THE WEST HACKBERRY STRATEGIC PETROLEUM RESERVE SALT DOME STORAGE SITE FIRE

HEARING

BEFORE THE

SUBCOMMITTEE ON ENERGY PRODUCTION AND SUPPLY

OF THE

COMMITTEE ON ENERGY AND NATURAL RESOURCES UNITED STATES SENATE

NINETY-FIFTH CONGRESS

SECOND SESSION

ON

THE STRATEGIC PETROLEUM RESERVE PROGRAM

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THE WEST HACKBERRY STRATEGIC PETROLEUM RESERVE SALT DOME STORAGE SITE FIRE

SATURDAY, OCTOBER 7, 1978

U.S. SENATE,
SUBCOMMITTEE ON ENERGY PRODUCTION AND SUPPLY,
OF THE COMMITTEE ON ENERGY AND NATURAL RESOURCES,
Lake Charles, La.

The subcommittee met, pursuant to notice, at 10 a.m., in the Civic Center, Hon. J. Bennett Johnston, presiding.

Present: Senator Johnston.

Also present: George Dowd, counsel; and Barbara Haugh, secretary.

OPENING STATEMENT OF HON. J. BENNETT JOHNSTON, A U.S. SENATOR FROM THE STATE OF LOUISIANA

Senator JOHNSTON. The subcommittee will come to order.

This hearing is called by the Subcommitee on Energy Production and Supply of the Senate Committee on Energy and Natural Resources. Our purpose is to investigate the West Hackberry salt dome fire, to determine the cause of this fire, to determine the safety of this operation, to determine whether or not the Federal Government is operating this dome in a safe manner for the future and whether or not we can count on this kind of operation to properly manage our strategic oil reserve program for the future. There are a number of other sites in Louisiana that are under consideration, and one of the questions we will want to look into today is whether or not we ought to let this agency of the Federal Government continue to manage our salt domes in the future or whether we ought to try some alternative method of having them managed.

It is incredible to me that private industry has been storing dangerous, noxious, and inflammable chemicals in salt domes in this State for over 20 years without ever having a fire, without ever having an explosion, and, here, with the very first one that the Federal Government operates we have a very serious fire with loss of life and loss of very valuable Government property. The purpose of this hearing will be to find out what is wrong.

Testimony will be received today from the officials of the Department of Energy's Strategic Petroleum Reserve, as well as the Louisiana Department of Natural Resources concerning the origin of the fire and its potential adverse impact on the current schedule for filling the salt dome caverns with crude oil.

The professional firefighters who battled the fire for approximately 6 days will tell the story this morning of how the blaze was finally

brought under control and perhaps throw some important light on the precautions that are needed in order to guard against such fires in other salt dome storage caverns.

One of the purposes of today's hearing is to find out whether the unexpected fire at West Hackberry has caused any change or reconsideration by the Department of Energy of the current strategic petroleum reserve plan which calls for the acquisition and storage of 750 million barrels of crude oil in underground storage sites here in the gulf coast area. It is no secret that the timetable for filling the reserve is running behind schedule. Instead of the legally-required goal of 250 million barrels being in storage by the end of this year, the reserve will probably be hard-pressed to have even half that amount in underground sites by December 31, 1978. There is a genuine concern in the Congress that the reserve will continue to encounter dangerous delays of one sort or another or, on the other hand, will disregard essential safety procedures in the haste to meet targets which may be unreasonable or unrealistic.

Our hearing will also hear testimony from a representative of the Ecology Center of Louisiana who will discuss the salt dome storage program from the standpoint of its potential threat to the environment.

Finally, the subcommittee will hear from representatives from various companies that possess considerable experience with operating salt dome cavern storage programs. Their comments and observations regarding the SPR program will greatly assist the committee's work in evaluating the many policy decisions which will be proposed to the Congress by the Department of Energy in the next several months. Our Committee on Energy and Natural Resources of the Senate has jurisdiction of this program. It will be up to our committee to recommend changes in this program to the Senate. It would appear to me at the outset that changes are definitely warranted in the way the Federal Government is operating its business.

We're very pleased to have as our first witness this morning Senator Jesse Knowles, an old colleague and an old friend of mine and an outstanding State legislator, and, Jesse, we're glad to have you.

STATEMENT OF HON. JESSE KNOWLES, LOUISIANA STATE SENATOR, LAKE CHARLES, LA.

Mr. KNOWLES. Senator Johnston, Mr. Chairman, members of the committee, ladies and gentlemen, experts, many of you.

Thank you for the opportunity of being on the panel. Hackberry is my senatorial district. I'm concerned, the people in that area are concerned, about what has happened, because of the fact that we realize that there is a lack of knowledge in the handling of oil in salt domes. As you stated, during the last 25 years the storage of LPG in salt domes has been very common.

Last year, as Chairman of the Natural Resources Subcommittee, we called hearings on the salt dome problem in Hackberry. We had Mr. Tom Noel, representing the DOE, come in and he gave us a very comprehensive oversight of the storage of oil. The people at that time were very concerned at Hackberry, because the Corps of Engineers had moved in and started taking the land, much like they do everything else, without giving much idea of what is going on. They not only did

that, they disrupted the operations of a company up here that was using the saltwater for their operations. Compensation was not adequate, I can assure you.

To give you a good example. They needed seven, I think, saltwater disposal wells to remove brine once they put the oil in the dome. These wells were located some 13,000 feet from the mouth of the dome. They took the land from private landowners. Thirteen hundred feet south of that area was the Federal land known as the Sabine Game Refuge. And I asked the question, "Why didn't you go 1,300 feet farther down and get on Government-owned land?" and, Mr. Chairman, they said it was easier to take it from a private landowner than it was to deal with another bureau in Government. That's a sad state of affairs in my judgment, and I wish you'd take this under consideration when you're considering the overall situation.

Senator JOHNSTON. Do you recall the person with whom you were dealing?

Mr. KNOWLES. It was a member of the Corps of Engineers. I think after he said it he regretted it, but he said it anyway, and we know this; I knew it already. At least it's very seldom you get anyone in Government to make a statement like that.

The cost of storing oil in that dome as Mr. Tom Noel said and, by the way, Mr. Noel, as you know, does not work for the Department of Energy anymore, he's now I think in private enterprise, he got smart, but at the time he was giving testimony he said it would cost about $6 for storage. The oil we were buying, of course, was from the Middle East, the $13 oil, $14 oil. Well, I hope it holds at $6, but we're putting $20 oil in that dome down there; it was, until this catastrophe.

The thing that gives me concern about the whole area is the lack of expertise. Now, we have a lot of people who are involved in this, Mr. Chairman, and we have a lot of people, because they came before the committee and they gave us assurances that we would have no great problems. The committee was not sure that they knew exactly what they were talking about, because some members of the committee have lived and worked in the oil business all their life, and I happen to be one of them, so I do know something about salt domes and that concept of the oil business. They were concerned. We are still concerned. And I do believe this, that, if this project had been given to private enterprise without government regulations, telling them, looking over their shoulder every day, a turnkey job, said, "You take it, put that oil in the ground, and we'll pay you for the cost," it would have been over with and I think we would've had an oil storage program.

Senator JOHNSTON. Senator Knowles, let me ask you this question.

Mr. KNOWLES. Yes, sir.

Senator JOHNSTON. You have been in the oil business all your life, and you have also been on the Natural Resources Committee of the Louisiana Senate. Do you know of your own personal knowledge that Louisiana oil companies and Louisiana chemical companies have been using these salt domes for years and have done so safely, without incident, and without disrupting the population?

Mr. KNOWLES. Liquefied petroleum gas has been stored for over 25 years.

Senator JOHNSTON. That's under high pressure, isn't it?

Mr. KNOWLES. That's exactly right. They store it in the summer and they pull it out in the winter when it's needed. Yes, no problems. The fact of the business, some of the first storage was in Louisiana 25 years ago, so——

Senator JOHNSTON. Well, in your judgment, is there anything basically wrong with using a salt dome as a storage facility for crude oil, or is it simply the mismanagement on the part of the DOE that's giving us a problem?

Mr. KNOWLES. The committee came to a determination. As far as my own knowledge, I think it can be used safely. I do believe this. I think there's nothing wrong with it. As long as the dome is tested and is bodily sound, I think it could be stored; but the one thing that bothers me and gives me great concern is when the Governor and Dr. Schlesinger came down and did their thing before the cameras and sent it out over the United States, opening a valve, and giving the idea that, "We have solved the problem for energy in our country. We're going to store millions of barrels." And I put the Governor in, because he was over here. But at that time I said that this was the greatest snow job that had ever been put upon the American people, because they were concerned about energy, and what happened—"Now we're going to store it and everything will be all right." And, Mr. Chairman, as a member of the National Congress and Senate, you know that that's not the solution to the energy problem. The solution is to take the price off, let private enterprise go to work and solve the problem, let the market—the fair market value come on up.

Louisiana, under the bill that's now under consideration and probably will be voted on very soon, we call it the energy bill, that's a matter of conjecture, I might call it a nonenergy bill myself, but we know that it's going to have an adverse effect upon the State of Louisiana. You know this, the people know this——

Senator JOHNSTON. That's why I voted against it.

Mr. KNOWLES. That was a wise vote. That was a good vote.

But we're not going to have any more oil and we're not going to have any more gas. You've got to drill holes in the ground to find that stuff. Storing it in a salt dome, buying it from the Middle East at inflated prices, is not going to solve it.

I wish we'd get the message over to the rest of the northeastern Congressmen and Senators and the President and Mr. Schlesinger, that Louisiana is a perfect example of how you find oil and gas: If it don't have controls on it and they'll go out and look for it. I wish you could take that message back to them, I think this hearing then would have accomplished something.

Senator JOHNSTON. Thank you very much.

Mr. KNOWLES. In closing, let me say this. I have a great—feel a great compassion for the man who lost his life down there, and particularly the man who is burned badly. I hate to see this happen, in my district or anywhere, because these men were trying to make a living. But I can say this without equivocation, if I've ever seen a sloppy operation, that is one. I put 7 years in the Army and the Army can operate as sloppy as anybody, but I can tell you this, that's the worst I've ever seen. And it hasn't improved since the fire, either.

Mr. Chairman, thank you very much for allowing me to speak.

Senator JOHNSTON. Thank you very much, Senator Knowles.

Let me say I agree with you, with what you say about the free market, the deregulation of oil, and that being necessary in order to get energy in this country. We've been fighting for that up there in the last 6 years. I think there is some glimmer of hope. I think there are some people beginning to realize that Government regulation is not going to solve the problems of energy in this country.

Now, as I understand your testimony on the particular salt dome, you think, first of all, that private enterprise under sort of what you might call a turnkey job could better manage the storage of crude oil in the salt domes?

Mr. KNOWLES. Absolutely.

Senator JOHNSTON. And, secondly, you feel that salt dome storage is inherently safe as long as it's properly managed?

Mr. KNOWLES. I have no concern. I think it would. I think the structure would take it.

Senator JOHNSTON. But that you are personally familiar——

Mr. KNOWLES. But you must handle it with great care, because pressure, of course, is a dangerous thing, whether——

Senator JOHNSTON. You are personally familiar that this operation was mismanaged both in the relationship to the people in not negotiating with them, not treating them fairly, not avoiding damage, and expropriation of private property and, also, obviously not running the operation safely. Is that a fair summary of your testimony?

Mr. KNOWLES. Very, very good.

Senator JOHNSTON. Thank you so much, Senator Knowles. We appreciate it very much.

Mr. KNOWLES. Thank you very much.

Senator JOHNSTON. Next, we have Mr. Dobie Langenkamp who is Deputy Assistant Secretary for the Department of Energy's Resource Applications.

STATEMENT OF DOBIE LANGENKAMP, DEPUTY ASSISTANT SECRETARY, DEPARTMENT OF ENERGY RESOURCE APPLICATIONS

Mr. LANGENKAMP. Senator, it is a pleasure and a privilege to be here today. I came down yesterday for the purpose of making a brief introductory statement.

Let me say, first of all, that the Department of Energy deeply regrets the accident. The Department of Energy particularly regrets the loss of Clarence Simon's life and the bad burns that Bradley Bergeron suffered. The Department of Energy has undertaken an immediate investigation to determine the cause of the accident and the proper steps to be taken to see that it never happens again. This investigation should be completed within the next week or so and the report should be provided shortly thereafter.

I would like to say that the response of the people of Louisiana has been tremendous. We had fire departments on the scene with firemen of both sexes fighting the fire until they virtually collapsed. We had the Hackberry sheriff's office there, we had the State police, we had the Cameron Parish Police Department. We had the fire departments of Sulphur, Hackberry, Cameron Parish, and others. We had people from

Fort Polk. Based on our preliminary look at this accident after it occurred, the response was far greater than anyone would have had the right to expect. And we appreciate it.

Senator JOHNSTON. All right.

Mr. LANGENKAMP. Now, one further thing. A comment has been made here regarding the ability of the Department of Energy to handle this project. The concerns expressed here today are not concerns that are unfamiliar to a person such as myself. I've been with the Department for 6 months. We've spent a lot of time with this program. About a month ago we went out to industry through the Commerce Business Daily and solicited turnkey proposals and we received a gratifying response.

Over 24 companies, many of them located here in the State of Louisiana, indicated that they agreed with Senator Helms and perhaps with yourself that they could do this job, and they have indicated they want to submit turnkey proposals, and the Department of Energy is looking carefully at this hearing and at other evidence that we're developing in determining whether or not to take that step, to go toward a turnkey approach. Up to this point we've hired the best brains that the taxpayers' money can buy. We had Louis Records, who has a lifetime of drilling in Louisiana, in charge of this drilling. He'll be here this morning to explain this situation. But that may not be good enough. In other words, the best brains that private industry can provide may not be enough with the Government supervising it. But we're going to take a long hard look at turnkey and we're going to take a long hard look at these proposals from people of Louisiana.

Now, today, to explain what happened in this accident and to answer questions, we have the following persons: Carlyle E. Hystad, who is the Deputy Director of the program; Don Mazur, from New Orleans, who is the Project Director; Jack Wilson, our environmental expert who came down from Washington to handle the cleanup operations; and Louis Records, who is from Louisiana and as I've said is the contractor in charge of drilling procedures. I would like to ask these gentlemen to come forward at this time, and each one of them has a brief statement and then we'll be prepared to answer questions.

Senator JOHNSTON. Just a moment, Mr. Langenkamp. You are the Deputy Assistant Secretary for the Department of Energy's Resource Applications Department. Would you say that you are the highest ranking man within DOE with direct responsibility for this program?

Mr. LANGENKAMP. No, Senator, I'm probably the lowest ranking appointed official in charge of the program. I report to an Assistant Secretary who reports to the Undersecretary on this program. I am the adminisration's representative regarding the program as far as these hearings are concerned. The director of the program reports to me. I have also reporting to me the several other DOE programs, the naval petroleum reserves, the Office of Oil and Gas, the Office of Shale, and so forth.

Senator JOHNSTON. Who actually coordinates this program in DOE?

Mr. LANGENKAMP. This program is under the direction of the program director.

Senator JOHNSTON. In other words, who is going to make the decision as to whether you go to turnkey operations for these other salt domes?

Mr. LANGENKAMP. The decision will be made possibly by myself, the Assistant Secretary and the Undersecretary. We've already talked to Secretary Schlesinger. Secretary Schlesinger specifically expressed his opinion that this was an approach we ought to look into, and it was pursuant to a meeting between Schlesinger, myself, and others that the turnkey approach was pursued.

Senator JOHNSTON. Mr. Langenkamp, what, in your judgment, was the cause of this fire?

Mr. LANGENKAMP. Based on the evidence that I've seen, and I had discussions with Mr. Louis Records, and he'll be here to answer that question himself, he'll say it was an equipment failure.

Senator JOHNSTON. The blowout preventor—you did have a blowout preventor installed?

Mr. LANGENKAMP. No; in my—as far as I can tell, from the information I've received, the packer appears to have failed.

Senator JOHNSTON. The packer?

Mr. LANGENKAMP. The packer appears to have failed. The packer was inserted in the brine stringer.

Senator JOHNSTON. Was it ever tested prior to the failure?

Mr. LANGENKAMP. I understand it was tested; yes.

Senator JOHNSTON. It was tested? Describe—do you know the procedure used in testing?

Mr. LANGENKAMP. The procedure was described to me, Senator, but I think probably either the director of the program or Mr. Louis Records, could describe the procedure to you much better.

Senator JOHNSTON. Do you know what the pressure was in the dome prior to the failure?

Mr. LANGENKAMP. Well, I've heard a technical discussion of that Senator. I'm not really capable of commenting on it, but I think Mr. Records mentioned that surface pressure was approximately 400 pounds.

Senator JOHNSTON. Now, is there no way with a salt dome to relieve that pressure or keep it under control? It would seem to me, and I'm not an engineer, but it would seem to me that you could have a hole down in the dome with a pressure regulator that would keep your pressure constant. Is there no way to do that?

Mr. LANGENKAMP. Well, Senator, I'm not an engineer either and I've heard discussions and participated in policy, but as far as the technical aspects of depressurizing I understand it is physically possible to depressurize caverns, but I would defer to someone who is an engineer or technician on this question.

Senator JOHNSTON. Well now, you described two other people, I think the Undersecretary and the Assistant Secretary who will be making these decisions. Are they skilled as engineers? Do they know about salt domes and the engineering aspects of them?

Mr. LANGENKAMP. Well, as a matter of fact, the Undersecretary is an engineer by training, but they would be forced as you are yourself to rely upon technical advice, and I might say that the things that concern you as a U.S. Senator also concern the Department with regard to the possible advisability of going on a turnkey approach.

Senator JOHNSTON. At this point, would you expect to go to the turnkey approach? Frankly, that would be my advice. I don't want to prejudge this matter before we finish this hearing, but that would be

my advice, to turn it over to private industry, where they have inhouse expertise, where they have the expertise of doing these very things over a period of years. We can't undo this accident now, but we can control this sort of thing in the future. Do you expect that you probably will go to a turnkey operation in the future?

Mr. LANGENKAMP. Senator, the response we got when we sent out those requests was very gratifying, it was almost overwhelming, and I think that it's reasonable to expect that we will, that we are likely to go the turnkey route.

Senator JOHNSTON. Let me say one further thing, Mr. Langenkamp, before we go to our next witness, and that is with respect to the expropriation of lands around these salt domes. I know you've had a lot of correspondence from me, a lot of calls from my office, and I know the Federal Government has the responsibility to try to run these things as cheaply as it can, keeping in mind we're dealing with taxpayers' money. But, for the future let me say that, in my judgment, the Department of Energy has not done the kind of job that it should have done in keeping the feelings of people, the property rights of people, in proper balance. I'm not underestimating the difficulty of this job, but I think private industry does a much better job with public relations, keeping the relationship with the public on an even keel, than the Department of Energy has done. Just like Senator Knowles said, somebody from the Government comes out and says: "Well, we're taking the private land, because it's easier to get. We can run over private people easier than we can take Government land." Now, that's the kind of highhanded action that gives the Federal Government and gives bureaucrats a bad name. DOE has got to do a better job in the future, or this program will get to be very, very unpopular.

Mr. LANGENKAMP. May I make one comment about that?

Senator JOHNSTON. Certainly.

Mr. LANGENKAMP. Senator, I'm not an engineer, I'm a lawyer, and when I first came to the program and heard that we were having difficulties in this State with the right-of-ways I asked what the problem was, and I was told about the amounts of money that were being offered to some of these people for their farms, portions of their farms, and so forth. Let me say that the Department of Energy at present is in full agreement with you with regard to the way some of these people have been treated. Now, we're not doing the taking ourselves, we're doing it through an agent, and there are evaluation procedures that have to be followed. I'll just conclude by saying that we do not feel that in all cases in the past the farmers and landowners of Louisiana have been treated with the kind of respect that perhaps they should have been or offered the kind of money they should have been offered for these right-of-ways, but we're trying as best we can within the system, using the Corps of Engineers, to see that this compensation is better. But your criticism of our program in this regard is one that we do recognize and to a certain extent admit.

Senator JOHNSTON. Let me give you an example. One lawyer that represents a chemical company that had an interest in the dome was called up to Washington on Good Friday, the Easter weekend when he wanted to be with his family, as the rest of them did, but business was first, so they went to Washington and someone with DOE, I don't know who it was, said: "Well, we want this dome and we're willing to

pay such and such a price, period, and we want it right away and, if we don't get it, we'll expropriate it." It was full of chemicals and DOE wouldn't give them the time to even dispose of their chemicals, because they wanted to do it that day. They had been called up on Good Friday and they wanted to do it before Easter. Now, that's the kind of high-handed operation that simply must stop, and I hope you'll convey that message back to DOE in Washington.

Mr. LANGENKAMP. We will, Senator.

Now, would it be all right if I called up to the stand the individuals from the Department who'd like to testify briefly on the accident?

Senator JOHNSTON. Mr. Hystad is——

Mr. LANGENKAMP. Mr. Hystad, Mr. Mazur, Mr. Wilson and Mr. Louis Records.

Senator JOHNSTON. Yes; we can bring them up at this time.

Mr. Hystad, you may proceed.

STATEMENT OF CARLYLE HYSTAD, DEPUTY DIRECTOR, STRATEGIC PETROLEUM RESERVE OFFICE, DEPARTMENT OF ENERGY, WASHINGTON, D.C.

Mr. HYSTAD. Thank you, Mr. Chairman. We appreciate this opportunity to appear before the committee today. I would first like to spend a few minutes to put this accident in perspective in terms of the total program. I'd like to explain to you where we stand now in the total program and the current plans for proceeding with the next 500-million barrels.

First of all, the reserve is to provide storage for up to 1 billion barrels of petroleum by 1985 and we have submitted to the Congress for approval the plans for 750 million barrels toward that goal.

Senator JOHNSTON. First of all, Mr. Hystad, you're Deputy Director of Strategic Petroleum Reserve Office in the Department of Energy?

Mr. HYSTAD. That's right.

Senator JOHNSTON. How long have you been in that position?

Mr. HYSTAD. I have been Deputy Director since July. Prior to that time, going back to the time the Department of Energy was created last October, I was Acting Director of the program and in the recruitment and assignment in various departments.

Senator JOHNSTON. Have you been actually running the program since its inception or involved with running it?

Mr. HYSTAD. Since last October, since the Department of Energy was created. Prior to that time Tom Noel was in charge of the program.

Senator JOHNSTON. And you worked under Tom Noel——

Mr. HYSTAD. I was in charge of planning analysis in the program at that time.

Senator JOHNSTON. Very well.

Mr. HYSTAD. Based on our current estimate of schedule, we now expect to have between 90 and 100 million barrels of oil in storage by the end of this year. We expect to reach 250 million barrels by the end of 1979, and we would have 500 million barrels in storage by mid-1982. Those are our current best estimates based on progress of the program to date.

Senator JOHNSTON. At the time this program was created, my recollection is that testimony before our committee was that cost of storing

a barrel of oil would be somewhere in the neighborhood of $1.50 to $2 a barrel.

Mr. HYSTAD. That's right.

Senator JOHNSTON. Was that a correct estimate at that time?

Mr. HYSTAD. That's right.

Senator JOHNSTON. And what have your estimates of cost been?

Mr. HYSTAD. Our current estimate for the full system would be approximately $3 per barrel.

Senator JOHNSTON. $3 per barrel?

Mr. HYSTAD. $3 per barrel. That's based on the experience today with the actual contracting orders and the costs incurred to date.

Senator JOHNSTON. What does it cost at West Hackberry?

Mr. HYSTAD. The cost there is somewhat higher, about $3.50 for the first portion of the program.

Senator JOHNSTON. Please proceed.

Mr. HYSTAD. The 1 billion barrel reserve when it's fully developed will provide protection against embargo for approximately 9 months if we had an embargo similar to the 1973–74 embargo, and for over 5 months against an even more severe embargo, such as a military interruption of oil out of the Persian Gulf area. So it's clear that a billion barrel reserve, while not solving the energy problem, will provide substantial short term protection in the event of interruption of petroleum supplies, and that was the purpose of the program.

As of October 1 of this year, we had a total of 44 million barrels of oil in storage at three sites, there at West Hackberry, at Bayou Choctaw, both in Louisiana, and at Bryan Mound near Freeport, Tex. The oil is being stored in existing cavities created by private industry over the years at these sites and at Weeks Island and Sulphur Mines. All five of these sites are located in the gulf coast area. I'd like to show a slide which shows the location of these in relation to the overall system.

Caverns in the gulf coast area were selected because they're in a good location for distributing the oil in the event of interruption. We will have direct pipeline tie-ins into the three major crude oil pipelines going up into the interior of the country, as well as to local pipelines in the gulf coast area, and we will be able to load tankers at tanker docks in the gulf coast area.

This next slide shows the distribution of imported oil through the country and indicates the importance of locating the oil in these locations in the gulf coast.

