSON, *Chairman, Senate Committee on Interior and Insular Affairs, U.S. Senate, Washington, D.C.*

DEAR SENATOR JACKSON: Last September I spent nearly two weeks vacationing in the "four corners" area of Utah and Arizona. Most of my time was spent in an area centered around Page, Arizona and Lake Powell.

In this area I found qualities which remain in few other places inside the original 48 states: the invigorating and clear air, together with vast panoramas unbroken by any sign of man's intervention, provide an unparalleled opportunity to experience the sense of freedom characteristic of the frontier, that must have motivated our forebears a century ago. These same qualities underlie much of the region's recreational appeal, which is being recognized by more people every year.

This is why it disturbs me to learn about plans which would make the area just a conveniently-remote "power shed" for some of our urban areas in the west. It's clear that the mammoth coal-fired power plants which are planned, each belching smoke from conspicuous stacks, along with the necessary towers for transmission lines, roads and rail lines for access, would mark the end of this area's important contrast most of our industrial centers.

It would seem that these power facilities should be sited nearer those whom they would directly benefit. The true "social cost" of this development would then be more directly apparent. Indeed, if the recreational cost of these developments were more immediately apparent to the power users, the added cost of fuel transport might be recognized as justifiable. It's a cheap trick to hide the real cost of these facilities by making them remote in time and place. In any case, adequate state laws, to insure the reclamation of lands strip-mined for coal, would seem to be a minimum prerequisite to these developments.

Respectfully yours,

LARRY R. HARRINGTON.

PHILADELPHIA, PA., June 1, 1971.

HON. HENRY M. JACKSON,
*Chairman, Senate Committee on Interior and Insular Affairs,
U.S. Senate, Washington, D.C.*

DEAR SENATOR JACKSON: It is my understanding that the hearings record will remain open to include statements from the public until June 7. I request that the following statement be made part of the Four Corners power plant field hearings.

The environmental impact of coal-fired electrical generating power plants in the Four Corners region of the United States is a matter of national concern. These plants effect a large area of public land including National Parks. Every citizen of the United States is equally concerned in these public hearings and is entitled to equal weight being accorded any statement, regardless of physical distance or proximity to the region.

The evidence already exists that the building of coal-fired power plants in the Four Corners region results in environmental degradation. Two plants now in operation demonstrate that their operation adversely affects the area. Scientific study projects that when the planned additional plants start operating these detrimental effects will be enormously increased. The proliferation of these plants in the Four Corners region has the appearance and the effect of terminal cancer spreading over the once vital ecology of the Southwest.

There is no justification whatever for sacrificing to environmental degradation the public lands of the Southwest supposedly the property of all the people of the United States in order to satisfy the undisciplined and irresponsible power demands of the distant cities not themselves in the area they wish to exploit.

Ample evidence exists of the following effects from these power plants: (1) pollution of the AIR over a widespread area of public lands including National Parks; (2) deletion of WATER resources in an already arid region; (3) LAND destruction (4) exploitation of INDIANS; (5) wasteful squandering of finite POWER resources which in the interests of United States require conservation.

I would like to ask that a moratorium be applied immediately to ALL building of coal-fired power plants in the Four Corners region, including those already begun and those in the planning stage.

Yours respectfully,

NANCY E. WILLIAMSON.

COMMITTEE OF CONCERN,
FOR THE TRADITIONAL INDIAN,
San Francisco, Calif., May 18, 1971.

Senator HENRY JACKSON,
Chairman, Committee on Interior and Insular Affairs,
Senate Office Building, Washington, D.C.

DEAR SENATOR JACKSON: I am writing on behalf of the Committee of Concern for the Traditional Indian. For over a year we have been active in studying and publicizing the actual and projected effects that the strip-mining and power plant network is having and will have on Indian tribes in the Southwest, particularly on the Hopi Indians of Northeastern Arizona. We have done quite a bit of research and for many reasons have come to the conclusion that the present stripmining of Black Mesa must be stopped. Some of these reasons are:

(1) The coal-mining lease between the Peabody Coal Co. and the Hopi Tribal Council is an illegal agreement, in that the tribal council did not have the proper legal authority to sign the lease, nor did the Secretary of the Interior have the authority to approve it.

