RECYCLING OF USED OIL

HEARING

BEFORE THE

COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS

UNITED STATES SENATE

NINETY-SIXTH CONGRESS

SECOND SESSION

ON

S. 2412

A BILL TO AMEND THE RESOURCE CONSERVATION AND RECOVERY ACT TO FURTHER ENCOURAGE THE USE OF RECYCLED OIL

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RECYCLING OF USED OIL

MONDAY, MAY 5, 1980

U.S. SENATE,
COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS,
Washington, D.C.

The committee met at 2:10 p.m., in room 4200, Dirksen Senate Office Building, Hon. Pete V. Domenici presiding.

Present: Senator Domenici.

OPENING STATEMENT OF HON. PETE V. DOMENICI, U.S. SENATOR FROM THE STATE OF NEW MEXICO

Senator DOMENICI. We are going to call the committee to order, and the way the Senate looks, we might, for a change, have about 2 hours when no one will have to be absent and we can proceed right through with about a 2-hour hearing. I think that might get most of what we need accomplished.

Today, the full Environment and Public Works Committee will be hearing testimony from a number of witnesses on S. 2412, a bill to encourage the recycling of used oil. I introduced this bill on March 12, 1980, because of the need for action in the recycling of waste oil to conserve energy and to protect the environment.

About 1.2 billion gallons of used lubricating oils are produced in the United States each year, principally from automotive crankcase oil account for 55 percent, industrial and aviation lubricating oils 36 percent, and industrial process oils 7 to 8 percent. Almost half of this is lost through disposal on land or in the water. Most of the remaining one-half is burned as fuel, while only about 5 percent is re-refined into lubricating oil. The effect on the environment through improper disposal and uncontrolled burning is serious.

By comparison with today's inherently wasteful practices, the re-refining of all used lubricating oils back into lubricants would produce a net energy savings of 42,000 barrels of oil per day, and would be reflected in reduced oil imports in the same net amount. This energy savings takes into account both the energy used in re-refining and the energy lost by not burning that portion of used lubricating oils which is presently used for this purpose. In clearer terms, 42,000 barrels of oil translates into enough fuel to heat 600,000 homes or can be equated to the amount of energy produced from one nuclear powerplant. Even if we could only capture half of that 42,000 barrels of oil, we would still realize a savings of $292 million per year, without taking into consideration that recycled oil can be re-refined over and over again.

However, the real resource loss in the U.S. failure to re-refine oil is substantially greater than the figure of 42,000 barrels per day

would indicate. Less than 2 percent of the average crude oil stream is suitable for use in manufacturing lube oils without greatly increasing the energy cost of production. The western Pennsylvania and west Texas fields, which have historically provided much of the domestic crude most valuable for this purpose, are in serious states of depletion. Thus, a failure to recycle and conserve the lube oil we now have will mean higher and higher costs for lubricating oil in the future.

The conservation of this resource base by re-refining would be even more important than the conservation of energy by re-refining. If petroleum-based lubricating oils became unavailable, either through foreign government action or the natural decline of oil fields providing suitable lube-bearing crude, the country could literally come to a grinding halt. There is no available, in-place technology to meet all the country's lubricating needs in the absence of sufficient supplies of high-quality petroleum.

Despite its obvious advantages to the country, the quantity of used oil re-refined in this country has fallen sharply since the early 1960's. During the 1940's and 1950's the United States re-refined substantially all the used lubricating oil which it generated. But the number of re-refiners has dropped from 150 in 1960 to less than 30 today, with a concomitant drop in capacity. Most of the remaining re-refiners say they are in poor financial condition with additional business failures occurring every year. Some of this decline can be attributed to operation of the market place during an era of apparent plenty. However, much of it has also resulted from governmental policies and actions. Chief among these is the labeling policy imposed by the Federal Trade Commission that all re-refined oil bear the label "made from previously used oil." This requirement has conveyed a negative connotation in the eyes of the consumer.

The labeling requirement has not been modified since it was first put into place, despite the fact that recent tests in which municipal vehicles in San Diego operated exclusively using re-refined oil showed lifetime engine wear to be equal or less than would have been expected in similar engines using top quality virgin lubricating oil. These results have been confirmed by tests at the Department of Defense, which is presently revising its military procurement program.

It was to conserve used oil as a resource, while reducing its threat as a waste that I introduced S. 2412. The bill attempts to remove artificial impediments which have been created by governmental action, but without tampering with the proper functioning of the marketplace. S. 2412 contains a distinct bias in favor of re-refinement because that seems to be the safest and most efficient way to utilize waste oil, but it does not preclude its use for other purposes when that is economically preferable to re-refinement and can be done safely.

I look forward to testimony from EPA, DOE, NBS, the Association of Petroleum Re-refiners and the National Association of Oil Recovery Coordinators, and hope that we can act swiftly on this important initiative.

In yesterday's New York Times there was an article by Michael Brown on this issue which will be made a part of the record.

[The article follows:]

[From the New York Times, May 4, 1980]

A Wasted National Resource: Millions of Barrels of Engine Oil

(By Michael B. Brown)

In Pennsylvania, it has been dumped into abandoned coal mine shafts or left in rusting 55-gallon barrels. In Missouri and Texas, it has been sprayed as a dust suppressant on rural roadways, causing health problems and an environmental mess. In New York City, it is burned off as low-grade fuel or simply unloaded into landfills. And in every community, it is poured onto fields to kill unwanted grass, dumped down basement sewers or discarded in the nearest trash can.

Each day, according to Federal and industry figures, Americans waste 70,000 barrels of used lubrication oil. That is not a large part of the 9 million barrels of petroleum imported every day, but, by the end of each 12 months, the figures add up impressively. Efforts at salvaging waste oil, however, have been dwindling markedly despite new technologies and what is supposed to be a national effort to conserve petroleum, and the industry points to Government regulations as the cause of much of its problems.

Annually, more than 2.3 billion gallons of lubrication oil are used in the country, and although 1.2 billion gallons are recoverable, less than 100 million gallons will be re-refined for future use. During the 1960's, up to 400 million gallons were re-used annually with about 150 facilities in the business. Today, only 13 re-refiners are active members of the Association of Petroleum Re-refiners.

It has become, as George Booth 3d of North Tonawanda, the only major re-refiner in New York, put it, "pretty much a dying industry."

It doesn't wear out

The lubricant oil is recovered from car service stations, automotive dealerships, air terminals, factories and railroad yards. During its many uses it picks up metal contaminant, grit, and often, toxic chemicals, which can be filtered and distilled out. Oil does not wear out any more than water does.

Far from the methods of yesteryear, when waste oil was passed through cheesecloth and put back to work, there are now techniques of gravity separation, centrifuging, coalescing, clay filtration, flash distillation and chemical absorption. In Bartlesville, Okla., the Phillips Petroleum Company has perfected a system, called the Phillips Re-refined Oil Process, that can recover 90 percent or more of spent engine oil. One of its plants, purchased by Texaco Mexicana, has a capacity of 20 million gallons a year.

Still, the industry is shrinking and it traces the origins of its decline to 1965, when the Federal Trade Commission, concerned about the poor grade of lubricants being sold, moved to mandate that the product be labeled "made from previously used oil."

"From the 1920's to the 1960's, re-refiners were selling it without a label and were really selling garbage," said Charles Donaldson, a staff attorney for the Federal Trade Commission. "With waste oil there was no idea what was getting into the tank—it was all mixed together. What quality was the base stock? And it was hard to tell which additives were proper to add in."

The F.T.C. is waiting for the Bureau of Standards to devise a standard quality and performance test for re-refined oil—an endeavor that could take five years and, when it is settled upon, cost up to $20,000 per test. Engines must be torn down to gauge corrosion, wear and tear, and residue accumulations as well as to determine the types of blends and additives.

But that comes as little comfort to those who, like Curtis Moore, a staff aide of the Senate Environmental and Public Works Commission, consider the recovery of oil as essential to national energy efforts and the F.T.C. label too discouraging to potential buyers.

"The way I see it, it looks like the industry was sent into a real, tailspin after the F.T.C. labeling requirement," Mr. Moore said. "When I look at the label I get the feeling that some grease monkey has just drained the oil out of a crank case and is trying to sell it to me." Mr. Moore, among others, suggests the label be changed to describe "recycled" or "re-refined" oil.

Another Government-imposed road block was that of excise taxation. Before 1965, the Treasury Department had taxed lubrication oil made from fresh petroleum at 6 cents a gallon, while exempting reclaimed oil. That advantage was wiped away in 1968 by the Internal Revenue Service when it was determined that re-refiners did

not qualify as "off-highway users," a category necessary to qualify for the Excise Tax Reduction Act.

So it was that re-refiners, who typically pay 15 to 20 cents a gallon for feed stocks of used oil and spend up to 50 cents a gallon in the recycling processes, were in a poor position to compete with unlabeled virgin products selling for $1.10 to $1.25. Because of the labeling requirement, and the taxation, they could at best expect a gross margin profit of 20 cents a gallon with a retail sales price of 90 cents.

Whatever marginal income was to be derived by re-refining oil was further diminished by other governmental regulations that dissuaded potentially huge customers from buying their products. Years before, the Defense Department had decided against allowing used oil for its equipment because of reservations over the quality, thus eliminating not only one of the largest oil clients in the world but, with the same stroke, discouraging purchases by other Federal agencies and state and local governments.

"Everything the Government did exacerbated the problem," said Jim McBane, executive director of the re-refiners association. "Our oil is just as good as virgin oil, but to the consumer it's dirt. The label forces us to be the lowest price on the shelf, and that's tough to swallow."

ADDITIVES A PROBLEM

In addition, re-refiners are squeezed by basic advances in lubricant technology. By the end of the 1960's, Detroit was producing powerful motors with such high-performance standards that ordinary oil was no longer sufficient. Chemical additives—emulsifiers and cleansing agents—were now added to the crude, making it more difficult to filter out the pure oil in the re-refining process. Once they got the oil out, they had to remix new additives.

To break down the new blends, those re-refiners who could afford the necessary equipment have tried using a method known as acid-clay filtration, in which particles are separated out and the oil filtered through absorbant clay. But even with this there was a major problem: The process created a hazardous sludge that had to be dumped in special landfills—and at high cost. Many of the dumps were a three-state journey from the distiller and charged $800 a load.

A final blow came as a result of the Arab oil embargo of 1973 and the resultant upward spiral in import prices. While the new scarcity of petroleum should have been a boon to recyclers, the maneuvers by the Organization of Petroleum Exporting Countries have instead created a new obstacle: competition with hundreds of independent waste haulers competing for the used feedstocks. So valuable has petroleum become that these haulers can offer more to service stations than can re-refiners, selling it to burners for 80 cents a gallon with no overhead except transportation. Where a re-refiner pays 20 cents a gallon, waste haulers can afford up to 30 cents.

"We've got problems," said Mr. McBane, "all along the way."

If economic factors alone aren't enough to encourage re-refining—most estimates state that the United States could save $1 million a day in imports from total recycling—then there are the many environmental factors that come into play. When waste oil is burned for heat, it releases into the air large quantities of lead and, if the oil has been mixed with other industrial residues, carcinogenic compounds such as polychlorinated biphenyls, or PCB's.

The haulers themselves, who are frequently paid to take away especially contaminated waste oil, have created the most notable damages. One such oil "scavenger" in 1971 drew from a Missouri factory waste storage tank residues generated in the manufacture of the antibacterial agent hexachlorophene and mixed them with oil he later used for dust control on rural roads and horse arenas.

The hexachlorophene contained dioxin, one of the most toxic substances ever synthesized by man—a compound with 10,000 times the punch of sodium cyanide. Within days of the spraying, sparrows and other birds roosting in barn rafters dropped from their perches and died, along with dozens of horses. A 6-year-old child was hospitalized with respiratory troubles and internal hemorrhaging.

Toxic-laden waste oil has also troubled New York City. Two weeks ago, a fire erupted in a 75,000-gallon pond of waste oil in Flushing Bay, Queens, sending into the air and toward Shea Stadium a black column of smoke that officals said probably carried PCB's.

Such distressing environmental effects have led one official of the Environmental Protection Agency, Hugh Kaufman, manager of the agency's waste assessment branch, to complain that large oil companies are not doing their share to recover the oil—and in fact have inhibited efforts to do so.

"The companies put barriers up," Mr. Kaufman asserted. "The Federal Trade Commission put the labels on re-refined oil based on lobbying efforts by the oil companies. Their virgin products are a high-profitability item."

All of which is flatly denied by the American Petroleum Institute, which says that the only reason it hasn't done more to develop re-refining technology is that it thought such efforts were already being handled by the Federal Government.

"The oil industry has not lobbied to have re-refined oil labeled," said Bobby Hall, a spokesman for the institute. "I don't think anyone has an ax to grind with re-refinery."

In fact, say industry sources, several major oil companies, now running low on stocks from the Middle East, are actively seeking economical means of recovering the products. "We can take a product worth perhaps 15 cents a gallon and produce a product worth $1.40," said Emil A. Malick, Phillips' special projects director overseeing its project. "It's absolutely irrational to dump this oil."

Recently, a number of governmental changes have occurred that re-refiners hope will save their industry. The military has decided to accept some of their oil, the E.P.A. is considering tight restriction on competing waste haulers, and a petition by the re-refiners association calling for elimination of discouraging labels was presented last week to the F.T.C.

In addition, Senator Pete V. Domenici, Republican of New Mexico, has proposed an amendment to the Resource Conservation and Recovery Act that would call for a review of the label.

Still, for the "large-dollar" investors that are needed to enter the business; there are as yet no guarantees. And when and if they do come, say those on both sides of the debate, they may be contained in legislation that won't be implemented for months, if not years.

Senator DOMENICI. The first panel of witnesses we will start with includes Gary Dietrich, Associate Deputy Assistant Administrator for Solid Waste from Environmental Protection Agency; Jerome Collins, Chief, Alternative Materials Utilization Branch, Office of Industrial Programs, Department of Energy; and Donald A. Becker, Manager, Recycled Oil Program, National Bureau of Standards.

STATEMENTS OF GARY DIETRICH, ASSOCIATE DEPUTY ASSISTANT ADMINISTRATOR FOR SOLID WASTE, ENVIRONMENTAL PROTECTION AGENCY; JEROME COLLINS, CHIEF, ALTERNATIVE MATERIALS UTILIZATION BRANCH, OFFICE OF INDUSTRIAL PROGRAMS, DEPARTMENT OF ENERGY; AND DONALD A. BECKER, MANAGER, RECYCLED OIL PROGRAM, NATIONAL BUREAU OF STANDARDS

Senator DOMENICI. You each have prepared remarks.

Mr. DIETRICH. Yes; I have a prepared statement.

Senator DOMENICI. How long do you think your prepared remarks will take?

Mr. DIETRICH. I can read it in 10 minutes. Do you want me to hit the highlights?

Senator DOMENICI. Mr. Collins?

Mr. COLLINS. Ten minutes.

Senator DOMENICI. Mr. Becker?

Mr. BECKER. The same.

Senator DOMENICI. Let's go ahead. You may read your statement or if you would care to highlight—they will be made a part of the record in toto.

Mr. DIETRICH. Thank you, Mr. Chairman, for the opportunity to present EPA's views on S. 2412, a bill to amend the Resource Conservation and Recovery Act to further encourage the use of recycled oil. This hearing is timely because EPA is currently in the process of considering appropriate regulation of waste oil as a hazardous waste under subtitle C of the Resource Conservation and Recovery Act. The provisions of this bill should be considered in that overall context, of our current authority.

EPA supports the recovery and reuse of used oil. We believe that the discarding and disposal of used oil should be discouraged. Waste oil represents a valuable resource because, with appropriate treatment, it can be recycled as a lubricating oil. It also can be burned as a fuel. In either case, two important objectives are served: (a) The use of virgin petroleum products are replaced by the amount of oil recycled, and (b) potential environmental hazards from improper disposal of used oil are reduced or eliminated.

In my statement, I will focus on the scope and nature of the waste oil problem, the options EPA is considering for dealing with that problem, and the specific provisions of this bill to encourage recycling.

Senator DOMENICI. As a general matter, as I understand it, you agree with the thrust that this is a dangerous product in terms of its toxicity for us to continue to just throw away in various manners and use it for various uncontrolled means. You agree it has recycling potential?

Mr. DIETRICH. Very much so.

As we will see later in my testimony here, we very much believe that the disposal or discarding of used oil should be discouraged as well as its use on the land or on the water or for other types of uses.

EPA estimates that there are 1.4 billion gallons of used and waste oil generated annually. About half of this is used automobile crankcase oil, and the other half is used industrial oils. Of this total, we estimate that 700 million gallons are burned as fuel, 100 million gallons are re-refined or reclaimed, 200 million gallons are used for road oiling or similar purposes and 400 million gallons are disposed of either indiscriminately or with garbage and trash.

The collection of used automotive and some used industrial oil for disposal, use or recycle is carried out by an estimated 5,000 small collectors. We believe that much of the used industrial oil is burned as a fuel directly by the generator onsite with or without reprocessing.

Used oil presents an environmental problem because it is usually highly contaminated. Also the oil, itself, can pollute the environment, particularly when discharged into surface waters. A variety of contaminants are added during its use. Automotive crankcase oil is contaminated with lead from gasoline. Industrial oils are contaminated with a variety of materials, but we have very incomplete data on the nature and degree of the contamination.

A large number and variety of chemical additives are added to oils to improve their performance and extend their useful life. Although they serve beneficial purposes during use, they constitute contaminants in used oil. We have an incomplete inventory of these additives and their importance as contaminants in used oil.

Perhaps the worst feature of used oil is the fact that it is typically mixed when it is collected, transported, and stored prior to being reused, recycled, or disposed. In this mixing process, a variety of toxic solvents, PCB's and other toxic materials are frequently mixed into used oil. The results are heterogeneous mixtures that can and frequently do contain some very hazardous materials. Indeed, the worst cases of environmental damages associated with used oil resulted from indiscriminant mixing: (a) dioxin-contami-

nated used oil employed as a dust suppressant on a horse arena in Missouri killing many horses and threatening human life; and (b) PCB contaminated used oil that has killed cattle; and road oiling with used oil in Texas which contained a highly toxic solvent.

It is largely the propensity for used oil to be a carrier for a variety of highly toxic solvents, PCB's and other materials that causes EPA to be concerned about used oil and to presume that used oil is a hazardous waste. We are also concerned about the lead in used oil, and here, also, the mixing of used oil results in all used oil being suspected of containing lead. If automotive crankcase oil were segregated from other used oil, our concern about lead contamination of used oil could be focused on crankcase oil and, further, crankcase oil exclusive of that derived from diesel engine fleets. Although we do not have a great deal of data on the other contaminants of used oil—particularly those picked up in industrial oil and those derived from additives—we believe that the mixing of used oil has the effect of spreading these contaminants throughout most used oil.

All uses, recycling and disposal of used oil have the potential of polluting the environment, but the nature and degree of this pollution varies. The disposal of used oil can result in the leaching or draining of the oil or its contaminants into surface and ground waters. Similar potential exists with respect to used oil that is used as a road oil or in other applications on the land. The burning of used oil can result in air emissions of lead, other metals and incompletely burned organic contaminants. The reclaiming, re-refining, and reprocessing of used oil can generate highly contaminated sludges, residues and wastewater, and air discharges.

The storage and transportation of used oil can be attended by leakage and spills into the environment. They can also be attended by indiscriminant dumping into the environment. Although the environmental impacts from individual uses, recycling and disposal operations can vary in degree and sometimes can be very substantial, the aggregate impact from the ultimate disposition of 1.4 billion gallons of used oil each year probably spell our greatest concerns about used oil.

EPA believes it has jurisdiction under subtitle C of the Resource Conservation and Recovery Act to regulate used oil as a hazardous waste and to regulate the disposal as well as the reuse and recycling of this material. Indeed, in our proposed regulations published December 18, 1973, we listed several used oils as hazardous waste and proposed to regulate the disposal, use on the land and burning as a fuel of these oils. We did not propose to regulate the reclaiming, re-refining or other recycling of these oils, but we indicated that we might, in the future, regulate these uses.

The Agency received a very large number of comments on these proposals. We had hoped to complete our consideration of these comments and our future analysis of the used oil problem in order to include regulation of used oil in the final and interim final subtitle C hazardous waste regulations that are being announced today. The used oil problem is very complex, however, and we simply have not been able to complete our work on this matter. We are, however, planning to list and regulate used oil as a hazardous

waste in an amendment to our hazardous waste regulations sometime in the fall of this year.

As I have mentioned, the used oil problem is complex and we believe it merits a special, tailored set of hazardous waste management regulations. We do not believe it should be managed under the same regulations as most other hazardous wastes. We feel this way for several reasons. First, used oil is a resource. It can be used and recycled. Disposal should be discouraged. In order to promote the use and recycling of used oil, while, at the same time, controlling its potential to pollute the environment, special regulations are required.

Second, because of the large number of generators of waste oil—300,000—most of whom are small service stations, garages, and other businesses because of the number of transporters—5,000—and because of the unknown but believed large numbers of users of used oil, we do not feel that the highly sophisticated and complex manifest tracking system of the subtitle C program is well suited or wholly necessary to deal with this problem.

Finally, we believe that the environmental impacts associated with the use and recycling of used oil are different and peculiar to this type of material. The requirements of the hazardous waste management regulations are designed primarily to deal with the long-term containment and destruction or treatment of wastes and are not always optimally designed to deal with use and recycling.

Against this backdrop of general findings, we have carefully reviewed the used oil problem and have come to some tentative findings with respect to environmental regulation. These are:

We believe that reclaiming and re-refining of used oil should be encouraged but should be regulated. It is important to assure that used oil is delivered to and safely stored at recycling facilities, and it is important to control the waste discharges from these facilities.

We believe that the burning of used oil as a fuel should be encouraged and can be accomplished in an environmentally safe way. But this use also must be regulated to insure environmental protection. Some types of burning should be prohibited or restricted while other types should be allowed but controlled.

Senator DOMENICI. As of this date, you have done nothing more than review; you don't have any regulations in place that address these first two items, do you?

Mr. DIETRICH. That is correct.

Senator DOMENICI. You have been contemplating them but there are none?

Mr. DIETRICH. There are none.

We had hoped to put them into the regulations that are being announced today. We have a few more months of work to complete and we believe we could have a regulation that generally covers those points that I am going through here by the fall of this year.

Senator DOMENICI. All right.

Mr. DIETRICH. We believe that the use of used oil for road oiling, dust suppression, pesticide carriers, and other land applications should be virtually prohibited.

We believe that disposal of used oil should be discouraged, and, where practiced, should be regulated as any other hazardous waste.

Finally, we believe that the collection, transportation and storage of used oil should be regulated but in a manner that does not impose a large amount of reporting and recordkeeping on generators.

We are working with these concepts in formulating a final regulation to be promulgated this fall under the subtitle C hazardous waste management.

Senator DOMENICI. How long have you known about the problems that prompted you to arrive at the five stated conclusions?

Mr. DIETRICH. As I say, in December of 1978 we proposed to regulate certain uses of waste oil. We received a large number of comments, most of which oppose the regulation of used oil as a fuel, most of which oppose the regulation of used oil for re-refining or oppose the regulation of any uses of used oil.

We have carefully gone through those comments. We have undertaken a number of studies, the last one of which should be completed by, perhaps, the end of July which will enable us to put out a regulation this fall.

Senator DOMENICI. I just can't help but comment that about every time we get a measure we think will encourage something like recycling oil and reusing it, we get an agency like EPA coming up here telling us they are about to solve everything.

I am not suggesting you are not telling us to proceed. I can just visualize it has gone without regulation for many, many years, and now you are suggesting that it ought to be regulated across the board. Still, you are not very enthusiastic about our approach to promote its recycling.