We have requested industry to participate with us, as Mr. Langenkamp mentioned, and we intend to proceed as far as we can toward a turnkey approach to try to consolidate development of these caverns under one contract; even if it's not under a full turnkey approach, at least have one contractor fully responsible for the construction of these sites as we proceed into the future.

Senator JOHNSTON. One contractor for each dome?

Mr. HYSTAD. Well, one contractor for each dome, or possibly one contractor for more than one dome, but we do intend to move to a position where we have one contractor fully responsible for the development and management of the site.

Senator JOHNSTON. You say that is your intention?

Mr. HYSTAD. That is our intention. That is the direction we have been moving in this program since the Department of Energy was created last October.

Senator JOHNSTON. Well, it's safe to say that, if you are able to get bids and skilled people who are willing to do the work, you will go toward the turnkey approach, so that one contractor will drill, prepare and operate and manage each dome or a collection of domes, is that correct?

Mr. HYSTAD. That's the direction we are proceeding. And we will proceed in that way just as fast as we can. Of course, we are committed, we were committed back prior to the creation of DOE to certain contracts and certain approaches, so it takes time to make these transitions, but we are in this transition.

Senator JOHNSTON. Does that include West Hackberry?

Mr. HYSTAD. That includes West Hackberry for the—If we decide to proceed in this fashion with West Hackberry, we will try to minimize the number of contractors and consolidate the work there to no more than two contractors, which would be one for construction and one for the operations of the site.

Senator JOHNSTON. Now, Mr. Hystad, the local newspaper had stated that one of the problems with West Hackberry is that nobody seems to know who is in charge. Is that a valid criticism at West Hackberry?

Mr. HYSTAD. We know who's in charge. We don't have any difficulties deciding who's in charge. And Don Mazur will comment on that, that's his direct responsibiilty, and he's very clear on who's in charge. The people who are in charge know it.

Senator JOHNSTON. Who is he?

Mr. HYSTAD. Maurice Graber, who is responsible for the construction activities at the site, he's in charge.

Senator JOHNSTON. Mr. Graber?

Mr. HYSTAD. He works for the Department of Energy for the Strategic Petroleum Reserve Office.

Senator JOHNSTON. He works for the Strategic Petroleum Reserve Office?

Mr. HYSTAD. That's right.

Senator JOHNSTON. And he is on the site?

Mr. HYSTAD. That's right.

Senator JOHNSTON. Who is under him?

Mr. HYSTAD. Well, he is the construction manager. He reports to Bob Weller who is responsible—has overall responsibility for that site, and he is located primarily out of the New Orleans office and he reports to Don Mazur, the project manager for the total SPR program.

Senator JOHNSTON. And Mazur is in Washington.

Mr. HYSTAD. No; Mazur is the manager of the office in New Orleans.

Senator JOHNSTON. All right. Well, coming down from Graber, who is under Graber?

Mr. HYSTAD. Maurice Graber has one assistant working for him, Allen Fruge, they represent a team at the site.

Senator JOHNSTON. And the contractor is under him?

Mr. HYSTAD. Yes.

Senator JOHNSTON. And who is the contractor?

Mr. HYSTAD. The primary contractor is Parsons-Gilbane. And in this case we also had a contractor, Pelican Well Service, that was a drilling contractor. And Louis Records and Associates have the responsibility to direct the operations of our drilling contractors and our workover rig contractors.

Senator JOHNSTON. Louis Records?

Mr. HYSTAD. That's right.

Senator JOHNSTON. And they are a contractor—a drilling contractor?

Mr. HYSTAD. Louis Records is an engineering services contractor, and you will be hearing from him.

Senator JOHNSTON. An engineering services contractor?

Mr. HYSTAD. That's right.

Mr. RECORDS That's right.

Mr. HYSTAD. This is Mr. Louis Records, and he will be talking to you in a moment.

Senator JOHNSTON. Very well.

And who is the overall facility commander?

Mr. HYSTAD. The commander is Maurice Graber, for normal operations at the site. Now, during the course of the fire, Don Mazur—During the course——

Senator JOHNSTON. Mr. Graber is the one who has authority to shut down operations if a question of safety arises?

Mr. HYSTAD. That's right.

Senator JOHNSTON. No one else?

Mr. MAZUR. Senator, any Government official at the site has the authority inherent to shut down an unsafe operation. Mr. Graber has it in writing, specifically.

Senator JOHNSTON. All right.

Mr. HYSTAD. This shows how West Hackberry fits into this particular what we call the Texoma system of the reserve, and the oil in West Hackberry would feed the Texoma pipeline and would also load tanker docks at the same terminal. Now, at the moment we have been putting oil into West Hackberry by barge, using the Amoco barge dock near the site. Now, we also have plans to acquire a portion of the Sulphur Mines salt dome and store approximately 20 million barrels of oil there, and that also would be connected by a smaller pipeline into this large 42-inch line that runs to the Sun Terminal. That pipeline, the construction of that is just about completed. We expect to start putting oil into the site through that pipeline within the next couple weeks.

Now, at West Hackberry we have five existing caverns that we have acquired, five existing caverns with a total capacity of 51 million barrels. One cavern involved, cavern No. 6, has a capacity of approximately 12 million barrels. It had about 7 million barrels of oil in the cavern at the time of the fire.

Let's go on to the next——

Senator JOHNSTON. Now, there was no fire in the cavern itself?

Mr. HYSTAD. No fire in the cavern. The cavern—it's not possible for a fire to occur down in the cavern. It's 3,200 feet below the ground, it was under some pressure, there was no way for oxygen to get down in that cavern.

Senator JOHNSTON. All right. Tell me why, why is it that this pressure was not controlled?

Mr. HYSTAD. Do you mean why it was not taken down to zero or—the pressure was controlled. We did know how much pressure was at the surface at the time the work was started. Louis Records Associates put together a plan for doing this particular workover on this well, recognizing the amount of pressure in there, and their plan was to deal with that particular pressure and remove a stringer from that well, and they were following what they considered to be——

Senator JOHNSTON. Remove a stringer?

Mr. HYSTAD. Yes, sir.

Senator JOHNSTON. A string of what?

Mr. HYSTAD. That's about a 10-inch pipe. We have a little graph here.

Why don't we put that on right now?

Senator JOHNSTON. Well, let me ask you. Why is it necessary to have any pressure at all in the dome?

Mr. HYSTAD. Well, it can be reduced by bleeding out brine and bleeding out oil for a few days to—you have to move the oil out and put it someplace else and reduce the——

Senator JOHNSTON. Remove what oil out and put it somewhere else?

Mr. HYSTAD. The top part of the picture here shows in this cavern we had 7 million barrels of oil in storage. In order to reduce the pressure to zero, we would have to bleed off some of that oil and move it into some other holding place, either another cavern or a tank.

Senator JOHNSTON. Why is it not possible that—the purple part at the top there is obviously not oil.

Mr. HYSTAD. That represents oil, yes.

Senator JOHNSTON. The purple is oil?

Mr. HYSTAD. Yes. The oil floats on top of brine.

Senator JOHNSTON. And the green is the brine?

Mr. HYSTAD. Right.

Senator JOHNSTON. I see.

Mr. HYSTAD. We were in the process of moving that inside——

Senator JOHNSTON. And the brown represents what?

Mr. HYSTAD. That's caprock in the earth above the site.

Senator JOHNSTON. That's what?

Mr. MAZUR. That's the cemented-in casing through the caprock.

Senator JOHNSTON. Now, as you put oil in, you take brine out, is that right?

Mr. HYSTAD. As the oil is pumped in, it forces the brine out. There are no pumps down in the cavern. It's simply a matter of—you put the oil in under pressure to force the brine out. That's why there is pressure on the cavern while you're putting oil in.

Senator JOHNSTON. I see. And there's no—there are no gas pockets, in effect, in that dome? In other words, the dome is at all times full of liquids?

Mr. HYSTAD. It's at all times full of liquids under pressure, that's right—well, while it's in operation. Now, in order to reduce the pressure to zero, it requires bleeding out brine and oil. And that is possible to do and, in fact, we intend to do that.

Now, we have taken action to assure that at all sites we comply with the new regulation by the Louisiana Office of Conservation which requires that we have zero pressure at the surface before proceeding with any of this type of work.

Senator JOHNSTON. Those are regulations that were adopted since this——

Mr. HYSTAD. They were issued I believe last Tuesday.

Senator JOHNSTON. Is that not usual practice in the industry?

Mr. HYSTAD. Well, this particular type of operation is not a common operation since there's not a lot of crude oil being stored in salt domes, but——

Senator JOHNSTON. Well, they do store a lot of chemicals——

Mr. HYSTAD. Louis Records advises us that this kind of an operation in which he was using on this well is common practice and that he considered it to be a very safe practice.

Senator JOHNSTON. It is common practice to store and to take a string of pipe out under heavy pressure in the dome?

Mr. HYSTAD. I can't answer how common it is in industry. All I can say is that our experts who were developing the plan and supervising the plan advised that they considered it to be a very safe operation.

Senator JOHNSTON. Now, your expert will be Mr. Records here?

Mr. HYSTAD. Yes.

Senator JOHNSTON. Well, let me interrupt your testimony to ask Mr. Records—First of all, will you describe yourself, Mr. Records?

Mr. RECORDS. Well, I suppose you mean my experience and education and———

Senator JOHNSTON. Yes; you are Louis Records?

Mr. RECORDS. Yes, I'm Louis Records.

Senator JOHNSTON. And what is your position?

STATEMENT OF LOUIS RECORDS, PRESIDENT, LOUIS RECORDS & ASSOCIATES, ENGINEERING CONSULTING FIRM, LAFAYETTE, LA.

Mr. RECORDS. I am the president of Louis Records & Associates, which is an engineering consulting firm.

Senator JOHNSTON. Where?

Mr. RECORDS. In Lafayette.

Senator JOHNSTON. All right, sir.

Mr. RECORDS. We plan well programs, procedures, in advance, to do drilling for private industry as well as for governmental agencies. We then supervise the actual drilling or workover at the rig site, so we have two functions, engineering planning and supervision and inspection of the work as it goes along.

Senator JOHNSTON. I see. Is it common practice to do a workover on a salt dome without bleeding off the pressure in the dome?

Mr. RECORDS. Well, there's—we don't consider it an unusual practice, Senator. There hasn't been that much salt dome storage work done in this area, but we haven't considered it an usual practice.

Senator JOHNSTON. Was it your responsibility to determine the conditions under which you drilled, or did DOE give you——

Mr. RECORDS. No, we prepared an oil plan, a plan of action, to work on this well. We sent that plan to our contractor, who is Parsons-Gilbane.

Senator JOHNSTON. Who?

Mr. RECORDS. Parsons-Gilbane is the name of the prime contractor. And then we were told to begin work on the well as quick as we could

get a workover rig ready. We considered it a safe plan. We still consider it a safe plan.

Senator JOHNSTON. Would you consider yourself to be the commander out there at the dome?

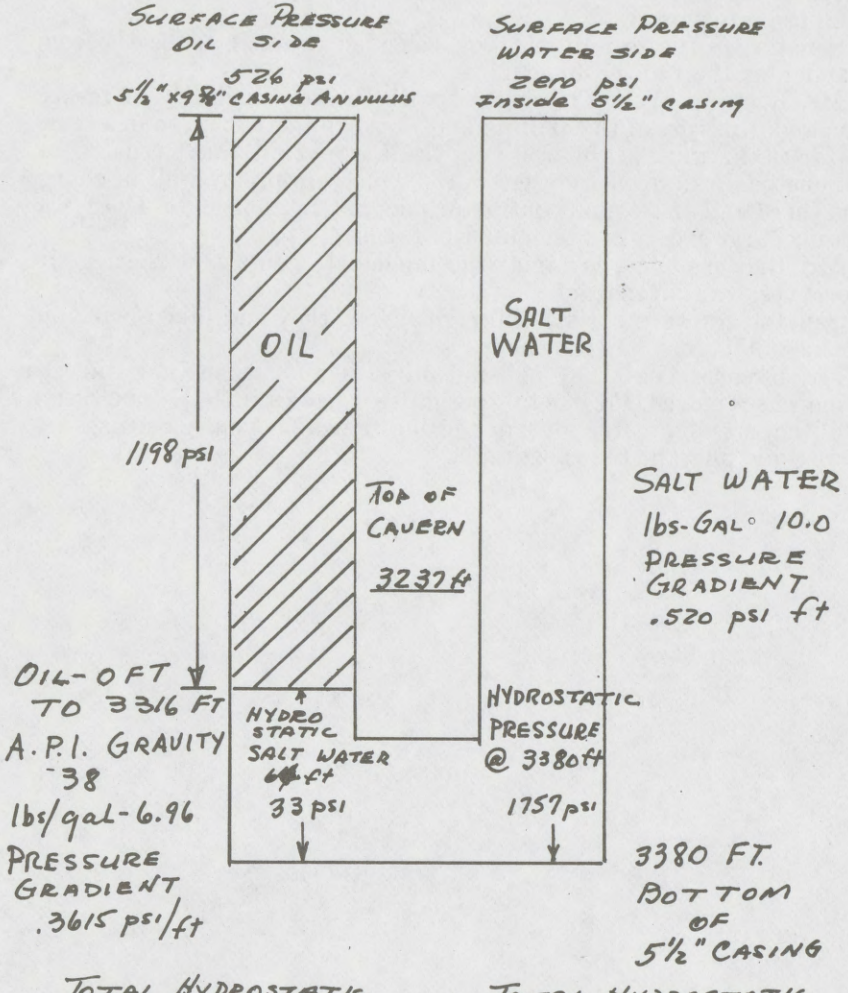
Mr. RECORDS. Well, I'm charged with the responsibility of inspection and direction of the drilling and workover activities, so in a sense, as far as the work at the well site, yes, I would say that's true.

Senator JOHNSTON. In other words, you were pretty well in charge out there and the prime contractor was not in charge, or DOE was not in charge except in a remote sort of sense?

Mr. RECORDS. Yes, as far as the immediate contact at the rig site work, yes, I was in charge.

Senator JOHNSTON. I see. All right. Now, they had taken brine out of this well before, had they not?

Mr. RECORDS. Yes, they had put oil in it and, when they did, the brine was removed. I'd like to—perhaps—I have a little U-tube sketch here that would answer some of the questions that you've been asking, if we could put it on the viewgraph.


SURFACE PRESSURE
OIL SIDE
526 psi
5½" x 9⅝" CASING ANNULUS
SURFACE PRESSURE
WATER SIDE
zero psi
Inside 5½" casing
OIL
SALT WATER
1198 psi
TOP OF CAVERN
3237 ft
SALT WATER
lbs-GAL 10.0
PRESSURE GRADIENT
.520 psi ft
OIL-0 FT TO 3316 FT
A.P.I. GRAVITY -38
lbs/gal-6.96
PRESSURE GRADIENT
.3615 psi/ft
HYDRO STATIC SALT WATER 64 ft
33 psi
HYDROSTATIC PRESSURE @ 3380 ft
1757 psi
3380 FT.
BOTTOM OF 5½" CASING
TOTAL HYDROSTATIC OIL SIDE
1198+33 = 1231
SURFACE PRESSURE OIL SIDE = 526 psi
TOTAL HYDROSTATIC WATER SIDE
1757 psi

Senator JOHNSTON. Yes.

Mr. RECORDS. I just made that this morning, thinking it might be useful. I don't know whether it'll show——

Now, Senator, as you may see from that sketch, there are two columns of different fluids or liquids, one is oil and one is salt water. Salt water is on the inside piping, 5½ inch casing, and that's the casing of the exit part or exit piping for the salt water. This is to remove brine from the dome when oil is pumped into the dome. The pressure at the surface under normal conditions would be zero pressure at the surface on the salt side, salt water side, and under the conditions that existed here we would have about a 526 psi surface pressure on the oil side. And that's the way the salt dome storage operation works.

Senator JOHNSTON. Would you repeat that? You say the pressure on the oil side could be heavy pressure on the oil side and zero pressure on the——

Mr. RECORDS. Well, I didn't say heavy pressure, Senator. 526 psi as a pressure is not a very heavy pressure.

Senator JOHNSTON. OK.

Mr. RECORDS. It's just the normal pressure that would exist in a similar situation in the salt dome, and that's with everything idle; that is, you're not pumping in, you're not pumping out, you're not moving anything. So this is generally the condition that the well was in. Now, there'll be some increase in pressures at the surface as the cold oil, that is, maybe at 75 degree temperature, is pumped into the cavern, which is at approximately 100 degrees.

Senator JOHNSTON. Now, at the time of this blowout, what was the pressure on the oil side?

Mr. RECORDS. Zero.

Senator JOHNSTON. Zero?

Mr. RECORDS. Yes, sir.

Senator JOHNSTON. At the time of the blowout?

Mr. RECORDS. Yes. I'd have to explain the procedure, but we had zero pressure at the surface on the oil side at the time of the blowout.

Senator JOHNSTON. Well, how did the column of oil come spraying out when the plug gave way?

Mr. RECORDS. Well, the plug was on the inside of a 5½ inch casing and the plug blew out of that casing, and then you had a U-tube effect so that the——

Senator JOHNSTON. A what effect?

Mr. RECORDS. What is described as a U-tube effect. A U-tube is something that's used in a laboratory; usually it's a glass manometer. But we use that term in the oil field to describe two different sets of stringer pipe, like drill pipe in the hole, casing, in this case inside another casing. There is a connection at the bottom between two columns of liquid and, so when you have two columns or lengths of pipe up and down that are connected at the bottom in some fashion, you call that a U-tube, because then you have the effect of one column can exert an effect on the other column.

Senator JOHNSTON. All right. Well, at the time this blowout preventor gave way, there was zero pressure on oil at the surface?

Mr. RECORDS. That's right. It was not a blowout preventor. It's what's called a bridge plug inside a 5½ inch casing.

Senator JOHNSTON. It's called a what?

Mr. RECORDS. A bridge plug.

Senator JOHNSTON. Bridge plug?

Mr. RECORDS. Bridge plug.

Senator JOHNSTON. What's the difference between a bridge plug and a blowout preventor?

Mr. RECORDS. Well, a blowout preventor seals around the outside of generally the drill pipe or around the outside of the 5½ inch casing. It seals the annulus space between the 5½ inch casing and the 9⅝ casing. The bridge plug was put in there to seal the inside of the 5½ inch. The blowout preventors were there. They worked—Well, we really had no use for them because we had the zero—we had zero pressure on the oil side, in addition to some heavy mud that we'd pumped in there.

Senator JOHNSTON. Well now, when the bridge plug gave, a column of oil, according to the newspaper reports, 50 feet high, or whatever it was, was spraying out. Was that correct, and, if so, why did that happen?

Mr. RECORDS. Well, the bottom 5½ inch casing that we were removing was at that time up into the oil level—let's call it colored sort of purple there—and so we have mud inside the 5½ above the bridge plug and when the bridge plug came out the bottom of that 5½ inch casing was setting in oil so you have that natural U-tube effect so that the oil was pushed out through the 5½ inch casing. And I don't think it went 50 feet in the air, I think it's about 5 or 6 feet at the beginning and an hour later it's 2 or 3 feet high.

Senator JOHNSTON. Well, the U-tube effect obviously created a pressure differential.

Mr. RECORDS. Yes.

Senator JOHNSTON. And do you know what that pressure differential was?

Mr. RECORDS. Yes; I calculated it would be 393 pounds per square inch across the bridge plug. The bridge plug is manufactured to stand the pressure of nearly 5,000 pounds per square inch. There's a picture of a bridge plug. It has a rubber section in it which is sort of a balloon around some piping. This is an inflatable section. The bridge plug that was lowered in the hole on a string of tubing was 4¼ inches in outside diameter, unexpanded. We put it in place, hanging on a piece of tubing or pipe. We then pumped into the bridge plug which expanded the rubber element from 4.25 inches to 4.950 inches. A pressure of 2,000 pounds per square inch was pumped into this element, and this 66-inch-long element was then expanded against the inside of the 5½-inch casing. After it was expanded—we did it twice. The first time we had a little leak-by so we raised it up in the piping 4 or 5 feet and expanded it again, and while we had it expanded we pressured up inside of the 5½ to 800 PSI to see whether the bridge plug would leak by or not.

Senator JOHNSTON. Would you hold it right there? I've got to make an important telephone call. I'll be right back. It shouldn't take but about 5 minutes.

[Recess.]

Senator JOHNSTON. We will come to order again.

We were in the middle of hearing from Mr. Records.

Mr. Records, I missed something somewhere. You said that at the time of the blowout the pressure of the oil was zero at the surface?

Mr. RECORDS. Yes; we created that condition by pumping some mud, very thick distillate mud, into the annulus side where the oil was. It was——

Senator JOHNSTON. Now, would you explain to me on a nonengineering basis, how is it possible at zero pressure to make that oil shoot up 5 feet or 50 feet or whatever the distance was?

Mr. RECORDS. Well, I'm afraid the U-tube concept is perhaps new to people, but it's very common use in drilling and workover. At the time that the bridge plug flew out of the well and was followed by oil, there was pressure underneath the bridge plug of 393 pounds per square inch.

Senator JOHNSTON. And what was the pressure on top of the bridge plug?

Mr. RECORDS. I have it calculated. I can dig in my briefcase and get it immediately if you'd like to know what it was. It won't take but a second.

Senator JOHNSTON. Well, please supply that actual figure for the record. There's a differential of pressure below and above the bridge plug, is there not?

Mr. RECORDS. That's right. Yes, sir.

Senator JOHNSTON. All right. So when you say there was zero pressure at the surface, you mean because that pressure was in effect being stopped by the bridge plug.

Mr. RECORDS. There was a pressure on the oil side of 250 pounds per square inch when we began to do something to reduce this pressure to zero pressure, and we simply substituted some heavier mud in that space that was occupied by oil. We drove the oil back down the hole and followed with a mud that overcame the pressure that was at the surface and we produced at that point a zero surface pressure on the oil side.

Senator JOHNSTON. A zero surface pressure on the oil side?

Mr. RECORDS. Yes, sir.

Senator JOHNSTON. Were you able to have flow by the bridge plug at that point?

Mr. RECORDS. No, sir, and we did not ever——

Senator JOHNSTON. Was the pressure identical above and below the bridge plug?

Mr. RECORDS. No; there was 393 pounds per square inch difference between—differential across the bridge plug.

Senator JOHNSTON. All right. Well, that's the point. There was 393 pounds per square inch differential below and above the bridge plug.

Mr. RECORDS. Yes, sir.

Senator JOHNSTON. And the bridge plug blew out and therefore 393 pounds per square inch was the pressure, of course, decreasing as it got close to the surface, that was the pressure that drove the oil to the surface.

Mr. RECORDS. That's correct.

Senator JOHNSTON. All right. Now, if you were to reduce that 393 pounds per square inch to zero—is that possible to do, first of all?

Mr. RECORDS. Yes; it's possible.

Senator JOHNSTON. And how would you do it?

Mr. RECORDS. Well, we would put some heavier mud inside the 5½-inch casing in which the bridge plug was installed, so you'd increase the hydrostatic pressure above the bridge plug by adding something that's heavier. We put a 11-pound-per-gallon mud in it. We could've, say, put a 12-pound-per-gallon mud in it and we would've had a zero pressure.

Senator JOHNSTON. Well, is it possible to reduce the pressure inside the dome to zero?

Mr. RECORDS. No, sir, you can't because you have a hydrostatic pressure from the surface of the ground down into the cavern.

You asked me the question about the pressure in the cavern?

Senator JOHNSTON. Yes.

Mr. RECORDS. It's impossible to have a zero pressure. You'd have an absolute lack of any liquids in the cavern if you had zero pressure in the cavern.

Senator JOHNSTON. Well, I mean zero pressure that does not rely upon—a zero surface pressure that does not rely either upon a bridge plug or upon heavier mud. In other words, so that you could have an open hole there filled with brine or filled with oil that does not flow up. Is that possible?

Mr. RECORDS. Yes, sir, it's possible. And you could do that by removing either salt water or oil, reduce the volume of each of them or either one of them, and you could have a zero pressure at the surface on the oil side.

Senator JOHNSTON. Is that not usually done?

Mr. RECORDS. It's done quite a lot of times.

Senator JOHNSTON. Who does it and why do they do it?

Mr. RECORDS. Well, we have done it on some wells that have a small amount of oil in them and a small amount of pressure. We pump the oil out and transfer it to another cavern.

Senator JOHNSTON. All right. Now, if you had done that in this case, you would have had to either take out oil or brine, or both, is that correct?

Mr. RECORDS. Yes, that's right.

Senator JOHNSTON. And where would you have stored that oil if you had taken it out?

Mr. RECORDS. In another cavern.

Senator JOHNSTON. In another cavern where?

Mr. RECORDS. In Hackberry.

Senator JOHNSTON. Which cavern would that be?

Mr. RECORDS. Probably No. 7.