(2) The mining of Black Mesa is considered as a desecration of sacred lands by Hopi (traditional) leaders and is being carried on despite their strong objections.

(3) The mining threatens the Hopi way of life, both physical and cultural in that: a) It threatens their surface runoff and sub-surface water supply (which supports Hopi dry-farming) with contamination and depletion; b) There is the great possibility that chemical and earthen wastes will poison and smother Hopi fields, particularly those located in and around the Moencopi Wash, which lies directly in the path of run-off from the mine; c) The Hopis' clear skies already are being filled with smog from the Four Corners plant—the situation can only get worse when other plants, such as the Navajo plant at Page, are completed; d) The threat to Hopi religion is great; there are sacred shrines located on Black Mesa. Also, eagles whose feathers are essential to a very sacred and vital Hopi religious ceremony are found to nest on Black Mesa—they too are threatened by the stripmining.

(4) The strip-mine at Black Mesa supplies coal to one electric-generating station and it is planned that it will supply another. These two plants are part of a network of powerplants whose presence in the Southwest will mean forced industrialization and pollution of one of the last areas of undisturbed beauty in this country.

(5) The coal-mining, construction, gigantic roads, transmission lines, railroad and 273-mile slurry pipeline ecologically and esthetically damage the relatively unscarred Southwest landscape.

(6) The need for this power is in question. Much of it has been created simply by the advertising of the power companies and the projections of planners and industries who stand to gain from the over-population and location of industry in the Southwest.

(7) Much of the power will go to areas outside of the Southwest, such as Los Angeles, whose pollution standards would not allow construction of coal-fired plants such as those now located in and planned for the Southwest.

(8) There is a possible pollution-free alternate source of power and water in the harnessing of underground steam deposits in the Imperial and Mexicali Valleys to provide geo-thermal power.

(9) Growth for growth's sake, as evidenced in the planning of this massive project, is an outmoded and backward type of thinking—it should have no place in the crucial policies it will be necessary to implement in order to rescue ourselves from total environmental destruction.

For these reasons we strongly urge that your committee call for a moratorium on present operations and construction and further planning and development of the coal-mine at Black Mesa, the Mohave, Navajo and Four Corners power plants, the slurry line between the Black Mesa processing plant and the Mohave plant, the railroad between the Black Mesa mine and the Navajo plant and other related activities, including plans for construction of additional power-plants in the Southwest.

We urge that a regional study be made by the Environmental Protection Agency of the combined, synergistic effects of the power-plant complex.

We urge that your committee lend its support to seeking out alternate sources of energy as well as to the formulation of a national energy policy.

Furthermore, we urge that your committee use its powers to safeguard the rights of Indians; to see that their lands be protected, their treaty rights adhered to, their aboriginal and human rights upheld. The federal government's unlawful and immoral recognition and acceptance of a small handful of unrepresentative Hopi as spokesmen and decision-makers for the entire tribe has led to many serious problems for the Hopi, this present situation being just one.

We hope that you will think about these things. When solutions to these problems are sought, it is our hope that the justice due the first inhabitants of this land will not again be lacking.

Sincerely yours,

SARA GREENSFELDER.

BERKELEY, CALIF., June 1, 1971.

HON. HENRY M. JACKSON,
*Chairman, Senate Committee on Interior and Insular Affairs, U.S. Senate,
Washington, D.C.*

HON. SENATOR JACKSON: Just two weeks ago I returned from my second venture into the magnificent canyons of the Escalante country. We enjoyed immensely the rejuvenating solitude and clear skies that are so rare these days in California.

However, if the Navajo and the mammoth Kaiparowits power plants are constructed as planned, it will spell the end of the Escalante and surrounding areas as refuges from the neuroses of modern urban technocratic life. The incredible amount of pollution that will be produced daily by these plants, combined with the atmospheric high pressure zones that characterize desert areas and will hold the smog in the area should be sufficient to accomplish this destruction.