Reading the whole statement you kind of indicate it is all going to happen without anything. Am I reading wrong?

Mr. DIETRICH. I think we do have jurisdiction under the current authorities to deal with waste oil as I have indicated here.

We very much want to deal with it. In the face of the comments we received, it is pretty evident to us that unless we can establish a very sound and legal defendable administrative record, that our regulation would not sustain itself in the courts. This is why we are taking the extra 3 or 4 months in order to put this regulation on the street.

Senator DOMENICI. You also are somewhat critical or suggestive that my bill doesn't provide for the burning of this byproduct and that we should permit that.

Might I suggest to you that at this point in time, if I would have recommended that we also encourage the use of it as a fuel, you would have come in here and told us "how can we do that, we want to get rid of the burning of it because it is toxic and it is dangerous."

I am perfectly amenable to use it for burning as well as recycling. When I started this process, there wasn't any control over its burning and, if I encouraged that, I would have to rely on EPA to find some way to make sure it wasn't burned improperly.

You have been working on that for the last 3 years and you have not had anything except what you have described.

Is that a fair statement?

Mr. DIETRICH. I believe we have undertaken some studies which indicate to us that used oil can be burned in large boilers, utility

boilers, where you have air pollution control equipment that takes care of the particular lead that is likely to be emitted.

We do not think that used oil can be burned in the average, medium, and small industrial boiler. Therefore, it appears that the regulation that we would be coming with in the fall would severely restrict the current burning of some 700 million gallons of used oil each year. Those regulations would also prohibit the use of waste oil on the land for road oiling industrialization. If we looked at that number we would probably be prohibiting or very strictly regulating about 500 million gallons of used oil from uses that are current today.

Senator DOMENICI. You would want to join with those who are trying to not only discourage its impropitious burning, but who want to encourage its beneficial use?

Mr. DIETRICH. Yes. I think what the effect of our regulation in the fall would be to push the 500 million gallons of used oil into the re-refining reprocessing loop.

Senator DOMENICI. You agree, however, that there isn't a demand for it at this point as recycled oil. We have done something to the market, either by our labeling or by the Departnent of Defense finding that it wasn't adequate.

Mr. DIETRICH. We very much agree, and believe, that the labeling problem should be worked out. We believe that waste oil can compete with virgin oil. We believe it should be used for its lubricating value if at all possible. And we believe that the effect of our regulation would, in fact, be pushing a great deal of material into that toward those uses.

Senator DOMENICI. Do you know much about the 5,000 small independent collectors who would obviously be very vital to any collection scheme? We would have to have many more than that if we had to be collecting for a different end use.

Are these rather well spread around in the United States from what you know?

Mr. DIETRICH. We don't have a good inventory. In fact, most of our data is several years old. The data that we do have indicates that they are distributing generally with the population, most of them being in the East, in the metropolitan area. These certainly don't cover rural areas, which is a problem. We would hope that we could gain getting an inventory on these folks.

Our data seems to indicate that a lot of them are very small outfits and not very sophisticated companies. That may have changed in the last couple of years, but the data we have is about several years old.

Senator DOMENICI. Even if we go to recycling it doesn't mean we have to have sophisticated collectors, does it?

Mr. DIETRICH. One of the problems we have had in looking at how one would regulate used oil under subtitle C as currently authorized, is how to deal with the manifest.

We would have a very difficult time in implementing a manifest system with regard to 300,000 generators. Yet, I think that the authority of subtitle C would almost require us to implement some sort of manifest with regard to those generators and, therefore, impose on them a great deal of recordkeeping and reporting.

One option that we have looked at and that we would, perhaps, like to suggest to the committee is maybe a different way of dealing with the problem, is to certify or license the collectors and impose some reasonably simple requirements but effective requirements on those collectors that once licensed they are not to take an oil to those uses but are to take it to these uses.

I believe we can achieve the same end of getting waste oil from point A to point B without a great deal of paperwork and record-keeping and reporting.

Senator DOMENICI. Have you suggested that in the balance of your statement?

Mr. DIETRICH. No; we have not.

Senator DOMENICI. We are interested, if we are going to promote recycling and if you are going to restrict the adverse use, in some easy way to effect that. We are not interested in a superregulatory scheme. We want to make sure we are moving in a direction that we are not pushing people out of business, rather pushing them into that business. And your suggestion makes sense. If you have any further information on that we would be pleased to hear from you on it. Perhaps DOD has something on this.

Would you like to summarize the balance of your statement, please?

Mr. DIETRICH. If I might.

Basically we agree with and very much support the labeling requirements that are spoken to in the bill.

Senator DOMENICI. What does that PC force the labeling to say now? What is on the label now that we want to change?

Mr. DIETRICH. I am not sure what the label says now.

Senator DOMENICI. "Made from previously used oil." That is what you are saying you support a change in?

Mr. DIETRICH. Yes; we do.

Senator DOMENICI. Do you have any suggestion as to what it ought to read?

Mr. DIETRICH. I believe that it ought not to indicate that it is recycled or re-refined oil at all. I believe that we should judge that oil on the basis of whether it is fit for the purpose it is being sold for. I believe that the military specs of the Department of Defense has informally come out with will—my understanding—informally come out within a short time, to gain opening up this aspect and dealing with this aspect of the label problem.

We agree with the approach that the bill takes with regard to classifying oil on the basis of its fitness rather than the substantial equivalency. We believe this would be a meritorious change.

If EPA were to be given that responsibility, we have to hasten to point out that we would have to gear up to do it and I doubt we could do it in 6 months.

Senator DOMENICI. All right.

Mr. DIETRICH. We cannot comment on section 9004 of the bill and we would leave that up to others.

In summary, instead of supporting this legislation at this time, we would like to continue to work with this committee on both this legislation as well as on the implementing the current authorities of the Resource Conservation and Recovery Act.

Senator DOMENICI. Thank you very much.

Let's see if we can have the other two panelists discuss their issues first, and then we will get back to you. Thank you very much.

Senator DOMENICI. Mr. Collins, would you care to proceed.

STATEMENT OF JEROME COLLINS

Mr. COLLINS. Mr. Chairman, I am pleased to be here today and to describe the Department of Energy's recycled oil program. With respect to the administration's position on S. 2412, we defer to the Environmental Protection Agency.

I would like to give a description of the Department's program over the last few years and as it is currently structured in the overall area of waste oil utilization.

I would like to enter the statement into the record but give a summary at this time.

Senator DOMENICI. It will be made a part of the record. (See p. 56.)

Mr. COLLINS. The need for a waste oil program in the Department of Energy derived from the recognition that the acid-clay process, a name given to the conventional process of re-refining waste oil into energy-saving lubricants, produces an acid-clay sludge which has become an undesirable land pollutant thus limiting waste oil recycling.

Second, most of the firms are small firms. That means that they don't have the resources to carry on research to find an alternative to the conventional process.

And, finally, there is the positive, small, but significant, energy benefit from using oil over again in any way, and preferably as a lubricant.

You, yourself, and the EPA spokesman have covered the ground on quantities of waste oil and I won't repeat that, and also with respect to size of the industry.

I would like to repeat, though, that in 1960 it was a considerably larger industry than it is now. That was its peak and at that time there were 150 firms producing over 300 million gallons of lubricant oil from used crankcase oil.

Senator DOMENICI. How many are there now, do you know?

Mr. COLLINS. My data, which is from 1975 or so, is about 20 firms. But, I understand there are a half a dozen at this time.

Senator DOMENICI. Our information is 5 or 6 and it was much higher than 50 at one point in time.

Mr. COLLINS. It was 150 at one time.

Senator DOMENICI. Do you know the principled reason why that has dropped from 150 to 5 or 6?

Mr. COLLINS. The prime reason is the fact that on the market the fuel users, those who use that oil as a fuel supplement, simply outbid the re-refiners' ability to purchase that waste oil feedstock source. There are other reasons but that is the prime reason.

Senator DOMENICI. That the U.S. military would not certify it for procurement?

Mr. COLLINS. You might say that is a demand aspect.

Senator DOMENICI. Does that affect the GSA across the board in its procurement?

Mr. COLLINS. Yes, most governmental agencies and many private firms use military specs as purchase specs.

Senator DOMENICI. Does the DOE think that we should, as a national policy, have a preference toward re-refining oil rather than burning it?

Mr. COLLINS. I can answer that question this way.

The market makes a choice based on today's considerations and today's considerations are relatively short term and represent the desires of an individual firm, or an individual, to minimize its cost and maximize its profit. And within that context in many cases burning is the desirable alternative.

On a national basis and for a longer term basis, re-refining to a lubricating oil appears to be the desirable alternative.

Senator DOMENICI. If, as a matter of fact, substantial portions or quantities of the burning now are potentially illegal, if the EPA was enforcing the law, would that have impact upon that market for burning?

Mr. COLLINS. Very much so, yes. Presumably it would be policed so that there would be a practical application of the regulation.

Senator DOMENICI. And just plain Btu economic issues. Is it better for our country to try to refine it than to burn it even under conditions where the burning is legal and nontoxic?

Mr. COLLINS. That is a complex situation. I will try to answer it this way.

The difference between burning as a use and the energy advantage as a lubricant is small, but favors re-refining most of the time.

The problem is that it depends on what the process assumptions are, and what the needs for pretreatment for burning are under the regulations. I would expect that re-refining to a lubricant would be the desirable and more energy-beneficial alternative to reprocessing as a fuel.

Senator DOMENICI. You want to proceed to summarize your statement?

Mr. COLLINS. The Department of Energy has had a program at the Bartlesville Energy Technology Center, which I will shorten to BETC, since 1971 and the object there was to offer to the industry an alternative process that would be more efficient, have a high yield, and would not have a contaminant disposal problem, primarily the acid sludge and the clay sludge.

We have over this time produced sufficiently large quantities of oil using this process to run a fleet of cars in the State of Iowa and to pass the engine sequence tests which are the conventional tests required for virgin lubricating oil, and in both cases the re-refined oil passed these tests.

There are alternative technologies. I believe that was the direction given to me to comment on some of the alternative technologies on a comparative basis. In general, they require large facilities.

Let me describe one or two. One developed in France and put into practice in both France and Italy is propane solvent extraction. Propane in liquid form is used to assist in separating the contaminants from used oil. And that process is then followed actually by acid treatment plus distillation hydrotreating.

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The problem appears to be one of cost in that particular process. It is a high-cost process.

Another process is straight distillation which is the basic building block process of oil refining. But because of the contaminant burden in used oil, fouling of the distillation column appears to be a problem as well as poisoning of any catalyst that may be used.

Another new process has been developed by the Phillips Petroleum Co. And, as a matter of fact, the Department of Energy is funding a grant program to the State of North Carolina for the purpose of monitoring a plant which has been purchased by the State of North Carolina from Phillips, and our intent is to understand that plant and furnish the operating, cost, and other useful information to the rest of the interested business community. That data should be available sometime next year.

In exhibit A of the accompanying statement we have a listing of a number of generic processes and also some new technology, including the DOE-Bartlesville technology, and a number of characteristics, advantages, and disadvantages.

I won't go into detail but I will be happy to answer questions if there are any on that.

One of the most interesting and important products of our work at Bartlesville was the determination that the feedstock, the raw input waste oil, does not vary significantly from region to region around the country and does not vary significantly over the course of the year. The original purpose of this research was to offer evidence in support of opening up the military specification since that specification requires that every time the source of oil was changed that a new set of tests be conducted to prove out the process or prove out the delivered oil. And we were able to show that although the actual source of oil may vary in the sense that it depends on what engine is being drained at any particular time, the collection process for aggregating this waste oil operated to produce a relatively uniform feedstock.

And the consequence of that was that the product was quite uniform in its quality.

Senator DOMENICI. Let me ask you this. I understand about all the research and I understand there was toxicity problem with the old approach which you are trying to improve, but the quality of the oil that can be produced with existing technology is a good product, is it not?

Mr. COLLINS. It can be a good product and will be if the same quality control measures and management of a business, if that same effort is put into a re-refinery as it is in a so-called virgin refinery. In fact, some people claim re-refined oil is more stable because some of the unstable compounds in the oil have been thrashed out of it by its use in auto engines.

Senator DOMENICI. So it is a matter of making sure that the present technology is properly applied. Then you have a sludge problem under the old existing technology; is that correct?

Mr. COLLINS. That is correct.

The newer technologies do not produce a hazardous sludge. Depending upon the process, a sludge may or may not be produced which may have to be disposed of. In some processes that sludge may be combined with asphalt, for example, as pavement material.

Senator DOMENICI. Is the present sludge that is toxic presently regulated by the EPA?

Mr. DIETRICH. Yes; it would be in most cases.

Senator DOMENICI. I am not talking about would be, is it? There are some refiners in existence now.

Mr. DIETRICH. I believe the sludge they are producing would exhibit the characteristics of what we call the toxicity and therefore would be hazardous waste.

Senator DOMENICI. Are they regulated now?

Mr. DIETRICH. They are regulated under the regulation we are announcing today.

Senator DOMENICI. But they have not been in the past?

Mr. DIETRICH. That is right.

Senator DOMENICI. Do you consider it more important to regulate that toxicity and make it difficult to re-refine while permitting all kinds of violations in terms of its use of burning and paving and the like?

Should you regulate them all at the same time or should you regulate the refiner?

Mr. DIETRICH. I believe we should, and as I indicated, we intend to try to regulate them all at the same time but we were unable to complete our administrative record so we could have something that was legally defendable.

Senator DOMENICI. Go ahead.

Mr. COLLINS. I would like to bring attention to the fact that the nature—let me back up. Hazardous materials can and have entered the system by being codisposed with automotive waste oils. The assumption is that they can be dealt with either by postburning cleanup or by prior processing, and we have some very preliminary data which shows that some processes of re-refining are effective in removing some hazardous materials. That still has to be studied further and the facts obtained. But in general, re-refining acts to reduce hazardous materials content in the oil product as opposed simply to dehydrating for burning.

The Department of Energy recognizes that waste oil can serve as an alternative fuel, and in several cases observed that the hazard aspect is managed by providing emissions controls. If the oil meets fuel specifications if the flash point is not depressed, for example—and that means if there is not too much gasoline from engine operation in the oil to cause the oil to become an explosive mixture—if those requirements are met, then, maybe a more cost-effective fuel alternative can be effected than use as a lubricant.

Another aspect of re-refining is that it reuses a potentially short supply resource. By that I mean that although a lubricant can be made from any barrel of crude oil obtained from any source, in general certain crude stocks are more amenable to producing a good lubricant than others and the less desirable crude stocks simply require more energy, more cost, and more processing to produce that lubricant.

The problem is that the newer discoveries in oil, from Indonesia, Alaska, and so on, are less amenable to lubricant production and, therefore, it is an advantage to re-refine and preserve that limited resource.

Senator DOMENICI. Where is most of the lubricant base oil coming from now for the United States?

Mr. COLLINS. I am not certain. I would prefer not to answer the question.

Senator DOMENICI. Do any of you know?

Mr. BECKER. About 40 percent is being imported. The rest comes from Alaska, midcontinent crude, some west coast.

Senator DOMENICI. Do you agree with the statement that "special kind of oil is needed as a lubricant base"?

Mr. BECKER. The lubricant fraction of a barrel varies considerably due to the source. As I understand it, in Pennsylvania crude, for instance, that can go up to 50 percent, and in some other crudes it can be as low as 1 or one-half percent.

Senator DOMENICI. So we are not just talking about resources that are exactly the same as the crude oil supply. We are talking about some fraction of that that is usable as a lubricant base; is that correct?

Mr. BECKER. That is correct. Unless you get into extensive rearranging in the molecules which almost puts it into the synthetic oil category.

Senator DOMENICI. Go ahead.

Mr. COLLINS. The potential savings of energy derived from re-refining oil has been touched upon, it is roughly 40,000 barrels a day equivalent and perhaps double that if industrial oil is included. The first number is only based on automotive use.

The chief thrust of the DOE waste oil recycling program up to now has been developing the process, and we are now moving into a demonstration phase. We have produced a set of engineering drawings and specifications for a 10-million-gallon-per-year nominal-size plant. However, the drawings and specifications are such that they are applicable to anything from a 2- to a 20-million-gallon-per-year plant. The object there was to match the technology that we have developed to the needs of the industry. The industry tends to be small and makes use of a good deal of secondhand, perhaps, equipment that if it were to be purchased at the factory, brandnew prices, it might not permit the industry to make a go of it in many cases.

Our developed design is such that it can be retrofit in variable sizes and also with respect to different elements of the plant. The object is to use as much as possible of the existing plant in an existing re-refinery and couple our process to the existing re-refinery. And the object there is to use as much as possible of the marketing system, the collection of oil system and the business know-how of the re-refinery and also to get him to understand our new process and take advantage of the learning experience that would obtain on both sides.

I just want to touch upon the nature of our further efforts in utilizing used oil whether as a fuel or as a re-refined lubricant. We have embarked on a look at what the various obstacles are that have to be overcome or at least dealt with and planned for, to move the situation now from the, perhaps, at best 50 million a year level to a potential of several times that, perhaps up to 400 million gallons per year, with some provision given to burning where it is

acceptable on an environmental basis and perhaps some waste oil used in asphalt.

Finally, the Office of Industrial Programs is cooperating with a number of other agencies including EPA, the National Bureau of Standards, and the Federal Trade Commission to promote uses of waste oil. We reconstituted an interagency oil recycling task force that operates among the Government agencies. We have been in touch with the Fort Belvoir Mobility R. & D. Command, the Association of Petroleum Re-refiners, and the National Association of Oil Recovery Coordinators who we have a speaker here today.

With respect to the local level and consumer aspect one study that is underway just now is a study to determine the attitudes and practices of the so-called do-it-yourself oil changers, the average person who purchases oil at discount supermarkets and changes his own oil. We are not quite sure what usually happens—at best the oil is disposed of in a garbage can. Our objective is to understand that source of used oil and perhaps find some way to have it enter the system and become available to re-refining or even as fuel.

That concludes my remarks.

Senator DOMENICI. Let me ask you one thing for clarification.

If we had 150 re-refiners and we now have 5 or 6, that suggests to me that a number of the industry, predominantly small ones, knew how to re-refine years ago and they have quit for one reason or another. Is that not correct?

Mr. COLLINS. That is correct.

Senator DOMENICI. And I understand that the reason for quitting to this point is certainly not the Environmental Protection Agency having any regulations regarding the need for improved technology in cleaning up sludge. Of course, we don't have any regulations on that yet. Would you agree with that?

Mr. COLLINS. I wouldn't want to guess at understanding the business mindset of a typical re-refinery operator.

Senator DOMENICI. We have them coming on and we will ask them.

I am saying that while I am delighted that you came here from DOE and I am pleased you understand this is a valuable resource that is not being used properly, I know there is no simple answer to anything any more. You spent a great deal of time telling us about all the research that is going on, and I don't knock that, that is fine. But I also got the impression that you were suggesting that until we get some more of this research accomplished, that the re-refining is not doable.

That isn't what I understand. I understand that the sludge problem is one that can be dealt with. We improved the technology, like we do in everything else, but to get on with encouraging the refining of this oil, that matter, other than the technology of re-refining, happen to be more important than a new technology.

Is that correct?

Mr. COLLINS. I agree with you completely.

Senator DOMENICI. While you are moving ahead with these, could we solve the other problems, namely the marketplace problem, the problem of making it, and creating a demand for it? This has been made difficult on the demand side because of actions of the Federal Trade Commission and other Federal agencies. We have the prob-

lem of collecting it and other things that are still there. We could move ahead with re-refining without your new proceses, could we not?

Mr. COLLINS. Not quite, because the situation has changed quite a bit over the last 20 years. Twenty years ago there were two kinds of oil—regular and premium, and premium simply contained a detergent. Oils have now become highly compounded. Yield has come down due to the necessity to deal with the contaminants related to these broken-down additives that a new technology is needed to replace the existing technology. That is an additional reason for new technology.

Senator DOMENICI. Can we proceed or not?

Mr. COLLINS. I believe yes, with our technology that we have developed and the several commercial technologies, there are new technologies available.

Senator DOMENICI. So that in any event, you are talking about the state of the art and the state of the future art, but there is sufficient state of the art now to proceed even with the more sophisticated compounds that are in used oil.

Mr. COLLINS. Yes.

Senator DOMENICI. That would be a matter of economics and a matter of the regulation of the pollutant that would come from them.

Mr. COLLINS. And arranging for the flow of oil into re-refiners.

Senator DOMENICI. Yes.

We will make your statement part of the record. I greatly appreciate you keeping us current on that.

[Responses from Mr. Collins to written questions from Senator Domenici follow:]

S. 2412
Hearing: May 5, 1980
Witness: Jerome F. Collins
252-2366

QUESTIONS SUBMITTED BY SENATOR DOMENICI

Recycling of Used Oil

Question: The central issue here is whether re-refined oil is as good a product as virgin oil. Can each of you tell me whether you think re-refined products are -- or could be -- as good as virgin products? Also, if the products are of comparable quality, how can you best assure a consumer that he can use re-refined oil without damaging his automobile?

Answer: Because of all the engine sequence tests and fleet tests that have been run (by DOE, DOD, and others) on re-refined oil, there can be no doubt that re-refined oil can be at least equivalent in quality to virgin oil. Neither the American Petroleum Institute (API) nor any of the major oil companies disagree with this. In fact, several major oil companies are in various stages of negotiating to include re-refined oil in their products.

Similarly, quality assurance is a problem shared equally by re-refined and virgin oil producers. Only purchases made under contract specifications (such as the military specifications) have any legal restrictions. The general public buys oil that is controlled only through guidelines established by professional, technical, and trade organizations. Thus, maintaining one's reputation is about the only incentive for compliance, and this would hold true for a supplier no matter what his source -- virgin or waste oil.

Question: I understand that the Department of Defense has recently revised its specificaitons to permit the use of re-refined oil in military vehicles. Can any of you describe the tests which the military conducted as part of this revision and tell me the results?

Answer: The Department of Energy waste oil program has not had a direct involvement with the development or revision of these specifications. Thus, we can not provide information on the tests.

Question: What percentage of the crude oil which goes to production of lubricants is imported and what are the principal countries of origin?

Assuming we could realize perhaps one-half of the re-refinement potential, how much imported oil could we displace?

Answer: Refinery process yield and "production slate" data is not freely available from which to calculate how much lube oil originates from foreign crudes. However, regardless of the origin of what is now

in the system, we are rapidly running out of domestic crudes which provide high quality lubricant basestocks. This is why several major oil companies are actively looking to recycled oil to supplement their supplies. In addition, capacity data indicate that we have stretched our lube oil production facilities to the limit. Thus, even if we could find new sources of appropriate crude, there are no refineries available to supply increased demand. Since it is estimated to cost less than 1/3 as much to build a re-refinery versus a virgin lube oil refinery of the same capacity, it is economically advantageous to recycle.

A precise answer to the second part of the question requires knowledge of lube cuts from imported crudes. In the absence of this data, a consequent simplified estimation, based on realizing one-half the re-refinement potential of both auto and industrial waste oils, is: approximately 35,000 barrels of oil per day less of crude oil would have to be imported. This represents current potential and also the best projections to year 2000.

Question: Only about five percent of the used lubricating oil is re-refined. What are the principal sources of this oil, large industrial users or crankcase drainings?

Answer: The principle sources for true re-refining (using refinery processes to bring oil quality back to that of virgin equivalent) are vehicle fleets, automobile service facilities, and large industries, where large quantities can be picked up and delivered in a single trip. However, many industrial lubricants are often reclaimed or burned in-house and do not show up in any accounting of recycling oil. The best estimate, on a national basis, indicates approximately equal shares of automotive and industrial operations as sources.