Senator JOHNSTON. And how would you have gotten the oil to the No. 7 cavern?

Mr. RECORDS. We would have pumped it over there.

Senator JOHNSTON. There are pipelines going to No. 7?

Mr. RECORDS. Well, we could have laid a pipeline and pumped it over there. They have not connected the piping yet, the permanent piping out there, we would've had to lay a temporary pipeline.

Senator JOHNSTON. In other words, if you had reduced, then, that pressure to zero, and when I talk about zero pressure I'm talking about one that's not—zero pressure at the ground and not zero pressure by virtue of the plug or by virtue of the mud but zero pressure by virtue of the oil. In other words, to achieve zero pressure you would have had to lay a pipeline, because you did not have a pipeline then in place.

Mr. RECORDS. Yes.

Senator JOHNSTON. And how much delay would that have caused to lay that pipeline?

Mr. RECORDS. Well, it wouldn't have taken too long to lay the pipeline, depending on the size and the way you constructed it, whether you screwed it together or welded it, but at the maximum I guess 4 or 5 days.

Senator JOHNSTON. All right. Now, is the No. 7 cavern in all respects ready to receive oil?

Mr. RECORDS. Yes, it's ready.

Senator JOHNSTON. Would you have had to remove any brine?

Mr. RECORDS. Yes, we would've had to remove from No. 7 cavern the amount of brine equal to the amount of oil we pumped into it.

Senator JOHNSTON. Where would you have put the brine?

Mr. RECORDS. The brine would have gone into the saltwater disposal wells that are south of the top of the salt dome.

Senator JOHNSTON. How would you have gotten it over there?

Mr. RECORDS. We would have pumped it over there. They have an installation by which they can pump saltwater to the disposal wells.

Senator JOHNSTON. Were each of those pumps in proper working order?

Mr. RECORDS. Well, I don't know whether they were or not. I'm not part of the general operation of the field.

Senator JOHNSTON. I thought you were the commander out there.

Mr. RECORDS. Of the drilling and workover rigs.

Senator JOHNSTON. Who would be in charge of those pumps?

Mr. MAZUR. Don Mazur, Senator.

Senator JOHNSTON. Don Mazur?

Mr. MAZUR. Yes. Project manager for the Strategic Petroleum Reserve in New Orleans.

Senator JOHNSTON. Very well.

STATEMENT OF DONALD W. MAZUR, PROJECT MANAGER, STRATEGIC PETROLEUM RESERVE PROJECT MANAGEMENT OFFICE

Mr. MAZUR. I'm responsible for the design and construction operation and maintenance of the facilities. West Hackberry is one of those facilities.

Senator JOHNSTON. You are located in——

Mr. MAZUR. New Orleans.

Senator JOHNSTON. Are you the commander out there at the site?

Mr. MAZUR. If I could take a moment, sir, I'd like to explain the difference between the special designation of the commander, the on-scene commander, which was designated specifically at the time of the incident by our procedures and rules that in the event of a catastrophe or such that the person of high responsibility able to commit the Agency to expenditure of funds and mobilize resources to bring it under control must take charge at the scene. That I did on the night of that event. As fast as I could get there from New Orleans by helicopter. That is the designation of the on-scene commander. I maintained myself at the site for 6 days, until the situation was completely under control, including the oil cleanup operation and the environmental

assessment work had started, and that I was satisfied that the fire situation was properly under control, and all other measures at the site were properly maintained.

Senator JOHNSTON. Who is in charge of pumps?

Mr. MAZUR. The pumps that we're talking about, and I assume are the brine disposal pumps, are a function of the normal operation and maintenance of the site under the direction of the operations, the director of the operations for my office. It is his responsibility on the day-to-day operations as we move oil into the site and brine disposed to maintain the equipment in working order.

Senator JOHNSTON. Who is he?

Mr. MAZUR. The director of operations is a fellow named Frank Fields. He's the director of operations and works directly for me in New Orleans. And he has at the site an operations manager, in this case Tom Petty.

Senator JOHNSTON. Is either one of those here?

Mr. MAZUR. Not Frank Fields or Petty, I don't think are here.

Senator JOHNSTON. So that you have a different person in charge of putting this oil in and doing the drilling and somebody separate is responsible for maintenance of the pumps.

Mr. MAZUR. The site at West Hackberry prior to the fire and even now is primarily in a construction mode. The operation that Mr. Records has been talking about was an operation in construction to prepare that hole or that well for oil fill and oil withdrawal, the reason for taking the tube out. That was part of the construction activities by design for that site. Mr. Graber, who has been mentioned in the newspapers, is the site resident construction engineer for us to monitor and maintain construction activities. At the same time, starting last July, the operations at the site with an interim fill system where oil is brought up the intracoastal with a barging operation, piped overland and put into caverns like No. 6 was initiated. That function, which is not construction but operations and maintenance, to make sure the pumps worked, to maintain the conditions of that system, to move oil into the dome, is an operations responsibility under Mr. Fields. The construction responsibility to complete the task, such as that well, is under the construction division. Since the site is predominantly construction, Mr. Graber assumed responsibility for the site to maintain activities. Operations people integrated with Mr. Graber to assure those operations were integrated and taking place in a safe manner. And it was Mr. Graber who has direct responsibility if there is an unsafe condition to shut it down if it's necessary.

Senator JOHNSTON. Well now, who made the decision not to reduce the pressure inside the dome?

Mr. MAZUR. Just a moment.

That decision was looked at previously when the well-drilling program was first put together, back in the late part of last year, by our design agency, Parsons-Brinkerhoff, in conjunction with Louis Records, in developing the well-drilling program and the techniques and procedures for dealing with cavern reentry under pressure, and those procedures were distributed and reviewed by the engineering agencies, including Mr. Records.

Senator JOHNSTON. Who made this decision?

Mr. MAZUR. Pardon?

Senator JOHNSTON. Who made the decision?

Mr. MAZUR. Well, it was a decision that was developed by the engineering expertise of our design agency and Louis Records and reviewed by our executive engineer and in concert with that intelligence the decision was made to proceed in a manner that would allow——

Senator JOHNSTON. The decision was made by whom?

Mr. MAZUR. In concert with the Department of Energy.

Senator JOHNSTON. You see, one of the things I asked earlier was who is in charge and we're talking about proceeding in concert with and in consultation with, but who is it that made this decision? This seems to be the key and critical decision to me. Do we know who the man was that made the decision?

Mr. HYSTAD. At the time the decision was made, I was Acting Director of the program and I was responsible for making that decision, based on the advice I received from my construction representatives and my operations people and input from the contractors that we had, including Louis Records, Gulf Interstate, and others. We went through an extensive analysis to determine whether this was an acceptable approach and——

Senator JOHNSTON. I want to ask you a pointed question. Did you not receive advice from Gulf Interstate Engineering Co. that it was dangerous to proceed with pulling out that pipe without reducing that pressure to zero?

Mr. HYSTAD. Gulf Interstate, as I recall, raised questions about the effectiveness of using mud to reduce the pressure to zero. They had some uncertainties about whether the mud mixed with oil would indeed serve as an effective plug.

Senator JOHNSTON. And did you overrule that decision?

Mr. HYSTAD. No, we had input from Louis Records as to how this could be done. Louis Records and Gulf Interstate got together with us, we agreed on an approach in which we would proceed to test this both in the laboratory and with an experiment in the cavern. Based on that, Gulf Interstate withdrew its objection and agreed that this was a safe procedure. Their concern was not with the use of these bridge plugs but rather with the use of the mud. If my memory serves me correctly.

Is that right?

I think maybe Louis Records can comment in maybe a little bit more detail on it.

Senator JOHNSTON. Gulf Interstate was concerned about the use of the plug?

Mr. HYSTAD. No, they were concerned about the use of the mud.

Senator JOHNSTON. I mean about the use of the mud.

Mr. HYSTAD. Yes.

Senator JOHNSTON. Did they finally sign on and agree that that was a safe procedure and was just as good as reducing the pressure to zero?

Mr. HYSTAD. They agreed to this, subject to going through this experiment to determine if indeed it would hold, and indeed it did hold in this case. We had no problem with the mud plug in the annulus. The problem was with the expandable bridge plug.

Senator JOHNSTON. Well now, if you had wanted to take out the oil, reduce the pressure, it was impossible to do so because the pumps weren't working, were they?

Mr. HYSTAD. At the particular time the pumps were not working, but that was not a factor in making this decision. Louis Records put together a plan to proceed this way before those pumps had gone down. The pumps had been working shortly before this occurrence. We had difficulty with some of the pumps. But prior to that time Louis Records & Associates had put together a plan for the workover of this well, which was to do it essentially as they in fact did do it, and they planned to do it with this pressure. So their plan to proceed was not based on the fact that we did not have pumps available to move the brine.

Senator JOHNSTON. All right. They had a plan to proceed with the mud pressure and relying on the plug and the mud, rather than by reducing the pressure inside the dome.

Mr. HYSTAD. That's right. And they had done similar things some 10 times in this program to date prior to this occurrence.

Senator JOHNSTON. All right. And it would have been impossible at the particular time to reduce that pressure to zero.

Mr. HYSTAD. It would have been impossible to do it immediately. It would have taken a few days. In fact, the pumps were back working the day of the accident. It would've been a few days.

The brine pumps?

Mr. MAZUR. None of the equipment was working. We didn't put the equipment back on the line until——

Mr. HYSTAD. That's right, but they were repaired——

Mr. MAZUR [continuing]. Until the 3d of October.

Senator JOHNSTON. Until the 3d of October?

Mr. MAZUR. Tuesday. Yes.

Mr. HYSTAD. We had shut down the site after the accident, but the pumps, in fact, had been repaired and could have worked had we wished to do so.

Senator JOHNSTON. How did you determine the pressure inside the cavern?

Mr. RECORDS. Well, we know the length of the—the depth to the top of the cavern, we know what's in the piping on each side, and it's simply a matter of calculating the length times the gradient pressure of the mud, the oil, and water. We multiply the gradient times the depth for each constituent and that gives us the bottom hole pressure at whatever depth we decide to use.

Senator JOHNSTON. There's no device for measuring? You have to calculate, in other words, based on depth, on the column in the pipe, and that sort of thing.

Mr. RECORDS. There are devices, Senator, to measure what's called the bottom hole pressure gage, a recording gage. There are devices to measure exactly what the pressures are and we have used them. When we drilled into these caverns we put the measuring device in an offset well and we'd pull it out every—as often as we want to. It has a 3-hour clock on it; you know, we'd create a 3-hour charge if we wanted it to. We pulled——

Senator JOHNSTON. Did you have such a device in this case?

Mr. RECORDS. No, and I don't think we needed it. We knew within a few PSI of what the pressures were.

Senator JOHNSTON. Now, isn't it a fact, Mr. Records, that these man-made cavities are very highly variable in permeability and poros-

ity and that they vary from one to another as to the source of pressure and the amount of pressure?

Mr. RECORDS. Well, it's my understanding, and I'm no salt dome expert, but it's my understanding that it's virtually zero permeability and zero porosity in a salt dome.

Senator JOHNSTON. You say you are not an expert on salt domes——

Mr. RECORDS. Well, there are people who are experts in stability, many other things about the salt domes that I don't know, but, you see, you cannot store either gas or butane or oil or water in a place where it can escape and the permeability that you mentioned is a measure of the ability of a liquid or gas to transmit itself through some belowground formation. And porosity is the void space between the same grains or salt grains in a cavern or in a hole. You have to have almost zero porosity and zero permeability to be able to put anything in a cavern. And that's what we have or you couldn't put it in there.

Senator JOHNSTON. Well now, I have a letter here from Mr. Charles G. Groat, Director and State Geologist of the Louisiana Geological Survey. Let me read you what he says and ask you if you agree with this:

> The fact that presure buildup occurred again after the thing was capped indicates that some natural or man-induced process that apparently wasn't anticipated is occurring. Some possible causes for this pressure buildup are:
>
> 1. Man-made cavities are encased in man-made porosity (miniature fractures) of highly variable permeability and extending inward for at least 50 feet. This pressurized permeability escapes very slowly and several days would not be sufficient to drain it. Thus when the hole was sealed, the residual pressure continued to drain off and build up the pressure on the oil.
>
> 2. The salt is still moving and this movement translates pressure to the oil. The question of rates and timeframe of pressure translation from the salt to the oil would have to be answered. (There is a man at LSU who can model this and provide useful information.)
>
> 3. The salt, which is an excellent heat conductor, is transmitting heat from depth to the oil causing it to expand and build up pressure. They should have temperature data on the salt, the oil they are putting in and of the oil during storage.
>
> There are other possibilities, but these are the most important based on what we know at this time. Assuming the cause of pressure buildup can be identified, it will be interesting to hear what plans they have to deal with it.

Now, your plans to deal with this pressure buildup were simply to put in the column of mud.

Mr. RECORDS. Well, you're talking I think about something else. You see, you had a fairly constant pressure within the dome——

Senator JOHNSTON. How do you know if you didn't measure it?

Mr. RECORDS. Well, we have gages at the top of these wells where you can read the surface pressures from time to time.

Senator JOHNSTON. "These wells"? How many wells did you have?

Mr. RECORDS. Well, and the wells that they have in Hackberry.

Senator JOHNSTON. I mean, you're talking about one well, aren't you?

Mr. RECORDS. Well, we didn't have a pressure gage on it but we were working inside that cavern, that hole, but——

Senator JOHNSTON. Wait a minute. I've lost something. We're talking about one cavern and one well of that cavern.

Mr. RECORDS. All right.

Senator JOHNSTON. Is that correct?

Mr. RECORDS. Yes.

Senator JOHNSTON. All right, now, what pressure gages are you talking about? There wasn't any pressure gage on this particular well and this particular cavern, was there?

Mr. RECORDS. No; but there are other wells in that cavern where we could put a pressure gage on them.

Senator JOHNSTON. Did they have pressure gages on them?

Mr. RECORDS. They had a pressure gage on them. And we're able to tell, though, as the pressure within the cavern reduced as the oil flowed out.

Senator JOHNSTON. Well, I asked you earlier if you could measure—if you knew what the pressure in the oil was in this dome at that time, and didn't I understand you to say, no, you did not know, that you had to calculate it?

Mr. RECORDS. Well, we had to—we did calculate it. We did not know what the pressure at various depths within the oil actually was because we didn't measure it.

Senator JOHNSTON. Well now, explain what you were saying about these gages. What gages?

Mr. RECORDS. Well, you know what a pressure gage is, it's something with a dial on it and a pin that rotates to reflect the certain pressures.

Senator JOHNSTON. All right. Did you have one on this one?

Mr. RECORDS. On No. 6 well, no, we did not have. You can't—that's a confined pressure, Senator, when you have something that you put a pressure gage on it. We weren't confined. Well, we did have pressure gages there so we could tell when we had reduced the surface pressure to zero, we had pressure gages on the pumps that we pumped the mud in, so we knew what the pressures were as we went along, at the surface.

Senator JOHNSTON. That's not in the cavern.

Mr. RECORDS. Not down in the cavern.

Senator JOHNSTON. In other words, you could tell what the pressure was at the surface.

Mr. RECORDS. Yes.

Senator JOHNSTON. But not in the cavern.

Mr. RECORDS. No.

Senator JOHNSTON. Now, do you agree with the State geologist here who talks about the different and variable causes of pressure within the cavern, like salt movement and man-made porosity or miniature fractures of highly variable permeability and those other things?

Mr. RECORDS. Yes; I think so. We do know that caverns, salt caverns, expand and contract as pressure change within the cavern and they will—and it's a slow process. And if you put more pressure in it, it may expand slightly and. if you reduce the pressure, it will contract slightly. And this is fairly evident in the storage of butane and propane where they're almost exhausting of the pressure in them and even though they do close up.

Senator JOHNSTON. Mr. Records, you testified earlier that with respect to some salt domes they do reduce the pressure to zero before they work the well; is that correct?

Mr. RECORDS. Yes; that's true.

Senator JOHNSTON. And who does that, to your knowledge?

Mr. RECORDS. Well, we have transferred some oil out of two caverns at West Hackberry before, we worked on two separate wells, with the aid of the operating people or the DOE at the site.

Senator JOHNSTON. That has been with DOE that you've done that?

Mr. RECORDS. Yes.

Senator JOHNSTON. Would you say that's not preferable to do, assuming you had the pipeline functioning and operating? Wouldn't that be preferable to using this column of mud?

Mr. RECORDS. Well, we thought it was, but we were not alarmed at at having some pressure in a cavern to work against it. We're accustomed to working with pressures in drilling and workover in the oilfield.

Senator JOHNSTON. You thought it was preferable to reduce that pressure to zero but, in effect, you were overruled?

Mr. RECORDS. I wasn't overruled. We never really advocated working in a pressurized cavern but, on the other hand, we work in pressurized situations in drilling and workovers all our lives, so it's nothing unusual to work in a pressurized cavern or a pressurized hole.

Senator JOHNSTON. Well, I mean you could have reduced that pressure to zero and sometimes you do it.

Mr. RECORDS. Yes.

Senator JOHNSTON. Sometimes—what I'm trying to get at is, why this time did you not do it and why sometimes do you do it? Is it because that you didn't have the pumps this time and there was not that pipeline that would take 4 or 5 or 6 days to build?

Mr. RECORDS. Well, I think the difference is that in the other times we transferred oil out of the cavern to work on it was maybe 10,000 to 12,000 barrels and we could do that fairly quickly at temporary facilities; in this case it would have probably taken 10,000 to 70,000 barrels removal to get the surface pressure down to zero. We felt like we had a safe plan to work within the pressure so we weren't that concerned about removal of that amount of oil to be able to complete the work.

Senator JOHNSTON. Now, you did have this blowout preventer here in operation. You don't call it a blowout preventer, you call it a bridge plug?

Mr. RECORDS. It's a bridge plug. I could show you a sketch of how the thing—the steps in which we went through to arrive at that point.

Senator JOHNSTON. Was the bridge plug tested after it was installed?

Mr. RECORDS. Yes, sir.

Senator JOHNSTON. Describe the procedure you used to test the bridge plug.

Mr. RECORDS. All right.

The bridge plug is lowered into the hole after having been screwed into some pipe, tubing, and we lower it to the point we want to set it, where we want to bridge off the inside of the hole. The tubing is then pressured up to expand the rubber element against the walls of the casing. A final pressure of 2,000 psi is what is used in this size bridge plug. We pressured it up to 2,000 psi. The packer or the plug was still attached to the tubing column. Then we pressured in the annulus between the 2⅞-tubing and the 5½-inch casing to 800 psi and held that pressure for 10 minutes, and there was no leak-by.

Senator JOHNSTON. How much pressure is necessary to actuate the plug?

Mr. RECORDS. 2,000 pounds, but that's on the inside.

Senator JOHNSTON. 2,000 pounds differential?

Mr. RECORDS. No, 2—well, I guess you'd call it differential. You pump on top of your hydrostatic head the mud that you have inside the tubing up to 2,000 psi, and this is what actuates and expands the rubber element against the walls of the inside of the casing.

Senator JOHNSTON. In this case you had only 3—was it 393 psi?

Mr. RECORDS. That's at a different time frame. That's as we went on later on. You asked me about how we set and tested the bridge plug——

Senator JOHNSTON. Yes. Yes, I understand that. You test them, and in this case you tested it and it would withstand 2,000 psi.

Mr. RECORDS. Well, we used 2,000 pounds to pump up the rubber element against the inside. This is what's an expandable bridge plug and this is what seals it inside the casing. That's internally, down to the tubing, inside the tubing and into the bridge plug itself. And we pumped it up to that amount, which is the recommended amount, and that set and sealed the bridge plug inside the——

Senator JOHNSTON. Oh, I see. That's just to set it inside the pipe.

Mr. RECORDS. Yes, sir. Then to test it, on the outside of the tubing, between the 2⅞ and 5½, we pumped up to a total 800 pounds to see whether there was a leak-by around the sides of the bridge plug, to see if it leaked, to see if it was holding, and we pumped to 800 psi and held that pressure for 10 minutes without any leak without any problem. So we felt we had conducted an adequate test because we never expected the differential across it from either side to reach 800 psi. We had an adequate test on this bridge plug when we left it in the hole.

Senator JOHNSTON. Now, how much differential is necessary to make the plug stop the flow of oil?

Mr. RECORDS. Well, Senator, I don't understand that question, but maybe I can reply with a statement and see how we make out.

After this bridge plug has been expanded by the 2,000-pounds pressure that went into it inside and expanded against the walls of the casing, this bridge plug is designed to stand close to 4,800 psi differential across it, and it should have held 4,800 pounds differential. We never intended to ever come close to that. There wasn't that much pressure at the bottom of the cavern.

Senator JOHNSTON. All right. If you want to withdraw the oil out of the pipe, how do you do it?

Mr. RECORDS. Which pipe I guess is the question——

Senator JOHNSTON. Well, which pipe would you use?

Mr. RECORDS. Well, we'd use the annulus outside the 5½ and the 9⅝.

Senator JOHNSTON. All right. If you want to withdraw the oil, you'd use the inside pipe; would you not?

Mr. RECORDS. No, it would be——

Mr. MAZUR. Not the inside pipe. The annulus on the outside of it, where it says 9——

Senator JOHNSTON. Oh, I see.

Mr. MAZUR [continuing]. Out through those two Y-valves.

Senator JOHNSTON. You put the oil in through the inside pipe; is that correct?

Mr. RECORDS. Well, the oil goes in and comes out through these Y-valves, outside the 5½ and inside the 9⅝ casing, that annulus space.

Senator JOHNSTON. Oh, I see. The middle one was for brine only.

Mr. RECORDS. Yes, sir.

Senator JOHNSTON. But it was in the brine pipe—where was this bridge plug located?

Mr. RECORDS. OK. It was very close to the bottom of the—it was in the water section about 33 to 30, about right there, that's where we installed the bridge plug before we began to remove the 5½-inch casing.

Senator JOHNSTON. The bottom what?

Mr. RECORDS. The bottom of the 5½-inch—the piping that's——

Senator JOHNSTON. You were bringing the whole string of pipe up.

Mr. RECORDS. Yes, sir.

Senator JOHNSTON. So that at the time of the blowout, the blowout preventor was no longer in the brine, but was in the oil.

Mr. RECORDS. Yes, sir.

Senator JOHNSTON. I see.

Mr. RECORDS. That's the bridge plug. The blowout preventor is something you have up around the top. The bridge plug had by that time reached into the oil column.

Senator JOHNSTON. All right. Now, my question is this. When you're putting in the oil, you put the oil in in the outer pipe.

Mr. RECORDS. Yes, sir.

Senator JOHNSTON. That increases the pressure inside of the dome.

Mr. RECORDS. Yes, sir.

Senator JOHNSTON. And then you draw the brine out from the pipe in the middle.

Mr. RECORDS. That's correct.

Senator JOHNSTON. Now, how do you get the oil past the bridge plug?

Mr. RECORDS. Well, you see, we were not putting oil in—they were not putting oil into the well at the time we were working on it.

Senator JOHNSTON. I understand that.

Mr. RECORDS. All right.

The bridge plug was there as a safety measure so that when we withdrew the 5½-inch casing we had a seal inside the 5½-inch casing. We had blowout preventors that were sealed around the outside——

Senator JOHNSTON. But my question is, How does it seal? I mean, Is there a pressure differential that is necessary to seal, or is it a manual operation, or how does it operate?

Mr. RECORDS. Well, the sealing—are we talking now about the sealing of the bridge plug?

Senator JOHNSTON. Yes.

Mr. RECORDS. All right. We seal it by pumping down in through the tubing—this is a different string of tubing now than we have here, Senator. You see, there's an intermediate set of tubing that we used. I have here a slide that would show this operation.

Here it is.

So, during part of this operation, we had another string of pipe inside the hole. There's a 2⅞ piping inside a 5½-inch inside a 9⅝. So, to set in the bridge plug, we lowered the bridge plug on some pipe that had a 2⅞-inch outside diameter and we pumped down through the 2⅞ to pressure upon the bridge plug.

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Senator JOHNSTON. And that's where you put 2,000 pounds of pressure and that set the bridge plug inside the pipe so that it sealed the rubber edges inside the 5½-inch pipe.

Mr. RECORDS. Yes; 5½-inch. That's right.

Senator JOHNSTON. Now, my question is this. Not during this operation, but at any time, how do you get the brine past that plug, if the plug is a seal? How does the plug seal?

Mr. RECORDS. Well, we had no intention of getting the brine past the plug in this operation. The plug seals because it's—it has a rubber seal inside the pipe and it's blanked off through the bottom and the top of it.

Senator JOHNSTON. I see.

Mr. RECORDS. Now, you might——

Senator JOHNSTON. Have you withdrawn this plug and inspected it since the accident?

Mr. RECORDS. Well, the plug blew out of the hole, Senator, and——

Senator JOHNSTON. Have you recovered it?