In addition to ruining the region for the white man's recreation and spiritual regeneration, the power plants would be extremely deleterious to the Navajo and Hopi tribes and culture. Not only are sacred mountains—Black Mesa and Navajo Mountain—in danger of being desecrated, but the reservations themselves may be destroyed through acid mine drainage, excessive construction, and "relocation" of the Indians themselves (again!).

As a native Californian, I have no love for Los Angeles or what it stands for. I do not like its self-justifying attitude of "Since I exist, I can take what I need—from anyone." I especially do not like to see therefore, one of the most beautiful area in our Nation befouled to sate the enormous appetite of perhaps our biggest nest-fouler.

Very soon, this Nation must examine in perspective its true energy needs, weighing these needs against the costs of further environmental pollution. Furthermore, since our energy sources are very definitely finite, we must realize this fact and move immediately to develop a new ethic for energy use, curtailing or eliminating uses that are unnecessary or excessively wasteful. The public must be re-educated relative to reducing energy consumption; and likewise, public utility companies should be prohibited from advertising for more power consumption.

In line with the foregoing, I most strongly urge a suspension of work and power plants in the Four Corners area until true power need (balanced against environmental considerations) is established. And before any plant is allowed, it *must* meet stringent restrictions on particulate, SO₂, and NO₂ emissions.

Please include this letter as testimony in the record for the hearings on the environmental impact of coal-fired power plants in the Four-Corners region.

Sincerely yours,

JOHN W. HARBUCK.

BERKLEY, MICH., June 4, 1971.

HON. HENRY M. JACKSON,
Chairman, Senate Interior and Insular Affairs Committee, Washington, D.C.

DEAR SENATOR JACKSON: Re the proposed massive installation of coal-fired steam generating power plants in the Four Corners region of the Southwest: I am absolutely hysterical, frightened, outraged, fire-breathing, etc.

The most important thing to me is to find a peaceful environment conducive to life, love and quality of life style. I am a suburban Detroit resident and work in Detroit. I am very unhappy with what, for lack of a better word, is my environment. We have many lakes north of Detroit; they are surrounded by wall houses and filled with household pollutants. It is in this environment that I spend my "country" weekends recuperating from weekdays in the city where the sky is never horizontally blue and often my eyes burn and lungs tickle.

I am about to marry. Neither my fiance nor I wish to commit birth to such a wasteland. Neither do we wish to leave the freedom and heritage of which America stands. Consequently, we have bought an acre of the most beautiful land I have ever seen in a town which values quality of living above growth and progress. I feel very committed to this move. We are both working very hard to make this dream come true. The land is on Red Mountain in Aspen, Colorado, forty-five miles from the proposed Paonia site. This is the last place, in this country, we could think to run to where we know the local citizenry is not influenced by money and profiteers. If the Rocky Mountains are polluted I would give up all hope of living in a peaceful healthy land. I might add that some of our friends have already given up hope and have moved to Canada and Australia. These are all college educated people with bachelors and masters degrees.

My solution is simply to go without if it is an either/or situation. Advertising and business have conned us into buying needless items by inducing model change over and planned obsolescence. It has also reduced self-reliance and created a machine dependency. Few of us now are resourceful enough to survive without the benefit of production. Machines have been created at our expense as well as for it, and we are paying. We must stop this spiralling progress which is not fulfilling basic human needs. If people are thrown out of work there is plenty of work to be done with cleaning litter off our highways. If we are no longer #1 in items let us be #1 in quality of items.

It is difficult writing this letter to you, knowing how you supported the SST. But you are in charge of this committee and I hope you might think differently on an issue that won't get you reelected in your home state.

What you don't know you don't miss, and it is getting increasingly difficult to have a sensitivity to nature. I ask that this most rewarding appreciation be returned to me and future generations.

Very truly yours,

GAYLE BETTEGA.

AZUSA PACIFIC COLLEGE,
Azusa, Calif., May 26, 1971.

Senator HENRY M. JACKSON,
Chairman, Committee on Interior and Insular Affairs,
Senate Office Building, Washington, D.C.

DEAR SENATOR JACKSON: I wish to go on record as opposing any further construction of coal fired power plants and accompanying transmission lines and strip mines in the southwest. I hereby request this statement be made part of the record in the Senate Committee on Insular and Interior Affairs to be held May 24, 25, 26, 1971.