Senator DOMENICI. Our third panelist is Donald Becker. We are delighted to have you, and your entire statement will be made a part of the record.

STATEMENT OF DONALD BECKER

Mr. BECKER. Thank you, Mr. Chairman, I appreciate this opportunity to testify on S. 2412, a bill which would amend the Solid Waste Disposal Act to further encourage the use of recycled oil. The Department of Commerce strongly supports the greater utilization of recycled oil.

In 1976, in response to section 383(c) of the Energy Policy and Conservation Act, the Department established a recycled oil program at the National Bureau of Standards. This program is part of the Office of Recycled Materials.

The recycled oil program has been working diligently in the development and evaluation of test procedures which can be used to establish the substantial equivalency of recycled oil products to new oil products. The first phase of our program involved development and evaluation of test procedures for characterizing used oil recycled as burner fuel. This work was completed and the report was officially transmitted to the Federal Trade Commission on November 20, 1978, as required by EPCA.

Mr. Chairman, I have a copy of this report available for you if you would like it included in the record.

Senator DOMENICI. We will accept it for the committee files.

Mr. BECKER. This report contains NBS recommendations for test procedures that would adequately control the quality of recycled oil used as fuel. These recommendations included the addition or substitution of four new test procedures and substantial modifications to four other tests.

Based on these results and in cooperation with NBS, the Federal specification on burner fuel oil has recently been revised by the U.S. Army Mobility Equipment Research and Development Command. This specification has only limited use within the Federal Government and fuel oil is generally sold in commerce by grade rather than by a specification.

However, it is well known that burning unprocessed or minimally processed used oil for fuel is currently the primary recycling mode in the United States, and has a substantial economic advantage over recycling for lubricating end uses. Generic issues which have yet to be resolved include whether the burning of unprocessed used oil presents any significant environmental or health hazard, and whether such use is consistent with resource conservation goals. Immediately after completion of the first phase of the NBS program, work was initiated on the second phase of the NBS program, on re-refined oil to be used as motor oil.

We feel that the most important requirement for assuring the quality of re-refined motor oil is development of a set of test procedures capable of monitoring the quality, consistency, and additive response of the oil basestock in between qualifications by means of the very expensive engine sequence tests. These evaluated test procedures are crucial in order to allow accommodation of the re-refined oils within the existing classification system, as established by the American Petroleum Institute, Society of Auto-

motive Engineers, and the American Society for Testing and Materials. Development and evaluation of these tests by NBS is significantly more difficult because no such set of test procedures exists for virgin lubricating oils. Historically, virgin oil producers were instead required to control the crude source and refining technology in order to assure a constant lubricating oil basestock, particularly for the U.S. military specifications. This option is not available to oil recyclers.

We believe that sufficient engine testing has been done to establish that, one, a high quality re-refined lubricating oil which has been formulated with a high quality additive package can be comparable to a virgin oil similarly formulated, and two, that both will provide adequate performance in most types of automotive service.

The problem which exists at the present time is the lack of technical information and data to determine which tests are necessary and how often they should be applied in order to assure that the re-refined oil basestock is consistent in between the engine tests. The user industries have made it clear that they are very concerned about the potential lack of consistency of re-refined oil products, and about the potential effects of unusual or unknown contaminants in the used oil feedstock to re-refineries. These potential problems are of particular concern when warranty questions are involved.

This consistency question is being addressed in part through a recently initiated cooperative ASTM/NBS study of re-refined oil basestock. In this 1-year study, 4 virgin oil producers and 6 re-refined oil producers are submitting monthly samples for analysis by a group of 12 laboratories, including NBS. These laboratories will analyze the coded samples using over 40 different chemical, physical, and performance tests. It is expected that the results from this study will provide much of the data necessary to indicate an appropriate set of test procedures to monitor re-refined basestock consistency. In addition to the consistency study described above, the NBS program is currently evaluating the chemical and physical test procedures used on lubricating oil basestocks, as well as performing research and development on benchscale performance tests for establishing basestock additive response. As stated previously, we feel that the development of effective and economical tests for additive response appears to be crucial to the success of our efforts.

Senator DOMENICI. How long do you think it is going to take to get those test procedures for monitoring consistencies completed?

Mr. BECKER. It is virtually impossible to give any reasonable estimate. We feel that within a year and a half or so we will have completed evaluation of the chemical and physical test. Until the basestock study and other studies are completed, we do not know what is going to be needed in the way of performance tests.

So, the length of time required is dependent on the results of this study and other studies that are going on out in the industry at the present time.

Senator DOMENICI. What is the basic problem with consistency? Is it the process or is it what goes into the process?

Mr. BECKER. I think the basic problem is a lack of information on how consistent it is.

The virgin oil industry has for many years had a situation where they control the feedstock and then they control refining the technology in order to obtain a consistant product; they have stated that they are not sure what tests are necessary to monitor the basestock for virgin oil because the oils come from so many different sources and they can't agree that any set of tests can do a good job.

A re-refined oil, on the other hand, is likely to be more consistent than virgin oil because it comes from an averaging of many different virgin oils. We feel there is a real possibility that the tests which may or may not be sufficient for virgin oil consistency, may be able to handle the re-refined oil consistency problem.

The bottom line is, until we get the data in, until we study the results, we really don't know how long this will take to complete.

Senator DOMENICI. If we don't have sufficient information about the consistency of virgin oil, why isn't that an impediment to its use as lubricant?

Mr. BECKER. In virgin oil there is enough historical knowledge that if the same oil fields are used as well as the same refining technology, according to the military specifications they only have to requalify by using the engine tests every 4 years.

Senator DOMENICI. And that is not satisfactory in the opinion of the end-user for re-refining?

Mr. BECKER. That is correct.

Senator DOMENICI. That is the essence of it.

Mr. BECKER. Yes. We believe that development of a set of effective and economic tests for monitoring re-refined basestock to be crucial to the success of our efforts.

Past accomplishments of the recycled oil program include, one, the detailed report on test procedures for used oil recycled as burner fuel, described earlier; two, organizing and holding three conferences on measurements and standards for recycled oil with published proceedings that contribute substantially to the available information on recycled oil testing and evaluation; three, establishing the National Bureau of Standards as a focal point in the dissemination of information and data on the testing and evaluation of recycled oil products; and four, development of a new ASTM technical division on recycled petroleum products, which has fostered interaction and cooperation between the oil recycling industry and the virgin oil producers and users.

Substantial progress has been made by the Department toward fulfillment of its statutory responsibilities regarding recycled oil, both in the development and evaluation of test procedures, and in advancement of the understanding of recycled oil by the scientific and technical community.

There is no question in my mind that difficult technical questions and problems lie ahead and that these must be resolved before re-refined and recycled oil products can expect widespread consumer acceptance.

For example, it is critical that consumers be assured of a product of acceptable quality. In the case of both new and re-refined motor oils, assuring that the product is capable of performing the intended service is particularly difficult because of technical problems

and cost for example, the complete testing of a single engine oil product costs a minimum of $20,000.

The Model Used Oil Recycling Act attempted to address these difficulties. Section 12(a) of that act stated that a recycled oil product should be considered equivalent to new oil if—

> Substantial equivalency has been determined in accordance with rules prescribed by the Federal Trade Commission under Section 383(d)(1)(A) of the Energy Policy and Conservation Act, or if the product conforms fully with the specifications applicable to that product made from new oil.

An important aspect for gaining consumer acceptance of recycled oil products is the assurance of adequate performance. The Department and its National Bureau of Standards possess the expertise in the development and evaluation of measurement methods and standards necessary to address the problems that lie ahead.

With regard to the need for S. 2412, the Department defers to the Environmental Protection Agency which is presenting the administration's views.

Mr. BECKER. I would be happy to respond to any questions you may have.

Senator DOMENICI. With respect to the recycled oil from the 150 recyclers—was there anything wrong with that oil that you have been able to find out?

Mr. BECKER. In the original work that the Department of Defense did in justifying the original FTC trade regulation rule, they did test two oil products that were very poor. So there is some knowledge that some re-refined oil products in the past were of substandard quality.

I might also say that is not unknown in terms of the virgin oils in the marketplace also. So I feel that the standards of performance that need to be assured for a re-refined oil should be similar to that of virgin oil.

Senator DOMENICI. I understand the military is going to change its purchase specifications with reference to re-refined oil.

Mr. BECKER. That is correct.

Senator DOMENICI. If they are going to do that, I assume they have arrived at a conclusion that certain of the re-refined oils are now acceptable, is that correct?

Mr. BECKER. Yes; as a matter of fact, both EPA and ASTM cooperated in the modification to their military specification and I was on the ASTM committee that provided recommendations to them. Included in the specification are a set of 14 different chemical and physical tests to be applied to the base oil—virgin and re-refined—that is submitted for qualification for the military specification.

However, it should be noted that this ASTM group in recommending these tests said, in effect, that these are our best guess, but we do not have the information to be able to state that these tests will in fact monitor all of the characteristics necessary to establish the quality and consistency of a re-refined base oil stock.

Senator DOMENICI. The same will be true of virgin oil whether they are consistent, whether they get the oil, and what field and refiners are employed. We don't have the lab test for virgin either.

Mr. BECKER. That is correct. In the military specification the virgin oils that are submitted for qualification will have to provide

the same required tests and samples, so that a technical data base will be established based on the samples that are provided to the military.

Senator DOMENICI. So all of that that we have gone over is not going to be an impediment to re-refining as far as the military using it, is that correct? They are going to be able to begin to buy re-refined oil?

Mr. BECKER. That is correct.

Senator DOMENICI. Do you know whether or not, of those five or six re-refiners that are left, they are going to be able to meet the specification for the military?

Mr. BECKER. In terms of the quality of their oil?

Senator DOMENICI. Yes.

Mr. BECKER. I know of a number of the existing re-refined oils that have been tested with engine sequence test and there is every indication that they are very high-quality oils.

Senator DOMENICI. So that is not going to be an impediment to growth and demand as long as they are as good as those that you have mentioned?

Mr. BECKER. To a certain extent the testing requirement of a small company as opposed to a large company would provide some sort of limitation costwise, some additional problems.

Senator DOMENICI. If we are going to try to move ahead, what about the uncertainty that the specific test will not be a conclusive impediment. We will be able to get a major demand out of the military that can be met by a supply that can be produced, is that correct?

Mr. BECKER. I would expect so; yes.

Senator DOMENICI. How far away are we from the time when the military will actually be ready to purchase some of this qualifying re-refined oil?

Mr. BECKER. Mr. Chairman, they have a purchase description out and I have a copy of the new specification. They are willing to purchase it now, that is my understanding. They have a Lubricant Review Institute under the Society of Automotive Engineers, which must pass on any oil that is submitted to the military for qualification. As far as I know, no re-refined oil has been submitted to or has passed this qualification board and been added to the qualified products list.

Senator DOMENICI. What is the status with reference to your imposition of regulation regarding the burning and/or disposing of used oil, crankcase oil, and the like? Where are we precisely in terms of some enforcement?

Mr. DIETRICH. We believe that in the fall of this year, perhaps we are looking at October 30, that we will list used oils as a hazardous waste and we will at that time also promulgate regulations with regard to their disposal, their use, their recycling.

Those regulations would be promulgated at that time and they would have effective implementation dates 6 months thereafter, or approximately April of next year. That is the time schedule we are looking at.

Senator DOMENICI. Let me ask all three of you, if we are proceeding ahead with existing laws to restrict the disposal because of toxicity that we ought to be moving ahead equally as vigorously to

find some beneficial uses other than perhaps burning it in some of the major facilities that have full pollution equipment?

We have been moving along with no re-refining, burning, and disposal that is unregulated, yet we know it is a valuable asset. You are moving ahead to get its use off the market, so shouldn't we move as vigorously to try to do what we can to make sure it cannot be used?

Aren't we going to people that cannot dispose of it, and having this hiatus out there where we have not done anything for all these years?

Mr. DIETRICH. Yes, I believe we should work vigorously on the demand side. Get the labeling problems worked out and the military specifications problems worked out so that consumers will want recycled oils.

To some extent, my partners here will be working on the demand side. I think we can supply the supply side to deal with this problem.

Senator DOMENICI. How about better collection of it out in the States? If we are going to begin to regulate its ultimate use, shouldn't we begin to encourage better collection of it? Therefore people aren't going to be invited to violate the law if we don't have a collection process out there.

Mr. DIETRICH. Yes, we have a suggestion that we have certified or licensed collectors and that it would be illegal for generators to deliver a waste oil to somebody that is not licensed. Presumably, that license collector would then deliver it to an acceptable user, a refiner, a reclaimer of waste oil, or in our judgment certain burners of waste oil, provided they can do it in an environmentally acceptable fashion.

Senator DOMENICI. When did the EPA begin this exercise in which you have reached the point you have described today? How long ago did you begin vigorously attempting to draw regulations and attract attention to this problem?

Mr. DIETRICH. In December of 1978 we proposed a set of regulations based on some prior work, 1½ years prior to that.

We did receive, I guess it is fair to say, a lot of scathing comments against our proposals. Over 400 people commented that they did not think that we should restrict, prohibit, or for that matter regulate disposal of waste oil.

Against that sort of comment—and by and large these were from folks who were burning their own waste oil, from what we could tell—we believe that we had to have a very, very sound basis for regulating used oil under those sort of comments.

We also got similar comments with regard to people who were using used oil for road deseparation, again indicating they did not think it was a hazardous waste that it was causing environmental hazards and suggesting that it ought not to be regulated.

We, therefore, are trying to deal with those comments as well as produce a very strong and dependable administrative record with regard to regulating those uses.

Reviewing those comments and doing the studies to substantiate a good record began April of last year, and has proceeded. We have also been working with 150 other wastes as well. In coming up with a formula that I gave, we have been working on it about a year.

Senator DOMENICI. Mr. Becker, has the world situation and the world price of oil had any impact upon the practicality of recycling and reusing oil?

Mr. BECKER. I think that has increased the interest in recycling a great deal, especially in countries outside of the United States, where re-refining and recycling is implemented to a much greater extent than within the United States.

Senator DOMENICI. Where is that being done?

Mr. BECKER. For example, in West Germany, they collect 90 percent of their used oil but they do this on a basis of a subsidy derived from a tax on all lubricating oil, which helps to support the rerefining and recycling industry.

Senator DOMENICI. Do they have any problems with the technology of rerefining?

Mr. BECKER. They have not had too much of a problem in the past, but they are running increasingly into environmental restrictions as do the rerefiners in the United States in terms of trying to get rid of their byproducts. They have not been as strict in their environmental regulations as some of the other countries, but these regulations are increasing and they are having increasing problems. As a result they are going to new rerefining technologies also.

Senator DOMENICI. Do you know whether or not they have any genuine concern as to the quality of that re-refined oil? If they are rerefining they must be using it for something.

Mr. BECKER. About 40 percent is re-refined into engine oil, and about 40 percent is burned as a fuel. This latter is the lower quality oil which is mixed with too many impurities to re-refine economically. They have a unique situation where they have a particular private company which effectively regulates the lubricating oil industry by inspecting and approving oils in the marketplace.

Senator DOMENICI. So that they got around the quality control part?

Mr. BECKER. That is right.

Senator DOMENICI. Can we solve the quality control part quickly in your opinion?

Mr. BECKER. Are you talking about the National Bureau of Standards tests for equivalency?

Senator DOMENICI. Can the Nation do anything so that we are in a position to feel comfortable with the quality quickly within the next couple of years?

Mr. BECKER. I think that the work that is going on at NBS will provide a substantial improvement in the question of quality in re-refined oils.

In addition, there is a number of other activities that are going on throughout the country and in other countries which will help to provide that information. I think the increasing involvement of larger companies with more technical know-how and new re-refining technologies will make a substantial difference in providing a consistent high-quality re-refined product.

Senator DOMENICI. I really cannot believe that every time we run into something like this we find that we cannot, and that somebody

else is. And you really believe that the two reasons in Germany are a subsidy and that they have one source of quality control.

Mr. BECKER. Daimler-Benz is the company involved. They issue a blue book on lubricating oils and they personally approve lubricating oils and they personally sample the marketplace and test oils in order to assure their quality.

Re-refined oils are included in their blue book and approved for use in their engine. This book is the bible in Germany and many other European countries, and also used in the United States as well. By that means, they have effectively controlled the quality of the lubricating oil in the country.

Senator DOMENICI. Do we have a quality control problem in all our lubricating oils?

Mr. BECKER. To a certain extent, yes.

Senator DOMENICI. Is Germany's better than ours?

Mr. BECKER. It all depends on what you are talking about. A high quality lubricating oil in the United States is generally thought to be better or at least as a good as high quality lubricating oil in the other countries. The U.S. military specifications are used throughout the world as a standard. I think there is no question these specifications are very important to assuring quality in the United States, as well as other countries.

Senator DOMENICI. So one of the clues to getting this industry going again is to get military approval?

Mr. BECKER. I think that is important. In other countries, except West Germany and South Africa, which in effect licenses re-refiners, those two countries have effective recycling systems, while the rest of the countries are having just as many or more problems as the United States.

Senator DOMENICI. Germany and who?

Mr. BECKER. South Africa.

Senator DOMENICI. They are very concerned because they have no base.

Mr. BECKER. That is right.

Senator DOMENICI. If the military approves, we get the label changed, get a better collection system, and begin gradually to regulate the present throwaway, is there any doubt in your mind that we can greatly increase the recycling of used oil in the next few years?

Mr. BECKER. I don't doubt that at all.

Senator DOMENICI. Would you give us your ideas as to how quickly we might do that?

Mr. BECKER. In my contacts with the re-refining industry, I understand that virtually all of the re-refiners, if not all, suffer from a lack of feedstock. That is, they cannot get enough used oil to keep up their current capacity, even the five or six re-refiners that are in existence now. There is no question in my mind that somehow diverting more of the used oil into re-refining feedstock has to be a necessary first step.

Senator DOMENICI. If it is a total waste product now, with little or no value in the marketplace, that feedstock is going to be very difficult to acquire, right?

If we are throwing it away and if we are delivering to country products department, then that is a very cheap marketplace disposal, is it not?

Mr. BECKER. Well, it is displacing other products which cost considerably more, and that is part of the problem. A re-refiner, because of the relatively low pricing of lubricating oil, cannot meet the price for used oil that someone that is burning it for fuel without processing can pay.

In addition, let us discuss road oiling. The person who would have to buy a virgin oil product to oil roads, if they didn't use waste oil, can pay substantially more than can a re-refiner.

Senator DOMENICI. If, as a matter of fact, it should not be used in that manner because of other American laws that are not being enforced, then that would change the market considerably, would it not?

Mr. BECKER. Yes.

Senator DOMENICI. Do you have any views on the toxicity of used oil being burned out, pollution control and for the other kind of uses that have been described by EPA?

Mr. BECKER. Obviously, the EPA is the lead agency in the environmental area. They have the most experience, as was mentioned by all the speakers today. However, there are a lot of potential environmental problems with used/waste oil. Unfortunately, there is not a great deal of data available as to how generic these problems are. That is, how many oils in different places have these problems, and in what concentrations.

Senator DOMENICI. But a country like West Germany would have similar uses as far as using the waste product, wouldn't they?

Mr. BECKER. No, it is very tightly controlled.

Senator DOMENICI. Except for the control, they would be the same kind of users?

Mr. BECKER. Yes.

Senator DOMENICI. They still burn fuel oil, don't they?

Mr. BECKER. Yes.

Senator DOMENICI. And having a lot of paved road, would they throw it around like we do?

Mr. BECKER. It is my understanding that the re-refiners in West Germany pay the current fuel oil price for their used oil. In other words, the cost of lubricating oil in West Germany is so high that they are able to pay the fuel oil price for their used oil and still make a profit.

Senator DOMENICI. Some of that is because of the overall way that lubricants are treated in West Germany?

Mr. BECKER. Yes.

Senator DOMENICI. We thank you very much.

We went much longer than we expected but I greatly appreciate your discussion.

I have a letter from the Department of Environmental Management, State of Rhode Island endorsing this bill which I will include in the record at this point.

[The letter follows:]

64-057 O - 80 - 3

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS

DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
75 Davis Street - 204 Cannon Building
Providence, R. I. 02908

22 April 1980

Senator Peter V. Domenici
Committee on Environment and Public Works
Room 4200 Dirksen Senate Office Building
Washington, D.C. 20510

Dear Senator Domenici:

On April 1-3, 1980, representing Rhode Island, I attended the second annual conference of the National Association of Used Oil Coordinators held in Springfield and Aurora, Illinois. The participants at this meeting voted unanimously to endorse U.S. Senate Bill S.2412.

For many years respected economists and environmentalists have been advocating the recycling of used oil, but very little progress has been made in this activity. Your bill will help the states in getting their used oil recovery programs started. As a public servant working on the tasks of energy conservation for the Rhode Island Department of Environmental Management and assisting our joint state legislative committee on the formulation of a used oil recovery program, I fervently hope S.2412 wins passage.

The enactment of this legislation will result in a substantial reduction in pollution currently caused by used oil being dumped in our sewers and streams. It will also aid our efforts in oil conservation. Every barrel of recycled oil we produce is one less that we will have to buy from OPEC.

Very truly yours,

Austin C. Daley

Austin C. Daley, Coordinator

ACD:tg

Senator DOMENICI. Mr. Kimball Morris, president, Association of Petroleum Re-refiners. Go ahead.

STATEMENT OF KIMBALL MORRIS, PRESIDENT, ASSOCIATION OF PETROLEUM RE-REFINERS, ACCOMPANIED BY JAMES McBAIN, EXECUTIVE DIRECTOR OF APR

Mr. MORRIS. Mr. Chairman, our statement is rather lengthy. If I can, I would rather summarize. I would like to put the whole statement in the record.

Senator DOMENICI. Fine. [See p. 70.]

Mr. MORRIS. My name is Kim Morris. I am president of CAM-OR, Inc., a small public corporation which is actively engaged in the re-refining of used oils. I am here as president of the Association of Petroleum Re-refiners. Also here today is James McBain, executive director of APR. Additionally, I am submitting for the record a statement of John O'Connell, vice president of APR, and president of Estech Oil Co. Unfortunately, Mr. O'Connell could not be present today. [See p. 83.]

We commend the sponsors of S. 2412 and the committee for their recognition of a need to stimulate the growth of an environmentally sound and healthy re-refining industry. This legislation addresses some of the major obstacles to a viable re-refining industry in this country today. Thank you for the opportunity to speak.

Briefly, re-refining and reclamation of used oil started in this country in 1915. The industry grew rapidly through World Wars I and II until 1960 when the industry claimed over 150 members producing over 300 million gallons of re-refined lubricants.

At that time that was about 18 percent of our Nation's total lube requirement.

Today the industry is composed of less than 10 companies producing less than 100 million gallons of quality re-refined lubricating oils. That is less than 4 percent of our Nation's lubricating needs.

What destroyed the dramatic growth of such a needed industry? There are many reasons, the most important of which are:

One, competition for feedstock with those who would indiscriminately sell unprocessed and untreated used oil as fuel.

Two, there is a need for more sophisticated technology in our industry to re-refine more complex lubricating oils and to meet environmental standards.

Three, over capacity in the virgin lube market caused prices for lube oils to drop sharply in 1960 resulting in lower price levels and a cost price squeeze which prohibited re-refiners purchasing new technology that was needed at the time.

At the same time, the industry was experiencing technology and market changes. Re-refined oils were excluded from the Department of Defense procurement lists. Re-refined oils have been sold to the Air Force, the Army from 1915 through 1960.

At that point in time, for some reason, because of perhaps the more complicated lubricating requirements, the re-refined oils were eliminated from the procurement list. The Federal excise tax was imposed unfairly on re-refined oil each and every time it was sold, and the Federal Trade Commission's labeling rule effectively prevented the re-refining industry from competing in the marketplace.