Mr. RECORDS. We recovered the remains of it after it was burned in the fire. We have found it.

Senator JOHNSTON. And did you find the fault with it?

Mr. RECORDS. No, we were not—it was burned so badly we couldn't detect anything to tell us about the fault.

Senator JOHNSTON. In your opinion, what was the cause of this accident?

Mr. RECORDS. Well, the cause of the accident was the fact the plug released and moved up the hole and out of the hole. My group of people and many other people have conjectured that—what did cause it to release, because we had it firmly sealed. And we had pulled 14 joints of this 5½ out without any problem. And everything was going along fine. Now, I do not know what caused it to come out of that hole, and I don't suppose anybody else ever will. We would have liked to have recovered the 5½-inch casing at the point where we actually had it set, this might have told us something. The investigating team for the DOE have recovered what was left of the bridge plug and taken it for analysis to see what they can find out. We have no reason—no real reason that we can say why the plug failed.

Senator JOHNSTON. In your opinion, the accident was caused by the failure of the bridge plug?

Mr. RECORDS. Yes.

Senator JOHNSTON. But you also are of the opinion that had you withdrawn enough brine to reduce the pressure to zero at the surface that the accident would not have occurred.

Mr. RECORDS. I think you could say that.

Senator JOHNSTON. With the benefit of hindsight, do you think it is better practice to reduce the pressure to zero, surface pressure to zero, in the future?

Mr. RECORDS. Yes, I do.

Senator JOHNSTON. And the responsibility for that decision was a joint one with DOE and yourself and the other contractors?

Mr. RECORDS. Yes, sir; that's right.

Senator JOHNSTON. Very well.

Now, DOE has commenced an investigation into the origin of the fire and the nature and extent of the cost, together with its impact on

the schedule for filling the reserve. It is supposed to report its findings to Secretary Schlesinger by October 25. My question is, Will this investigating report regarding the fire be made available to the public?

Mr. HYSTAD. We expect the report will be made available to the public; yes.

Senator JOHNSTON. Very well.

Do you have anything further to add?

Mr. HYSTAD. I think we'd like to take just a couple minutes to show you the cleanup of the oil. That was a major spill of oil. We have a few photos which I think would give you a quick feel of what was spilled and the cleanup process. It'll just take about——

Senator JOHNSTON. If you'll make it very quickly.

Mr. HYSTAD. Mr. Jack Wilson will make that presentation.

Senator JOHNSTON. If you can do it, make it in 2 minutes.

Mr. HYSTAD. OK.

Just show a few of those photos.

Mr. WILSON. Here is a picture of the well while it's on fire. I'd like you to note we already have the boom in place, the oil is contained. Some of our local people from Louisiana who work for us I think were very courageous while the fire was raging in planting the boom and containing the oil. This is the largest oil spill that I'm aware of in this country that's ever been contained and cleaned up like this one. We did have an organization which went into effect, I'll not go into the details of this, but we had a very comprehensive organization on the site almost immediately——

Senator JOHNSTON. I'm sorry, we don't have time for that. You've got a minute and a half.

Mr. HYSTAD. Can you show what it looks like right now?

Mr. WILSON. Yes.

Here is the spill contained.

Here is a day later. You can see we've already got most of the oil out of the way.

Here is what it looked like Tuesday afternoon. You can see all the oil is off the water. Here are the marshes, the small marsh area that was contaminated. We're now mopping up the oil that's in the dyked area, some of the debris that accumulated from the workmen and other materials that were out there.

This is the latest one I have, is Tuesday afternoon. You can see the oil is basically off the water.

Another view is showing the piers of boom off the water, off the shore.

The Coast Guard supervised the cleanup for us. They're still onsite and continue to mop up.

The national regional response team came on site before the fire was out, reviewed what we were doing, liked what we were doing, and left. They did not take over control of the spill.

Senator JOHNSTON. Thank you very much, gentlemen.

Your full written statements will be put into the record and will be available for the news media or, to the extent that we have copies, to the public.

Thank you very much, gentlemen.

I would appreciate it if you stayed throughout the rest of the hearing in the event there are other questions.

[The prepared statements of Mr. Hystad, Mr. Mazur, and Mr. Wilson follow:]

STATEMENT OF CARLYLE E. HYSTAD, DEPUTY DIRECTOR, STRATEGIC PETROLEUM RESERVE

Mr. Chairman, I appreciate this opportunity to appear before this Committee today to discuss the SPR Program and the recent oil loss and fire at the West Hackberry site.

Before discussing the details of the fire, I would like to provide a brief status report on the SPR Program to help put that accident into perspective.

The Reserve is to provide for the storage of up to 1 billion barrels of petroleum by 1985 in order to diminish U.S. vulnerability to the effects of a severe petroleum supply interruption. The Department of Energy (DOE) now plans to have 90 to 100 million barrels (MMB) in storage at three SPR sites by the end of this year and 250 MMB stored at five Gulf Coast sites by the end of 1979. The Department expects to have 500 MMB in storage by mid-1982.

The 1 billion barrel Reserve would provide protection for about 9 months against an embargo similar to the 1973–74 embargo, or for over 5 months for a much more severe disruption of Persian Gulf oil due to terrorist or military attacks.

As of October 1, 1978, a total of 44 MMB were in underground storage at the West Hackberry and Bayou Choctaw sites in Louisiana and the Bryan Mound site in Texas. Existing capacity, created by private industry over the years, at these three salt dome sites and two additional sites, Weeks Island and Sulphur Mines, will be used to store the first 250 MMB of the Reserve. All five sites are located in the Gulf Coast area where they are readily accessible to tanker terminals and major crude oil pipelines to assure timely fill and withdrawal.

For developing the remainder of the Reserve, new storage caverns will be leached at three or four of the existing sites and four to five additional sites may be acquired to meet SPR storage requirements.

A range of storage facilities has been considered by DOE. Caverns in salt in the Gulf Coast area were selected as the primary type of storage facility to be used for the SPR because of their good location for distributing the oil; their use results in minimized environmental impacts; they offer the best security from fire, natural disaster, sabotage and other factors which might impact the safety of the oil; and they are less costly to develop and operate than other facilities examined.

West Hackberry was the first SPR site to receive oil. Fill started in July 1977 and is currently averaging close to 50 MBD. In excess of 14 MMB are in storage at this site and we plan to have nearly 40 MMB stored at West Hackberry by the end of this year. Construction of on-site facilities, piping, electrical and instrumentation systems, buildings, roads and wellpads is nearly complete.

Five existing caverns with a total capacity of 51 MMB are to be used for oil storage. To achieve planned fill and withdrawal rates, additional wells have been drilled into each storage cavern. To meet the brine disposal requirements for filling this existing capacity, ten brine disposal wells are being drilled. Oil is currently being barged to the West Hackberry site but starting later this month it will be transported via a 40-mile, 42-inch pipeline from the Sunoco Terminal in Nederland, Texas.

Up to 160 MMB of additional storage capacity may be developed at West Hackberry by the end of 1985. A pipeline to the Gulf of Mexico would be constructed to dispose of brine produced during the leaching process in the follow-on expansion.

Bryan Mound is the only existing site in Texas. DOE acquired these four caverns with 60 MMB of storage capacity in April 1977. Currently there are 20 MMB of oil stored at Bryan Mound with plans to have 34 MMB in storage by the end of this year.

About 10 MMB of oil are currently in storage at Bayou Choctaw. The usable capacity at Bayou Choctaw was earlier estimated at 74 MMB in 10 caverns. These caverns were acquired by DOE in early 1977. Several of the caverns were unable to pass the battery of tests required before they could be certified as suitable for crude oil storage. This has resulted in a reduction in the usable

capacity at this site. DOE now plans to store 36 MMB in four existing caverns and to develop about 40 MMB of new leached capacity at the site.

Bayou Choctaw will be connected to DOE's tanker terminal at St. James via a 39-mile, 36-inch pipeline. This line is currently under construction and is scheduled to be completed in early November. At that time, fill will increase from the current barged 40 MBD rate to more than 280 MBD through barging and by pipeline to achieve about 30 MMB in storage by the end of this year.

The technical problems experienced with several of the caverns at Bayou Choctaw have resulted in a major redesign effort at the site, and have delayed construction of permanent facilities on site. Despite the delay, construction is proceeding and facilities required to receive oil at 285 MBD are to be completed in November. The drilling program is well underway at this time with 11 disposal wells under construction or planned for completion before the middle of December.

Weeks Island is the only conventional mine among the five sites selected to date for the SPR. The Weeks Island mine has 75 MMB of capacity which has been developed over a 60-year period of conventional mining operations.

The mine was purchased from Morton Salt Company in 1977. Morton is developing a new mine at Weeks Island to maintain its salt production and processing plant. The mine is currently being converted to an oil storage facility. Fill is scheduled to start in July of 1979 at a rate of 480 MBD.

The site will be filled via a 67-mile, 36-inch pipeline from DOE's St. James terminal. This pipeline is currently under construction and should be completed by early 1979.

In addition to the five Gulf Coast sites already selected for the SPR, three additional salt domes in Louisiana and Texas are primary candidates for future SPR development. These are Napoleonville and Cote Blanche in Louisiana and Big Hill in Texas.

At Napoleonville, existing caverns with 30 MMB of capacity may be used and up to 11 new caverns could be developed to provide additional storage capacity in the Capline area. A new pipeline would be constructed to increase the withdrawal capability by 1 MMB through the St. James terminal. Cote Blanche is a conventional salt mine located proximate to the Weeks Island mine. The 30 MMB of capacity at Cote Blanche would be filled and drawdown via the Weeks Island to St. James terminal pipeline. The site would be connected to this line via a 2-mile feeder pipeline.

Big Hill would provide about 130 MMB of additional storage capacity in the Texoma system and would be linked via pipeline to the Sunoco Terminal for fill and withdrawal.

For each of the four sites which the SPR has acquired, arrangements were worked out with the operators at the sites to permit them to continue brining and/or mining activities, to minimize any adverse economic impacts on these companies, their employees and the local communities.

When Weeks Island was acquired, the minimum volume of salt required to implement storage was taken so that Morton Salt Company would have adequate space to develop a new mine. DOE did not acquire the existing processing plant and agreed to take a minimum amount of surface area. Morton Salt was also permitted to continue mining operations in the existing mine concurrent with the mine conversion effort to avoid a shutdown of their operations.

At Bayou Choctaw, property lines were modified to acquire the minimum salt buffer required around each cavern. DOE did not acquire the surface area where Allied's plant is located. The acquisition agreement also permitted Allied to continue using two caverns with 20 MMB of capacity for ethylene and ethane storage to minimize any disruption to their ongoing operations at Bayou Choctaw. The SPR has also assured Allied an adequate supply of brine to maintain their brine commitments through December of 1980, while they develop new caverns for their brining operation.

Property at West Hackberry acquired for the SPR was operated by Olin Chemical Corporation to produce brine for feedstock for a plant owned by PPG Industries. DOE modified the property lines for the site's proposed expansion area to exclude certain areas so that Olin can develop brining facilities to meet PPG's brine requirements and the future brine needs of Olin's plant.

In current negotiations with Allied Chemical at Sulphur Mines, we are working to assure maintaining brine supplies to Allied and PPG. These negotiations have resulted in delaying construction and fill at Sulphur Mines but support the DOE policy to minimize disruption to private industry and local employment.

Early in the SPR Program, work began to prepare an SPR environmental plan to help assure that the potential environmental impacts of constructing and

operating the SPR would be avoided or mitigated to the maximum extent practicable. Environmental planning has proceeded in two basic areas: (1) storage site development, and (2) oil transport.

Environmental planning associated with storage site development has been an ongoing process consisting of three inter-related activities: documenting protective actions; reviewing engineering criteria and specifications to ensure their inclusion in designs; and site monitoring and inspecting to ensure implementation.

Environmental action reports have been prepared to build upon the initial Environmental Assessments by identifying in more detail the potential impacts, and then developing design criteria, construction practices, and operational procedures which will help minimize impacts.

Environmental review of SPR engineering documents is required to help ensure the consideration of environmental issues in their preparation.

As the third element of site environmental planning, compliance with developed specifications is monitored during construction. Environmental specialists have been retained at each site to inspect construction activities and advise the DOE manager concerning environmental issues.

Despite the SPR's demanding schedule, safety and oil security have been important considerations throughout the Program's planning and implementation phases.

The cavern certification program was instituted to apply specific technical standards to all storage caverns. The inability of certain wells and caverns to pass pressure tests contained in the certification program has reduced the amount of existing capacity available for SPR use and has contributed to construction and fill delays for the first 250 MMB. However, it imposes quality control on the storage system.

The initial feasibility studies and conceptual designs for the SPR did not fully include fire protection systems, wellpads, containment dikes, roads or sophisticated instrumentation which have since been incorporated in the detailed facility designs and are under construction.

Inclusion of these items has contributed to the increase in facilities costs for the Program, but provides greater assurance that environmental impacts will be minimized and the system will operate safely.

For example, at the detailed design stage, the dike containment area around wellheads was increased over 200 percent. The increased area was determined necessary to contain a ten minute discharge at full line flow, plus a 25 percent safety margin.

The potential for fires and explosions is inherent in operations involving the production, storage or transportation of petroleum. The potential for fires or explosions is greatest while construction or maintenance operations are being performed on, or in proximity to, filled or partially filled storage caverns.

The first at West Hackberry was an unfortunate occurrence. DOE regrets the loss of life and the personal losses which occurred. I will ask Mr. Donald Mazur, SPR's Project Office Manager, to explain in more detail in a moment the apparent causes of the fire, the actions taken to control and stop the fire and oil flow, and to recover the spilled oil.

In brief, the fire was caused by failure of plugs in a well while crews were pulling pipe from the well. The cavern was under pressure, resulting in ejection of oil to the surface when the plugs failed.

The work-over operations on the well were being conducted under the direction of Louis Records, a recognized expert in Louisiana on oil well drilling and maintenance. Obviously, something went wrong in the implementation of those procedures. Exactly what went wrong is still under investigation by a special DOE investigating team. It is recognized that the accident could have been avoided if the pressure on the cavern had been reduced to zero at the wellhead prior to starting the work. However, the experts believed that this was not necessary, and that the procedures being used were safe.

As a result of the accident, the DOE took steps to assure that there would be no drilling into caverns under pressure, and no work-over of wells under pressure, pending a case-by-case review of the safety of the procedures to be followed. This was a necessary safety precaution. Earlier this week the Louisiana Office of Conservation issued an order requiring zero pressure at the surface prior to doing remedial work on wells into storage cavities. I believe this was an appropriate step pending the outcome of the investigation of the West Hackberry fire. Upon completion of the studies, we will want to consider whether zero pressure during workover is indeed necessary in the long term. We may wish to propose to the Louisiana Office of Conservation some modification of its recent order, to permit work with some pressure under prescribed procedures.

The fire and oil loss does not indicate any fundamental flaw in the SPR storage plan; it does not indicate that salt cavern storage is an undesirable means of SPR storage. On the contrary, the accident showed that basic security of the bulk of the oil storage deep underground in spite of the raging fire at the surface.

The fire resulted in a loss of about 20,000 barrels of oil. This is less than ½ of 1 percent of the oil in the cavern, and less than one day of fill at the West Hackberry site. Oil fill at the site was stopped for 12 days as a result of the fire, resulting in a reduction in fill of about 500,000 barrels. Fill is now proceeding again in other caverns at the site, and the fire at the one cavern is expected to have little impact on fill rates at the other 4 caverns. Changes in procedures as a result of the fire may have some long-term impact on schedules and costs, but it is not possible to estimate the impacts at this time.

The cost of the accident is not yet fully determined but rough estimates indicate that total cost may be about $10 million.

I would now like to ask Don Mazur to explain the causes of the fire, and the control and clean-up operations.

We will then be happy to answer any questions you may have.

STATEMENT OF DONALD W. MAZUR, PROJECT MANAGER, STRATEGIC PETROLEUM RESERVE PROJECT MANAGEMENT OFFICE

Mr. Chairman, I appreciate this opportunity to appear before this Committee today to discuss the SPR Program and the recent oil loss and fire at the West Hackberry site.

Before I discuss the events that took place at West Hackberry, I would like to briefly discuss my responsibilities in the SPR program and subsequently at the West Hackberry site after the fire occurred. As the SPR Project Manager, I am responsible for the design and construction of the SPR program. In this regard I have assigned certain responsibilities to my local representatives at each of our construction sites. West Hackberry is one of those sites. Mr. Maurice Graber (DOE Resident Construction Engineer) is my assigned representative at the West Hackberry site. The attached memo (#1) issued by the Director, Construction Division, delineates some of the responsibilities for our Resident Construction Engineers. The Resident Construction Engineer's delegated responsibility as a field representative is primarily that of assuring implementation and performance functions by our contractors. Clearly in matters such as safety, they have unilateral authority to take appropriate steps as required, including a stop action to prevent personal injury and/or destruction of Government property. The same degree of authority would exist in matters affecting the environment, contractor performance outside construction provisions, etc. In matters of contractor performance within approved procedures, and designs, our site representative would assure compliance, and if occasion should arise, question the appropriateness of this direction.

They can solicit guidance from our technical and managerial staff in New Orleans. This in a general sense is our standard mode of operation in implementing the SPR program.

The oil loss and fire at West Hackberry of September 21, 1978 required immediate implementation of our emergency spill prevention and control procedures. These procedures are for emergency situations and by commitment and signature authority from me require a person of sufficient contracting authority and responsibility to be able to commit the agency's resources to cope with the emergency. I have that authority and in the case of the West Hackberry incident took charge as the "On Scene Commander" within 3 hours of the incident and remained at the site for 6 days discharging that responsibility. This should not be confused with the delegated responsibility as previously described as a standard operating procedure for the SPR Resident Construction Engineer. The On Scene Commander role was dissolved when the emergency was subsided.

The attached diagram (No. 2) indicates the relationship of the major contractors involved at the time of the West Hackberry incident with the Department of Energy.

The significance of the relationship identifies the responsibility to ensure implementation of approved drilling safety procedures to Parsons-Gilbane. At West Hackberry (Pad No. 6 site of the fire), a procedure for removing the brine string whole the cavern was under pressure was developed by Louis Records and submitted to Parsons-Gilbane on September 1, 1978.

Parsons-Gilbane took no exception to the procedure. The questions regarding

entry into a pressurized cavern was not raised. Previous dialog and testing by the A/E had resolved the issue as how to technically proceed (Attachment No. 3). Parsons-Gilbane, as the Construction Manager, has responsibility to ensure site safety, and further as the Drilling Manager, has the responsibility to ensure that adequate safety backup equipment is in place.

Chart No. 4 is a general description of the West Hackberry site. West Hackberry is a storage area with five existing storage caverns which will store 50.6 million barrels of oil. West Hackberry began filling operations in July 1977, and currently has 14.2 million barrels in storage. Cavern No. 6 has a 12 million barrel capacity and has 7 million barrels in storage at this time. At the time of the incident we ceased all oil movement operations and did not resume until a readiness review was complete on October 3, 1978. Limited filling operations with the interim operation are in progress now and permanent facilities are under construction. We eventually may store a total of 210 million barrels of oil at West Hackberry through a combination of existing and leach filling caverns.

The next diagram (No. 4) illustrates Cavern No. 6 at the time of the accident. I would like to have Louis Records, the drilling supervisor, explain in detail what work was being done at the time.

Attachments 6 and 7 show the initial organization of the mobilization for containment of the fire. The plan in place to cope with fires of the West Hackberry magnitude was to contain the fire through use of local fire fighting resources while professional well fire fighting personnel mobilized at the site to extinguish the fire. Each of the designees had unique specialties within their respective assignments. For instance:

"The Department of Energy (DOE) Site Manager, after informing the appropriate New Orleans DOE personnel of situation, mobilized the local resources and personnel to contain the fire. The DOE West Hackberry (WH) OPS man dealt regularly with Amoco and Sun which provided access to additional booms and foam which were needed quickly."

Attachment No. 8 shows the containment program as it was implemented during the early stages of the fire. The secondary dikes were to provide relief to the primary dikes should the oil level get high enough to threaten spill-over of burning oil into Black Lake. Should this threat occur, the primary dike would be breached and expanded to Area I. As it turned out the breach in the dike occurred in the northeast corner of the primary dike and into Black Lake. The nature of the breach was to undermine the dike and did not present a burning problem. Before this area could be controlled 31,000 barrels of crude escaped into Black Lake. No other breaches occurred throughout the incident.

The wind coming from the northeast assisted our containment efforts a great deal. Except for one brief period the wind continued out of the east, northeast, and north.

Ultimately through the use of foam and light water, the fire was driven to the northwest portion of the pad. It was confined to this area while the hot metal removal and well capping process went on.

The capping process was completed on Tuesday, September 26, 1978. With the fire out, the local fire department trained some site personnel to handle stand-by equipment while they retired (to a well deserved rest). On the night of September 26, 1978 a hot spot ignited the pooled oil in the dike area flared into a fire which quickly exceeded the stand-by capability and the volunteer fire departments had to be recalled. Most were physically exhausted and equipment limited. Additional help was called from Fort Polk to quickly extinguish the fire. Following this incident professional full time firemen were deployed to relieve the volunteers and additional standby equipment and personnel from Fort Polk were maintained at the site for 3 more days.

No further outbreak of fire occurred and the site cooled down. On Wednesday, September 27, 1978 preparation began to build a new Christmas Tree in preparation for removal of the temporary plug that was placed in the well to cap it. On Saturday, September 30, 1978 the process was completed and pad cleanup operations began.

DEPARTMENT OF ENERGY,
Washington, D.C., April 10, 1978.

Memoranda: To all resident engineers.
From: Guy John Scango, Acting Director, Construction Division.
Subject: Responsibilities.

With the new Construction Manager Contract in force, it has become necessary to redefine the role of the Site Resident Engineer in the SPR Program. The following are provided as guidelines to allow you to gain the tone and

nature of your responsibilities and authority on site. They are not all inclusive and reflect the value placed on your foresight and judgment in all situations. Other memos in the future will add or redefine your authority as the complex develops and new situations arise.

1. As the Official Government Representative on site you are ultimately responsible for all activities within the complex serving your site. This includes the areas required for pipelines, brine disposal, electrical power, off-shore pipeline work, water intake structures, access to service roads, levees, laydown areas, off site storage areas, offsite parking areas, etc.

2. *Safety:* You are ultimately responsible for insuring that proper safety practices are defined and enforced by the Construction Manager. You have the authority and obligation to shut down all or part of the project in the event an imminently dangerous situation becomes apparent; and in your judgment a threat to lives is involved. In the event of a situation where proper action or judgment is not being exercised you must take the necessary action.

3. *Security:* You are ultimately responsible for insuring that proper security practices are defined and enforced by the Construction Manager. In the event a situation occurs in which proper action is not being taken, you have the authority and obligation to insure that the situation is immediately brought to the attention of your supervisor with your recommendation, and that interim steps are taken as you see necessary. Additionally, you are to insure that only authorized persons are allowed on site.

4. *Environmental:* You are ultimately responsible for all aspects of the site as they relate to environmental quality. Where actions are taking place or are projected to take place, it is your responsibility to question those actions to insure that they are environmentally acceptable whether or not they are specifically required in the working documents. Should an oil or brine spill occur, proper authorities shall be notified and clean up effected. You will serve as the Government man "in charge" to oversee these actions. Wherever levee crossings are involved it is your responsibility to insure that levee Authorities agree to construction efforts and sign off on them and that work is actually accomplished in accordance with their requirements.

5. *Performance monitor:* You are the performance monitor on site for the Parsons/Gibane contact. It is your responsibility to insure all monthly reports and evaluations are prepared and submitted to your coordinator to allow proper processing of this award fee contract. You are the Contracting Officer's Technical Representative on site.

6. *Fire protection and natural disasters:* You are ultimately responsible for insuring that the Construction Manager has a proper plan for handling the subject situations and that facilities are maintained to allow implementation of the plan. In the event that proper judgment is not being exercised in the handling of either of these situations, you have the authority and responsibility to act to protect lives and property.

7. *Government property and Government furnished equipment:* You are ultimately responsible to insure that the Construction Manager has an adequate plan for receiving, accepting, inspecting and protecting all Government property and Government Furnished Equipment and that this plan is implemented. Where Government property and Equipment is not properly stored you are responsible to take actions necessary to rectify the situation.

8. *Strategic petroleum reserve program:* You are responsible for understanding the Program goals and Schedule in its entirety as it affects your complex. You are responsible for insuring that the program goals are considered in every job site decision which affects schedules and cost. All outages and work stoppages shall be planned, and unforeseen situations immediately reported to your supervisor. You shall insure that all appropriate activities and events are properly logged and documented for the record.

9. *Quality assurance and control:* You are responsible for insuring that the Construction Manager has a quality assurance program for each site activity which requires one, and that it is implemented. Adequate records shall be properly maintained.