Sincerely,

DUANE KAPP,
Assistant Professor of Psychology.

GRAND FORKS, N. DAKOTA, May 26, 1971.

Hon. HENRY M. JACKSON,
Chairman, Senate Committee on Interior and Insular Affairs, U.S. Senate.

DEAR SENATOR JACKSON: Would you please include this statement in the record of the hearing on the environmental impact of coal-fired electrical generating plants in the four-corners region.

I am a resident of Utah and have enjoyed the recreational opportunities that the four-corners region provides many times in the past and hope to enjoy them in the future. I feel, therefore, that my interests are at stake when a coal-burning power plant threatens to degrade the environment of the area. One of the most enjoyable parts of any outing for myself or for any fisherman, hunter, boater, or sight-seer is to simply be outdoors where we can enjoy the pleasant surroundings of landscape and clear blue sky. Its going to completely spoil any outing in the four-corners region if that sky is fouled with black smoke and poison gas.

Our need for electric power does not justify air pollution or strip mining in the four corners region. We must realize that our resources are finite and that we must eventually limit the expansion of production and population if we are to retain any quality of life in this country. A good place to start this limiting is in the four-corners region. When the people of this country realize there are limits to their energy resources, they will realize the need to limit population and the need to make better use of the energy sources presently available.

For these reasons, I strongly support the suggestion that a moratorium be

declared on the building of any power plant in the four corners area until a real need for power can be determined and until much more effective pollution controls can be developed and standards set and enforced.

Sincerely,

CHRISTIAN CHRISTENSON, Capt., USAF.

LOS ANGELES, CALIF., May 14, 1971.

Senator HENRY JACKSON,
Chairman, Senate Committee on Interior and Insular Affairs,
Senate Office Building, Washington, D.C.

DEAR SENATOR JACKSON: As a member of the Southern Section of the Indian Lands Subcommittee of the SIERRA CLUB, and as Chairman of the Indian Section of the Current Issues Group of the Unitarian Community Church in Santa Monica, California, I wish to add our support to those Native Americans who are protesting the air pollution from the power plants in the 4-Corners region of the Southwest, the disturbing of sacred grounds of the Hopi Indians, and the desecration of the earth by strip mining of Black Mesa.

We believe that strip mining should be outlawed by the government in all of the United States, and that a world movement should be initiated to make this outlawed all around the face of the earth.

We strongly urge your immediate attention to the impact of this power plant and the strip mining operations on the land and many peoples in the 4-Corner area. We call for an immediate moratorium on all expenditures for the further construction of the Navajo Project and the Black Mesa strip mining project.

We wish to request a full review by the Department of the Interior of decisions leading up to the location of this destructive project.

Most sincerely,

J. L. SORENSON.

PULLMAN, WASH., May 26, 1971.

Senator HENRY JACKSON,
Senate Office Building,
Washington, D.C.

DEAR SENATOR JACKSON: The TV reported that only Senator Moss attended the power hearings at Four Corners. This issue should be of concern to you if you are interested in preserving northwest water for those in the northwest.

As a new comer to Washington State last fall, we often heard your taking the credit for having saved Washington State from being forced to lose water to the dry desert states. You called this one of your "conservation" accomplishments though it appeared to be done more with an eye to Washington's own growth rather than concern for the land. If restrictions aren't placed on population centers in the south, you will not have saved Columbian waters for long.

As a former resident of Nevada I can tell you that no one in the water or growth business in that parched state considers the battle lost but only a short unfortunate delay to have occurred. The policy seems to be in Nevada generally but specifically in the Las Vegas area (as well as Los Angeles) to use up all surface and ground water in order to place the state in a better position to demand more water.

At one point Nevada ground water specialist told me that ground water use would be encouraged in the race to put applications in for a bigger northwest allotment. The same person told me that Las Vegas, for instance, would not tolerate using tertiary treatment water, though I found out later that no study had been done and where environmentalists have done studies they found the public not that opposed. This is one of the inherent weaknesses in the Nevada water Department that its powers deal only with allocation and that of immediate beneficial use with little thought to changing peoples' concepts of water re-use or saving.