This Government action added to the already mentioned cost-price squeeze and resulted in more financial losses for re-refiners. Most of them went out of business.

Today, as a result of congressional action in the passing of EPCA, RECRA and the Energy Tax Act, Department of Defense specifications have been changed to allow the purchase of qualified re-refined oils and, re-refined oil has been exempted from the Federal excise tax.

By your action on this bill, we believe that Congress can make the difference between whether the industry will continue to decline or begin to recover to its full potential.

If this industry grows, the country will benefit from a cleaner environment, and the continued reuse of an already scarce resource. Projected lube oil demand for 1980 is over 2.8 billion gallons. Of that, 59,000 barrels a day, almost one third of our current lube oil needs, are potentially recoverable. All that is needed is a viable re-refining industry.

In our opinion, there are three major problems facing this industry today.

One, we have heard about feedstock. We have to compete for it with people who will burn fuel without any processing or any cleansing methods at all.

Two, technology. We have heard a lot about that this afternoon. However, the financial community and our stockholders and the directors or the people who own these companies cannot see making the investment in technology today—it is a long throw of the dice. Today only three companies in our industry have changed their technology from the acid clay process that you heard mentioned earlier.

Three, we believe that the final problem facing our industry is the FTC restrictive labeling requirements.

By its very nature "Made from previously used oils" implies inferior quality in the minds of the retail consumer and restricts market acceptance. No matter what the lubricating specifications and properties of a re-refined oil, this label must appear on the front of every can. To our industry's detriment, the words "used" and/or "previously used" have very negative connotations in American society.

Why is it that no other industry marketing recycled products—steel, lead, aluminum, paper—is required to bear a label stating that the product was "previously used"?

In comparison, Canada does not have restrictive labeling requirements on re-refined motor oils. It is interesting to note that Shell Canada and Mohawk Lubricants of Canada have both announced plans to build major re-refineries, and I am talking about 5- to 20-million-gallon plants.

If this prejudicial labeling requirement is eliminated, the United States will begin to expand the development. We believe that a vast retail market will open for re-refined oil either directly as a lubricating product or as a basestock in independently compounded lube oil products. This expanded market will generate needed investments in more efficient technology required by the industry.

APR and its members strongly favor this legislation. However, there are some important changes that we would suggest and I would like Jim McBain to go over those now.

Mr. MCBAIN. If I may, Senator.

Senator DOMENICI. Please.

Mr. MCBAIN. On page 2 of the bill, lines 23 through 25, the definition of "oily waste" should be deleted. The bill doesn't treat oily waste at all and we find it unnecessary.

On page 3, lines 9 and 10, the definition of "recycled oil" we would delete the word "recycling" and "reprocessing". "Recycling" can't be defined, and the term "reprocessing" is not treated on the bill.

On line 10 after the word "other," we would add the words "environmentally acceptable" so that would read, "or other environmentally acceptable treatment.* * *"

On page 3, lines 15 and 16, in the definition of "re-refined oil" we would delete the words "substantially equivalent in quality to virgin oil." The definition of "re-refined oil" in the bill defines how the oil was made.

We believe that substantially equivalent is a function of specifications and not of method of production. I think if you can separate how the oil is made, re-refined oil is made through a combination of various processes and re-refined oil meets certain standards.

On page 3, lines 21 and 22, just delete the words "the characteristics of" and delete the words "have been changed by". The characteristics of used oil are not changed, it simply acquires contaminants through use. We suggest the words be "has acquired contaminants through".

On page 4, lines 5 through 12, with regard to transfer authority for the FTC to the EPA, we don't presume to tell the Congress which agency should have that responsibility. However, any agency that does receive that responsibility should be given explicit instructions as to what type of labeling the Congress requires.

We suggest on page 4, lines 16 through 19 should be changed to read, ". . . the extent not adequately provided for by current market labeling, such as the ASTM, ASLE, or API classification codes, assure that purchasers of all retail petroleum products are fully and accurately apprised of the nature and fitness of the product for its intended use."

What we are saying, basically, the current market labeling code—the consumer needs to know that particular product is sufficient for use in his corridor.

We would also change on page 6, lines 1 through 3, "Insuring that any labeling change under this bill would preempt any other State law or regulation."

On page 6, line 18, we add the word "including providing for any necessary fleet, SAE sequence or other tests recycled oil must undergo to meet State purchasing requirements". Essentially, that would allow the funds provided for by this bill, the State could use those funds to qualify any re-refined oil to meet its own standard. That would allow a lot of small businesses to qualify for State business.

There are a number of other minor word changes we have treated in the written statement, but I won't go over them orally.

Senator DOMENICI. We will note them. I have looked at them and they are self-explanatory. You don't have to take any more time on that.

Let me ask a few questions with reference to this.

You have heard the administration witnesses. Do you believe that the two major changes that you have addressed in your testimony will actually cause the industry to begin to grow again?

Mr. MORRIS. I don't think there is any question about it. The companies that are existing in this industry today are basically companies with industry or railroad basis. Very few of them are actively selling or marketing re-refined motor oil.

John O'Connell's company has serviced the railroad industry for the past 30 years. The quality of his oil is not questioned by the railroad industry. Our own particular company has serviced various industrial accounts, Carter Paint, International Harvester, a variety of industry oils, hydraulic fluids and other types of lubricants. We have asked the industrial base or railroad base to go ahead and purchase new technology.

The company on the west coast has purchased new technology. But we are the only three companies in the United States that have a different technology than acid sludge. And our economic reasons for purchasing that technology really were our existing markets that we were serving. We would all very much like to get into the motor oil market. We believe we can produce a good product.

Our company is working on military specs with Amoco Chemical right now. We have no fitness of our oil for mil-spec use. We expect in the next year to apply for that. I can't speak for John's company, but I am sure he probably is looking very hard at it also.

Senator DOMENICI. What effect would the military's willingness to look at the product of each of the refineries, as has been described here, have?

Mr. MORRIS. I think it will be a good business effect in terms of municipalities, States, and Federal Government. In terms of the consumer market, it won't do us a great deal of good. Unfortunately, when you have qualified oil under mil-spec, you are still going to have that labeling requirement as it exists today.

I might add, if you have ever seen a can that meets the labeling requirement, I believe the type base on the previously used slogan has to be as large as the name of the product. It is a very, very unmarketable can of motor oil. So, I think the mil-specs will help our industry tremendously in the Federal area, State area, and municipality area. But, I do not believe it would allow us to actively participate in the consumer market.

Senator DOMENICI. But, even if it took a while to get into the automobile market, breaking into the military would be an impetus to again develop greater supply capacity, would it not?

Mr. MORRIS. Correct.

Senator DOMENICI. Do you have any idea as to what they might use in terms of re-refined oil? The ripple down there would be to all kinds of Government; GSA kind of follows suit, and State and local follow suit from that. Would that in and of itself, along with the labeling, have a significant impact, as you see, it in investment and getting new technology applied in the field?

Mr. MORRIS. I am not sure. One of the questions our company has tried to determine, what size the market is in our marketing area. I believe that the larger military market tends to be on the east coast, at least that is what I have heard. There is no question that the mil-specs would help our company in the Midwest in terms of municipalities and State governments, but I am not sure that the military establishment is large enough there to offer a very sizable market in the States that we cover.

Senator DOMENICI. Is it your belief that we should proceed to pass this bill even if there are marketing problems with the auto industry? Passage itself would relieve some of the chilling effect that exists now.

Mr. MORRIS. Yes, I definitely think so. I do think that the problems with the automotive industry, which were eluded to earlier, could be met by somebody going through a full-blown sequence test. The price tag on that is substantial. A minimum of $60,000 or so we have been told, and that is assuming there are no corrections in the additive package.

There are some of us who have been through various sequence tests but not the full-blown package. For a company our size, that would be a rather large gamble.

Senator DOMENICI. Who is the largest refiner now?

Mr. MORRIS. Aztec Oil, which is owned by S. Marc based in Chicago.

Senator DOMENICI. What is the per quart price of that compared with virgin lubricant oil?

Mr. MORRIS. I am not sure I understand the question.

Senator DOMENICI. If you have two of those cans, even one that is labeled so that it won't sell, what would be the comparable pricing to the consumer?

Mr. MORRIS. At the present marketplace?

Senator DOMENICI. Yes.

Mr. MORRIS. The only people that are marketing in re-refined oil are marketing at the low end of the marketplace. We have a member in Texas that sells against the nondetergent marketplace which tends to be the lower price area of the market.

If we had a typical 10-W-40-SF grade re-refined versus nonre-refined, I don't think the price would be substantially different. There might be a slight advantage on re-refined oil. The additive package would be the same.

Senator DOMENICI. But not as competitive.

Mr. MORRIS. No.

Senator DOMENICI. If there is anything else based upon what you heard today that you would like to submit, we would be pleased to take that within 10 days.

Mr. MORRIS. We have one other document that we would like to submit. I am not sure if the committee has it. This is the complete file from the FTC hearings which were held in 1960. It was very difficult for the association to get it.

The reason we are submitting it, I wish you would read through some of the letters and comments that were submitted in support of the FTC labeling requirement. For the most part, there is very few comments that talk about quality of oils. They are really almost nonexistent in this file.

Most of the people in this file talk about the fact that re-refined oil was causing them a real rough time in the marketplace. They tend to be lower price, it had a competitive advantage that virgin oils didn't have.

Senator DOMENICI. We will accept the whole package for the committee files. We understand, and we have an in-depth letter from the Federal Trade Commission, and, while it isn't totally positive, it is not negative. I don't think they are going to be a serious impediment in the change in the law that is provided.

I think the other issues are more significant than the change in the label. Namely, whether you are going to have environmental problems in the improved technology and whether it is going to be competitive from the standpoint of creating enough demand to get the investment. Those are the issues.

I will put the FTC letter in the record.

[The letter follows:]

FEDERAL TRADE COMMISSION
WASHINGTON, D. C. 20580

BUREAU OF
CONSUMER PROTECTION

April 25, 1980

Honorable Jennings Randolph
Chairman
Committee on Environment and
Public Works
United States Senate
Washington, D.C. 20510

Dear Chairman Randolph:

This letter is in response to your request to Chairman Pertschuk for comments on S.2412, a bill to encourage the use of recycled oil and to protect the environment. The views presented are those of staff and do not necessarily represent the views of the Commission or any individual Commissioner.

The Federal Trade Commission is mentioned only in Section 9003(a) of the bill, which would abrogate the Commission's Used Oil Rule, 16 C.F.R. Part 406, and assign responsibility for regulating the marketing of used oil and used oil products to the Environmental Protection Agency (EPA). My comments are directed to that section and to related issues that affect the consumer or the Commission's authority and responsibilities.

SECTION 9003(a)

Section 9003(a) of the bill would repeal the FTC's Used Oil Rule, formally entitled "16 C.F.R. Part 406 -- Deceptive Advertising and Labeling of Previously Used Lubricating Oil." Instead, the bill would assign to EPA the responsibilities for "labeling, packaging, marketing or other requirements related to the sale or distribution of used, waste, or recycled oil". Our understanding is that the intent of the legislation is to vest in EPA the responsibility for all aspects of the marketing of used oil and used oil products. The most troubling aspect of the legislation is that it is not clear whether this provision would allow the Commission to continue in its responsibility for used oil product advertising and consumer product quality claims under Section 5 of the Federal Trade Commission Act, 15 U.S.C. 45.

The FTC is the chief federal agency charged with the responsibility for preventing deception in the consumer marketplace. Over several decades, the Commission has accumulated considerable expertise in advertising, labeling, and other marketing practices.

In addition, our specific experience with motor oils goes back to 1918 and continues today. Thus, the Commission in the past has halted performance misrepresentations by a marketer of motor oil additives and has required marketers of re-refined oil to disclose the fact that the oil was previously used. Even now, the Commission staff is monitoring marketing activities related to several new motor oil products, to determine whether misrepresentations are being made to consumers. For example, claims regarding viscosity and American Petroleum Institute Service Classification are crucial to consumers, and the Commission continues to police industry claims in these areas.

Moreover, it is important to note that the potential for misrepresentations in the marketing of motor oil products applies equally to both new and used oil. Such misrepresentations not only cause injury to consumers, but generate competitive harm as well. Since both new and used oil products compete in the same market, we believe that responsibility for the marketing practices of both products are most appropriately lodged in a single agency. In view of the FTC's expertise in advertising, labeling, and other marketing practices, and its continuing experience with motor oil products, we do not support the provisions in Section 9003(a) that would alter the existing FTC responsibilities for used oil products.

THE USED OIL RULE

The Commission promulgated its Used Oil Rule in 1964. Prior to beginning rulemaking proceedings, the Commission had decided a number of cases involving the failure to disclose that a lubricant was made from previously used oil.*/ Relying on the record in that rulemaking proceeding, the Commission found that many consumers preferred new lubricants, and that it was impossible for consumers to distinguish by inspection new lubricants from those made from used oil. Basing its opinion on the legal principle that one product may not be substituted for another, even though the two may be qualitatively equivalent, the Commission ruled that lubricants made from previously used oil must disclose that fact on the product's container.

The legal principle embodied in the Used Oil Rule is that the consumer has the right to get what he or she asks for. This principle is best articulated in Federal Trade Commission v. Algoma Lumber Company, 291 U.S. 67 (1934):

> We have yet to make it plain that the substitution would be unfair though equivalence were shown....The consumer is prejudiced if upon giving an order for one thing, he is supplied with something else...In such

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*/ See, e.g., Kerran v. FTC, 265 F.2d 246 (10th Cir.), cert. denied, 361 U.S. 818 (1959); Mohawk Refining Co. v. FTC, 263 F.2d 818 (3d Cir. 1959); Royal Oil Corp. v. FTC, 262 F.2d 741 (4th Cir. 1959).

> matters, the public is entitled to get what it chooses....291 U.S. at 77-78.

However, the FTC staff recognizes that hazards to the environment and crude oil shortages have become urgent national concerns. These concerns gave rise to the Energy Policy and Conservation Act of 1975 (EPCA), Pub. L. 94-163. Section 383 of EPCA directs the National Bureau of Standards (NBS) to develop and report to the FTC procedures for determining the substantial equivalency of used oil products to those made from crude oil. Upon receipt of the report from NBS, the FTC is required to prescribe standards for the labeling of used oil products which are substantially equivalent to the same product made from new oil.

I understand that technological problems have prevented NBS's completion of the final report. Until the Commission receives the NBS report, it will not be possible to issue final labeling standards under EPCA Section 383. However, the Committee should note that EPCA Section 383(e)(2) already provides that these standards will effectively supersede the current Used Oil Rule.

THE PENDING PETITION TO MODIFY THE USED OIL RULE

Another factor that the Committee should consider is that on April 15, 1980, the Association of Petroleum Re-refiners (APR) petitioned the Commission to reopen the Used Oil Rule. The Commission staff is examining the petition, which asks that the Used Oil Rule be either set aside or modified to permit the use of the term "recycled oil products". The APR petition, if granted by the Commission, provides an opportunity to reexamine the continuing validity of the Used Oil Rule. In particular, the petition draws into question current consumer perceptions regarding re-refined oil products, and suggests that the Rule impedes the recycling of scarce petroleum resources. The FTC staff is sensitive to the consumer, environmental, and energy policy implications of this petition. These and other issues should be thoroughly explored in any Commission proceeding reconsidering the Used Oil Rule. The record developed in any such proceeding would, of course, be available to the Committee.

STATE LAW

Several states have statutes governing commerce in used oil products. Many statutes are consistent with the Used Oil Rule and are complied with by re-refiners. See Royal Oil Corp. v. FTC, 262 F.2d 741, 742 (4th Cir. 1959). Section 9004(b) of S.2412 refers to federal preemption of state used oil product regulations. Since some of the labeling requirements are statutes rather than regulations, the Committee may wish to consult with various states about the effect of Section 9004(b) as drafted.

CONCLUSION

For the foregoing reasons, the FTC should retain responsibility for regulating the advertising and other marketing practices associated with used oil products. While we share the Committee's deep concerns about energy and the environment, we also believe that the Committee's efforts to encourage the recycling of used oil should give due weight to the historic role of the FTC in this area. I hope these comments will be useful to the Committee. I appreciate this opportunity to comment on the portion of the bill which affects the consumer and the Commission's duties. If the Commission or its staff can be of any further assistance, please call on us.

Sincerely,

Albert H. Kramer

Albert H. Kramer
Director
Bureau of Consumer Protection

Mr. MORRIS. I would like to make one more comment on some of the newer technologies that are available. They have been developed by the companies that are in the business. They are creating byproducts that are usable byproducts for the most part.

I believe that three of the companies in our industry do not have a waste disposal problem. The byproducts are being sold, in one case I believe they are being used as cutback asphalt material or a roofing material.

In our particular case, we have somebody who has developed a rubber product out of it which has some exciting possibilities out of residue material out of our refinery. I think there are a lot of possibilities of what we call waste.

Senator DOMENICI. We thank you very much. We will hope to mark the bill up soon.

We have one additional witness: Mr. Don Eastep, National Association of Oil Recovery Coordinators.

If you will take the stand here we will get on with it.

STATEMENT OF DON EASTEP, PRESIDENT, NATIONAL ASSOCIATION OF OIL RECOVERY COORDINATORS

Mr. EASTEP. Mr. Chairman, I would like to thank you, the Government, for giving me the opportunity to come and speak for a few moments.

I am Don Eastep, a resource recovery specialist for the State of Illinois Institute of Natural Resources. I am appearing at this hearing as president of the National Association of Oil Recovery Coordinators—NAORC. Voting members of this association are representatives of State government agencies concerned with the conservation, recycling and where necessary, disposal of used oil.

Currently, 35 States are represented and all indications are that all 50 States will be represented soon.

The aims of this association are:

To provide an oil recycling information clearing center.

To coordinate State programs which will encourage collection and recycling of used oil.

To provide promotional material to aid State and local government agencies, as well as citizens groups, to encourage conservation, collection, and recycling of used oil.

To provide information and assistance for State legislative action.

We believe these activities will increase public awareness of the merits of oil recycling and engender a greater degree of citizen participation.

This Senate bill S. 2412 is long overdue. For several years "used oil" legislation has been introduced, but because of opposition from special interest groups, has been defeated.

We are aware of the provision of the Resource Conservation and Recovery Act and of section 383 of the Energy Policy and Conservation Act. These include some of the provisions of earlier recycled oil bills.

Notwithstanding, this, we believe that S. 2312 is the most reasonable piece of legislation presented to date and it clarifies the issues.

The U.S. Environmental Protection Agency estimates that the Nation annually generates 1.4 billion gallons of recoverable lubrication oil. These include used automotive and industrial oils.

Approximately 50 million gallons were re-refined in 1979 and an unknown amount reclaimed for industrial use. We believe that a reasonable estimate for reclaimed oil, for the purpose of this testimony, could be 150 million gallons per year.

Most of the used oil generated by service stations, garages, and industry is being collected. We believe that the volume remaining after re-refining and reclaiming is burned as fuel or used for oiling roads.

We estimate, however, that 60 percent of the sales of automotive oils is made to the do-it-yourselfers—DIY. This means that approximately 390 million gallons of used oil is generated by DIY and very little of this is returned to the system; rather, it is dumped on land or in water.

The bill addressed this problem in section 9005(b), and we welcome and strongly support the provision of this section, since we believe that more effective action programs and better results can be achieved at State and local levels in both the automotive and industrial oil sectors.

We believe that the greatest need is for programs which will eliminate the environmental hazards associated with dumping of used oil and encourage recycling of an important national resource.

The amount of recoverable used oil may be small in relation to the total petroleum product, including fuels, but as a percentage of the lubrication oil production, without which our industry and transportation system could not operate, the volume of recoverable oil becomes a very significant percentage.

I will veer from the testimony for a moment to respond to some comments that have been made earlier.

In the percentage of oil that comes from a barrel of crude, the American Petroleum Institute indicates in writing that an average of 1½ percent is lubestock. This is an average of all oil production in America.

I believe their most recent figure is 1.3 percent, which means that we receive about 2½ quarts per 42 gallons. The 98½ percent of the barrel that we consider consumable products, either in distillants, gasoline, jet fuel, asphalts, or other nonreferrable products are all something that this country could do without in case of a

national emergency, but by no stretch of the imagination can this country do without the lubricating oil, the industrial oil.

Were we to do without industrial oil, the production of this country would eventually come to a standstill. Our demand for that product will never decrease, but 1½ percent becomes much more important today than it ever has before.

I only say that because I guess the possibility does exist that we may be cut off at some time.

As to comments on specific parts of the bill, we suggest the following:

Section 9003: We suggest that this section be more positive in providing for the preferred recycling of used oils as lubricants. We cannot argue against the use of used oil as fuel, if it is processed to produce an environmentally clean product.

This is preferable to dumping but from a resource recovery aspect is less effective than recycling as lubrication oil which can be done over and over again since the oil does not wear out.

Section 9002(4) used the term "substantial equivalency" which is also used in section 383 of the Energy Policy and Conservation Act. This term has caused some controversy, and we believe that Congress should define this not only for the Federal agencies involved in oil recycling programs but also for State agencies, industry groups—producers and users—and the public consumers.

Section 9003(a)(1) requires that the Environmental Protection Agency promulgate regulations for labeling of recycled oils in regard to product quality. We believe that the responsibility for this label should, more appropriately, be consigned to the Department of Energy which has been very active in oil recycling programs.

I should veer again and say from the comments made at this hearing today that other administration representatives have suggested that the EPA be given the lead for this program and I would agree in one respect, that they be given the lead in the regulation of a used product which is destined for disposal.

But I would also reiterate, the Department of Energy's position in this past 2 years toward oil recovery programs at State and local level, has taught us to regard the product as a feedstock, that which is destined for reuse either as a fuel supplement or as a re-refined lube product.

But if it is in fact destined for disposal, then that portion of the product should be given to the EPA for safe disposal. And which, I hope, will be a very, very small percentage of the total.

However, we also believe that the Federal Trade Commission responsibility is not inconsistent, as long as there would be action forthcoming within a reasonably short time and without reference to the program of the National Bureau of Standards program mandated by the Energy Policy and Conservation Act.

Section 9003(b)(1) requires a label "Don't Pollute—Conserve Resources, Return Used Oil to Collection Centers." We fully agree with this label, but suggest that it also be required on containers of recycled oil, if there should be a distinction between recycled and virgin oils.

Our association is grateful to the committee for allowing us to present our views and comments on this important and needed legislation.

Senator DOMENICI. I have one comment I made a note on. Several questions have been asked by the consumer market, about the labeling of the cans for consumer protection. In my dealings with major oil companies, from being a part of the API Task Force on Oil Recovery, I have heard a number of the majors indicate that they would doubt re-refined oil would ever see the consumer market but that it would, in fact, be purchased by major oil companies as a blend stock to supplement their existing shortages.

So, with that in mind, I don't think we are terribly concerned about that part of the market. We think there is an automatic market as soon as the quality control standards are initiated within the industry and the labeling requirement is removed. We would see that every drop of re-refined oil would find its way to the market, but with the major oil companies.

From your standpoint, as long as it is used in that manner, would that accomplish your goal?

Mr. EASTEP. The goals that we had 2 years ago when we began this was not in direct conflict with the EPA but instead we were unofficially told that State programs should really wait until such time as the hazard waste regulations that were released today were in fact released and it was our opinion that the 12 States that originally began this association should go ahead on the assumption it may take forever for the EPA to come up with these regulations and, unfortunately, they have not come up with them yet.

But our association still believes that the recovery and the collection of the oil serves a very useful purpose, and that is to get it out of the environment and allow the re-refining industry to do with it what they best know how.