10. *Local government contact and public relations:* You are the Government Representative on this complex. Since this is a Government Complex being constructed on Government Property and funded by the Government you are responsible to insure that all relations with local authorities, media, citizens, land owners, and businessmen are proper and congenial. It is the intent of this Office that you present the 'good neighbor' attitude of cooperation in every

situation, and that only you reflect the Government position where necessary. In this respect information shall be given on request which shall be brief, accurate, and to the point. Where you are not qualified to address factual issues you shall defer to your supervisor.

11. *Site condition:* You are ultimately responsible for the cleanliness and orderliness of the complex.

12. *Drilling contractors and drilling service contractors:* Where these contractors are on site and totally under control of the Government, it is your responsibility to insure that the Construction Manager has included these Contractors and their work in all milestones and site concerns. You are to insure that all rigs are being properly supervised by PB/KBB and that good drilling practices prevail.

13. *Contract authority:* Until rescinded you have the authority to issue contract changes under your warrant. You also have a responsibility to insure that contracts administered by the Construction Manager are properly and legally administered. Where discrepancies occur you are responsible for reporting the through proper channels.

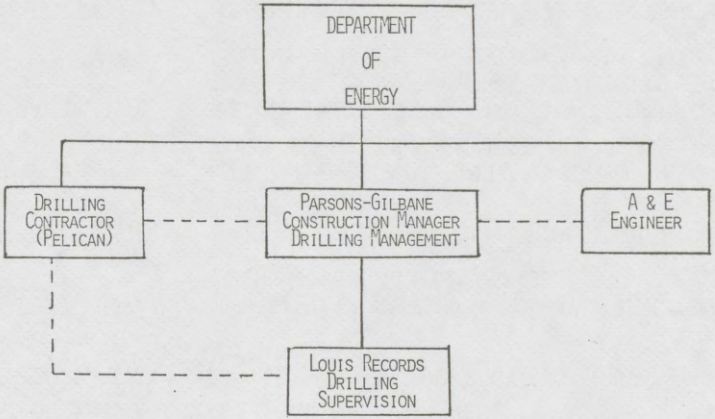
14. *Operations:* The control of all operations functions at the site shall be under the control of the site Operations Manager. Where construction interferes with operations you are responsible for insuring that adequate coordination is effected.

2

D.O.E. STRATEGIC PETROLEUM RESERVE PROJECT

NAME:

DATE:



#3

PRESSURIZED REENTRY REVIEW

OCTOBER 20, 1977	DRILLING PROGRAM RELEASED AND CIRCULATED FOR COMMENT TO GIEC
NOVEMBER 15, 1977	RECEIVE COMMENTS FROM GIEC
NOVEMBER 23, 1977	DOE DISCUSSES GIEC COMMENTS VIA TELEPHONE WITH LOUIS RECORDS AND ASSOCIATES
DECEMBER 7, 1977	DOE FOLLOWS UP NOVEMBER 23 PHONE CALL WITH FORMAL TRANSMITTAL OF GIEC COMMENT TO LOUIS RECORDS
DECEMBER 19, 1977	LOUIS RECORDS RESPONDS TO DOE WITH TECHNICAL OUTLINE OF USE OF MUD FOR REENTRY
JANUARY 19, 1978	MEETING HELD AT PB/KBB OFFICE IN NEW YORK WITH DOE, LOUIS RECORDS, PB/KBB AND GIEC IN ATTENDANCE - MINUTES PUBLISHED FEBRUARY 6, 1978
FEBRUARY 14, 1978	MEETING HELD AT LOUISIANA MUD CO'S OFFICE IN CROWLEY, LA. PURPOSE - TO CONDUCT LABORATORY TYPE DEMONSTRATION OF RECORDS MUD/REENTRY CONCEPTS, ATTENDING - GIEC, PB/KBB, LOUIS RECORDS AND DOE
MARCH 1, 1978	LETTER FROM GIEC TO DOE GIVING QUALIFIED APPROVAL TO REENTRY METHOD
APRIL 25, 1978	REENTRY WELL #9B IS SUCCESSFULLY REENTERED
APRIL 25, 1978 TO SEPTEMBER 21, 1978	NINE WELLS REENTERED UNDER PRESSURE SUCCESSFULLY

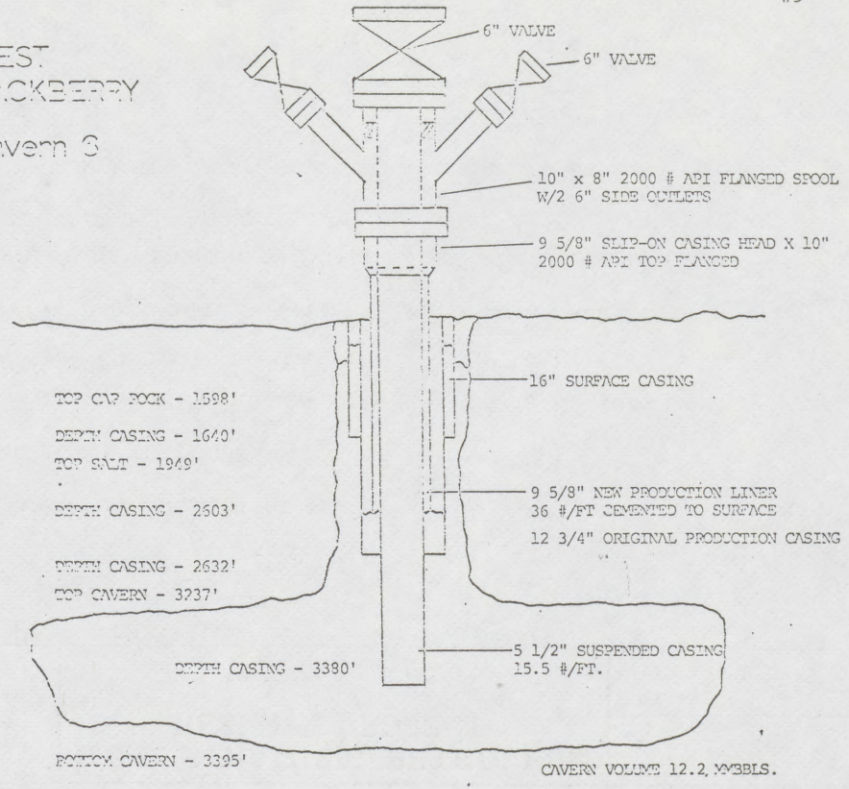
STATUS	D.O.E. STRATEGIC PETROLEUM RESERVE PROJECT GENERAL DESCRIPTION OF WEST HACKBERRY	NAME: DATE: October 7, 1978

- West Hackberry is a crude oil storage area.
- Cavern 6 is one of five existing storage caverns.
- West Hackberry began filling operations in July 1977. Currently 14.2 million barrels are in storage.
- Cavern 6 has 7 million barrels in storage of a 12 million barrell capacity.
- The five existing caverns will store 50.6 million barrels. Eventually plan to store a total of 210 million barrels.
- Limited filling operations are in progress and permanent facilities are under construction.

#5

WEST
HACKBERRY

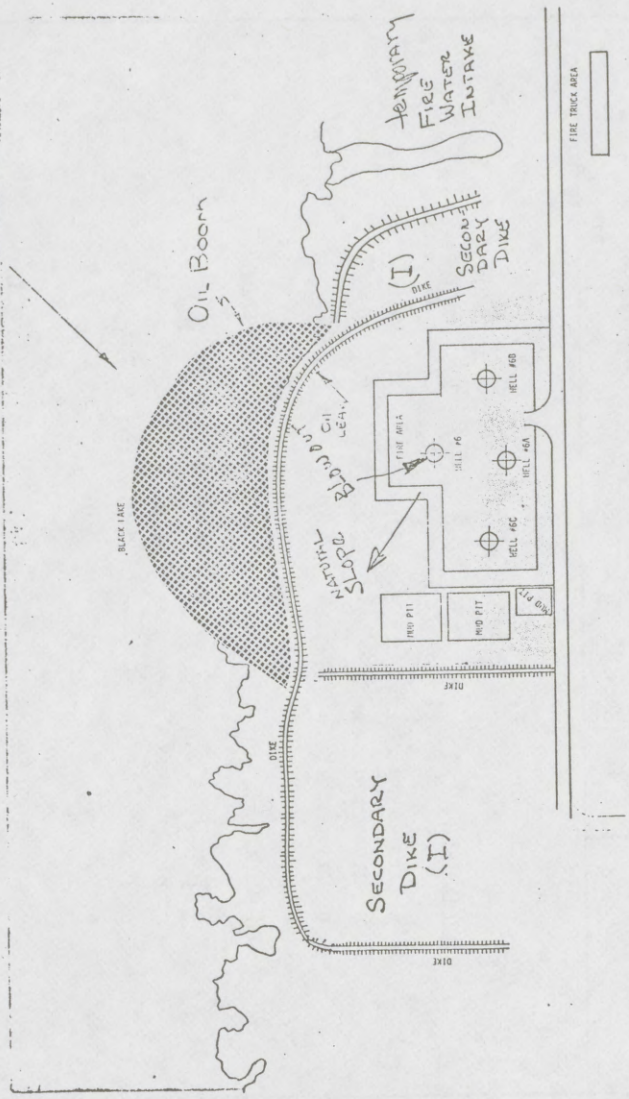
Cavern 3



Sept. 21,	4:00 pm	Site personnel called West Hackberry Fire Department (WHFD)
	4:05 pm	1st. WHFD fire truck arrived.
	4:15 pm	Guard called LA State Police.
	4:20 pm	Guard called local sheriff's department. Injured airlifted to Mem. hospital via copter. Emergency copter called. 2nd WHFD fire truck arrived.
	4:30 pm	Sulphur fire truck arrived. 1st Sulphur ambulance arrived. 1st LA State Police unit arrived. 1st call to Coast Guard by OPS
	4:40 pm	2nd and 3rd LA State Police units arrived.
	4:45 pm	"Boots and Coots" called - message left. 2nd Sulphur ambulance arrived. 2nd call to Coast Guard by OPS.
	5:00 pm	"Boots and Coots" returned call. Coots scheduled to arrive from Houston at 6:30 via plane to Lake Charles. Site copter pick "Coots" up at Lake Charles airport and transport to WH site.
	6:45 pm	"Coots" arrived on scene and begins assessment of situation.
	7:00 pm	New Orleans Forces arrive On Scene Commander assumes responsibility for fire fighting activities and takes over direction of spill containment and environmental assessment activities.
		Air Space secured for a 2 mile radius to 2,500 feet.
	7:10 pm	Mobilized the Coast Guard Strike Team to assist in managing and directing the oil spill and pick up activities.

WITHIN 30 MINUTES OF FIRE - ACTION UNDERWAY
LOUIS RECORDS/PARSONS-GILBANE - REMOVAL OF INJURED VIA AIR LIFT TO MEMORIAL HOSPITAL.

PARSONS-GILBANE RESIDENT CONSTRUCTION MANAGER	-	MOBILIZE HEAVY EQUIPMENT, OPERATORS, WELDERS, PORTABLE GENERATORS, EMERGENCY LIGHTING AND OTHER SUPPORT EQUIPMENT WITH ON SCENE CONSTRUCTION CONTRACTORS. RESPOND TO CONSTRUCTION REQUIREMENTS NOTIFICATION TO COAST GUARD AND STATE POLICE.
DEPARTMENT OF ENERGY WEST HACKBERRY OPERATIONS	-	OFF SHORE CONTAINMENT AND UTILIZATION OF EQUIPMENT AND SUPPLIES FROM AREA INDUSTRY.
LOUIS RECORDS AND ASSOCIATES	-	AREA INSIDE DIKE, CONTROL OF FIRE AND PROTECTION OF WELLHEADS WITHIN DIKE.
PARSONS-GILBANE WEST HACKBERRY OPERATIONS	-	INTERFACE WITH FIRE DEPARTMENTS TO COMPLY WITH THEIR NEEDS AND L. R. REQUESTS.
PARSONS-GILBANE NEW ORLEANS OPERATIONS	-	COORDINATE ANY OPERATIONS REQUESTS OR REQUESTS PLACED ON THEM.



EARLY CONTAINMENT

9

WEST HACKBERRY ACCIDENT	**D.O.E. STRATEGIC PETROLEUM RESERVE PROJECT** OIL EXPULSION, ACCOUNTED FOR & BURN	NAME: D. W. MAZUR DATE: OCTOBER 6, 1978

(BARRELS)

- o OIL EXPULSION 72,000
  - o DECOMPRESSION OF SALT = 40,000
  - o DECOMPRESSION OF BRINE = 8,000
  - o DECOMPRESSION OF OIL = 24,000
- o OIL ACCOUNTED FOR 52,000
  - o BLACK LAKE = 31,000
  - o PUMPED TO CAVERN #7 = 2,000
  - o IN SHELL ON PAD = 10,000
  - o SOIL = 9,000
- o OIL BURNED/NOT RECOVERED 20,000

#10

D.O.E. STRATEGIC PETROLEUM RESERVE PROJECT

DRILLING PROCEDURES

NAME: MAZUR

DATE: 10-7-78

1. 9-21-78 STOPPED DRILLING AT ALL SITES RELATED TO CAVERN REENTRY
2. 9-22-78 CONTACTED NAVAL PETROLEUM RESERVE AT ELK HILLS REQUESTING EXPERT TO INVESTIGATE RIG CONDITIONS AND PRACTICES
3. 9-23-78 REPRESENTATIVES FROM ELK HILLS DRILLING TEAM WERE IN NEW ORLEANS AND BRIEFED ON SPR DRILLING PROGRAM
4. 9-24-78 INVESTIGATING TEAM INSPECTED DRILLING RIGS AT BAYOU CHOCTAW
5. 9-25-78 INVESTIGATING TEAM INSPECTED DRILLING RIGS AT BRYAN MOUND, WEST HACKBERRY
6. 9-25-78 MET WITH PROJECT MANAGER AND REVIEWED FINDINGS
7. 10-2-78 MET WITH DRILLING MANAGER (PARSONS-GILBANE) AND DRILLING SUPERVISOR (LOUIS RECORDS) TO DISCUSS FINDINGS
8. 10-3-78 MET WITH DRILL RIG OWNERS IN NEW ORLEANS TO INFORM THEM OF PENDING ACTIONS TO UPGRADE DRILLING PRACTICES AND PROCEDURES
    - o. SAFETY INSPECTION OF EACH RIG COMPLETED BY 10-16-78 SCHEDULED INSPECTIONS THEREAFTER
    - o EFFICIENCE INSPECTION ASAP
    - o PROCEDURES MANUAL TO BE DRAFTED
    - o ENTRY INTO CAVERNS WOULD BE AT ZERO PRESSURE

LOUIS RECORDS & ASSOCIATES, INC.,
LaFayette, La., October 17, 1978.

MR. DON MAZUR,
Department of Energy, Strategic Petroleum Reserves,
Harahan, La.

DEAR MR. MAZUR: The workover procedure for the Well No. 6 at the West Hackberry Site in Cameron Parish, Louisiana had two objectives. The first was to remove the 5½" tubing which was used for salt water removal from the cavern as oil was pumped into the cavern. The 5½" tubing was suspended to a depth of 3380 feet inside 9⅝" casing set at 2603 feet which had been cemented inside 12¾" casing having a depth of 2632 feet.

The other objective was to remove a small length of the 12¾" casing which had a crack in it and was leaking oil which had to be leaking through the top of the 9⅝" casing. It was planned to strengthen the way the wellhead was built.

We were confident that we had a safe plan to acomplish these two objetives. This plan required the following:

1. A plug set near the bottom of the 5½" tubing to keep liquids from the cavern entering the 5½" tubing as it was pulled from the hole.

2. A hydrostatic overbalance with very viscous mud pumped into the annulus to bring the ground surface pressure to zero. The 5½" tubing by 9⅝" casing annulus also had two blow out preventers which could seal the annulus, if necessary. In addition, the 5½" tubing could have been stripped out of the hole by pulling it through the bag type blow out preventer.

The setting of bridge plugs inside tubing or casing is customary oil field practice of long standing and near a 100% certainty of success. Further, it was tested for leaks around it and for in-place stability at a surface pressure of 800 psi. In addition, the 5½" tubing had been placed new in this hole only a year before and was considered to be in good shape. There should have been in the tubing an adequate bridge plug seat.

The bridge plug is designed to hold a differential pressure across it from either direction of 5000 psi and the maximum that occurred across the packer was 393 psi at the time that it blew out.

The viscous plug that was pumped into the annulus held the surface pressure to zero pressure during the pulling of the 14 joints of 5½" tubing. We had no doubt that it would be successful as we had used this system ten times in drilling into caverns that contained a surface oil pressure.

During the planning of the workover program and the execution of the work we never had any doubt that the total plan was safe.

Sincerely,

LOUIS R. RECORDS,
President.

WEST HACKBERRY, LA. STRATEGIC PETROLEUM RESERVE OIL SPILL CLEANUP AND ENVIRONMENTAL DAMAGE ASSESSMENT

(By Jack E. Wilson, DOE On-Scene Commander Representative)

Figure 1 is an aerial view of the oil cavern well fire as seen, on September 25, looking north across Black Lake. The Strategic Petroleum Reserve Construction site and well pads adjoining cavern 6 can be seen in the foreground.

Figure 2 is a closer aerial view of the well oil fire from the south on September 25.

Figure 3 is a view of the wellhead and pad on fire looking toward the northwest. A drilling rig adjacent to the burning wellhead is seen in the left foreground. Fire fighting efforts are being staged from the center foreground. Firefighting foam can be seen on the oil at center right. Contained oil can be seen on Black Lake in the background. The thick smoke plume is blowing south westerly over farmland and marshland.

Figure 4 is a westerly view of firefighting activities. Intense flames near the wellhead can be seen center left. The well pad containment dike can be seen on the right. The dike failed approximately 18 hours after the fire erupted, at 10:00 A.M. on September 21, The blackened dike at right center indicates the dike breach location.

Figure 5 is a westerly view at 1:00 P.M., September 25, of the burning pad, pad dike, and the contained oil on the water. A secondary oil containment boom has been placed outboard of the primary boom.

Figure 6 outlines the oil pollution control strategy that had been developed by the Strategic Petroleum Reserve (SPR) which is as follows:

1. Preposition equipment on site and establish a minimal response capability with on-site boom, boats, and oil recovery vessel, and personnel trained to deploy the boom and initiate oil recovery.
2. For spills beyond on-site capability, third party cleanup contractors and other assets, such as; USCG, Cooperatives, State and other Federal agencies will be called in to assist as required.

Figure 7 is the Department of Energy On-Scene Commander's Organization which was activated and in operation during the fire and oil spill cleanup operations. Non-DOE Organizations, such as; the U.S. Coast Guard, EPA, U.S. Fish and Wildlife, U.S. Army COE, NOAA, State and local regulatory agencies actively participated on the response team. The 8th. Coast Guard District Captain of the Port, Port Arthur, Texas assumed responsibility for monitoring clean up contractors and recovery operations. The USCG Gulf and Pacific Strike Teams provided additional personnel support and a mobile trailer was invaluable in establishing quick control and direction of the waterfront cleanup operations while DOE personnel were primarily concerned with firefighting activities.

Figure 8 is a chronology of oil containment boom deployment. Early containment was the principal reason for the quick and effective cleanup of the oil spilled on Black Lake. Containment Phases I and II occurred while the well fire was raging. DOE on-site personnel utilized the training received prior to the accident. An oil skimmer was launched at the site on September 16th, and crewmen were trained. A one-day seminar was held in New Orleans for appropriate operating personnel from all SPR sites on September 20, the day before the West Hackberry accident.

Figure 9 vividly illustrates oil recovery operations which were begun well before the fire was extinguished. Pits are being dug for temporary storage of oil as it is recovered from the lake while tanks trucks are transporting recovered oil from the pits to off-site storage tanks and barges.

Figure 10 is a direct overhead view of the wellhead fire and adjoining lake front. The primary and secondary containment booms are in place with the oil properly contained. Oil recovery operations are underway to the left, underneath the smoke plume and near the fire. This photograph was taken on the fourth day of the fire, September 25. The lake water supply channel can be seen on the far right. This channel was quickly excavated to provide adequate firefighting water from the lake. Adjacent to this channel is a temporary dike and pool of oil which was bled off the cavern in order to reduce the cavern pressure more quickly.

Figure 11 is an overhead view taken on Tuesday, September 26, the day the well was capped and the fire extinguished, and 24 hours after Figure 10 was taken. Note that substantial quantities of the oil on Black Lake have already been recovered and temporarily stored in the series of pits on to the left of the well pad. Approximately 10,000 barrels of oil is still on the lake and another 20,000 barrels contained inside the diked area on land.

Within another 48 hours (September 28) most of the oil on the water had been recovered. A few hundred barrels remained on the water in thin sheens and patches in small shoreline identations and irregularities. The oil remaining on the water and along the shoreline was manually removed by absorbents and hand labor. As the temporary storage pits were emptied by tank trucks, the contaminated spoil was scooped up and hauled to a temporary holding area within the Federal complex. A more rugged permanent oil containment boom will be placed to contain any sheens of oil that may back or wash from the contaminated well pad area. This boom will remain in place until all contaminated soil is removed from the burned and oily well pad, and the appearance of oil sheens have subsided. Final restoration of the well pad and adjoining land will require the removal of all contaminated soil, shell base, and diked area. Four waste holding areas have been established inland, with dikes around each to retain any oil that may leach from rainfall over the next several months. The oily soil and sludge will be applied to agriculture land on-site or on approved off-site locations. The shoreline will be reseeded where vegetation was disturbed.

Before the oil fire was extinguished, the Department of Energy On-Scene Commander had established a team to assess and document any environmental damage.

Figure 12 shows the organizational structure of the Environmental Assessment Team and member responsibilities. In addition to the participating Universities

and environmental contractors, the Environmental Protection Agency (EPA), National Oceanographic and Atmospheric Administration (NOAA), and State Department of Conservation, Wildlife and Fisheries participated in an advisory and support capacity.

Figure 13 states the team objectives and general approach to the damage assessment project.

Figure 14 and 15 identify the Environmental Assessment Team Plan by phases. Phase I field sampling was completed within 10 days and the samples are now being analyzed. Field sampling during Phases II, III, and IV could be reduced if Phase I results show environmental damage is minimal or non-existent. The number of samples indicated are considered the worst case. The 25 member scientific team indicated there was no environmental damage noted during the Phase I field sampling and observations.

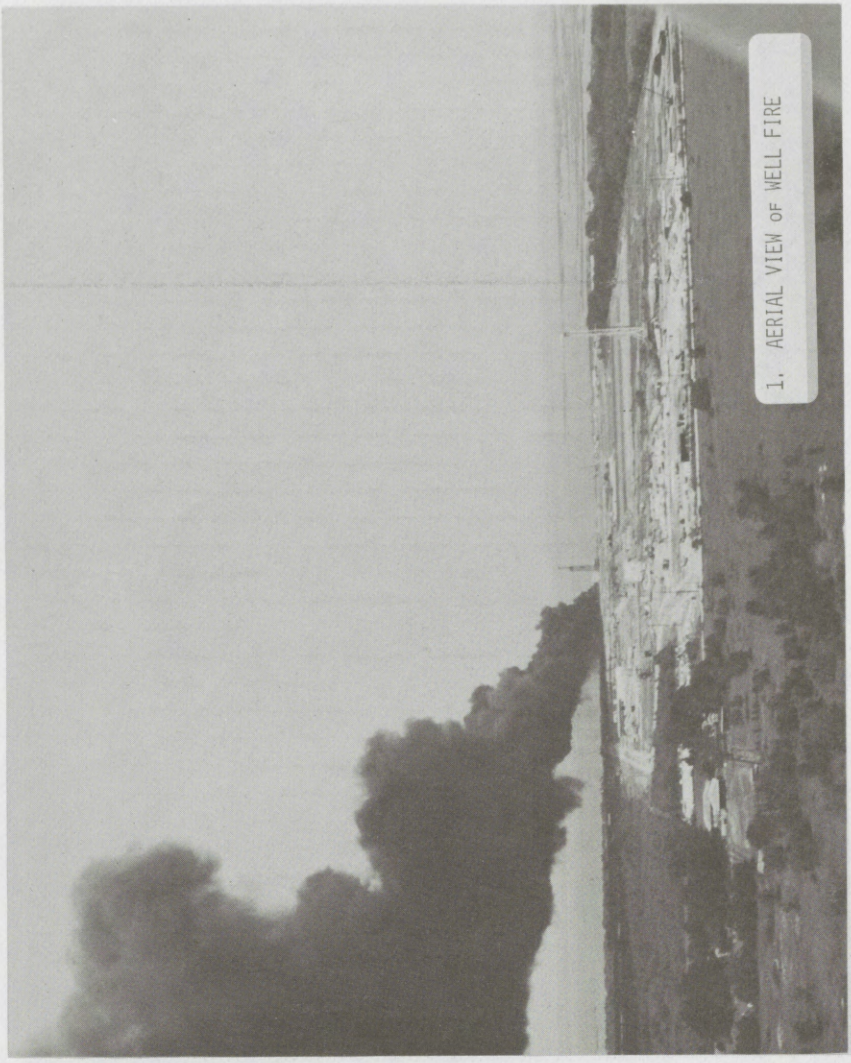
Figure 16 is a view of the Black Lake waterfront looking northwest on Tuesday, October 3, 12 days after the oil fire spill incident, 10 days after oil recovery operations began, and 7 days after the well was capped and the fire was extinguished.