The power plants at Four Corners will not only further encourage growth in the dry southern areas but will increase the voting demand for more water and power—at someone else's expense. Los Angeles doesn't want the pollution, or the water saving and the demands will inevitably come to build pressure on a northwest exchange. The Four Corners power plants destroy the recreational potential of the land. The cities of Los Angeles and Las Vegas do little to make their cities worthwhile for weekend or vacation living. The inhabitants of those cities end up destroying both areas through neglect.

Sincerely,

(Mrs.) TINA NAPPE.

CULVER CITY, CALIF., July 27, 1971.

Senator HENRY M. JACKSON,
Chairman, Committee on Interior and Insular Affairs,
Senate Office Building, Washington, D.C.

DEAR SENATOR JACKSON: I feel compelled to add my voice to the rapidly increasing numbers of citizens who, like myself, are gravely concerned about the Black Mesa Power Problem in the Four Corners area of the southwestern United States and the resulting ecological impact and cultural devastation to this once native environment.

It is abundantly clear that the entire Southwest is in jeopardy. The combined effect of operating coal-fired power plants and strip mines to provide fuel for these associated electricity-generating plants constitutes a serious hazard to the Four Corners and surrounding outdoor recreation areas. These coal-burning plants are dumping tons of particulate matter (smog) into the surrounding atmosphere, destroying thousands of acres of grazing land, and polluting vast amounts of desert water.

I feel quite certain, Senator, that you recognize the importance and desirability for developing new outdoor recreation areas for an increasing and mobile population and the necessity for maintaining the natural beauty of such favorite recreation areas as Grant Canyon, the Glen Canyon National Recreation Area, Monument Valley, Lake Powell, Mesa Verde, etc. In addition, the economy of the Four Corners area will be affected proportionate to recreation development and availability of unpolluted land and desert water for present and future development.

Surely, the devastating effects of the Black Mesa power development could not have been anticipated without a calous disregard for the future of the Navajo and Hopi Indians on whose reservations these operations are taking place, the environmental-economic effects on the vast Four Corners area, nor the millions of Americans who annually visit the great outdoor recreation areas of the Southwest. One of the biggest users of Black Mesa power will be Los Angeles where steps have been taken to ban fossil-fuel burning in order to cut down on air-polluting emissions. It becomes obvious that Black Mesa power will be transmitted to distant cities of the Southwest, while the Black Mesa-Four Corners area becomes environmentally unsafe for man and the life forces associated with him.

The reported loss of approximately 100,000 acres of Navajo and Hopi Reservation lands to strip mining operations is of paramount importance to the future of the Navajo and Hopi Indian tribes. The compensation paid to these tribes cannot replace the grazing lands that are lost, replenish the desert waters that are contaminated, nor restore the atmosphere that is filled with particulate matter.

American Indian history repeatedly demonstrates that the land base by a nation or tribe is the single most important factor contributing to the success or failure of the development of their social/economic structure. The land base, land acquisition, and land management and conservation are absolutely essential and constitute the basic ingredient for the economic development of Indian tribes, as pointed out in the Meriam survey report prepared in 1928 and contained within the Indian Reorganization Act of 1934. Therefore, it can be concluded that acquisition of the vast acreage for the Black Mesa power project can only have a deleterious effect on the economic well-being and growth of the Navajo and Hopi tribes due to their specialized needs for land.

In conclusion, Senator, it seems that the Government of the United States is once again adding a page to an abominable record in Indian affairs. Once again we act on a present and immediate problem without due consideration to the future of all of our Indian citizens—this time, without regard for the future of all of our citizens.

Ecology, the interrelationship of "man" and his environment, depends on a clean atmosphere and the safe use of land and water. The continued use and development of fossil-fueled power plans and the wanton waste of land and water reserves must be banned. Environmentally safe alternatives for the rational use and production of electric energy are not only possible but imperative for continued development of our great Southwest. The protection and guarantee of the rights and needs of our Indian citizens must be inherent in all future planning and development of the southwestern United States.

Very truly yours,

HELEN ROGINSKY.