We don't advocate that the Government should be involved in the re-refining business either as collectors, as manifesters, re-refiners, reprocessors, or any other areas, but we think the Government should encourage and promote State and local programs if, for no other reason, environmentally, to get the product out of the ground and back into the fuel stream.

Senator DOMENICI. Could you tell us how many States now operate oil collection programs and how long some have been in existence?

Mr. EASTEP. The first State I believe to have an active program was Oregon or California. These are legislative programs. We now have, I believe, eight States that have legislative requirements of one degree or another.

In the case of Illinois, it is not much more than a policy paper, but it is a legislative program which gives us a little muscle to get things done.

In the case of New York State or California, it is a very strict piece of legislation which follows the original guidelines set up by the old FAA—very strict requirements. The other States are somewhat in between. We have 36 States with active programs at this time.

Senator DOMENICI. Voluntary programs?

Mr. EASTEP. Voluntary or legislative, they go from Maine to Hawaii.

Senator DOMENICI. Where there are collection programs in operation, what happens to the used oil?

Mr. EASTEP. The oil that is being collected in service stations, as it has been since the 1920's, finds its way to the re-refining industry; it has in the past been either used as a road control, as road oil or channeled itself through the refiners.

The service stations still have collection facilities and we have encouraged the use of those collection facilities through the State coordinators to make contact with State associations, petroleum markets, service station associations to allow the do-it-yourself, the light industry the farmer, to bring that oil in and to get it turned in to a service station.

So the programs, from all indications without having funding for a major monitoring device, we have all indications that they are very successful, but we still feel that legislation is necessary to further promote it and to make it happen.

It could take 10 years at the rate we are going. We would say with a piece of legislation like 2412, if the plan goes the way I hope it will, within 2 years we will show a significant decrease in environmental problems, in problems that the EPA is forced to respond to and we should show increased production in the re-refining industry.

Senator DOMENICI. From your standpoint, even though collection is a very fragmented thing, with thousands of collections to be used in each filling station, can significant quantities be easily collected, if there is a real program?

Mr. EASTEP. I think there is no question about it. Mr. Dietrich said there are approximately 300,000 generators. It has never been defined to me what a generator is. I think in my own mind that a person that dumps a gallon of oil in a storm drain is a generator of a hazard waste. An industrial waste that allows 10,000 gallons to spill into a river is a generator of a hazardous waste.

In that context, I would say there is probably an excess of 100 million generators of this product and the biggest problem is the collection.

The key to the collection, however fragmented, is public awareness. We have seen surveys; we have conducted surveys that if people are aware of what to do with the oil that is drained from their car or the farmers that are aware of what to do with the 1 quart per acre per year, which is from their farm equipment, if they know what to do with it, they do it, especially in the last year.

They are more and more aware today of dependency, the press has put this program in the position where with some more support and help from the press make the public more aware to the point where the oil will flow in.

Senator DOMENICI. As we mark up the bill, if the staff wants to discuss other issues with you, they will feel free to call you. I don't think there are any more specific questions we will submit to you.

We appreciate your statement. Your testimony will be made a part of the record and we stand in recess.

[Whereupon, at 4:20 p.m., the committee recessed, to reconvene subject to the call of the Chair.]

[The bill, S. 2412 and statements submitted for the record follow:]

II

96TH CONGRESS
2D SESSION

S. 2412

To amend the Resource Conservation and Recovery Act to further encourage the use of recycled oil.

IN THE SENATE OF THE UNITED STATES

MARCH 12 (legislative day, JANUARY 3), 1980

Mr. DOMENICI (for himself, Mr. RANDOLPH, Mr. STAFFORD, and Mr. BAKER) introduced the following bill; which was read twice and referred to the Committee on Environment and Public Works

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A BILL

To amend the Resource Conservation and Recovery Act to further encourage the use of recycled oil.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the Resource Conservation and Recovery Act (Public Law 94–580) is amended by adding a new subtitle as follows:

"Subtitle I—Recovery and Reuse of Used Oil

"CONGRESSIONAL FINDINGS

"SEC. 9001. USED OIL.—The Congress finds with respect to used oil—

64-057 O - 80 - 4

"(a) that used oil constitutes a valuable energy and material asset for the United States;

"(b) that the technology exists and has been applied to re-refine, reclaim and otherwise recycle used oil into a valuable and environmentally acceptable product;

"(c) that the recycling of used oil into environmentally acceptable products has been unduly and unnecessarily hindered by a bias in favor of virgin oil.

"(d) that said bias has been fostered by the regulations and policies of the United States Government;

"(e) that used oil containing or masking contaminants constitutes a threat to the health and welfare of the Nation; and

"(f) that it is therefore in the national interest to provide a program to eliminate any unfounded bias against recycled oil, and to protect the health and welfare of the Nation against threats posed by used or waste oil which is contaminated or improperly disposed of.

"DEFINITIONS

"SEC. 9002. As used in this subtitle—

"(1) the term 'oily waste' means a mixture of water, solvents, dirt, debris, or other waste substances with oil;

"(2) the term 'reclaimed oil' means oil produced through the use of physical methods (short of those used in re-refining) to cleanse used oil for further use in its original or some other purpose. Cleansing methods may include settling, heating, dehydration, filtration, and centrifuging and may also entail the use of oil additives.

"(3) the term 'recycled oil' means oil produced as a result of recycling, re-refining, reclaiming, reprocessing, or other treatment of used oil so that it is suitable for reuse as oil for the original or a new purpose;

"(4) the term 're-refined oil' means oil produced through the application of petroleum refining techniques to used oil to produce lubricants or other petroleum products that are substantially equivalent in quality to virgin oil intended for the same purpose. Re-refining may include a combination of distillation, acid, caustic, solvent, clay and/or hydrogen treating, and other physical and/or chemical treatments including formulation with additives.

"(5) the term 'used oil' means oil the characteristics of which have been changed by use, storage, or handling, whether or not it has thereby been rendered unsuitable for use for the purpose for which it was originally intended;

"(6) the term 'waste oil' is oil which through use, storage, or handling has become unsuitable for its original purpose and which is uneconomical to recycle.

"LABELING REQUIREMENTS AND AUTHORITIES

"SEC. 9003. (a)(1) LABELING OF RECYCLED OIL.—Authority to prescribe labeling, packaging, marketing, or other requirements related to the sale or distribution of used, waste, or recycled oil shall be vested in the Administrator of the Environmental Protection Agency. Regulations promulgated prior to the date of enactment of this subtitle by the Federal Trade Commission relating to the labeling of recycled and re-refined oil shall be void and of no effect.

"(2) Within six months after the date of enactment of this subtitle, the Administrator of the Environmental Protection Agency shall promulgate regulations to—

"(A) assure that purchasers of recycled or re-refined oil are fully and accurately apprised of the nature and quality of the product and its fitness for its intended use;

"(B) encourage the recycling, and especially re-refining, of used oil; and

"(C) to the extent not adequately provided for by regulations promulgated pursuant to the implementation of Public Law 94–580, assure that waste oil and used oil are collected, manifested, processed, re-refined,

recycled, or otherwise treated or handled in such a way as to minimize the threat which they pose, or may pose, to public health or the environment.

"(b)(1) LABELING OF VIRGIN OIL.—Effective twelve months after the date of enactment of this subtitle, virgin oil containers shall bear the following legend, prominently displayed:

"DON'T POLLUTE—CONSERVE RESOURCES, RETURN USED OIL TO COLLECTION CENTERS".

"(2) The Administrator of the Environmental Protection Agency shall review the wording of said labeling requirement from time to time and shall, as necessary, revise it to encourage the conservation and recycling of oil.

"PROHIBITED ACTS

"SEC. 9004. (a)(1) It shall be unlawful for any person to enter into any contract or agreement the intent of which is to discourage the use of recycled oil, if such use is consistent with the required labeling for such recycled oil.

"(2) Any party injured or otherwise aggrieved by an agreement or contract in violation of paragraph (1) shall be entitled to treble the damages caused by said contract or agreement. An injured person may file suit to enforce this section in either a Federal or State court which otherwise has jurisdiction. Once filed, said suit shall be nonremovable except on jurisdictional grounds.

"(b) Notwithstanding any other law, no Federal or State regulation shall require labeling on re-refined oil which identifies said oil as "previously used".

"COORDINATION WITH OTHER LAWS

"SEC. 9005. (a) SOLID WASTE DISPOSAL ACT.—In the implementation of sections 5001, 5002, 5003, 5004, 6001, 6002, and 6003 the Secretary of Commerce, the Administrator of the Environmental Protection Agency, the Administrator of the General Services Administration, the Secretary of Defense, and the personnel of the Office of Procurement policy shall accord the development of standards, markets, specifications, and regulations relating to recycled, and especially re-refined, oil the highest priority.

"(b) STATE PROGRAMS.—Each of the States is hereby encouraged to develop a plan to—

"(1) institute to the maximum feasible extent the use of recycled oil in all areas of State and local government;

"(2) require or encourage persons contracting with such State to use, to the maximum extent feasible, recycled oil;

"(3) encourage the private use of recycled oil;

"(4) establish public awareness of the uses of recycled oil;

"(5) provide for the collection, manifesting, treatment, reclaiming, re-refining, reprocessing, or other recycling of used oil in such a way as to assure that—

"(A) the dangers to health and the environment posed by contaminated used oil or by waste oil are eliminated;

"(B) the production and sale of recycled oil which fails to meet applicable specifications or which is unsuitable for its intended use is eliminated;

"(C) waste oil, sludges, oily wastes, or other such hazardous wastes generated by the use or recycling of oil are treated, stored, or disposed of properly.

To the extent necessary to encourage development of such programs, the Administrator may delegate the authorities under this Act to any State which has developed a program meeting the requirements of this subsection.

"AUTHORIZATIONS

"SEC. 9006. There is hereby authorized to be appropriated $25,000,000 for the fiscal year ending September 30, 1982, and for each of the next succeeding fiscal years, for grants to States for the purpose of establishing and implementing programs meeting the requirements of section 9005 of this subtitle.".

STATEMENT OF GARY N. DIETRICH, ASSOCIATE DEPUTY ASSISTANT ADMINISTRATOR FOR SOLID WASTE, ENVIRONMENTAL PROTECTION AGENCY

Mr. Chairman, I am Gary Dietrich, Associate Deputy Assistant Administrator for Solid Waste of the U.S. Environmental Protection Agency. I thank you for the opportunity to present EPA's views on S. 2412, a bill to amend the Resource Conservation and Recovery Act to further encourage the use of recycled oil. This hearing is timely because EPA is currently in the process of considering appropriate regulation of waste oil as a hazardous waste under Subtitle C of the Resource Conservation and Recovery Act. The provisions of this bill should be considered in that overall context.

EPA supports the recovery and reuse of used oil. We believe that the discarding and disposal of used oil should be discouraged. Waste oil represents a valuable resource because, with appropriate treatment, it can be recycled as a lubricating oil. It also can be burned as a fuel. In either case, two important objectives are served:

(a) The use of virgin petroleum products is replaced by the amount of oil recycled.

(b) Potential environmental hazards from improper disposal of used oil are reduced or eliminated.

In my statement, I will focus on the scope and nature of the waste oil problem, the options EPA is considering for dealing with the problem, and the specific provisions of this bill to encourage recycling.

Used oil quantities and collection

EPA estimates that there are 1.4 billion gallons of used and waste oil generated annually. About half of this is used automobile crankcase oil, and the other half is used industrial oils. Of this total, we estimate that 700 million gallons are burned as fuel, 100 million gallons are re-refined or reclaimed, 200 million gallons are used for road oiling or similar purposes and 400 million gallons are disposed of either indiscriminantly or with garbage and trash.

The collection of used automotive and some used industrial oil for disposal, use of recycle is carried out by an estimated 5,000 small collectors. We believe that much of the used industrial oil is burned as a fuel directly by the generator on-site with or without reprocessing.

Environmental problem

Used oil presents an environmental problem because it is usually highly contaminated. Also the oil, itself, can pollute the environment, particularly when discharged into surface waters. A variety of contaminants are added during its use. Automotive crankcase oil is contaminated with lead from gasoline. Industrial oils are contaminated with a variety of materials, but we have very incomplete data on the nature and degree of this contamination.

A large number and variety of chemical additives are added to oils to improve their performance and extend their useful life. Although they serve beneficial purposes during use, they constitute contaminants in used oil. We have an incomplete inventory of these additives and their importance as contaminants in used oil.

Perhaps the worst feature of used oil is the fact that it is typically mixed when it is collected, transported and stored prior to being re-used, recycled or disposed. In this mixing process, a variety of toxic solvents, PCB's and other toxic materials are frequently mixed into used oil. The results are heterogeneous mixtures that can and frequently do contain some very hazardous materials. Indeed, the worst cases of environmental damages associated with used oil resulted from indiscriminate mixing: dioxin-contaminated used oil employed as a dust suppressant on a horse arena in Missouri, killing many horses and threatening human life; PCB contaminated used oil that has killed cattle; and road oiling with used oil in Texas which contained a highly toxic solvent. It is largely the propensity for used oil to be a carrier for a variety of highly toxic solvents, PCB's and other materials that causes EPA to be concerned about used oil and to presume that used oil is a hazardous waste. We are also concerned about the lead in used oil, and here, also, the mixing of used oil results in all used oil being suspected of containing lead. If automotive crankcase oil were segregated from other used oil, our concern about lead contamination of used oil could be focussed on crankcase oil and, further, crankcase oil exclusive of that derived from diesel-engine fleets. Although we do not have a great deal of data on the other contaminants of used oil—particularly those picked up in industrial oil and those derived from additives—we believe that the mixing of used oil has the effect of spreading these contaminants throughout most used oil.

All uses, recycling and disposal of used oil have the potential of polluting the environment, but the nature and degree of this pollution varies. The disposal of used oil can result in the leaching or draining of the oil or its contaminants into

surface and ground waters. Similar potential exists with respect to used oil that is used as a road oil or in other applications on the land. The burning of used oil can result in air emissions of lead, other metals and incompletely burned organic contaminants. The reclaiming, re-refining and reprocessing of used oil can generate highly contaminated sludges, residues and wastewater and air discharges. The storage and transportation of used oil can be attended by leakage and spills into the environment. They can also be attended by indiscriminant dumping into the environment. Although the environmental impacts from individual use, recycling and disposal operations can vary in degree and sometimes can be very substantial, the aggregate impact from the ultimate disposition of 1.4 billion gallons of used oil each year probably spell our greatest concerns about used oil.

Environmental control of used oil

EPA believes it has jurisdiction under Subtitle C of the Resources Conservation and Recovery Act to regulate used oil as a hazardous waste and to regulate the disposal as well as the re-use recycling of this material. Indeed, in our proposed regulations published December 18, 1978, we listed several used oils as hazardous waste and proposed to regulate the disposal, use-on-the-land and burning-as-a-fuel of these oils. We did not propose to regulate the reclaiming, re-refining or other recycling of these oils, but we indicated that we might, in the future, regulate these uses. The Agency received a very large number of comments on these proposals. We had hoped to complete our consideration of these comments and our further analysis of the used oil problem in order to include regulation of used oil in the final and interim final Subtitle C hazardous waste regulations that are being announced today. The used oil problem is very complex, however, and we simply have not been able to complete our work on this matter. We are, however, planning to list and regulate used oil as a hazardous waste in an amendment to our hazardous waste regulations sometime in the fall of this year.

As I have mentioned, the used oil problem is complex and we believe it merits a special, tailored set of hazardous waste management regulations. We do not believe it should be managed under the same requirements as most other hazardous wastes. We feel this way for several reasons. First, used oil is a resource. It can be used and recycled. Disposal should be discouraged. In order to promote the use and recycling of used oil, while, at the same time, controlling its potential to pollute the environment, special regulations are required. Secondly, because of the large number of generators of waste oil—300,000—most of whom are small service stations, garages and other businesses, because of the number of transporters—5,000—and because of the unknown but believed large number of users of used oil, we do not feel that the highly sophisticated and complex manifest tracking system of the Subtitle C program is well-suited and wholly necessary to deal with this problem. Finally, we believe that the environmental impacts associated with the use and recycling of used oil are different and peculiar to this type of material. The requirements of the hazardous waste management regulations are designed primarily to deal with the long-term containment and destruction or treatment of wastes and are not always optimal to deal with use and recycling.

Against this backdrop of general findings, we have carefully reviewed the used oil problem and have come to some tentative findings with respect to environmental regulation. These are:

We believe that reclaiming and re-refining of used oil should be encouraged but should be regulated. It is important to assure that used oil is delivered to and safely stored at recycling facilities, and it is important to control the waste discharges from these facilities.

We believe that the burning of waste oil as a fuel should be encouraged and can be accomplished in an environmentally safe way. But this use also must be regulated to insure environmental protection. Some types of burning should be prohibited or restricted while other types should be allowed but controlled.

We believe that the use of used oil for road oiling, dust suppression, pesticide carriers and other land applications should be virtually prohibited.

We believe that disposal of used oil should be discouraged and, where practiced, should be regulated as any other hazardous waste.

Finally, we believe that the collection, transportation and storage of used oil should be regulated but in a manner that does not impose a large amount of reporting and recordkeeping on generators.

We are working with these concepts in formulating a final regulation to be promulgated this fall under the Subtitle C hazardous waste management program.

Comments on S. 2412

EPA agrees with the basic intent of the bill but has a number of concerns with its specific provision.

First, we are concerned that the objectives of the bill do not reflect the beneficial use of used oil as a fuel. We have information that indicates that burning of waste oil as a fuel is and can be a competitive and appropriate use of used oil, as compared to reclaiming and re-refining, from the standpoint of economics as well as conservation of resources. Section 9001 of the bill fails to recognize this. As previously mentioned, use of used oil as a fuel can have environmental impacts, as can reclaiming and re-refining, but we believe these impacts can be adequately controlled. We recognize that re-refining of used oil for re-use as a lubricant produces a higher level of conservation because it produces a material that, after use, can be recycled once again and perhaps several additional times. Thus, re-refining is to be preferred. However, we also recognize that many generators will prefer to burn their used oil, as a fuel in on-site boilers. If air emissions are controlled, this use should not be discouraged.

Secondly, we believe that most of the provisions of the bill are already provided in the Resource Conservation and Recovery Act and therefore can be implemented under the current authority. Certainly, those provisions of the bill related to regulation of used oil for purposes of protecting human health and the environment—principally Sections 9003(a)(2)(B) and 9005(b)(5)—are already covered by existing authority. Also, we believe that many of the provisions of the bill for encouraging the use and recycling of used oil can be accomplished under RCRA. Section 6002 of RCRA requires Federal agencies to produce products containing the highest practicable percentage of recovered materials, and it requires EPA to issue guidelines to encourage and assist agencies in carrying out that mandate. EPA has the authority under Section 6002 to issue guidelines for use of re-refined oil. Because of the Section 6002 mandate, the Department of Defense has already initiated a program to use increased amounts of re-refined oil. The existing authority of Section 6002 seems to be ideally suited to achieve the objective of § 9003(a)(2)(B) of this bill. We do support the concept of aggressive State programs, both to implement environmental protection requirements and to foster the beneficial use and recycling of used oil. We believe that the first of these objectives can and will be served under the current authorities of RCRA which provide for authorizing the States to implement the hazardous waste management program under Subtitle C and further provides for Federal grant support to the States to assist them in this effort. With respect to the second objective, we believe that carefully designed regulations and guidelines under current RCRA authorities can suffice to promote the beneficial use and recycling of used oil. Thus by regulation, we believe that we can set the framework that favors use and recycling and permits the private sector to accomplish this objective without Federal assistance through State grants.

We do believe that Section 9003(b)(1) of the bill, which requires the labeling of virgin oil to encourage users to conserve used oil, has considerable merit and would support enactment of this provision. We would point out that EPA already has a very similar mandate under the Energy Policy and Conservation Act, P.L. 94-163. Section 383(d)(2) of that Act requires EPA to prescribe labeling standards applicable to containers of new, used, and recycled oil relating to proper disposal after use. However, the timing of this action is predicated on completion of certain still pending action by the National Bureau of Standards.

We further believe that Section 9003(a)(2)(A) of the bill, which requires EPA to assure the fitness of recycled or re-refined oil for intended uses, has considerable merit. We note that Section 383 (c) and (d) of the Energy Policy and Conservation Act has a similar provision which requires the National Bureau of Standards to develop test procedures for determining the "substantial equivalency" of re-refined and reprocessed used oil with new oil and further requires the Federal Trade Commission to promulgate those test procedures, together with labeling standards, to affect notification to consumers about the equivalency of the reprocessed or re-refined products. We understand that implementing a "substantial equivalency standard" presents some very difficult technical and judgmental problems and believe that a fitness test is preferable and more readily implemented. We hasten to point out that Section 9003(a)(2)(A) would add a new activity to EPA's many programs—an activity with which we have no experience. If it is the wisdom of the Congress that EPA perform this function, we undoubtedly would have to seek help from the National Bureau of Standards and would have to gear up. However, EPA does not seek out this activity. Based on past experience, we do not believe we could meet the statutory deadline of six months.

Finally, we do not feel qualified to comment on Section 9004 of the bill and will defer to others to comment on its merits.

In summary, instead of supporting, this legislation at this time, we would like to continue to work with this Committee in implementing the current authorities of RCRA to deal with the wise regulation of used oil from the standpoint of both

environmental protection and resource conservation. As I have already mentioned, we are moving to use the current authorities of RCRA to deal with this matter.

Again, I appreciate the opportunity to provide this statement and I shall be happy to answer any questions you might have.

STATEMENT OF JEROME COLLINS, OFFICE OF INDUSTRIAL PROGRAMS, OFFICE OF CONSERVATION AND SOLAR ENERGY, DEPARTMENT OF ENERGY

Mr. Chairman, members of this Committee, I am pleased to be here today and to describe the Department of Energy's recycled oil program. With respect to the Administration's position on S. 2412, we defer to the Environmental Protection Agency.

The Waste Oil Program in the Office of Industrial Programs, Department of Energy (DOE) provides the research, development, and demonstration foundation necessary for a technically, economically, and environmentally viable lubricant recycling industry. The need for performing this function within the government arises from the fact that oil recycling firms are, with few exceptions very small businesses in a declining industry. Of the 150 firms rerefining 300 million gal/yr of crankcase oil in 1960, less than 20 remain with a capacity now of about 50 million gal/yr.

Waste Oil Potential Supply

- Automotive (crankcase drainings)

  1.3 billion gallons purchased annually, of which approximately 45 percent is consumed in service leaving approximately 0.7 billion gallons as a potential maximum.

- Industrial (railroads, manufacturing process)

  1.6 billion gallons purchased annually, of which approximately 45 percent consumed in service leaving approximately 0.9 billion gallons as a potential maximum.

  Total maximum available is therefore, 1.6 billion gallons. Currently rerefining accounts for about four percent of the total maximum potential from the transportation and industry sectors.

It is estimated that, of the 0.7 billion gal/yr of recoverable used auto lube oil, about one-half is burned and about 20 percent is used for road oiling, in asphalt, or other miscellaneous applications. About four percent enters rerefining facilities and is converted into lube oil basestock and other petroleum products. The remainder of potentially recoverable used auto lube oil is simply released into the environment through dumping.

As this Committee is aware, we have been sponsoring research at the Bartlesville Energy Technology Center (BETC) to develop a technology for rerefining used oil that is energy conserving and environmentally sound. The solvent precipitation/distillation (SP/D) process developed in this program produces high quality rerefined oil at a higher yield than conventional processes. Complete engineering design specifications are available for a variably scaled solvent precipitation/distillation plant based on a nominal scale of ten million gallons per year capacity. The product of this process has performed well in extensive engine tests including the first long-term fleet tests ever performed on a rerefined motor oil.