Figure 17 is a view of the primary oil recovery area West of the well pad. Oil containment boom is still in place to trap oil that is being manually removed from the marsh grass and shoreline. Tank trucks can be seen in the foreground as they continue to remove oil that has been recovered from the lake and stored in temporary holding pits.

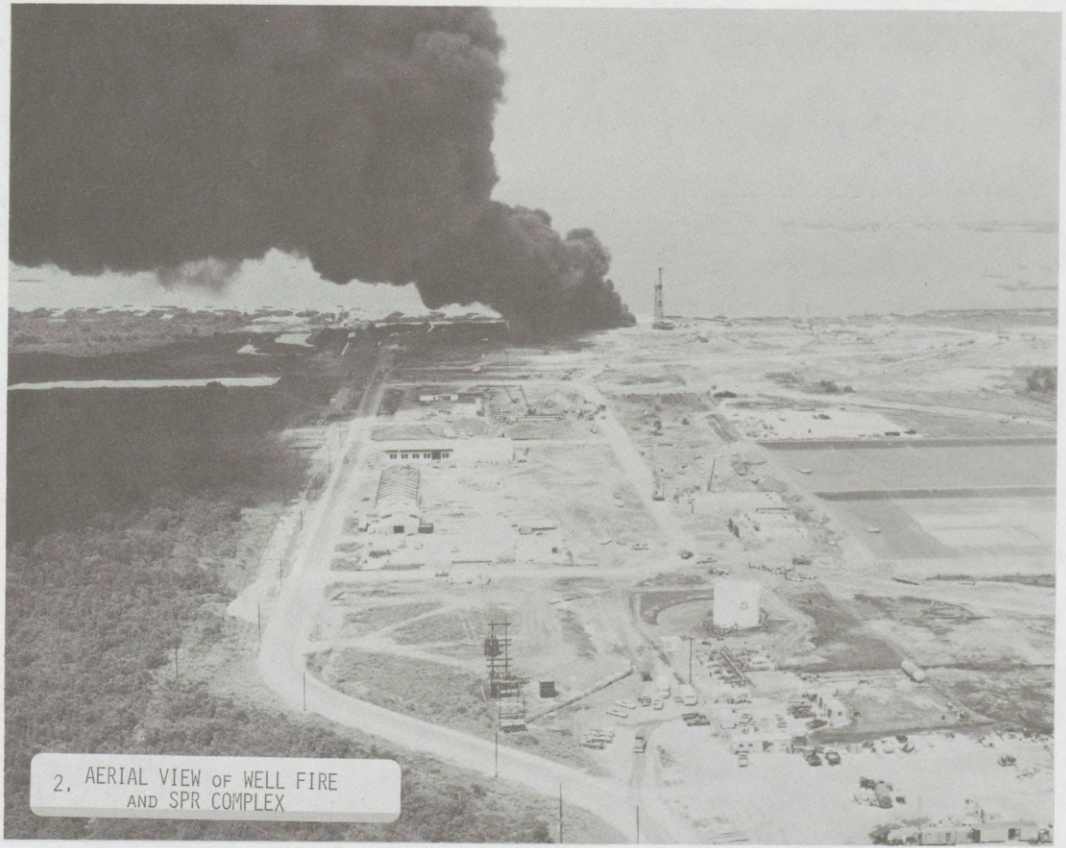
Figure 18 is a view of the cleaned lake water looking northeast. Mopping up was continuing via wash pumps and manual labor which were being used to flush the remaining oil from vegetation and into pools for collection.

In summary, of the 72,000 barrels spilled from the oil storage cavern, 52,000 barrels were recovered with no apparent environmental damage. Never before has an oil spill on water of this magnitude been so effectively contained and recovered in such a short time. Prior planning and quick execution by DOE personnel, the professional and expert assistance of the U.S. Coast Guard, E.P.A., and other Federal and State officials are responsible for turning a potentially disasterous situation around into a model of oil spill control and cleanup operation. The Department of Energy, the Strategic Petroleum Reserve in particular, are deeply indebted and appreciative of these personal contributions and governmental agency support actions.

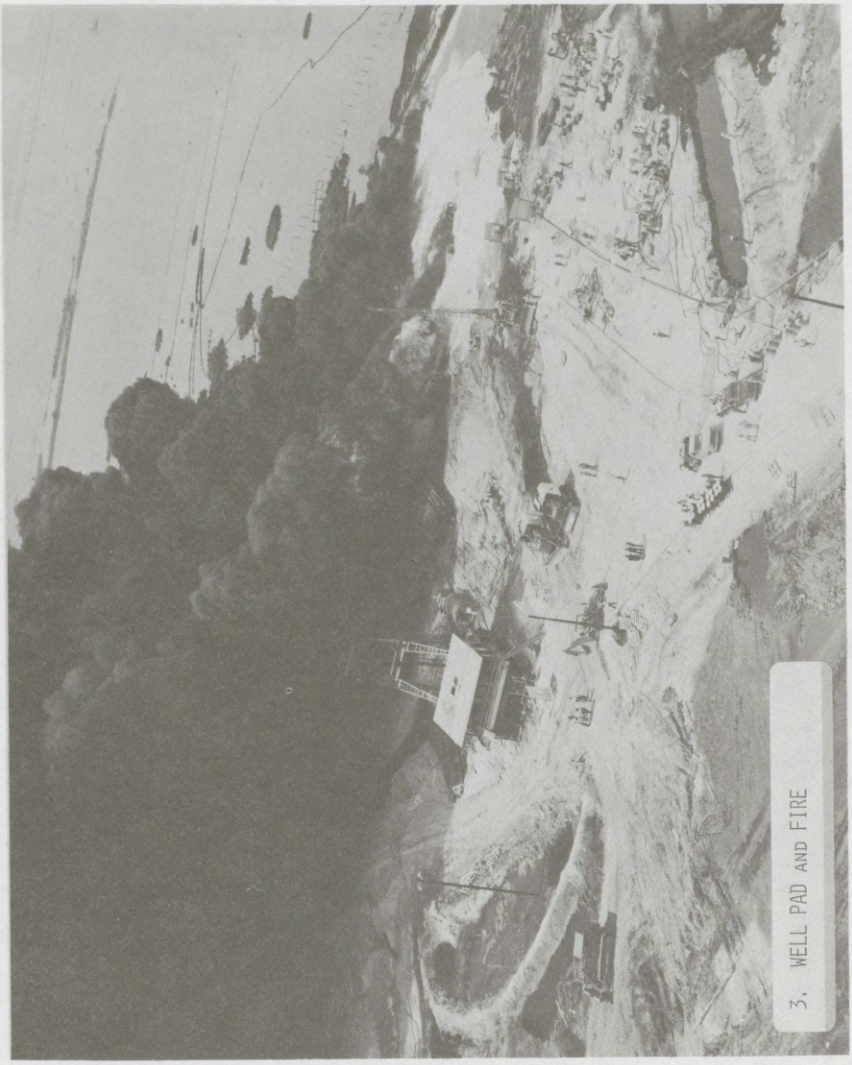
Thank you.



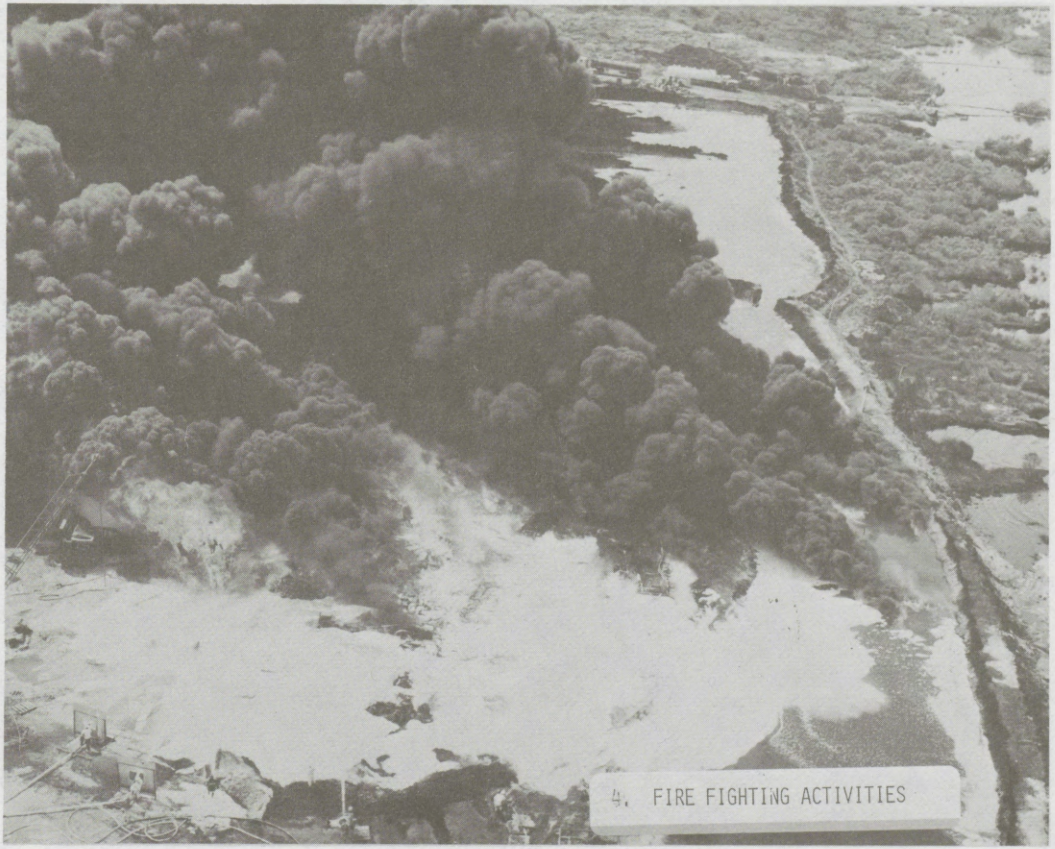
1. AERIAL VIEW OF WELL FIRE

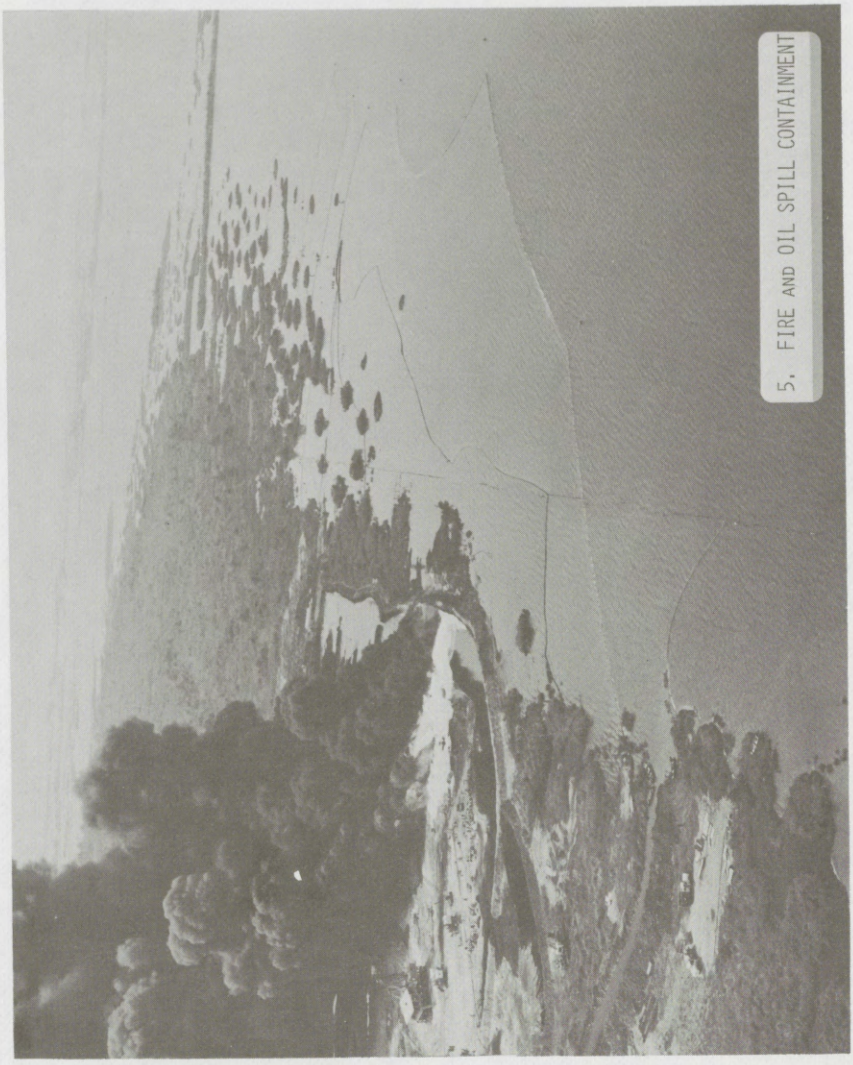


2. AERIAL VIEW OF WELL FIRE AND SPR COMPLEX



3. WELL PAD AND FIRE


4. FIRE FIGHTING ACTIVITIES



5. FIRE AND OIL SPILL CONTAINMENT

WEST HACKBERRY FIRE/OIL SPILL	STRATEGIC PETROLEUM RESERVE PROJECT	FIGURE 6

CLEAN-UP STRATEGY

1. RESPOND WITH SITE PERSONNEL AND EQUIPMENT.

2. AUGMENTATION AND TAKEOVER BY OUTSIDE RESOURCES.

   A. OIL SPILL CONTRACTORS

   B. U. S. COAST GUARD

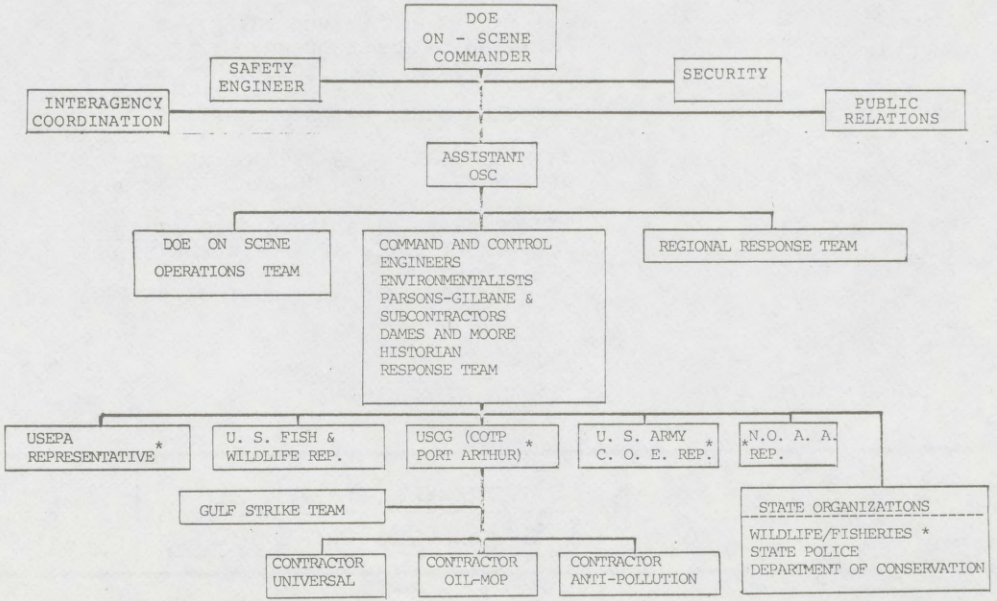
WEST HACKBERRY
FIRE/OIL SPILL

D.O.E. STRATEGIC PETROLEUM RESERVE PROJECT

NAME: FIGURE 7

DATE:

WEST HACKBERRY CLEANUP ORGANIZATION



*ALSO REPRESENTED ON THE RRT

WEST HACKBERRY FIRE/OIL SPILL	STRATEGIC PETROLEUM RESERVE PROJECT	FIGURE 8

CONTAINMENT

A. PHASE I (PRIMARY) -- SEPTEMBER 21

300 FT AMOCO BOOM IN PLACE 1930
WEST SIDE OF SITE (SITE PERSONNEL)

1600 FT CONTRACTOR BOOM IN PLACE 2300
CENTER TO EAST SIDE (SPILL CONTRACTOR)

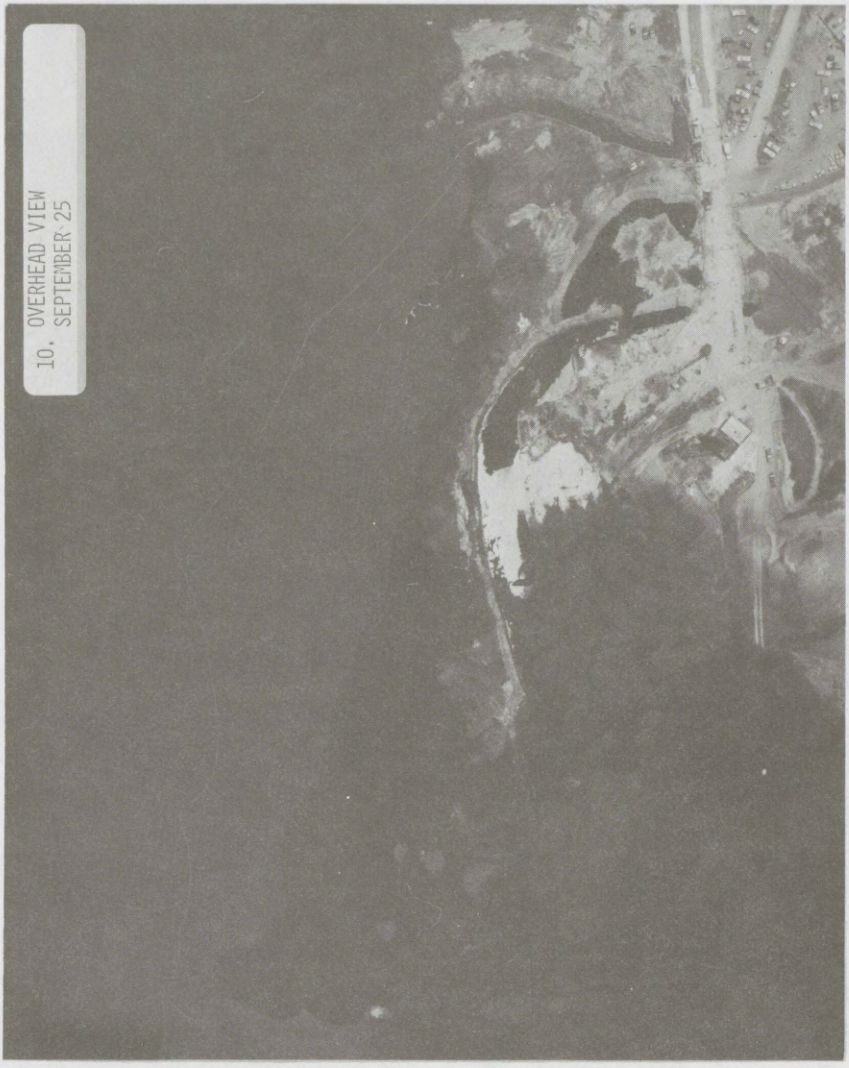
B. PHASE II (SECONDARY) -- SEPTEMBER 22

4500 FT CONTRACTOR BOOM IN PLACE 1500
WEST END AND SURROUNDING PRIMARY BOOM (SPILL CONTRACTOR)

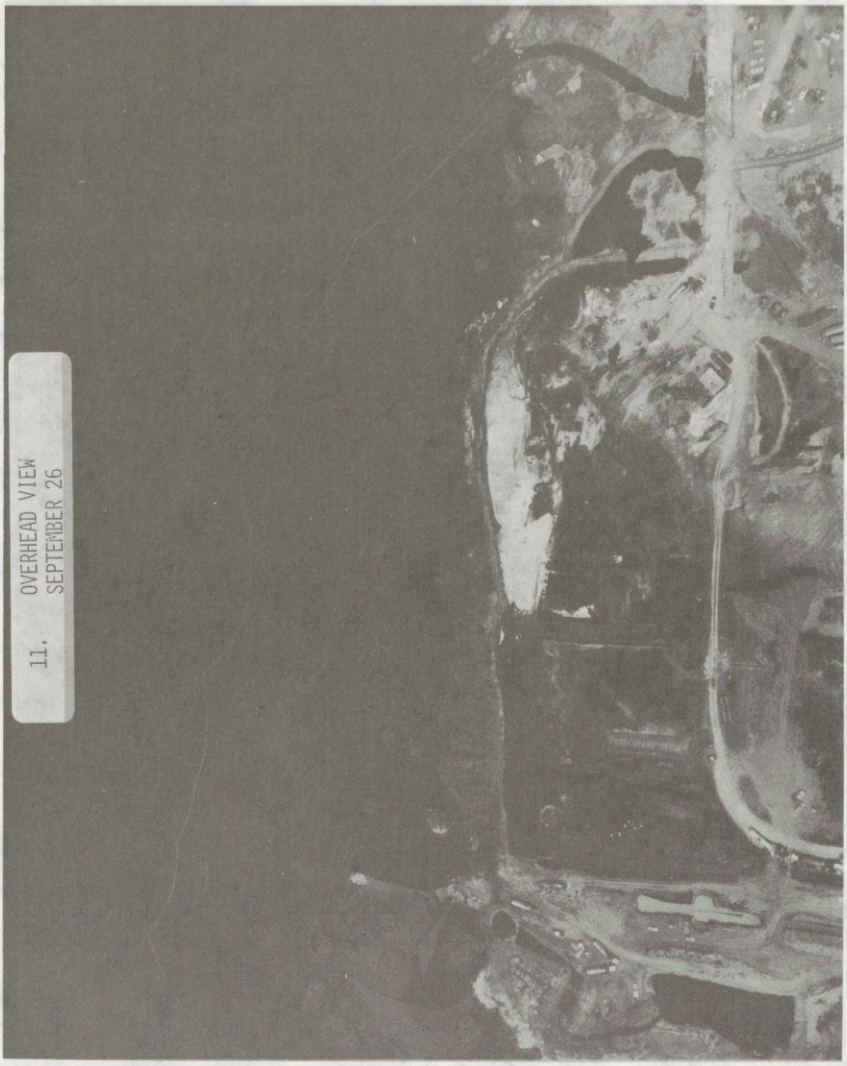
C. PHASE III (TERTIARY) -- SEPTEMBER 27

2000 FT CONTRACTOR BOOM IN PLACE
SURROUNDING SECONDARY BOOM AS CONTINGENCY AGAINST WIND SHIFT

9. OIL RECOVERY PITS



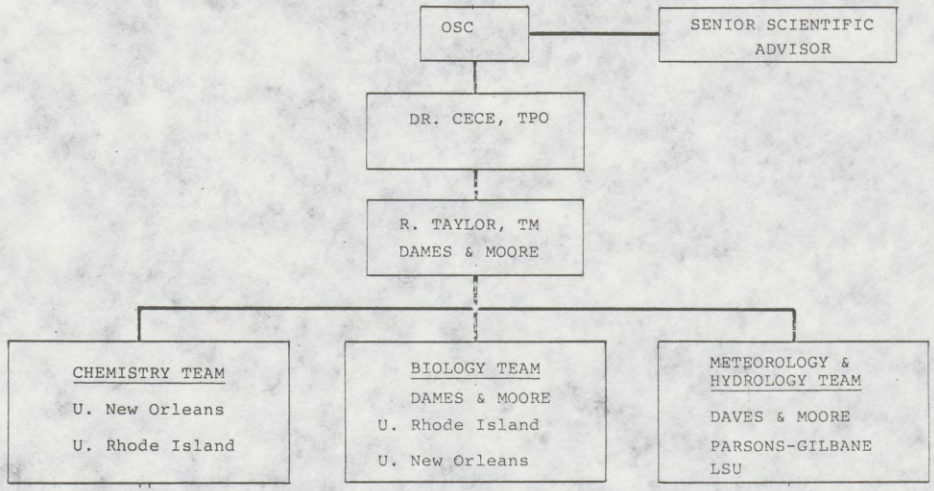
10. OVERHEAD VIEW
SEPTEMBER 25



11. OVERHEAD VIEW
SEPTEMBER 26

WEST HACKBERRY FIRE/OIL SPILL	D.O.E. STRATEGIC PETROLEUM RESERVE PROJECT	NAME: FIGURE 12
		DATE:

ENVIRONMENTAL ASSESSMENT TEAM ORGANIZATION



40 PERSONNEL AT PEAK

25 SCIENTISTS AT PEAK

WEST HACKBERRY FIRE/OIL SPILL	STRATEGIC PETROLEUM RESERVE PROJECT	FIGURE 13

ENVIRONMENTAL ASSESSMENT TEAM PLAN

OBJECTIVES

A. DETERMINE GEOGRAPHIC AREA COVERED

B. ASSESS ENVIRONMENTAL IMPACT

1. WATER
2. MARSH
3. INLAND (PLUME)

GENERAL

A. DOCUMENT STATUS BEFORE

B. DETERMINE ACUTE AND CHRONIC IMPACT

C. INCLUDE

1. ON-SITE IMPACT, INJURIES, DEATH
2. LOST RECREATION BENEFITS AND COMMERCIAL PRODUCTION

D. RESAMPLE 3, 6, 12 MONTHS (AS APPROPRIATE)

WEST HACKBERRY FIRE/OIL SPILL	STRATEGIC PETROLEUM RESERVE PROJECT	FIGURE 14

EAT PLAN PHASES

PHASE I (0-6 MONTHS)

1. SAMPLE WATER, MARSH, LAND
   - o CHEMICAL - 200 SAMPLES
   - o BIOLOGICAL - 200 SAMPLES
   - o METEOROLOGY - 20 SAMPLES
2. ESTABLISH DOE OIL VERSUS OTHER
3. ANALYZE 80% SAMPLES -- 336

   REPLICATE 10% SAMPLES -- 40

PHASE II (3-6 MONTHS)

1. RESAMPLE AS APPROPRIATE
   - o CHEMICAL -- 160 SAMPLES
   - o BIOLOGICAL -- 160 SAMPLES
   - o METEOROLOGICAL - 0 SAMPLES
2. ANALYZE 80% SAMPLES -- 130

   REPLICATE 10% SAMPLES -- 32
3. REPORTING

WEST HACKBERRY FIRE/OIL SPILL	STRATEGIC PETROLEUM RESERVE PROJECT	FIGURE 15

EAT PLAN PHASES (CONTINUED)

PHASE III (6-9 MONTHS)

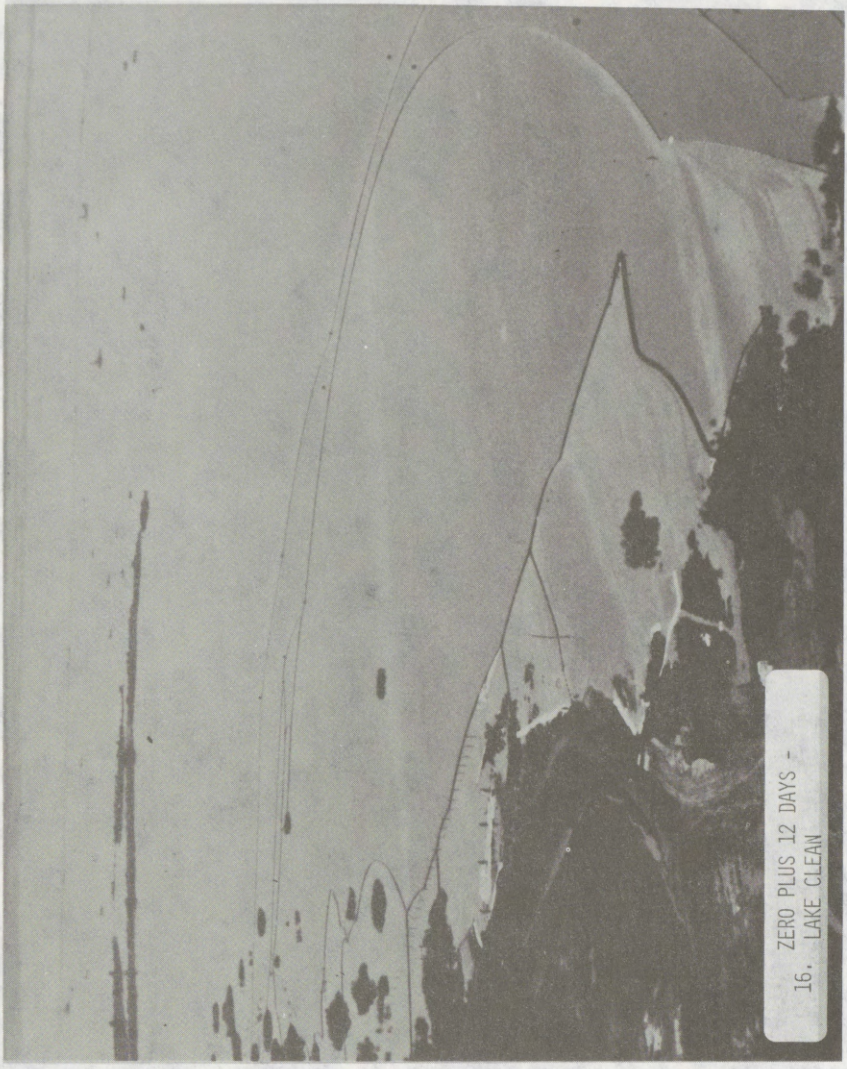
1. RESAMPLE AS APPROPRIATE
   - o CHEMICAL - 100 SAMPLES
   - o BIOLOGICAL - 100 SAMPLES
2. ANALYZE 80% SAMPLES -- 160
   REPLICATE 10% SAMPLES -- 20
3. REPORTING

PHASE IV (12-15 MONTHS)

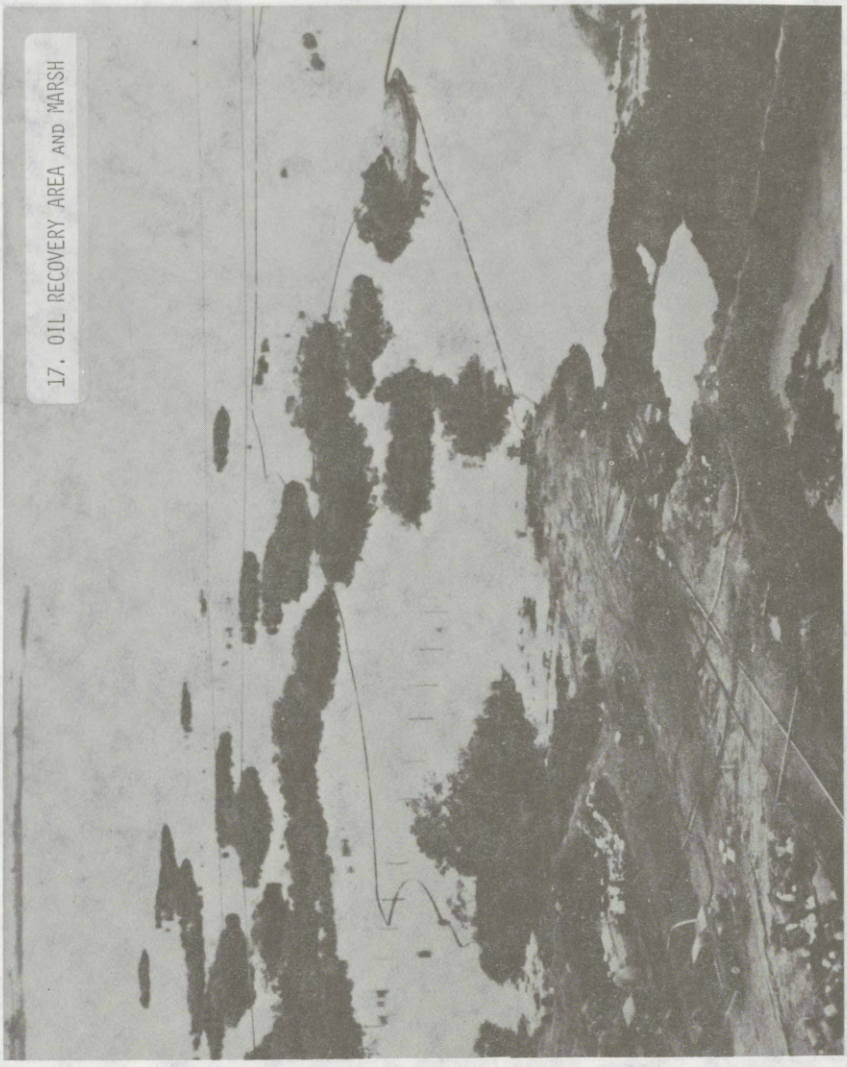
1. RESAMPLE AS APPROPRIATE
   - o CHEMICAL - 80 SAMPLES
   - o BIOLOGICAL - 80 SAMPLES
2. ANALYZE 80% SAMPLES -- 120
   REPLICATE 10% SAMPLES -- 16
3. REPORTING

PHASE V (12-16 MONTHS)

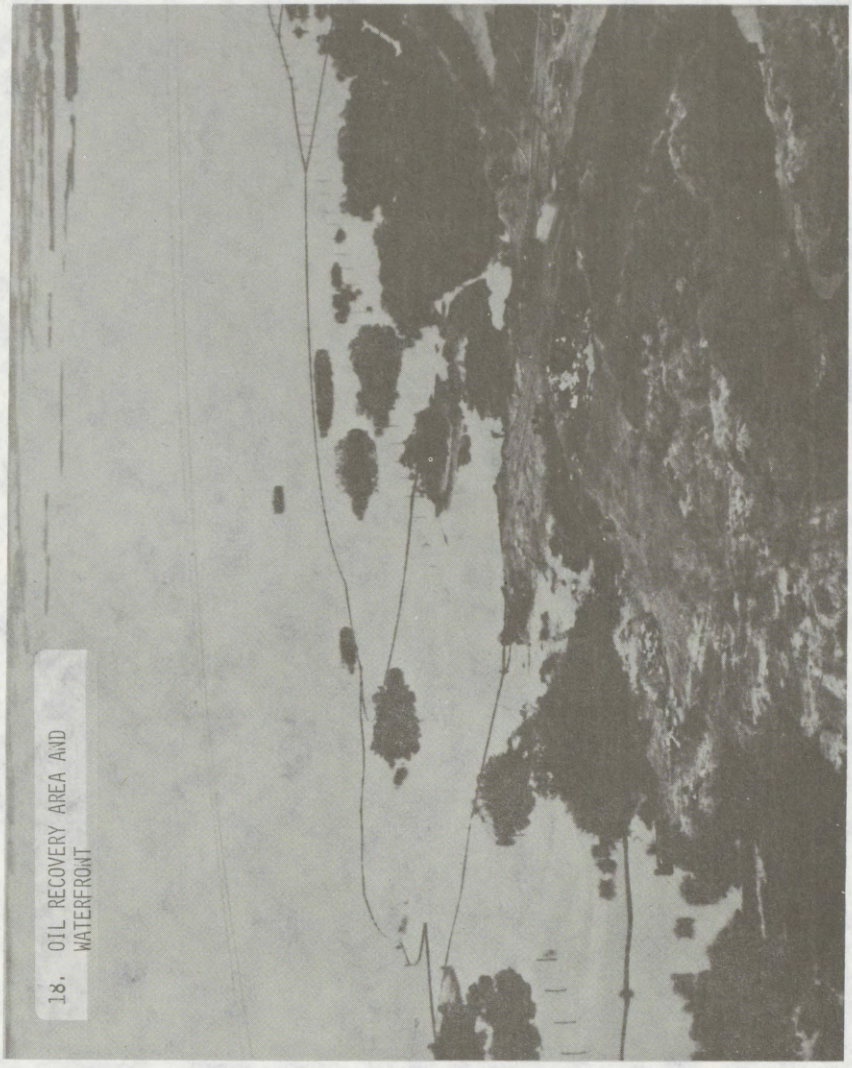
1. CORRELATE, INTERPRET, REVIEW FINDINGS
2. DOE REVIEW
3. OTHER AGENCY REVIEW
4. PUBLISH FINAL REPORT



16. ZERO PLUS 12 DAYS - LAKE CLEAN



17. OIL RECOVERY AREA AND MARSH



18. OIL RECOVERY AREA AND WATERFRONT

Senator JOHNSTON. Mr. James Lowery who is a local resident and an employee of Olin Corp., whose family formerly owned the West Hackberry dome has stated to us he has some information that would be pertinent and would like to testify.

Mr. Lowery.

STATEMENT OF JAMES LOWERY, OLIN CORP., HACKBERRY, LA.

Mr. LOWERY. I'd like to thank you for this opportunity.

Senator JOHNSTON. You live in Lake Charles?

Mr. LOWERY. No. I live in Hackberry. I'm a resident on the dome itself and on one of the closest residences affected by the explosion. And my background into it is that I've lived there all my life and know exactly what's going on in the dome and what has to be done in order to make this a safe project.

And what the DOE has done from the outset has been vastly wrong. They came in with the opinion that they had the authority, bar all holds, to get this damn thing done, no matter what it cost, because they have a blank check for the whole project. And their main goal is to get this thing done as fast as posssible without any regard to the environment or any other aspect as far as safetywise.

Senator JOHNSTON. Let me ask you this. What, in your opinion, living there on the dome, did they do wrong?

Mr. LOWERY. Well, the main thing is that prior to the oil operations previously their main contractor at the very beginning was Gulf Interstate and all maintenance on the caverns themselves was always followed by a bleeddown which took approximately a week to 2 weeks. It depends on the amount of pressure of each cavity, and also depending on the size of the line that they were using to bleed off the pressure.

Senator JOHNSTON. You say that that was always done previously?

Mr. LOWERY. Always done previously.

Senator JOHNSTON. Previous to what?

Mr. LOWERY. Well, previous to Gulf Interstate leaving the project. Now, one of the reasons that Gulf Interstate were finally, I think, ejected was because they made two blunders last fall which never came to the attention of the public concerning two possible major oil spills or disasters that showed what was fixing to happen, both of them being of transferring the blanket oil which Olin maintained for years prior to this time of several thousand barrels per each cavity.

Senator JOHNSTON. In other words, these cavities have been used to store oil previously.

Mr. LOWERY. They have been used previously, since about 1950. Before this time they used what they call an air blanket on top of the cavity to control leaching action when they were mining the brine. And the reason the oil had to be removed each time was that the Government didn't want to claim responsibility for the oil in the cavity, they said it was Olin's oil, so the controversy raged on, so everytime that work was done on the cavity it was Gulf Interstate's responsibility to remove the oil and transfer it to another cavity which was not being in use at the time.

In September of last year they had one major spill when a line ruptured and flowed for approximately 2 hours without anybody's

being aware of what was going on. And this spill got into Black Lake, but they were lucky, again, preventing any major disaster. They contained most of it on site. It was on top of the dome on cavern 9.

The next night, while they were cleaning up the first spill, they had another spill, the same origin, but it was on well 8. They were pumping 8 into 9 and they had another major spill.

After this time Gulf Interstate finally woke up and put check valves on each well which prevented—if any line ruptured, prevented any of the oil loss, and——

Senator JOHNSTON. Prior to that time they did not have check valves?

Mr. LOWERY. Prior to that time they did not. And we kept advising them of the danger that they were risking.

Senator JOHNSTON. Who is "we"?

Mr. LOWERY. The employees for Olin who were advising Gulf Interstate at their request when—you know, they wasn't familiar with the dome operation theirselves and they would come to us anytime they had a problem and we'd give our opinion on what should be done and how it should be done and our expertise as far as the pumpers in that area were concerned.

Senator JOHNSTON. In other words, you live on the dome and you also work for Olin and your job is to help manage this dome.

Mr. LOWERY. My job prior to this was to develop the cavities, and my family and everybody else on the dome prior to this were in charge of the mining operation for Olin, the pumping of brine to the Lake Charles facility.

Going back to the reason this thing happened is that it—they were well aware of what the possibilities of disaster were but, again, it's the timetable frame which was set up by Congress and mandated that they have to follow is the main problem for this whole operation. They knew that they had no way to get the brine out that day and they knew the risks that was involved with—just like always, they went ahead and done it without thinking.

Senator JOHNSTON. You mean, in your opinion, there is a risk not to reduce that pressure to zero?

Mr. LOWERY. There's a risk any time. It's just like going into a gas tank with a lighted torch. You're asking for trouble and——

Senator JOHNSTON. Well now, Olin managed these domes prior to the time DOE took over?

Mr. LOWERY. Since 1930.

Senator JOHNSTON. All right. Had the pressure always been reduced previously?

Mr. LOWERY. Always. Any operation concerning maintenance on these wells it's always been a policy of Olin, and still is, to reduce the pressure. And I might add that Cities Service, Citgo, which has an operation next door to Olin on 80 acres, stores the LPG and they follow the same practice. The Government seems to be the only one that deviates from the practice of safety.

Senator JOHNSTON. And in your opinion, is it unsafe ever to withdraw oil under heavy pressure, under 300-something pounds of pressure?

Mr. LOWERY. The withdrawal is not the safety factor. The safety factor is going in——

Senator JOHNSTON. I mean, removing the pipe.

Mr. LOWERY. Going in and plugging these wells and trying to work on them while you're under pressure. It's just like putting a gun to your head. You're going to—You may get away sometimes, but eventually it's going to catch up with you.

Senator JOHNSTON. Were they aware of the danger?

Mr. LOWERY. They were well aware of the danger from the prior spills.

Senator JOHNSTON. Who is "they?"

Mr. LOWERY. Graber, and everybody on the dome. And the local people kept telling them, "There's a grave danger," but——

Senator JOHNSTON. Was the DOE man present at that time?

Mr. LOWERY. I don't know where the DOE man was. It seems like they kept him away from this area so that they could get their whitewash over.

Senator JOHNSTON. Mr. Graber was aware of the danger?

Mr. LOWERY. He was. We told him time and time again, and——

Senator JOHNSTON. Who is "we?"

Mr. LOWERY. I told him, personally, previous to last fall.

Senator JOHNSTON. Tell us what you told him.

Mr. LOWERY. I told him, I said: "You have to remove this oil in a safe way." I said: "We could move—" when they were moving or transferring blanket oil. They would go in this gigantic military type operation to remove oil, which all you had to do was run one line from one cavity to the other cavity and let Olin just add the pressure and it'd flow out—free flowing. But they would go in this gigantic military operation and call all these oil companies in, B–J and all that bunch, to come in with these big pumps to take this oil out and they'd put it on a—pressurize it on a 2-inch line and that line would jump about that high above the ground in strokes of the pumps, and that damn line would start leaking after about an hour and they'd have to shut everything down and go tighten it all back up and start over.

Senator JOHNSTON. I want to know what you told Mr. Graber, though, if you recall.

Mr. LOWERY. I told him personally that, if he would let us, that we would remove his oil without any problem and——

Senator JOHNSTON. "We" being Olin?

Mr. LOWERY. Olin.

If he would, you know, let us and get it cleared, we could move it faster than what they could and a lot safer.

Senator JOHNSTON. Well, did you specifically warn him that it was dangerous to withdraw that string of pipe with the dome under pressure?

Mr. LOWERY. Not particularly on that well, no. This was another oil removal operation being conducted a year previous.

Senator JOHNSTON. Was Mr. Graber or any contractor or any DOE official, to your knowledge, aware of the danger of removing pipe out of that hole with the dome under pressure?

Mr. LOWERY. I'm sure they were, but it didn't phase them. It wasn't no concern to them. The concern to them was the time.

Senator JOHNSTON. Well, how do you know they were aware of the danger?

Mr. LOWERY. Because they've been doing it all year. If they haven't learned anything in a year, it's kind of late to find out.

Senator JOHNSTON. In other words, they had done it previously under pressure and had some oil spills.

Mr. LOWERY. One instance. In drilling into No. 8 cavern, which they added another well or two wells to each cavern to get the maximum recovery rate when they need this oil. They had to drill another well into the cavern. On entry into the cavern, they contacted Olin and wanted Olin to maintain 400 pounds of pressure on the cavern while they drilled in. Olin also had, I don't know exactly how many thousand barrels of oil, inside this cavern at the time. Upon drilling in, I don't know who the contractor was responsible for this, they did lose an amount of oil, the same type of way, drilling into the cavity. They lost their mud plug and it came back out onto the rig. And this was in the spring of the year, I'd say around April, that they did this. They were well aware of what the possibilities were. It should be a recordable accident somewhere on somebody's record.

Senator JOHNSTON. Very well.

Mr. LOWERY. To the best of my knowledge, it was between 50 and 400 barrels that they lost at that time.

Senator JOHNSTON. In your opinion, what was the cause of this accident?

Mr. LOWERY. Same thing. Drilling it under pressure without the adequate safeguards.

Senator JOHNSTON. And the adequate safeguards would have been what?

Mr. LOWERY. Well, in this instance they had to have a mud packing, but the guy in charge of the mud packing wasn't doing his job and the next thing he knew he ended up with oil at the surface. The only other safeguard would have been to remove the oil from a cavity prior to doing the drilling and drill into a brine solution and the chance of fire is a lot less.

Senator JOHNSTON. Well, he wouldn't have had to remove all the oil at that time.

Mr. LOWERY. It would have been better to remove all the oil.

Senator JOHNSTON. Well, you could have removed enough brine, could you not, to relieve the pressure?

Mr. LOWERY. Yes; you could have removed enough brine to relieve the pressure, but I don't think you could've held your mud inside the— When you drilled into the cavity, you couldn't have held your mud when you were setting your pipe, and that's what they had to do. It was a different type operation, but they still came up with the same problem. They lost oil on both these occasions.

Senator JOHNSTON. Mr. Lowery, we appreciate very much you coming forward.

Thank you very much for your testimony.

Mr. LOWERY. I appreciate it.

Senator JOHNSTON. Our next witness will be Mr. Asger "Boots" Hansen of Boots & Coots, Inc., out of Houston, Tex., who put out the fire.

We're very glad to have you here, "Boots."

Where is "Coots?"

Mr. HANSEN. I think he's feeding his horses, I imagine.

Senator JOHNSTON. You're in the fire extinguishing business. I understand you used to work for Red Adair.

Mr. HANSEN. Yes, sir.

Senator JOHNSTON. And how long have you been in this business?
Mr. HANSEN. Twenty-six years.
Senator JOHNSTON. Do you want to tell us how you put out the fire?

STATEMENT OF ASGER "BOOTS" HANSEN, BOOTS & COOTS, INC., HOUSTON, TEX.

Mr. HANSEN. Well, actually, to put it out, we put the same type of packer in the hole that came out. We inflated it and it held; of course, then, the oil quit flowing.
Senator JOHNSTON. How did you get the packer down in the hole?
Mr. HANSEN. Well, when we work on these fires we have a big long boom about 60-feet long with a hook and we run the pipe out there and hung it and we saw where the oil was coming from and just jobbed it down in there.
Senator JOHNSTON. The heat didn't melt the pipe or deform it in any way?
Mr. HANSEN. No. We had all the fire and everything pushed away from it and, with our water on it, and we just let it down in there about 8 feet and inflated it. That cut off the flow of oil, and then the rest was just for everyone to just put the foam on it and put the fire out.
Senator JOHNSTON. Have you ever heard of any other blowouts or fires occurring in salt domes?
Mr. HANSEN. Well, we haven't actually been involved in it. There was one gas storage well I think, but they just let it go ahead and deplete, just let all the gas burn out of it before they did anything, they didn't even mess with it.
Senator JOHNSTON. Mr. Hansen, do you have an opinion as to the danger of withdrawing a string of pipe from a salt dome under pressure?
Mr. HANSEN. Well, no, not really. You know, in all the wells that are drilled you have a certain amount of pressure and you have to work with it to keep the pressure in the ground, and one thing and another. These dome type of deals, or caverns, are a different situation altogether than drilling ordinary wells. Now, it no doubt would have been better to bleed the pressure off of this thing, but the way they were doing it it could be done and it has been done.
Senator JOHNSTON. What causes one of these plugs to—one of these packers—not to work?
Mr. HANSEN. Well, I believe it's just something mechanical and it's something like that is just bound to happen. We just figure it's one of those things.
Senator JOHNSTON. In other words, out of so many packers there's going to be so many that are going to fail?
Mr. HANSEN. Well, not only that, these accidents occur. Maybe you don't realize it, but we have maybe between 30 and 40 of these fires and blowouts all over the world every year. And lots of them, 95 percent of them, let's say, are human element, and in this case I really don't know. You know, you've got mechanical things and you've got human element, and something is going to happen. And that's—we don't look at it no more than an industrial accident.
Senator JOHNSTON. Mr. Hansen, what do you think would be the total cost of putting out a fire like this, fees, materials, all of that?

Mr. HANSEN. Oh, gosh. Senator, I wouldn't even make an estimate; I really wouldn't.

Senator JOHNSTON. All right. Well, have you rendered a bill yet? You're not doing it for nothing, are you?

Mr. HANSEN. No, sir.

Senator JOHNSTON. Can you tell us what the cost will be?