The current acid-clay process for rerefining oil has come under careful scrutiny since the acid clay sludge formed by this process represents a serious disposal problem. This has impaired the economic and technical feasibility of rerefining. The BETC program which involves solvent extraction and purification would eliminate this disposal problem. The acid clay process has been the mainstay of the rerefining industry, particularly for processing highly contaminated oil such as crankcase drainings. Its primary disadvantage is the acid clay sludge residual which is produced.

Another conventional process, the clay process, consists of dehydration and clay contacting. This process is not well suited for processing today's highly contaminated crankcase drainings. The clay process is nevertheless widely used for rerefining industrial oils.

Other crankcase oil rerefining technologies developed under private funding also have overcome the acid clay sludge residual problem, but appear to be applicable only to relatively large facilities. As a consequence, we have redirected the DOE program to be capable of retrofit into the relatively small existing acid clay plants, thereby permitting survival of the small entrepreneur, and maintaining the infrastructure of collection, transportation and distribution of oil.

Among the other emerging rerefining processes are propane solvent extraction, which has recently been developed in France, and distillation-hydrotreating which is primarily suited to large scale, continuous operations and requires solution of distillation column fouling and catalyst poisoning problems. Another new process, proprietary to the Phillips Petroleum Company is the Phillips Rerefined Oil Process (PROP). The Department of Energy has recently awarded a grant to the State of North Carolina for the prupose of monitoring a PROP plant in long-term operations. As yet, no long-term engineering data characterizing this system's performance is available to the public. Such data will be available to DOE sometime during the next year.

Exhibit A compares the salient features of various rerefining processes.

Another significant portion of the BETC work has been the determination that used oil feedstock does not vary significantly from region to region of the country--indicating that, indeed, a uniform product meeting commercial and military specifications can be made

regardless of feed source. A word of caution, however, must attend this statement. There is growing evidence that used oil collection sites are being misused for the disposal of hazardous wastes. For example, PCB transformer oil from old transformers can easily enter such a collection system undetected. Such a practice would seriously jeopardize the use of used oil for rerefining or waste oil for burning. It is our-opinion that current safeguards do not adequately address this problem.

The DOE program recognizes that waste oil can serve as an alternative fuel. It appears that a considerable quantity of collected waste oil is attracted away from the rerefining industry, by a purchase price differential, to be blended in with residual oil for industrial boiler use. If the waste oil collection system can be made to operate to prevent the admission of hazardous materials and if the oil meets fuel specifications (e.g. flash point is not depressed dangerously due to gasoline content) and assuming minimal processing energy expenditures, then the market choice for burning over rerefining to lubricants or industrial oils (e.g. hydraulic or cutting oils) may be more cost-effective. Under these conditions, burning may be more energy efficient as well. Thus the burning option should remain open.

Rerefining can mitigate future critical lubricating oil shortages, which could occur due to several causes. These causes might include a reduction in crude oil supplies, particularly from foreign sources during a time of national emergency, or reduced availabilities of "lube cut" quality and quantities from new peteroleum discoveries such as those in Nigeria, Indonesia, and Alaska. Rerefining processes can be fueled with coal, but economics may not be justified from the private sector standpoint at this time. Typically the raw waste oil furnishes most of the fuel to energize rerefinery operations in the form of the "Light fraction", predominant gasoline in the automotive drain oil--a form of renewable resources.

The economics of rerefining are strongly affected by the value of raw used oil for burning. When uncontrolled burning of used oil mixed with fuel oil is permitted, the resulting upward pressure on the price of raw used oil virtually drives rerefiners out of the market. At present, the practice of uncontrolled burning of used oil is the single biggest impediment to the production and use of rerefined oil.

The potential saving in petrolum conserved and environment preserved are significant. Rerefining a barrel of oil is not the saving of one barrel, but the potential saving of several barrels, since lubricants can be rerefined a number of times. In addition, it takes less energy to rerefine a barrel of lubricant than to produce a new barrel from crude oil.

In response to the needs for research discovered during preliminary investigations in 1971, this office has pursued a wide spectrum of fuel and lube end use studies. The predominant rerefining technology is based on an early refining process which employed sulfuric acid and clay to aid in removing contaminants. Currently, communities object to the acid-containing sludge and this has been a major factor in locating new plants using this process. A tax disadvantage has now been removed but there yet remain many institutional barriers to be overcome before a revitalized rerefining industry is in place. As part of an overall DOE implementation plan, these barriers are becoming identified and will be addressed. They include oil collection and distribution logistics, finance, working within local and national codes which effect the movement of waste oil and process by-products, and market acceptance, among others.

The chief thrust of the DOE Waste Oil Recycling program up to now has been directed to developing an environmentally acceptable, more efficient process to replace the traditional acid-clay process together with related technical studies. Many of these projects have been

performed or administered for DOE by the Bartlesville Energy Technology Center (BETC) located in Bartlesville, Oklahoma. These efforts have ranged from determination of rerefinery feedstock consistency to performing the first documented engine sequence tests and full-scale fleet tests ever run on rerefined lube oils. The resulting products include over 30 publications (see attached bibliography, Exhibit B), world-wide recognition of BETC as the leading source of technical information on rerefining, and a patented rerefining technology, solvent precipitation/distillation, which shows promise of becoming the most viable rerefining method developed to date. Significant technical contributions have also been made by other outside organizations through contracted studies.

In order to successfully transfer the technology developed in this program to the private sector, negotiations for participation in a full-scale cost-shared demonstration will be initiated in FY 81. Confirmation of pilot-scale data and engineering projections is required before investments of several million dollars can be reasonably expected. The most attractive option at this time appears to be retrofitting an existing oil rerefining facility. All supporting utilities and operations would already be in place and feedstock supplies and product markets would already be established. The total cost to the government for its share can be more firmly controlled this way than with a new business operation and the likelihood for commercial success will be higher.

An area in which significant further investigation is planned is the recycling of industrial lubricants. While major industries, such as steel and iron producers, tend to reclaim their oils, most firms generate quantities of used lubes too small to be worth recycling on their own. Along these lines detailed information is being collected by a contractor, Bidga & Associates, on every type of lubricant produced. After quantifying what is available, what is done presently with used material, and what the potential markets are, they are to outline research needs that might appropriately be fulfilled by the government.

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The program's overall goals are to 1) conserve energy and lubricant oil, a vital energy resource, and 2) reduce degradation to the environment. Heavy emphasis is placed on rerefining, but not to the exclusion of processing for use as fuel, or other uses such as in asphalt. Year 2000 expected impacts of the program, for waste automotive lube oil alone (waste industrial lube oils are to be included in the future), are as follows (annual quantities):

- 425 million gallons of waste oil rerefined,
- 40 million gallons of waste oil burned as environmentally acceptable fuel,
- 80 million gallons of waste oil used in asphalt or other ways,
- rerefining by-products would be used in environmentally acceptable ways, and
- the rejuvenated rerefining industry would contribute to U.S. independence from foreign oil supplies, providing about 31 percent of the nation's automotive lube oil requirement.

The Office of Industrial Programs is cooperating with a number of other agencies and groups in the conduct of this program. Communications are maintained with the following:

- o DOE Office of State and Local Programs
- o EPA
- o Federal Interagency Waste Oil Recycling Task Force
- o National Bureau of Standards
- o Federal Trade Commission
- o DOD MERADCOM
- o Association of Petroleum Rerefiners
- o National Association of Oil Recovery Coordinators

Thank you for giving me the opportunity to present to the Committee information on the waste oil program of the Office of Industrial Programs.

EXHIBIT A - SALIENT FEATURES OF VARIOUS RE-REFINING PROCESSES

Process	Implementation	Product Quality	Process Yield	Process Energy Requirements	Process Complexity	Other	Hazardous Waste	Additional Advantages	Additional Disadvantages
				EXISTING PROCESSES AND FACILITIES					
Acid Clay	EPA restrictions closed or forced changes in most facilities.	Can produce a quality lube oil	Low 65 % when processing used automotive lube oils.	Low 12,000 BTU per gallon of product.	Simple, and adapted to small volumes and batch operations. Can be adapted to semi-continuous operations.	Produces acidic sludge & oily clay waste products.	Does not necessary remove hazardous waste.	Suited to small installations with regional disposion; 2mm gal/yr is large.	Acid clay disposal, plant atmospheric emissions hazard; economic poor
Clay	None	Questionable for highly contaminated oils acceptable for industrial oils.	Low 60% for automotive lubes and high 90% for for industrial oils.	Same as acid-clay 12,000 BTU per gal. of product.	Very simple.	Produces oily clay waste product.	"	Used for pretreatment of used oil to be burned.	Does not produce acceptable engine oil.
Caustic-Clay	Limited use, one known plant producing automotive lube oil.	Although thought questionable for highly contaminated oils, production of a quality lube oil is claimed.	Low lube oil yield 62% offset by concurrent production of fuel oil 16%.	Abour 40% higher than acid-clay 17,000 BTU per gal. product if all energy is charged to lube production.	Comparable to acid-clay process.	Produces caustic sludge and oily clay waste product.	"	Similar to acid-clay.	Similar to acid clay, sensitive to feedstock variations.
Propane Extraction	Newly developed process with two European plants in production.	Can produce a quality product.	Yield unresolved. High yield 82% claimed by process developer. Moderate yield 70% reported by plant operator.	Very high, more than 2 x acid-clay 28 to 32,000 BTU gal. of product.	Relatively complex & and suited to large scale operations. Propane section operates on a continuous basis.	Requires an acid-clay finishing step. Economics unattractive.	"	Produces good extraction quality oil.	Economicaly unattractive.

Process	Implementation	Product Quality	Process Yield	Process Energy Requirements	Process Complexity	Other	Hazardous Waste	Additional Advantages	Additional Disadvantages
Propane Extraction					The acid-clay finishing step can be either batch or semicontinuous.				
			PROPOSED UNDER DEVELOPMENT						
Distillation Hydrotreating	Several variations of process exist. Two distillation no hydrotreating plants in production. Demostration plant under construction in W. Germany and small pilot plant in operation in the U.S.	Should be capable of producing a quality lube oil.	Significantly higher than for acid-clay 76%.	Slightly higher than for acid-clay 13,000 BTU per gal. of product.	Somewhat complex & suited to large scale continuous operations.	Requires solution of distillation column fouling & catalyst poisoning problems.	Will remove some classes of hazardous waste.	Simplier than other newer technologies.	Not proven.
BETC SP/D	Pilot plant operation has produced rerefined oil for engine sequence and field tests.	Producing high quality oil that passed all engine sequence tests for an SE oil rating (the commerical spec) with slightly larger quantities of certain additives.	Higher than acid clay 75%.	20,000 BTU per gal. of product.	Relatively complex. Currently engineered for continuous operation.		"	Possible to retrofit to a degree into existing acid clay or virgin petroleum refinery.	Lacks commercialization.

Process	Implementation	Product Quality	Process Yield	Process Energy Requirements	Process Complexity	Other	Hazardous Waste	Additional Advantages	Additional Disadvantages
MZF Solvent	Laboratory test tube stage. Process evaluation based on this data. Has least development work of processes reported.	Laboratory date reports good removal of metallic contaminants which should produce quality lube oil after undergoing subsequent fractionation and clay contacting.	Significantly higher than acid-clay process 76%.	About 2 x acid clay 25,000 BTU per gal. of product.	Should be comparable to other solvent extration processes and suited for semi-continuous or batch operations.	Emulsion separation by centrifugation replaced by use of an undisclosed demulsication agent who's cost is claimed to be low.	Unknown	Insufficient information.	Insufficient information.
Phillips Rerefined Oil Process (PROP)	Pilot test completed 2 plants in process of installation NC & Canada.	Passed engine & fleet sequence, test not published.	75-80%	Not avaliable	Similar in complexity to distillation hydrotreating BETC.		Will remove some classes of hazardous waste.	Turn key plant. Big oil backing.	Must buy complete plant, feedstock sensitive, cannot be retrofitted.

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EXHIBIT B

U. S. DEPARTMENT OF ENERGY/BARTLESVILLE ENERGY TECHNOLOGY CENTER

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STATEMENT OF

KIMBALL L. MORRIS

PRESIDENT

ASSOCIATION OF PETROLEUM RE-REFINERS

BEFORE THE

U. S. SENATE

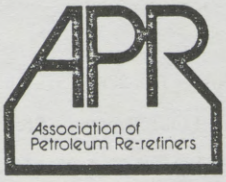
COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS

ON

S. 2412

TO AMEND THE RESOURCE CONSERVATION AND RECOVERY ACT

MAY 5, 1980



Association of Petroleum Re-refiners
1101 Connecticut Avenue, N.W.
Suite 700
Washington, D.C. 20036
(202) 857-1150

Mr. Chairman:

My name is Kim Morris. I am President of CAM-OR, Inc., a small public corporation which is actively engaged in the re-refining of used oils. I am here as President of the Association of Petroleum Re-refiners (APR). Also here today is James McBain, Executive Director of APR. Additionally I am submitting for the record a statement of John O'Connell, Vice President of APR, and President of Estech Oil Company. Unfortunately, Mr. O'Connell could not be present today.

The Association of Petroleum Re-refiners was formed close to thirty years ago to represent the interest of a then growing industry. A concerned reading of APR minutes since its beginning bears sad witness to the demise of a once thriving industry and American's early, but unrecognized, ability to lessen today's dependence on foreign oil imports.

We are here today for the first time in generations testifying on a bill to revitalize an industry composed of small businesses and peopled by individuals more than capable and willing to take on and carry out the responsibility of growth that legislation such as this can generate.

We commend the sponsors of S.2412, Senators Domenici, Randolph, Stafford, and Baker, and the Committee for their recognition of a need to stimulate the growth of an environmentally sound and healthy re-refining industry. Your legislation addresses some of the major obstacles to a viable re-refining industry in this

country today. Thank you for the opportunity to speak.

Used oil re-refining and reclamation in the United States dates back as early as 1915. Although re-refining techniques were not extremely sophisticated, the oil was being adequately renewed for the then current uses. The military used a great deal of this re-refined oil during World War I and thereafter.

In 1932, commercial airlines began to use custom re-refined oils in aircraft engines. This generated substantial economic savings for the fledgling aviation industry and stimulated the use of re-refined oil by other industries as well.

World War II and the need to conserve limited supplies of lubricants led to an even wider use of re-refined lube products. For example, over 29 million hours of piston aircraft engine time were logged using re-refined oils. There were no recorded ill effects on engine wear. In fact, average engine life was increased by 50 percent.

Following World War II, the Air Force continued to use re-refined products, and by 1949 almost 25 percent of all Air Force engine lubricants were re-refined. However, with the advent of jet engines requiring sophisticated, and sometimes synthetic, lubricants, the need for re-refined oils declined.

At the same time, America was becoming a mobile society and the American love affair with the automobile stimulated other markets to grow rapidly. The re-refining industry was able to compete favorably with virgin products, and by 1960 the industry claimed over 150 companies producing over 300 million gallons of

re-refined lubricants - almost 18 percent of the Nation's total comsumption!

Today the industry is composed of less than ten companies producing less than 100 million gallons of quality re-refined lubricating oils.

What destroyed the dramatic growth of such a needed industry? There are many reasons, the most important of which are:

(1) The flow of used oil as a feedstock for re-refiners was reduced, due to the increased use of used oil as a road oil and a fuel. Increased competition for this used oil led to drastically higher feedstock prices for the re-refiner.

(2) Lube oil formulations became more complex in order to satisfy specifications for higher performance engines. The inclusion of more sophisticated additives made the job of removing them more difficult for the re-refiner. Higher levels of re-refining techniques were necessary. The industry began a needed technological change and, during the process of change, product quality began to suffer. This cast the stigma of product inferiority, which still plagues our industry today.

(3) Over capacity in the virgin lube market caused prices for lube oils to drop sharply. The resulting lower price levels prohibited re-refiners from passing the increased costs of changing technology on to the consumer.

This cost/price squeeze continued to tighten and led to inefficient operation of plants, poor product quality, and more and more financial losses for re-refiners.

The foregoing scenerio is not unique. This country is replete with industries that have struggled through technological and market changes to emerge on stronger footings. But at the same time the re-refining industry was ebbing, government action profoundly increased its problems. The following actions prevented the industry from completing the needed technological changes:

. The armed forces excluded re-refined oils from the Department of Defense, and therefore all government procurement lists.

. The Federal excise tax was imposed unfairly on re-refined oil each and every time it was sold. This tax could not be passed on to the consumer and was absorbed by the re-refiners.

. The Federal Trade Commission labeling rule effectively prevented the re-refining industry from competing in the retail consumer motor oil market by requiring prejudicial language on the front of all re-refined oil containers.

This government action added to the already mentioned cost/price squeeze and resulted in more financial losses for re-refiners and the eventual decimation of the industry.

Today, as a result of Congressional action in passing of the Energy Policy and Conservation Act (EPCA), The Resource Conservation and Recovery Act (RECRA), and the Energy Tax Act, the Department of Defense specifications have been changed to allow the purchase of qualified re-refined oil and, re-refined oil has been exempted from the Federal excise tax. We commend Congress for its efforts in this regard, but the last and most important major barrier - the FTC labeling rule still remains.

By its action on this bill, the Congress can make the difference between whether the industry will continue to decline or begin to recover to its full potential.

If this industry grows, the country will reap the benefits of a cleaner environment, and the continued re-use of an already scarce resource. Projected lube oil demand for 1980 is over 2.8 billion gallons. Of that, over 900 million gallons (59,000 barrels a day), almost one third of our current lube oil needs, are

potentially recoverable for re-use. All that's needed is a viable re-refining industry.

There are three major problem areas that inhibit the growth of a viable, re-refining industry in this country. One is the ability of the re-refiner to compete for used oil - his feedstock or his crude; the second involves the development and purchase of modern re-refining technology; and the third is consumer market acceptance for re-refined lube products.

Assuming that used oil is saved and collected, which we encourage, today's re-refiner must compete against those who pick up or purchase used oil, provide no treatment, and sell it for use as a fuel or fuel additive. Used oil contains lead, zinc, chromium, barium, and many other heavy metals which, in addition to health problems, can cause boiler and refractory problems, as well as stack emission problems when burned in an undiluted state. Studies have shown that used oils can effectively be burned, if processed, or when diluted with high proportions of virgin fuel, or in facilities with high efficiency emission control equipment. Unfortunately, most of the used oil burning today can be classified as indiscriminate, using none of the above.

Unfortunately for today's re-refiner, the economics of selling for indiscriminate burning of unprocessed used oil is very profitable. While the re-refiner has collection costs, processing costs, depreciation, as well as administrative and overhead costs, the indiscriminate fuel collector only has collection costs. If he can sell used oil at 10 to 15 cents a gallon over his collection

costs, he can make an excellent profit. For example, in Detroit the wholesale market price for used oil is about 30 cents per gallon. The one percent sulfur #6 fuel price is 53.5 cents per gallon, the difference of 23.5 cents represents the potential profit for the indiscriminate fuel seller. In many cases, partially processed used oil can compete against #2 fuel (78 cents per gallon), increasing the indiscriminate fuel sellers potential profit.

The re-refining industry believes that the problem of indiscriminate burning of unprocessed used oil can be restricted if used oil is classified as a hazardous waste under the pending regulations of the Resource Conservation and Recovery Act of 1976. If these regulations require the removal of heavy metals and other contaminants from used oil in order to qualify as fuel, or they restrict the burning of used oil to facilities with high-efficient emission control equipment, the re-refiner will be able to compete in the wholesale market for feedstock on an equal footing with the fuel processor.

The second major problem facing today's re-refiner is technology. Increasing environmental regulations have created serious disposal problems for wastes generated by the acid/clay process used by re-refiners for generations. Consequently, the re-refiner has been forced to seek new technology if he is to stay in business.

Today, three re-refiners are using new processes incorporating vacuum distilation. Additionally, the recent development of the Phillips re-refining process (PROP), although not currently producing, represents another of first-generation new technologies available. The capital costs of these technologies and processes,

however, are extremely expensive.

For most re-refiners, who are basically small business entrepreneurs, new process expenditures are a long "throw of the dice". In view of a declining market for their products and lack of market acceptance in the automotive lubricant segment caused by the restrictive FTC labeling requirements, most have been unwilling to make the financial commitment.

U.S. re-refiners who have taken the step to new processes - and there are only three - are the larger companies in the industry who have built their business by "custom" re-refining for the railroads or industry. These companies have had a strong market base which allowed them to justify the capital investment. However, none of them are aggressively marketing "re-refined" motor oil in the retail market.

The FTC's restrictive labeling requirement is the third major factor inhibiting the growth of a viable U.S. re-refining industry. By its very nature "Made from Previously Used Oils" implies inferior quality in the minds of the retail consumer and restricts market acceptance. No matter what the lubricating specifications and properties of a re-refined oil, this label must appear on the front of every can. To our industry's detriment, the words "Used" and/or "Previously Used" have very negative connotations in American society. Why is it that no other industry marketing recycled products, e.g., steel, lead, aluminum, etc., is required to bear a label stating that the product was "Previously Used"?

In comparison, neither Canada nor Mexico have restrictive labeling requirements on re-refined motor oils. It is interesting to note that Shell Canada and Mohawk Lubricants of Canada have both announced plans to build major re-refineries. Texaco is

purported to be planning a facility in Mexico. In the United States, there is only one small re-refinery under construction and its owners have publicly stated that it will be used for re-refining specialized industrial lubricants. If the labeling restrictions are eliminated, the U.S. re-refining industry will begin to expand and develop.

There is no question that the APR and its members agree with the sponsors of S.2412 as to the definite need for this legislation.

Of most importance is the long-awaited recognition that the FTC labeling requirement has been and is extremely detrimental to the growth of re-refining and thus to the nation's needs for resource recovery and environmental protection.

The elimination of the current prejudicial labeling requirement will open a vast retail market for re-refined oil either directly as a lubricating product, or as a base stock in independently compounded lube oil products. This expanded market will generate needed investments in more efficient technology and promote the accelerated growth of this industry.

Additionally, by restating Congressional intent under the Resource Conservation and Recovery Act, the bill encourages EPA to assure that the needed feedstocks will be available for re-refining.

There are, however, some specific sections of the bill APR would like to address:

Page 2, Line 9 should read "unnessarily hindered by bias." Delete "in favor of virgin oil" so that the section reads as follows:

"(c) that the recycling of used oil into environmentally acceptable products has been unduly and unnecessarily hindered by bias."

Page 2, Lines 23 through 25 should be deleted. The bill does not treat "oily waste" and the definition is unnecessary.

Page 3, Lines 9 and 10: delete "recycling" and "reprocessing." Recycling cannot be defined as itself. The term "reprocessing" is not necessary to the bill. On line 10 after the word "other," add the words "environmentally acceptable" so that the section reads as follows:

"(3) the term 'recycled oil' means oil produced as a result of re-refining, reclaiming, or other environmentally acceptable treatment of used oil so that it is suitable for reuse as oil for the original or a new purpose;

Page 3, Lines 15 and 16: Delete the words "substantially equivalent in quality to virgin oil" and after the word "purpose" add "as virgin oil" so that the section reads as follows:

"(4) the term 're-refined oil' means oil produced through the application of petroleum refining techniques to used oil to produce lubricants or other petroleum products that are intended for the same purpose as virgin oil...additives.

We believe that substantially equivalent is a function of specifications and not of method of production and, therefore, should not be in a statutory definition describing method.

Page 3, Lines 21 and 22: Delete the words "the characteristics of" and delete the words "have been changed by". Add the words "has acquired contaminants through" so that the section will read as follows:

> "(5) the term 'used oil' means oil which has acquired contaminants through use, storage, or handling, whether or not it has thereby been rendered unsuitable for use for the purpose for which it was originally intended;

Page 4, Lines 5 through 12: We do not necessarily recommend any transfer of authority from the Federal Trade Commission to the Environmental Protection Agency. The chosen agency should be given explicit directions as to the precise intent of the Congress in this matter. We suggest the following:

Page 4, Lines 16 through 19 should be changed to read:

> "(A) the extent not adequately provided for by current market labeling, such as the ASTM, ASLE, or API classification codes, assure that purchasers of all retail petroleum products are fully and accurately apprised of the nature and fitness of the product for its intended use.

Page 5, Lines 4 and 5: On both lines the words "virgin" should be changed to "motor" so that the section reads as follows:

> "(b)(1) LABELING OF MOTOR OIL -- Effective twelve months after the date of enactment of this subtitle, motor oil containers shall bear the following legend, prominently displayed:

Page 6, Lines 1 through 3 should be changed to read:

"(b) Notwithstanding any other law, labeling requirements allowed to continue in force or promulgated under Sec.9003 (a)(2)(A) of this Act shall preempt any other conflicting Federal or State labeling requirement.

Page 6, Lines 14 and 15 should be changed to read as follows:

"(b) STATE PROGRAMS. -- Each of the States is hereby encouraged to develop a plan to encourage the treatment, reclaiming, re-refining or other environmentally acceptable recycling of used oil and to --

Page 6, Line 18: Delete ";" and add "including providing for any necessary fleet, SAE sequence or other tests recycled oil must undergo to meet state purchasing requirements" so the section will read as follows:

"(1) institute to the maximum feasible extent the use of recycled oil in all areas of state and local government including providing for any necessary fleet, SAE sequence or other tests recycled oil must undergo to meet state purchasing requirements;

Page 7, Lines 1 through 3: After the word "collection" add "and" and delete the words "treatment through recycling" so that the section will read as follows:

"(5) provide for the collection and manifesting of used oil in such a way as to assure that--

Page 7, Line 11: Delete the words "oily wastes" so that the section reads as follows:

"(C) waste oil, sludges, or other such hazardous wastes generated by the use or recycling of oil are treated, stored, or disposed of properly.

In conclusion, we believe the growth of the re-refining industry will alleviate America's burden of increasing energy requirements. Passage of this legislation will not only benefit a needed but struggling industry, but will also bring this country closer to the goal of energy independence.

Motor Oils Refining Company

Estech Oil Company

STATEMENT OF

JOHN P. O'CONNELL, PRESIDENT

ESTECH OIL COMPANY

ON THE

PROPOSED LEGISLATION AMENDING

THE RESOURCE CONSERVATION AND RECOVERY ACT OF 1976

TO FURTHER ENCOURAGE

THE USE OF RECYCLED OIL

BEFORE THE

SENATE COMMITTEE

ON

ENVIRONMENTAL AND PUBLIC WORKS

MAY 5, 1980

Estech Oil Company, a subsidiary of Esmark Inc, has been re-refining used lubricating oils in Illinois since 1936. This service is being provided to a wide cross section of American industries including railroads, large truck and municipal fleets, the steel and aluminum industries, automobile manufacturing facilities and a variety of smaller industrial businesses.

The re-refining industry has been severely restrained and inhibited in expansion of our capabilities in the oil re-refining field as a result of discriminatory Federal regulations and lack of environmental controls on the disposal of used lubricating oils which are needed as the feedstocks for our industry.

Specifically, three areas must be addressed if we are to have not only a viable industry but also the return on investment required to make capital committments which are needed for the growth that is urgently desired. These three areas are:

1. Remove the requirements of discriminatory labeling on re-refined oil.

2. Assure that used lubricating oil is properly collected with a manifest system for control of this proven hazard waste. This change will assure that adequate feedstocks are available for the re-refining industry.

3. Provide incentives and assistance for development of programs which will encourage the rapid collection of used oil and the expansion of the re-refining industry.

Once the above have been accomplished, I forecast that the re-refining industry will exhibit substantial growth, to recover the more than one billion gallons of used lubricants generated each year in the United States. The technology now exists to produce

high quality competitively priced lubricants from these used oils.

Estech Oil Company has not entered the retail market because of the discriminatory labeling regulation on re-refined oil required by the FTC. The present labeling requirement, "made from previously used oil", negates higher profit margins and thereby discourages investment by the re-refiner. This is unfortunate because, in our case, Estech Oil Company's products have been proved to be equivalent to those manufactured by major oil companies and have been approved for use by many State and local Governmental agencies. In addition, our products have been proved through years of actual use in many large and small automobile and truck fleets in the midwest.

Also, our initial hope after the Resource Conservation and Recovery Act of 1976 and the Energy Policy and Conservation Act of 1975 became law was that prompt agency action would result in the necessary changes in regulations and/or new regulations to encourage the growth of our industry. As you no doubt are aware, the promulgation of these new or changed regulations has been held up for many reasons. The original intent of Congress was to encourage the conservation and recycling of our natural resources as well as to place controls on waste streams which, if not properly handled or recycled, could be a serious hazard to our environment. We believe it imperative that this congressional intent be implemented as soon as possible. Until used oil is controlled through proper collecting and recycling, the following problems will continue:

1. Improper disposal of used lubricants into our water systems and sewage treatment plants creates serious environmental and economic problems.

2. Uncontrolled burning of used lubricants produces serious environmental air pollution problems as a result of the heavy metals, sulfur and lead often present in these oils.

3. Road oiling for dust control produces serious and long-term environmental problems from run off into fields and streams

We find it difficult to understand why the implementation of these regulations has taken so long, particularly in light of the facts that the technology and an industry exist which are capable of taking this valuable resource and recycling it back to its original and most desirable application, lubricating oil. Papers presented to the National Petroleum Re-Refiners Association and American Society of Lubrication Engineers have predicted a shortfall in our country's ability to supply certain lubricants required for our industry and defense. In addition, availability of crudes capable of producing quality lubricants is decreasing. Several U. S. Government sponsored studies also have shown that the most energy efficient way to handle used lubricants is through re-refining back to finished products. Even the American Petroleum Institute has now developed a program to encourage car owners to return used lubricants to a proper collection site.

Our company has been able to continue in operation only because our business base is related to several major industries which have recognized the need for and the economic benefits from lubricant re-refining. In parts of our country where this economic base has not existed, many re-refiners have closed their re-refining operation as a result of Federal restrictions on their products and the uncertainty of the future source of feedstocks for their plants.

In regard to Senate Bill 2412, I would like to compliment the sponsors for addressing the above issues and would like to offer the following specific comments:

A. The Bill addresses the major issues described above and will be of great help in expanding the re-refining industry and thereby produce positive environmental affects as well as lessen our dependency on the need for foreign crude sources.

B. Section 9002, we recommend the following changes:

1. Section (1) be eliminated. Since this Bill does not address the subject of oily waste, this definition is unnecessary.

2. Section (3) be changed to read: "The term 'recycled oil' means oil produced as a result of re-refining or reclaiming of used oil in an environmentally acceptable manner so that it is suitable for reuse as a lubricating oil".

3. Section (4) be shortened as follows: "The term re-refined oil means oil produced through the application of oil refining technology to produce lubricants or other petroleum products".

C. Section 9003, we recommend the following changes:

1. Section 2 (A) be changed to read: "Assure that purchasers of recycled or re-refined oils are fully and accurately apprised of the nature and performance requirements of the product".

   The question of quality should be controlled by the use of existing performance definitions promulgated by the API, ASLE, ASTM, NLGI and SAE and current commercial industrial product specifications.

2. Section 3 (B) (1) retail market container labeling should pertain to both re-refined and virgin oils.

D. Section 9004 (B), we recommend the addition of a phrase to further clarify the intent of this paragraph as follows:

Not withstanding any other law, no Federal or State regulation shall require labeling on re-refined oil which identifies such oil as "previously used" or the use of any other words which create a bias against such products.

E. Section 9005 (B) (5) first sentence must be changed as follows:

(5) Provide for the manifesting and encouragement of collection of used oil in such a way as to insure that-----

The reason for elimination of the words "collection, treatment, reclaiming, re-refining reprocessing and other recycling" is we do not believe State Governments should be encouraged to enter the business of re-refining or reclaiming used oil, particularly, when this could be financed through the Federal grants as authorized in Section 9006.

We would like to thank you for the opportunity to offer comments on this Senate Bill which can be of great assistance in reducing our dependence on foreign crude sources and improving our environment.

UNITED STATES DEPARTMENT OF COMMERCE
National Bureau of Standards
Washington, D.C. 20234

May 23, 1980

Honorable Pete V. Domenici
United States Senate
Committee on Environment and Public Works
Washington, DC 20510

Dear Senator Domenici:

Thank you for your letter of May 12, 1980 inviting my response to a series of questions included with your letter. My written comments on these questions are enclosed.

Thank you also for the opportunity to testify on S.2412 on behalf of the Department of Commerce. We all look forward to the time when recycled oil products can take their rightful position in the marketplace.

Sincerely,

Donald A. Becker

Donald A. Becker, Manager
Recycled Oil Program

Enclosure

Question 1a: The central issue here is whether re-refined oil is as good a product as virgin oil. Can...you tell me whether you think re-refined products are--or could be--as good as virgin products?

Comment: I believe that there has been sufficient engine testing on re-refined oils to establish that: (1) a high quality re-refined lubricating oil which has been formulated with a high quality additive package can be comparable to a virgin oil similarly formulated, and (2) that both will provide adequate performance in most types of automotive service. The problem which exists at the present time is the lack of technical information and data to determine which tests are necessary and how often they should be applied in order to assure that the re-refined oil basestock is consistent in-between the engine tests. The user industries have made it clear that they are very concerned about the potential lack of consistency of re-refined oil products, and about the potential effects of unusual or unknown contaminants in the used oil feedstock to re-refineries. These potential problems are of particular concern when warranty questions are involved.

Question 1b: Also, if the products are of comparable quality, how can you best assure a consumer that he can use re-refined oil without damaging his automobile?

Comment: Since the general public appears to have a substantial bias against recycled lubricating oil products, in my opinion any identification that the product is re-refined or recycled will significantly decrease the marketability of that product. This attitude is also prevalent in West Germany (considered by many to be the model country for effective oil recycling). This was stated to me personally by a virgin oil refiner in Hamburg after readily acknowledging that the West German re-refined oils were of excellent quality and fully accepted by Daimler-Benz for inclusion in the "Blue-Book" of lubricating oils for use with their automobiles.

Question 2: I understand that the Department of Defense has recently revised its specifications to permit the use of re-refined oil in military vehicles. Can...you describe the tests which the military conducted as part of this revision and tell me the results?

Comment: The tests conducted by the U.S. Army with funding by EPA are fully described in AFLRL Report No. 98, and a copy of this report is included as Attachment No. 1. The results of these tests plus many others (including additional engine sequence tests, fleet tests, etc.) have indicated without question that a high quality re-refined lubricating oil basestock can be made into a high quality formulated engine oil which is fully equivalent to virgin oil (see also question 1a).

It should be noted, however, that the ASTM Task Force which helped to provide recommendations to the Army with regard to chemical and physical tests for the re-refined basestock, included the statement that, while the list of tests they developed was their best estimate of appropriate tests, there presently was not enough information and data available to state that application of these tests would be sufficient to monitor all of characteristics and/or potential contaminants which are necessary to reliably produce a high quality re-refined engine oil.

Question 3a: What percentage of the crude oil which goes to production of lubricants is imported and what are the principal countries of origin?

Comment: The Department of Energy should have the necessary information to answer this question accurately. I therefore will defer to their response.

Question 3b: Assuming we could realize perhaps one-half of the re-refinement potential, how much imported oil could we displace?

Comment: Current estimates are that approximately 1.2 billion gallons of collectable used oil are generated in the U. S. each year. Approximately one-half of this is from automotive use, and most of the rest is from industrial use including oils separated in industrial waste-water treatment plants. EPA has estimated that somewhere between 50-70% of the total used oil generated is now burned as a fuel for energy recovery, although largely without removal of contaminants. It seems to me that all of the used/waste oil which can be collected and recycled, but which is now disposed of without recycling, would effectively displace imported oil.

Question 4: Only about five percent of the used lubricating oil is re-refined. What are the principal sources of this oil, large industrial users or crankcase drainings?

Comment: I am aware of six re-refiners still operating in the U. S. Of these, three operate largely on crankcase drainings. The other three are considerably larger, and have substantial industrial oil re-refining. However, due to the labeling and subsequent marketing problems, most of the re-refined oil appears to be sold to industrial-type users, including truck and taxi fleets, railroads, and as hydraulic and industrial oils. Crankcase drainings, when not diverted to fuel use, are very important for re-refiners to provide the high quality feedstock necessary to produce most of the above-mentioned lubricants.

AD

U.S. ARMY/ENVIRONMENTAL PROTECTION AGENCY RE-REFINED ENGINE OIL PROGRAM

AFLRL REPORT No. 98

by

Edwin A. Frame
U.S. Army Fuels and Lubricants Research Laboratory
Southwest Research Institute
San Antonio, Texas

and

Thomas C. Bowen, Jr.
U.S. Army Mobility Equipment Research and Development Command
Energy and Water Resources Laboratory
Fort Belvoir, Virginia

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Gasoline Engines
Diesel engines
20. ABSTRACT *(Continue on reverse side if necessary and identify by block number)*:

Re-refined base oils were obtained and analyzed. Based on the analyses, six oils were formulated to MIL-L-46152 quality level using the same concentration of a single additive package. The formulated oils were tested against the requirements of MIL-L-46152. One oil passed all the engine tests. Vehicles from City of San Diego which operated on re-refined oil were disassembled and inspected for deposits.

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FOREWORD

The work reported herein was conducted at the U.S. Army Fuels and Lubricants Research Laboratory (USAFLRL), located at Southwest Research Institute, San Antonio, Texas, under contract DAAG53-76-C-0003 during the period October 1976 through September 1977 and contract DAAK70-78-C-001 through May 1978. The U.S. Environmental Protection Agency participated in the program under Interagency Agreement EPA- IAG-D6-0957. The EPA project officer was Mr. H.B. Kaufman, while Mr. T.C. Bowen, Jr. of the U.S. Army Mobility Equipment Research and Development Command (USAMERADCOM, DRDME-GL) was the Army project officer. Mr. F.W. Schaekel of USAMERADCOM, DRDME-GL was the contract monitor.

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I. INTRODUCTION

A. Background

Over two billion gallons of lubricating oils are used annually in the United States. Of this amount, about one-half is consumed or otherwise lost in use. The other one billion gallons remain as waste products and require disposal.[1]* When improper methods such as uncontrolled burning or dumping are used for disposal, these materials represent an environmental hazard. For example, the uncontrolled burning of used crankcase lubricant results in harmful emissions which pollute the atmosphere. Also, when dumped on land, this material can contaminate groundwater through leaching or waterways by runoff.

These waste products need not represent a hazard, but rather can be a significant potential resource. With the proper processing, waste oil can be used as fuel. Thus, energy is recovered which would otherwise be lost. Also, these materials can be used in cement manufacturing, asphalt road applications, or re-refined for reuse as base stock components of lubricating oils. The later re-refining option appears to be an efficient method of extending the useful life of petroleum products.

Based on the potential environmental benefits to be derived from re-refining waste oil, the Environmental Protection Agency (EPA) became interested in a program to investigate the feasibility of using re-refined base stock in engine lubricants of the type covered by Military Specification MIL-L-46152[2], i.e., oils meeting the American Petroleum Institute (API) performance classifications SE and CC.[3-5] This interest led to an interagency agreement, EPA-IAG-D6-0957, with the Department of Defense (DoD) covering the joint "EPA-DoD Re-Refined Engine Oil Program" being reported herein.

B. Program Objectives and Methodology

- The objectives of the program were:

  (1) To demonstrate the feasibility of producing MIL-L-46152 quality lubricants using re-refined base oils and suitable additive treatment.

  (2) To generate technical data which will increase the understanding of re-refined lubricants.

Accomplishment of these objectives employed the following methodology. First, re-refined stocks were obtained and analyzed using standard laboratory techniques. Based on the analyses, six stocks were selected and each was formulated with the same additives to provide a finished engine oil. The finished lubricants were then subjected to the engine dynamometer tests used to define oil performance under the MIL-L-46152 specification and API classification system. In addition to this effort, the field performance of a re-refined product was evaluated through engine teardown inspections.

*Superscript numbers in parentheses refer to the List of References at the end of this report.

II. RE-REFINED BASE OILS

Representative re-refined base oils were obtained with the assistance of the Association of Petroleum Re-Refiners (APR). APR contacted 36 member and nonmember companies requesting them to consider participating in the re-refined oil program. A copy of this request letter is shown in Appendix A. Of the companies contacted, 17 participated in the program. These companies furnished 30 samples, 17 re-refined base stocks, 12 feedstocks, and a finished product.

A. Analytical Characterization

The analytical characterization consisted of the following three major areas:

(1) Physical Properties

- Viscosity
- Gravity
- Pour Point
- Flash Point
- Color

(2) Re-Refining Level

- Total Acid Number
- Total Base Number
- Saponification Number
- Carbon Residue
- Total Ash
- Insolubles
- Copper Strip Corrosion
- Trace Metals

(3) Composition

- Aniline Point
- Boiling Point Distribution by Gas Chromatographic Technique
- Elemental Content
- Aromaticity
- Characteristic Groups (Column Chromatography)

Fifteen re-refined base oils were received in time to be analyzed and considered for selection to be blended to finished product. Some materials were late arrivals, and the analyses for these are given in Appendix C. Table 1 shows most of the analytical inspection data for the 15 re-refined base oils, and a virgin base oil denoted AL-6755 which AFLRL had obtained previously. It was later determined that the virgin stock was a hydrotreated base oil which explained some of its compositional characteristics such as very low sulfur content and very light color. Table 2 gives the characteristic groups' (D2007) determina-

TABLE 1
INSPECTION OF RE-REFINED BASE OILS

Sample I.D.																
AL No.		6688	6689	6690	6691	6692	6693	6694	6695	6696	6697	6698	6699	6700	6701	6702	6755
IR Trace No.		992	993	994	995	996	997	998	999	1000	1001	1002	1003	1004	1005	1006	1019
Inspection	ASTM No.																
K. Viscosity	D445																
@ 100°F, cSt		63.82	50.51	64.66	70.27	70.90	88.52	58.95	60.50	67.08	76.93	50.64	119.60	50.75	80.26	45.67	46.60
@ 210°F, cSt		8.36	7.23	8.02	8.75	8.81	10.13	7.86	7.92	8.54	9.23	6.84	12.09	6.83	9.33	6.63	6.59
Viscosity Index	D2270	110	116	98	105	104	101	108	105	105	103	98	99	97	100	110	108
SAE Grade		20	20	20	20	20	30	20	20	20	20	20	30	20	20	20	20
API Gravity, °	D287	29.7	30.4	29.1	29.6	29.4	29.1	30.0	30.5	29.6	29.5	29.8	28.7	29.6	28.5	28.8	31.6
ASTM Color	D1500	4.5	4.5	5.5	7.0	7.0	4.5	4.5	2.5	3.5	3.5	2.5	2.5	2.5	6.0	6.5	0.5
Carbon Residue, wt %	D524	0.14	0.13	0.13	0.09	0.15	0.24	0.06	0.05	0.05	0.08	0.06	0.10	0.06	0.14	0.34	0.07
Pour Point, °F	D97	−15	10	5	10	−25	10	15	5	10	10	15	15	15	0	−5	−5
Flash Point, °F	D92	425	380	425	410	440	430	385	415	415	435	440	465	450	435	365	440
Aniline Point, °F	D611	222	221	221	225	225	226	222	225	225	227	220	242	221	225	207	228
TAN	D664	0.09	0.16	0.16	0.05	0.11	0.22	0.05	0.17	0.10	0.08	0.04	0.04	0.09	0.11	0.17	0.03
TBN	D2896	0.00	0.06	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.06	0.00	0.27	0.06	0.00	0.00	0.16
Copper Cor., 3hr @ 212°F	D130	1B	1B	1B	1B	1B	1B	1B	1B	1B	1B	1B	1B	1B	1B	1B	1A
Chlorine, ppm	XRF	<100	<100	<100	<100	<100	1250	<100	<100	<100	<100	<100	<100	<100	<100	1010	<100
Sulfur, wt %	XRF	0.21	0.16	0.31	0.18	0.34	0.19	0.14	0.16	0.12	0.15	0.16	0.14	0.15	0.24	0.29	0.05
Phosphorus, ppm	D1091	7	24	3	25	65	25	30	33	5	17	14	9	5	5	70	7
Elemental, ppm	MOD.																
Calcium	AA	10	10	<5	10	111	10	<5	15	<5	44	<5	16	<5	75	<5	<5
Barium	AA	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Zinc	AA	<2	15	<2	<2	11	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Lead	AA	<1	<1	<1	<1	47	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Magnesium	AA	<1	12	<1	<1	3	<1	<1	<1	<1	2	<1	<1	<1	11	<1	<1
Copper	AA	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Chromium	AA	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Iron	AA	6	13	<2	<2	13	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Sodium	AA	<2	<2	<2	<2	9	<2	<2	<2	<2	<2	4	5	5	5	<2	<2
Silicon	AA	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
Aluminum	AA	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
Saponification No.	D94	0.43	0.37	0.49	0.36	0.52	0.7	0.35	0.39	0.24	0.21	0.25	0.22	0.38	0.45	4.1	ND
Total Ash, wt %	D482	<0.001	0.014	<0.001	<0.001	0.036	0.004	<0.001	0.005	0.002	0.009	0.001	0.004	0.001	0.022	0.004	ND
Nitrogen, wt %	PE	0.03	0.01	0.01	0.01	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.03	0.01	0.01	0.01	0.02
Oxygen, wt %	PE	0.66	0.51	0.70	0.80	0.76	0.82	0.65	0.53	0.41	0.55	0.59	0.55	0.40	0.55	0.68	0.44
Benzene Insolubles (uncoagulated), wt %	D893	0.022	0.016	0.014	0.013	0.022	0.018	0.033	0.022	0.032	0.016	0.017	0.020	0.026	0.024	0.030	0.016
GC BP Distribution % Off @ °C																	
1		224	295	346	330	298	346	240	257	276	314	337	355	338	270	226	383
5		370	366	377	383	366	382	339	370	371	383	380	397	380	368	326	400
10		388	384	394	403	390	405	377	388	390	400	395	414	397	397	357	414
50		444	441	448	466	455	465	452	443	447	452	450	483	453	463	434	450
90		535	545	540	574	537	563	551	539	550	532	518	600	518	564	555	488
Residue, wt %>600°C		5	5	5	6	3	5	5	3	4	1	<1	10	<1	5	5	0 (557 EP)

XRF = X-Ray Fluorescence.
AA = Atomic Absorption.
ND = Not Determined.
PE = Perkin Elmer.

tions, while Table 3 shows the aromaticity by ultraviolet spectroscopy data. The UV aromaticity procedure is shown in Appendix B.

TABLE 2
CHARACTERISTIC GROUPS ASTM D2007

Sample ID		Weight Percent		
AL-	CCL-	Saturates	Polars	Aromatics
6688	844	78.4	2.8	18.8
6689	845	88.8	2.5	8.7
6690	846	77.3	2.6	20.1
6691	847	79.7	10.9	9.4
6692	848	71.2	3.0	25.8
6693	849	84.4	7.0	8.6
6694	850	84.4	2.7	12.9
6695	851	82.9	2.6	14.5
6696	852	80.7	2.7	16.6
6697	853	74.9	2.5	22.6
6698	863	75.1	2.5	22.4
6699	864	82.0	9.8	8.2
6700	865	83.9	8.1	8.0
6701	873	79.8	1.5	18.7
6702	879	75.0	2.3	22.7
6755	–	88.7	2.0	9.3

TABLE 3
RE-REFINED BASE OILS

	Aromaticity by UV Spectroscopy wt %, Ring Carbon		
AL-	Mono-Ring	Di-Ring	Tri-Ring
6688	3.1	0.89	0.22
6689	3.0	1.0	0.23
6690	3.6	1.3	0.36
6691	3.2	1.1	0.32
6692	3.5	1.2	0.36
6693	3.0	0.86	0.21
6694	3.1	0.98	0.20
6695	2.7	0.67	0.10
6696	2.9	0.96	0.24
6697	3.0	0.85	0.19
6698	3.0	1.0	0.27
6699	2.8	0.85	0.20
6700	3.1	1.1	0.28
6701	3.2	1.0	0.24
6702	3.7	1.3	0.27
6755	2.2	0.33	0.02

Significant items from Table 1 relating to re-refined stocks include:

(1) Two base oils had rather high chlorine contamination levels (AL-6693—1250 ppm and AL-6702—1010 ppm).

(2) With the exception of two stocks, all base oils fell within a Society of Automotive Engineers (SAE) classification for Grade 20 motor oil. The two remaining products were in SAE Grade 30.

(3) Three base oils had flash points less than 400°F (AL-6689, AL-6694, and AL-6702).

(4) Total acid numbers were all fairly low (0.04—0.22) as were total base numbers (0.00—0.27).

(5) Sulfur contents were typical of virgin lube oil stocks and ranged from 0.12 to 0.34 percent.

(6) All stocks exhibited high viscosity index values.

(7) The following summary table shows the significant trace elemental contaminations which were observed:

Sample AL-	Element	PPM
6692	Cu	111
	Zn	11
	P	65
	Pb	47
	Fe	13
6701	Ca	75
	Mg	11
6697	Ca	44
	P	17
6689	Ca	10
	Zn	15
	P	24
	Mg	12
	Fe	13
6699	Ca	16
6695	Ca	15
	P	33
6691	P	25
6693	P	25
6694	P	30
6702	P	70

The zinc, phosphorus, calcium, and magnesium are probably residual additive components, while the iron and copper are wear-related contaminants. The lead is either left from leaded gasoline or results from engine wear/corrosion.

In comparing the percent of aromatics of Table 2 with the aromaticity values of Table 3, it should be remembered that the D2007 method (Table 2) considers *any molecule* which has an aromatic carbon atom as entirely aromatic. For the UV aromaticity, only those *carbon atoms* which are in aromatic rings are regarded as aromatic. This difference in methods accounts for the difference between values presented in Tables 2 and 3.

B. Feedstocks of Re-Refined Base Oils

As previously mentioned, the participating companies furnished 12 samples of feedstocks. Table 4 shows the data obtained for these stocks. Also indicated is the corresponding re-refined base stock. All samples contained lead, chlorine, and bromine contamination which is indicative of used crankcase drainings obtained from vehicles operated on leaded gasoline. In addition, the feedstock contained phosphorus, barium, calcium, and zinc which is typical of engine oil additive systems. Therefore, it is believed that in all cases the feedstocks came at least in part from vehicle crankcase drainings.

TABLE 4
FEEDSTOCKS ANALYSES

AL-	7028	7029	7030	7031	7032	7033	7034	7035	7036	7037	7038	7039
Related Base-oil AL-	6696	6688	6702	6694	6695	6693	6689	6691	6697	None	6690	6698
TAN	2.11	2.58	3.00	3.74	2.53	1.05	2.90	4.11	2.79	2.95	2.11	4.06
TBN	3.95	3.05	3.32	3.80	4.30	0.90	4.28	4.41	4.00	4.14	3.73	3.73
Nitrogen, wt %	0.064	0.045	0.009	0.074	0.030	0.049	0.052	0.078	0.052	0.078	0.056	0.083
KVIS, cSt												
100°F	48.9	55.7	38.3	67.2	62.4	75.0	68.6	56.2	72.4	69.2	52.3	66.2
210°F	7.53	8.47	6.48	10.00	9.71	9.25	10.31	8.77	9.29	10.11	7.91	10.27
Viscosity Index	128	138	134	144	150	110	147	145	115	141	130	154
Water, %	2.7	0.2	0.6	5.3	6.0	0.2	10.1	10.2	0.8	2.8	7.4	3.6
Specific Gravity	0.8953	0.8877	0.8887	0.8960	0.8968	0.8857	0.9067	0.8993	0.8876	0.8956	0.8961	0.8981
Carbon Residue, wt %	1.35	1.40	1.12	1.94	1.35	0.46	1.56	2.07	1.21	1.78	1.20	2.20
Total Ash, wt %	0.70	0.82	0.62	1.07	0.86	0.25	1.14	1.14	0.68	1.13	0.74	0.68
Flash Point, °F	*	350	205	*	*	365	*	*	300	*	*	*
Pour Point, °F	−45	−35	−40	−30	−25	−10	−30	−30	−25	−30	−40	−30
Elements by XRF, wt %												
P	0.083	0.130	0.088	0.120	0.108	0.116	0.35	0.123	0.098	0.138	0.150	0.133
S	0.36	0.54	0.38	0.51	0.42	0.49	0.44	0.52	0.43	0.60	0.49	0.59
Cl	0.135	0.072	0.385*	0.20	0.068	0.182*	0.08	0.34	0.048	0.064	0.44	0.135
Ca	0.105	0.086	0.058	0.088	0.104	0.06	0.080	0.069	0.135	0.080	0.14	0.07
Ba	<0.010	0.024	0.018	0.023	0.046	<0.010	0.018	0.020	<0.010	0.031	<0.010	<0.010
Fe	0.0135	0.0190	0.0575	0.021	0.0190	0.029	0.0190	0.018	0.0105	0.03	0.0515	0.021
Zn	0.05	0.075	0.026	0.055	0.059	0.035	0.062	0.046	0.068	0.068	0.048	0.068
Pb	0.205	0.185	0.179	>0.33	0.147	0.215	0.22	>0.33	0.11	0.245	0.221	>0.33
Cu	0.003	0.004	0.002	0.0045	0.003	<0.003	0.0035	0.002	0.0045	0.0045	0.0065	0.0025
Other Elements	Br	Br	Br	Br	Br	Ti, Br, Al, Si	Br	Br	Br	Br	Br	Br

*Water content too high.

C. Selection of Re-Refined Base Oils for Formulation

The selection of six representative re-refined base oils, to be formulated into finished engine oil, was made with the assistance of the ASTM task force on re-refined oils, and various other interested parties. The group met on February 24, 1977, at EPA headquarters, Washington, D.C. and selected the six base oils. Attendees and their organizations are shown in Table 5. The re-refined base oil analyses presented in Tables 1 and 3 were reviewed and used as the basis for selecting oils to be formulated. The group sought to select base oils which represented a range of potential quality. The selected base oils were grouped in the following three broad categories:

(1) "Excellent" quality (L-6697, AL-6698)

(2) "Good" quality (AL-6696, AL-6690, AL-6094)

(3) "Lesser" quality (AL-6692)

The six stocks were similar in physical properties. From a viscosity standpoint, the stocks would be classified as SAE 20W-20 oils and generally would be comparable with 250-350 neutral high VI virgin base stocks. Two dissimilarities which should be noted are the low flash point for stock AL-6694 and the low pour point value of stock AL-6692. These are probably related to the re-refining level used in their production.

TABLE 5
ATTENDEES AT RE-REFINED ENGINE OIL MEETING
FEBRUARY 24, 1977

Name	Organization
Mr. H.B. Kaufman	EPA
Mr. W.W. Crouse	ASTM (Suntech)
Mr. H.F. Hitchcox	Exxon Research
Mr. C.J. Thompson	BERC/ERDA
Mr. D.M. Stehouwer	GM Research
Mr. H.E. Tiffany	API
Mr. M. Willingham	FEA-State Programs
Mr. M.L. Kerran	Double Eagle Refining
Mr. R.F. Pedall	Motor Oils Refining
Mr. D. Ekedahl	Assoc. of Petroleum Re-refiners
Mr. J. Swain	Consultant (EPA)
Mr. C.F. Schwarz	Consultant
Mr. D.A. Becker	National Bureau of Standards
Mr. T.C. Bowen	MERADCOM
Mr. E.A. Frame	USAFLRL

Although similar in physical properties, the six stocks show significant variation in their chemical makeups. There is a fair range in TAN between stocks, two stocks (AL-6690 and AL-6692) contain high sulfur levels, and a significant difference in trace element content can be observed. The higher level of trace elements in sample 6692 tends to confirm a lesser re-refining level for this stock.

Also, moderate variation was observed in the boiling point distribution and characteristic group analyses. Most significant is the lower 1- and 5-percent point values for sample 6694 and the higher saturate-lower aromatic contents shown for samples 6694 and 6696. The low 1- and 5-percent point values indicate that some of the light ends may not have been removed in the re-refining process and tend to confirm the comment made concerning the low flash point of this sample.

One last point that should be made is that the data for several re-refined stocks reflected values similar to that of the virgin stock. In other words, it would not be possible using these data to distinguish several of the re-refined stocks from a virgin stock.

III. FORMULATION OF RE-REFINED LUBRICANTS

The next phase of the program was the formulation of the selected stocks into finished engine lubricants. The major additive suppliers were contacted and asked for an additive system recommendation to meet MIL-L-46152 requirements. It was desired, but not required, that a single additive package be used for all six stocks. Also, the manufacturers were asked when making a recommendation to consider both the performance and economics of the finished products. A copy of the letter requesting additive company participation is included in Appendix A. Responses from the various additive suppliers are summarized as follows:

(1) All manufacturers recommended a package currently used in qualified MIL-L-46152 oils.

(2) With one exception, the additive system was recommended for use in all stocks at the same treatment level. One manufacturer, however, did recommend supplementing the basic system with additional inhibitors for three of the stocks.

(3) Except when additional inhibitors were recommended, the treating cost for the re-refined oils was the same as for virgin-based products.

In a meeting held on June 17, 1977, at EPA headquarters, the additive recommendations were reviewed with the ASTM task force. Table 6 gives the meeting attendees and their affiliations. One recommendation involving a single additive package for use in all stocks was selected. Drum quantities of the six re-refined stocks were shipped to the additive manufacturer for blending with the selected additive system. Table 7 shows the inspection/properties of the six formulated lubricants which were *all* treated with 7.7 vol % (8.76 wt %) of the recommended additive package. The additive elements show very close agreement among the six lubricants and reflect the excellent blending technique used by the additive manufacturer. In addition, the six oils were tested in accordance with FTMS 791B Method 3470 for compatibility. The test results indicate that the oils are compatible with products qualified under various military engine oil specifications.

TABLE 6
ATTENDEES AT RE-REFINED ENGINE OILS MEETING
JUNE 17, 1977

	Name	Affiliation
1.	Mr. H.B. Kaufman	EPA
2.	Mr. Jack Swain	EPA Consultant
3.	Mr. Don Becker	National Bureau of Standards
4.	Mr. Bob Pedall	National Bureau of Standards
5.	Mr. Duane Ekedahl	Association of Petroleum Re-refiners
6.	Mr. Michael L. Kerran	Double Eagle Refining Co.
7.	Mr. Michael Willingham	FEA
8.	Mr. C.J. Thompson	ERDA/BERC
9.	Mr. Harold Tiffany	API
10.	Mr. David M. Stehouwer	GM Research
11.	Mr. Thomas C. Bowen	MERADCOM
12.	Mr. Charles F. Schwarz	Consultant
13.	Mr. Leslie Mayot	Exxon
14.	Mr. William Crouse	Sun Oil Co. (ASTM)
15.	Mr. William Sanjoon	EPA

TABLE 7
FINISHED OIL INSPECTION DATA

Finished Oil	AL-	7067	7068	7069	7070	7071	7072
Re-refined Base	AL-	6692	6698	6690	6694	6696	6697
Properties	Method						
Vis., 210°F, cSt	D445	10.2	8.2	9.3	9.2	9.8	10.6
Vis., 100°F, cSt	D445	86.3	62.7	79.1	72.5	80.8	92.4
Vis., 0°F, cSt (Ext.)	D341	7125	4364	7084	5136	6321	8159
VI	D2270	107	107	103	111	109	106
API Gravity, °	D287	27.2	28.0	26.9	28.4	27.9	27.9
Carbon Residue, wt %	D524	1.17	1.02	1.15	1.11	1.10	1.09
Sulfated Ash, wt %	D874	0.98	0.96	0.95	0.95	0.97	0.96
Pour Point, °F	D97	5	10	10	10	15	10
Elemental:							
Ca, wt %	XRF	0.21	0.21	0.22	0.21	0.22	0.22
Ba, wt %	XRF	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Mg, ppm	AA	9	6	6	7	6	7
Zn, wt %	XRF	0.14	0.14	0.14	0.14	0.15	0.14
P, wt %	XRF	0.12	0.12	0.12	0.12	0.12	0.12
N, wt %	PE	0.019	0.027	0.026	0.025	0.023	0.026
S, wt %	XRF	0.64	0.46	0.59	0.47	0.46	0.46
Base oil S, wt %	XRF	0.34	0.16	0.31	0.14	0.12	0.15

IV. STANDARD ENGINE DYNAMOMETER TESTS

The finished re-refined lubricants were subjected to the standard engine dynamometer tests used to define oil performance under the MIL-L-46152 specification. This specification describes oils intended for use in both gasoline and in low- to medium-output, diesel-powered commercial vehicles which are operated by the military and other federal agencies. Oils that meet MIL-L-46152 specifications satisfy all the requirements of API service SE and CC. Custody of this specification is maintained by USAMERADCOM.

Table 8 summarizes the standard engine dynamometer tests required by MIL-L-46152 and shows the primary performance areas determined by each test. All engine tests were

TABLE 8
ENGINE TESTS OF MIL-L-46152

Engine Test	Primary Performance Areas
L-38	Bearing corrosion Piston varnish Multiviscosity oil-shear stability
Sequence IIC	Engine rust
Sequence IIIC	Oil Oxidation/Thickening Engine varnish Engine wear
Sequence VC	Engine sludge Engine varnish
Caterpillar 1-H2	Diesel engine piston deposits

performed by Southwest Research Institute (Division of Engines, Fuels and Lubricants), San Antonio, Texas.

Table 9 compares engine test results to the requirements of MIL-L-46152. The data are single test results which have been adjusted for laboratory severity effects observed during the testing period. The results have also been adjusted for accuracy as reviewed at the initial meeting of the SAE Interim Engine Oil Review Committee in Chicago, Illinois, October 31-November 2, 1977. It should be noted that data adjustments did not affect the results in regard to meeting specifications. All oils performed satisfactorily in the single-cylinder CLR L-38 and the Sequence IIC tests. In the Sequence IIIC test, all oils passed except

TABLE 9
SUMMARY OF PERFORMANCE TESTS ON REFINED ENGINE OILS

		Lubricant Formulation					
		Finished Lube					
	MIL-L-	AL-7069	AL-7067	AL-7070	AL-7071	AL-7072	AL-7068
				Base			
Test	46152	AL-6690	AL-6692	AL-6694	AL-6696	AL-6697	AL-6698
			L-38				
BWL, mg	40 max	28.4	22.0	14.9	4.8	8.2	20.9
Piston Varnish	–	9.7	9.7	9.7	9.7	9.7	9.7
			Sequence IIC				
Avg. Rust	8.4 min	8.4	8.7	8.7	8.9	8.5	8.7
Lifter Sticking	None	None	None	None	None	None	None
			Sequence IIIC				
% Vis. Increase							
@ 40 hr	400 max	105	111	126	88	69	62
@ 64 hr	–	166	173	4774	117	114	103
Sludge	9.2 min	9.8	9.8	9.6	9.7	9.7	9.7
Piston Varnish	9.3 min	9.3	9.2	9.5	9.4	9.5	9.4
Ring Land Deposit	6.0 min	7.95	8.1	7.6	8.3	8.0	8.1
Ring Sticking	None	None	None	None	None	None	None
Wear (Cam & Lifter)							
Scuffing	None	None	None	None	None	None	None
Average, in $\times 10^{-4}$	10	2	2	3	4	3	3
Maximum, in $\times 10^{-4}$	20	6	6	6	7	6	5
			Sequence VC				
Piston Varnish	7.9 min	7.9	8.0	7.9	8.2	8.1	7.9
Avg. Engine Varnish	8.0 min	7.9	8.3	8.2	8.3	8.6	8.4
Avg. Sludge	8.7 (8.5) min	9.6	9.6	9.6	9.6	9.6	9.6
Screen Clogging, %	5 max	0	0	0	0	0	0
Oil Ring Clogging, %	5 max	0	0	0	0	0	0
Compression Ring Sticking	None	None	None	None	None	None	None
			1-H2				
Top Groove Filling, %	45 max	9	1	24	2	12	10
Weighted Total Demerit	140 max	80.4	73.6	176.0	67.8	188.3	155

Value in parentheses indicates Manual No. 10 rating, other values by Manual No. 12 rating.

AL-7067 which was borderline fail in piston varnish. In the Sequence VC test, a potential problem was revealed in varnish deposits. Many average piston varnish results are at or just above the minimum MIL-L-46152 requirement level. Oil AL-7069 was a borderline fail, missing the required average engine varnish by 0.1 merits. In other VC areas such as sludging, clogging, and ring sticking, all oils performed satisfactorily. In the 1-H2 test, all oils showed acceptable performance in controlling top groove deposits. Piston cleanliness (lacquer deposits) resulted in three of the oils (AL-7070, AL-7072, AL-7068) failing to meet the specifications.

Oil AL-7071 passed *all* the engine performance tests of MIL-L-46152 (API service SE-CC). Oils AL-7070, AL-7071, AL-7068, and AL-7072 met the requirements for API service SE, while oils AL-7069, AL-7067 and AL-7071 met the API CC service requirements. These findings are summarized in Table 10.

TABLE 10
SUMMARY OF PERFORMANCE

Lubricant	MIL-L-46152	API Service	
		SE	CC
AL-7069	F	F	M
AL-7067	F	F	M
AL-7070	F	M	F
AL-7071	M	M	M
AL-7072	F	M	F
AL-7068	F	M	F

M = Met Requirements
F = Failed to meet requirements.

V. FIELD EVALUATION OF RE-REFINED ENGINE OIL

A portion of the joint EPA/DoD program involved a limited field evaluation of a re-refined oil. Specifically, the evaluation involved the teardown inspection of engines from six police cruisers operated by the city of San Diego, CA where re-refined oil had been used since February 1974. The complete results of this evaluation were reported in AFLRL Report No. 92, "Inspection of Police Cruiser Engines Operated Using Re-Refined and Virgin-Based Crankcase Lubricants" which is available through the Defense Documentation Center, Cameron Station, Alexandria, VA under accession number AD A045330.

Table 11 shows a summary of the vehicles inspected and the observed deposit ratings. To briefly summarize these data, the San Diego (SD) vehicles had moderate engine varnish, light sludge, and very light rust. It is believed these data indicate the re-refined product provided satisfactory performance under the operating conditions encountered by the city of San Diego police cruisers.

TABLE 11
1974 FORD TORINOS
SAN DIEGO, CA POLICE CRUISERS
OPERATED ON RE-REFINED ENGINE OILS[a]

SDPD Unit No.	Veh. ID No.	Eng. Type	Manuf. Date	Odometer Miles	Avg. Deposit Ratings, Merits				
					Varnish		Sludge	Rust	Int.
					Pistons	Engine	Engine	Lifters	Valves
701	4H27H178785	351C	3-74	96,590	5.7	7.0	9.3	9.8	7.8
712	4H27H178853	351C	3-74	91,328	6.3	6.8	9.5	9.8	8.0
723	4H27H178864	351C	3-74	109,703	6.4	5.7	9.2	9.8	9.4[b]
730	4H27H178851	351C	3-74	104,514	6.3	6.3	9.3	9.8	8.1
764	4H27H178820	351C	3-74	88,267	6.3	6.8	9.3	9.8	9.2
742	4H27H178798	351C	3-74	91,395	6.0	6.2	9.3	9.8	8.1

[a]Oil and filter changed at 4,000-mile intervals.
[b]Recond. heads@ 84,664, 5/76.
Deposit ratings made in accordance with standard CRC techniques where 10 = clean.

VI. SUMMARY/CONCLUSIONS

Overall, the test work produced encouraging results for the future use of re-refined engine oils. Based on the single test evaluations of the six formulated oils, four passed the performance requirements of API service SE, three met the API CC classification, and one oil passed all the performance tests of specification MIL-L-46152 (API service SE and CC). Although variations in specific pass/fail results could be expected with further testing or reformulation, the data as reported demonstrate the technical feasibility of producing SE, CC, and MIL-L-46152 quality level lubricants from re-refined base stocks.

Characterization of the base stocks using standard laboratory analytical techniques showed significant variation between physical and chemical makeup of these samples. Although these differences were noted and could be related to re-refining treatment, they could not be effectively correlated with the performance demonstrated by the finished engine oils. Therefore, further research needs to be conducted to establish characterization techniques and quality conformance tests for both virgin and re-refined base stocks.

VII. RECOMMENDATIONS

Considering the encouraging results of this program, the following recommendations are made:

(1) Develop baseline data concerning the feasibility of formulating MIL-L-2104C lubricants from re-refined components.

(2) Conduct a *well-controlled* fleet test of administrative service vehicles at a government installation using commercially available re-refined engine oil and/or

a re-refined oil of the same type as was engine tested in the current program. The test should include a qualified MIL-L-46152 virgin-base lube which uses the same additive treatment as the re-refined oils. This fleet test will provide a *direct performance comparison* between re-refined engine oil and a qualified MIL-L-46152 oil in administrative-type service.

(3) Perform additional research to better define base stock characterization techniques and quality conformance tests which correlate with engine performance for both virgin and re-refined base stocks.

VIII. REFERENCES

(1) Kimball, V.S., "Waste Oil Recovery and Disposal," Noyes Data Corporation, 1975.

(2) U.S. Military Specification MIL-L-46152, "Lubricating Oil, Internal Combustion Engine, Administration Service," November 1970.

(3) API Publication 1509 (sixth edition).

(4) ASTM Research Report D2:1002, January 1971.

(5) SAE J183a, Engine Oil Performance and Engine Classification.

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APPENDIX C
ANALYSES OF LATE ARRIVING OILS

Sample I.D.	Method			
AL-		7040	7041	7042
Inspections				
KVis @ 40°C	D445	85.06	85.26	56.13
KVis @ 100°C	D445	10.31	10.38	7.77
VI	D2270	103	104	102
API°	D287	29.1	29.4	29.9
ASTM Color	D1500	4.5	4.5	4.5
Carbon Residue, wt %	D524	0.16	0.13	0.12
Pour Point, °C	D97	−13	−24	−12
Flash Point, °C	D92	240	246	240
TAN	D664	0.01	0.01	0.09
TBN	D2896	0.00	0.00	0.00
Saponification No.	D94	0.15	0.15	0.35
Elemental Analyses				
Barium, ppm	AA	<5	<5	<5
Calcium, ppm	AA	<5	<5	<5
Chlorine, ppm	XRF	<100	<100	<100
Lead, ppm	AA	2	2	2
Copper, ppm	AA	<1	<1	<1
Iron, ppm	AA	6	<2	<2
Sodium, ppm	AA	515	508	511
Silicon, ppm	AA	<1	<1	<1
Magnesium, ppm	AA	<1	<1	<1
Nitrogen, ppm	PE	26	33	45
Sulfur, wt %	XRF	0.14	0.14	0.36
Phosphorus, ppm	XRF	<100	<100	<100
GC BP Distribution				
wt % off @ °C				
1		358	358	325
5		395	395	371
10		415	415	391
50		498	502	476
90		–	–	555
Residue, wt % >600°C		11	12	0 (598 EP)