Mr. HANSEN. About a quarter million dollars.

Senator JOHNSTON. Other blowouts and fires do occur in salt domes, do they not? Have you ever put out one in a salt dome before?

Mr. HANSEN. Well, like I say, we had one—but they just let it deplete. It was a gas storage and they just decided to just let it deplete rather than do anything with it.

Senator JOHNSTON. Mr. Hansen, you put out a good proportion of those 30 to 40 fires that occur each year around the world, blowouts like this. What advice can you give us in the State of Louisiana where we've got a storage program and they're looking at other salt domes to store much more oil. They've got only a small portion right now. They've only got 44 million barrels stored right now, and they want to go to 200 million barrels by 1979 and 500 million barrels by 1982. In other words, they're going to get over 10 times as much by 1982 as they have now. Are these kinds of fires going to continue to occur, in your judgment—these blowouts?

Mr. HANSEN. Well, they could. It's just like anything else. It could happen more, and it sure will. It was just a matter of how long it would take for something like this to happen. I think, like everybody else, that give it back to the petroleum industry and let them do it.

Senator JOHNSTON. You think this is a very good argument for the Government getting into the drilling business?

Mr. HANSEN. No. Absolutely not.

Senator JOHNSTON. You think private industry can better manage this than DOE can?

Mr. HANSEN. Absolutely.

Senator JOHNSTON. Could you tell when you went out there to the site, that it was being mismanaged?

Mr. HANSEN. No, not at all. Every phase of our work just went real good. There's always a lot of rushing and hurrying going on the first couple days, but after that everybody settles down and we worked through Mr. Records' people and through the DOE and it wasn't any different than any other job. Everything went great.

Senator JOHNSTON. Very well.

We appreciate very much, Mr. Hansen, you coming up here. It's a very interesting business and I'd like to question you here for a long time, because you're one of the more colorful people in this country and do a great job putting out these fires, and we're glad you put out this one.

Thank you very much for coming forward.

Mr. HANSEN. Thank you.

Senator JOHNSTON. We're very pleased to have from the State of Louisiana the Secretary of the Department of Natural Resources. Mr. William C. Huls, who is accompanied by Raymond T. Sutton, who is the Assistant Secretary of the Office of Conservation.

Mr. Huls and Mr. Sutton, we're very glad to have you here.

And they're accompanied by Mr. John Camp, counsel for the State of Louisiana.

Mr. Huls.

STATEMENT OF WILLIAM C. HULS, SECRETARY, DEPARTMENT OF NATURAL RESOURCES, STATE OF LOUISIANA, ACCOMPANIED BY RAYMOND T. SUTTON, ASSISTANT SECRETARY, OFFICE OF CONSERVATION, AND JOHN CAMP, COUNSEL

Mr. HULS. Senator Johnston, I'm not happy to be here. It's kind of a sad day in our State when we come to a hearing such as this when one of our people has been killed, and I think that is the greatest tragedy of this fire.

In order for you to understand the Department of Natural Resources, I might just take a moment to explain to you the physical makeup of the regulatory process in the State of Louisiana.

In the Department of Natural Resources, there is the Conservation Commissioner who regulates the entire storage, the entire drilling to completion in all of the various petrochemical facets of the hydrocarbon industry. Louisiana is a little bit different than the Federal Government in that each person that is responsible in these different categories has to have a background in the industry in which he is going to serve. Mr. Sutton is well qualified, a petroleum engineer, many years of experience in the oil and gas industry, and one of Governor Edwards' prime requirements is that you have experience, which has been a very good requisite.

The State of Louisiana has been operating a conservation department for some 40 years. They saw fit in the beginning when they set the department up that the commissioner would be quasi-judicial. There would be no administrative review or overview or any interference whatsoever with his rulings. He will address himself in a moment to the order that he has issued. He will address himself to the manner in which his operation takes place.

Also in the Department of Natural Resources is the department or office that's called State lands. In this office we are responsible for the administration of some 5 million acres of State-owned water bottoms. It is in this capacity that we first came to know about the strategic oil storage program. This was in May of 1976. We were informed by the Baton Rouge *State Times* that the FEA was in town and that they were going to begin a storage plan.

We were contacted in March by Gulf Interstate as to what our procedure was for the leasing of lands and for the rights-of-way, and so forth. That was in March of 1977. We've had no further contact from them.

The next point of contact was, on State-owned lands only, was on July 21, 1977. We were advised that Secretary Schlesinger was coming to Louisiana to open up the salt dome at Hackberry and they were going to begin storage. Mind you, now, there was no lease agreement between the State of Louisiana and the Department of Energy. Governor Edwards, in his usual fashion of being cordial to those people that come visit our State, attended this opening and the first storage of oil in the State of Louisiana, and Commissioner Sutton also attended that event.

We were then contacted in August of 1977 by the Corps of Engineers and informed that they were doing some work at Hackberry. It would belabor the point that I'm trying to make, Senator, to read from that point of time to today and state to you from a position of the Department of Energy not having to even cope with the State of Louisiana relative to a lease agreement, coming from that point where their first position was they didn't have to pay us anything for the use of the State-owned acreage that was attributed to the dome, to a position to where they then wanted to take the dome in total fee, which is of course contrary to our law as you well know. We are not allowed to alienate the water bottoms at all. From that position to a lease agreement, which in effect takes it in perpetuity in that it is a 99-year lease, which is really contrary to our law. We have attempted to work with the DOE in every manner that we can in that fashion.

From that position, of paying us nothing for the use of the dome, to today, we have received nothing. We are in the process of negotiating a lease agreement that will pay to the State $1.2 million, but as of this date there is no agreement. And I don't mean to make anything more out of that than is there, but I want the record to show that the State of Louisiana has cooperated, I think, in a very, very fine fashion in an attempt to make this program a success.

There have been several references as to whether or not this is a good program and what is Governor Edwards' position. Governor Edwards is not so much concerned with the program as such as I think he is concerned with in what direction is this Nation going. That has more to do with his concern than the storage of a few days of crude oil. And I think that has been witnessed here this morning as to the amount of time that it takes.

So from a standpoint of no lease to a lease, we are still back almost at start. Now——

Senator JOHNSTON. In your opinion, has the Department of Energy acted efficiently and fairly with the State of Louisiana in respecting the rights of the State and seeing that you were promptly paid for acquiring the rights owned by the State?

Mr. HULS. Well, let me answer that this way, Senator.

President Carter attacked the energy problem as a moral equivalent to war and he clothed the DOE with the responsibility of getting this oil stored, so these fine young gentlemen from Washington, and I have nothing but the highest regard for them, they are brilliant young men and they respond to their responsibilities in a very fine fashion, left Washington with that in mind "get the oil in the ground" and I've heard this on occasion after occasion. The timetable was important to them and they played catchup all the time; it seems like they were always behind. We had some problems in the beginning and we will always have problems as between governments, because governments have a natural conflict and good government is just a result of working within the conflicts.

Governor Edwards was able to exact principles of understanding and in those principles of understanding we dealt with the Napoleonville salt dome, the Atchafalaya pipeline, the backup operations at New Iberia, the compensation at Hackberry, the docking facilities at St. James Terminal, the well pad construction at Bayou Choctaw, and the other 10-point we refer to it as the treaty. In that treaty with the Federal Government both parties agreed——

Senator JOHNSTON. Without reference to the details of it, have they done their part, have they lived up to their part of what ought to be the bargain?

Mr. HULS. Yes, I would say they have, with the problems that they operate under. Their problem is a simple problem. They have, and I think the word they use is "interface," between agencies. They have the Corps of Engineers, they have the Justice Department, they have the Coast Guard, all these various and myriad of agencies, put a burden upon their operations. As you can see by the various things they put up here this morning, there's no way in God's world you can operate in that fashion, and thank God they're not drilling oil wells.

Senator JOHNSTON. In other words, you're saying that they're good people, but simply because they're in Government with so many different agencies with none being specifically responsible for the overall whole coordination of the program, that simply because they're in Government they've had big problems.

Mr. HULS. Yes, sir. And with that in mind, I was contacted by one of their men in New Orleans and told of the fact that there was a possibility that they were going to begin a new approach to this problem, which was a turnkey arrangement whereby the domes would be leased. I immediately responded, and they have made this letter public so I'm sure it's all right to talk about it, immediately responded to a Mr. Bogg and told him that the State of Louisiana under this type of an arrangement would certainly be interested in the utilization of its remaining domes. Now, the reason we'd be interested there is because you have an entirely different interface between a lessee and a lessor. Even though the end result would be the same, we would be dealing with one prime contractor or one person that we would negotiate with a lease, and I can assure you that prior to the storage of the oil in that dome the State of Louisiana would be paid.

Senator JOHNSTON. Now, in other words, you're saying that there is nothing basically wrong with a plan to store oil in a salt dome so long as it's properly managed, so long as the contractors know what they're doing, so long as one person is responsible, and so long as they're able to deal as one entity with the State of Louisiana?

Mr. HULS. Yes, sir, that would be much better for us.

Senator JOHNSTON. In other words, you would support the turnkey operation that DOE described as the direction they were going in earlier today?

Mr. HULS. Yes, sir.

Senator JOHNSTON. And that would be greatly preferable as far as the State is concerned?

Mr. HULS. Yes, sir.

Senator JOHNSTON. Well, let me ask you this. Do you have any recommendations to make to us in the Senate Committee on Energy and Natural Resources as to new legislation or new rules that we should urge be adopted or any other specific recommendations that we ought to make other than to urge them to go to the turnkey operations?

Mr. HULS. Well, I would certainly not ever advocate any more legislation under any terms. I think that within the confines of what you already have designed in the strategic storage program that a different approach to its conclusion would be more in keeping and more with a removal of the interface of the regulatory people would be better, but I would have no recommendations, no, sir.

Senator JOHNSTON. In other words, if you were in my position, you would simply urge DOE to go into a turnkey operation, but at this point at least you have no recommendations for legislation or——.

Mr. HULS. No, sir. I'm really not that adept at framing legislation, but I do know that the private sector is much more responsive, because of what motivates the private sector are dollars. I think that's the tragedy in Government that the economic impact is never considered.

Senator JOHNSTON. Now, would you agree with me that DOE has been awfully highhanded in the way it dealt with private landowners, its failure adequately to compensate them, and its failure to deal with them in a sympathetic sort of way? Would you agree with that?

Mr. HULS. Yes, sir, and the reason they do that is because of the restrictions they have to operate under. It's not the DOE when it comes to the amount of money that can be paid to a landowner, it's the Justice Department. It's not the DOE when it comes to right-of-way agreements, it's the Corps of Engineers; they are the real estate people for the Government. The problem is the fragmentation of the responsibility and the constant vying for who has what to do.

Senator JOHNSTON. Competition between the various agencies——

Mr. HULS. Yes, sir.

Senator JOHNSTON [continuing]. And lack of cooperation?

Mr. HULS. Yes, sir.

Senator JOHNSTON. Very well.

Mr. Huls, we appreciate very much your testimony. Is there anything else you'd like to add,

Mr. HULS. No, sir. Mr. Sutton is here and, as I've outlined his responsibilities, he'll respond in that fashion.

Thank you.

Senator JOHNSTON. If you'd like to supplement your statement with anything in writing, we will hold the record open.

Mr. HULS. Fine. Thank you, Senator.

Senator JOHNSTON. We're glad to have you, Ray.

STATEMENT OF RAYMOND T. SUTTON, ASSISTANT SECRETARY, OFFICE OF CONSERVATION

Mr. SUTTON. Thank you, Senator.

Senator, in 1976, the legislature saw fit to pass an act giving the responsibility of the salt domes in Louisiana for the storage of hydrocarbons to the Commission of Conservation. When they wrote this act, they made the statement in the act that: The storage of oil will permit the accumulation of large quantities of such liquid for orderly withdrawal in times of greater demand. And our legislature found at that time it was in the public interest to have a supply of hydrocarbons readily available for consumption. After the passage of this act which put the authority of the regulation of these domes in the Commissioner on Conservation's office, in July 1977, I adopted rules and regulations for the handling of these domes. This was not in complete detail, but it gave the regulations for the casing programs, for the integrity of the domes themselves, and public hearings on each one of these was called, under law, to make a determination. And those three findings that were made at that time, as outlined in the act, that the area of the salt dome for injection and storage and with-

drawal was feasible, that the dome would hold it and, two, that the salt dome cavity for the storage would not contaminate or interfere with other oilfield usage and, three, that the proposed storage, including the surface facilities, were safe and environmentally would not cause disruption in the area. I made those findings.

Senator, I notice you asked the DOE many questions about their responsibility, who is responsible; unfortunately, I don't have a committee, I don't have others. I have the authority and any responsibility I have to answer for it, so we can move from that point.

We look at this situation in Hackberry on a factfinding mission of our people gathering information and, incidentally, I have called a hearing for November 8 to review our rules and regulations for the State of Louisiana to determine whether they are sufficient. What did I miss back in 1977? And as we looked at the Hackberry dome and the conditions that came up there, on the second day of this month I issued an order that before you drill into one of these cavities, before you work a well over in a cavity, that pressure at the surface will be reduced to zero and, if it is not, under State law I have the authority to discontinue the operations at the dome.

Senator JOHNSTON. Now, in your judgment, Mr. Sutton, I take it, then, it was a dangerous operation for the contractor to be removing that string of pipe under pressure?

Mr. SUTTON. Senator, it could have worked. I've looked at it, it could have worked, but it didn't. It did not work. I see some dangers in it. It's not fail-safe. I would question the mud laying on top of the oil. This is like a bartender building a pousse-cafe, trying to lay it on there. You've got to have a steady hand to put it in there and, if you miss, you've messed it up.

Senator JOHNSTON. In your judgment, would it be safe to reduce that to zero?

Mr. SUTTON. Yes, sir. Yes, sir.

Senator JOHNSTON. And all you're talking about is a small amount of delay and some additional cost.

Mr. SUTTON. It's very simple. It's very simple. I'm very familiar with drilling fluids, I've worked with them personally for years. I know what they'll do, and I would question laying the mud in on top of that oil. With the differential pressure that was there, I can understand what happened.

Senator JOHNSTON. Now, Mr. Sutton, you agree with Mr. Huls, I take it, that it would be preferable for DOE to go to a turnkey operation with private industry?

Mr. SUTTON. Well, I have not reviewed the management of the dome itself. I do know one thing, industry knows how to handle these jobs. I do know this. I don't have that confidence in those that are in DOE, because I just don't know them.

Senator JOHNSTON. Are you satisfied that your department has sufficient power under the law to oversee the operation of DOE?

Mr. SUTTON. Under State law, Senator, I am confident we have the authority to handle this situation, or any other situation.

Senator JOHNSTON. And you are not concerned about any Federal law overriding you?

Mr. SUTTON. Well, you're always concerned about a Federal law overriding you, Senator, but as I see it, DOE, operating in the State of Louisiana is no different than anyone else operating in the State.

Senator JOHNSTON. I certainly agree it ought to be that way. What I'm asking really is, Would you suggest any particular amendment that I ought to put in on the law to give you more power, or do you feel like you have sufficient power?

Mr. SUTTON. You've asked a legal question, Senator, and as far as what my responsibilities are under the law, let me check with counsel on this just a moment.

Senator, it might be beneficial if it were in Federal law that those operating in the State would operate under State law.

Senator JOHNSTON. I would appreciate it very much if you would give me a letter on that, John. We'd also like to hold this record open for that as well.

It seems to me that, if we don't have that power now or it's not clearly spelled out, we ought to have it.

Mr. SUTTON. Well, I accept it as implied power that the Commissioner of Conservation has that authority now to enforce the rules and regulations that he promulgates.

Senator JOHNSTON. Very good.

In your judgment, what caused this accident, from what you know?

Mr. SUTTON. What caused it? Well, No. 1, the packer that was in the tubing, it giving way. When it gave way, the differential in the pressure from the annulus into the 5½, and I'm of the opinion and I'll be holding a hearing to gather more information on this, Senator, that when that mud started moving from the annulus through that differential, that 400 pounds that was there, started moving around, it picked up the oil, lightened the mud that was inside the casing or the tubing, and brought the well in. You must remember at this depth, shallow depth on the order of 3,000 feet, that there's only about 60 or 65 barrels of mud inside that tubing and it doesn't take long to unload it.

Senator JOHNSTON. So, in other words, instead of having a column of mud 3,000 feet long, you've got a column of——

Mr. SUTTON. Once it started feeding in, I'm of the opinion it picked up oil and lightened that, with the pressure on the formation or on the dome itself, brought the well in, or brought the oil in.

Senator JOHNSTON. And you say that the driller's got to really know what he's doing, sort of like somebody making a pousse-cafe, in order to keep that mud in there——

Mr. SUTTON. Yes; and you're working in such a big area, I would question that layer of mud laying on top of that oil, will it strain down through the difference in the density of it, and as I understand it viscosity was built up on the mud system to make it stay there. We don't know whether it did or not.

Senator JOHNSTON. Gentlemen, we appreciate very much your testimony.

Is there anything either one of you would like to add?

Mr. SUTTON. No, Senator. Again, we look at ourselves. We'll be calling this hearing on November 8 to review our rules and regulations, to see what we've missed, and we're going to beef it up, too.

Senator JOHNSTON. Thank you very much, Mr. Huls and Mr. Sutton.

[Subsequent to the the hearing the following information was submitted for the record:]

CAMP, CARMOUCHE, PALMER, BARSH & HUNTER,
Lake Charles, La., November 27, 1978.

Senator J. BENNETT JOHNSTON,
Senate Energy and Natural Resources Committee, Dirksen Senate Office Building, Washington, D.C.

DEAR SENATOR JOHNSTON: As a member of the Senate Committee on Energy and Natural Resources and the Subcommittee on Energy Production and Supply, you sponsored a public field hearing in Lake Charles, Louisiana on October 7, 1978 to investigate the cause of the fire at the Strategic Petroleum Reserve Program's oil storage facility at the West Hackberry salt dome, to determine if the federal government was operating in a safe manner and to gather information for future decisions on the storage of oil salt domes.

As special counsel for the Department of Natural Resources of the State of Louisiana and in accordance with your request for a letter that the Department of Energy must operate in accordance with the laws of Louisiana, I respond as follows:

Although the supremacy clause of the United States Constitution, Article VI, clause 2 makes it clear that the authority of the United States of America is the supreme law of the land and that every state shall be bound thereby, this clause is applicable only when a state law conflicts with the valid federal law. *Ranjel* v. *City of Lansing*, 417 F. 2d 321 (6th Cir. 1969), cert. denied, 90 Sup. Ct. 1105, 397 U.S. 980, 25 L. Ed. 2d 390, rehearing denied, 90 Sup. St. 1352, 397 U.S. 1059, 25 L. Ed. 2d 680 (1970).

The Department of Energy must recognize that our State's rules, regulations and laws are designed to protect the public safety and environment and it must be emphasized that private industry have for many years worked in accordance with our laws.

For federal regulations to preempt state law, the federal regulations must be themselves constitutionally valid and must be constitutionally enforced. *United States* v. *City of St. Louis*, 452 F. Supp. 1147 (E.D. Mo. 1978).

The United States Supreme Court held that, in determining whether federal law preempts contrary state statutes, the proper approach is to reconcile the operations of both statutory schemes with one another rather than holding one completely ousted. *Merrill Lynch, Pierce, Fenner & Smith, Inc.* v. *Ware*, 94 Sup. Ct. 383, 414 U.S. 117, 38 L. Ed. 2d 348 (1973). The State of Louisiana desires to work with the federal government and the Department of Energy in order to accomplish the Congressional goals mandated for the Strategic Petroleum Reserve, but such goals should not be attained by sacrificing the standards for safety established by the legislature of Louisiana. The State of Louisiana wishes to expedite the Department of Energy's program and the attitude shown by our State in the February 27, 1978 instrument between the State of Louisiana and the United States of America, Department of Energy, through John O'Leary, Deputy Secretary, is still one of cooperation. Neither the federal government's nor the State of Louisiana's "statutory schemes" need be "completely ousted" to accomplish the goals of the Strategic Petroleum Reserve.

At various public hearings, officials of the Department of Energy have stated that it is their intention to comply with all applicable rules, regulations and laws of the State of Louisiana. In fact, those officials have obtained permits from the State for various aspects of their operations. However, the Department of Energy has made it clear that these permits are obtained as a matter of courtesy and that they do not concede the necessity therefor nor the jurisdiction of the State over their operations.

It is recommended by the State of Louisiana that the United States Congress pass legislation requiring that the Department of Energy, in implementing the Strategic Petroleum Reserve Program, follow all statutes, rules and regulations of the State of Louisiana and its local governing bodies which are not in conflict with federal statutes, rules or regulations.

Yours very truly,

JOHN C. CAMP.

Senator JOHNSTON. Our next witness is Mr. Guy Watkins, president of the Louisiana Chemical Association, of Baton Rouge, La. He is also general manager of the Dow Chemical Co.'s Louisiana Division.

Mr. Watkins.

STATEMENT OF GUY WATKINS, PRESIDENT, LOUISIANA CHEMICAL ASSOCIATION, BATON ROUGE, LA.

Mr. WATKINS. Senator.

Good afternoon, members of the subcommittee.

My name is Guy Watkins. I am general manager of the Dow Chemical Co.'s Louisiana Division and president of the Louisiana Chemical Association.

I have with me here Mr. Dare Campbell from our Plaquemine operations whose primary responsibility is the design, construction, and operation of our solution mining facilities in which we produce salt brine for chemical production. This creates cavities in the salt dome which are then utilized for the storage of other raw materials and products, mostly hydrocarbons. Mr. Campbell has over 22 years of experience in the solution mining area.

Back to the LCA. The LCA collectively, and most of its individual members, has supported the basic concept of storing a reasonable amount of crude oil to be used in the event of a national emergency. We have also agreed with the DOE that salt domes, if designed and used properly, are the safest and most economical method of producing storage in the quantities needed to mitigate a major impact on the national oil requirements in case of an interruption of outside supplies. At the same time, we have objected to the way the DOE has proceeded to implement the SPR program. Our principal objections are:

1. The timetable that has been set which is unrealistic and has caused major disruptive and uneconomical events to take place, both here and in Texas, and

2. The displacement of private industry from salt domes that have been and still are being used for raw material, salt, and product storage.

For more than 2 years there has been an ongoing dialog between the Department of Energy and Dow Chemical concerning the plans for the program. I personally have been involved in much of this dialog.

In Dow's discussions with the DOE and in hearings related to this subject, both Dow and the LCA have many times disagreed with the methods that have been used to obtain storage facilities; we have been critical of the location of specific storage sites under consideration; we have expressed our concern that sufficient technical expertise may not be available to adequately staff and operate the storage program; and we have stressed that more attention must be given to the impact any given storage site may have on the people, the communities, and the industries involved.

The explosion and fire at the West Hackberry dome has highly raised the anxieties and concerns that we have had from the beginning about having a group that has demonstrated so little regard for the rights of others coming into the Napoleonville salt dome to operate such a program. I might add that Dow decided years ago that the procedures used at Hackberry which led to that tragedy would never be used on Dow product storage cavities.

Senator JOHNSTON. Let me interrupt at that point, Mr. Watkins. We have your written statement which I'd like to put in the record at this point. I'd like to ask you a few questions, though, which I think are very well dealt with in your statement that I'd like to highlight.

First of all, you objected to the timetable of DOE. What kind of timetable do you think would be proper? Do you have any specific advice as to what kind of stretchout they ought to have?

Mr. WATKINS. Well, Senator, just considering the magnitude of the storage volumes and having some idea of how long it takes to adequately prepare new cavities, which they're going to require doing this, at least the initial timetable was just very unrealistic and I think they've proven that. Now, they keep changing the objective of the program; first, it was only a half a billion barrels and now I understand it's up to 1 billion barrels, and that's almost an incomprehensible volume, frankly. So, we haven't personally tried to see what would be required to develop adequate, safe, economical storage for those volumes. We have been more concerned with what we think, what we know, are DOE's goal and aim in our own particular environment, which happens to be the Napoleonville dome.

Senator JOHNSTON. What you're saying with respect to the timetable is that it was much too fast, they were put under much too much pressure to rush this program through?

Mr. WATKINS. That's certainly our belief.

Senator JOHNSTON. All right. Second, you say private industry was displaced. Now, do I take it from that that you would recommend the turnkey operation?

Mr. WATKINS. Well, that certainly, I believe, would have facilitated and eased situation.

Senator JOHNSTON. In future dome storage, should they go to turnkey, in your judgment?

Mr. WATKINS. Yes; I think that would certainly be the most appropriate way, the most economical and safest way to do it, but I'd like to make sure you understand what I mean by turnkey.

Senator JOHNSTON. Yes. Would you explain that?

Mr. WATKINS. Because we talk about private industry. Well, the contractors which are currently being employed by the DOE, they're certainly private industry, but they act today under the direct supervision of DOE. And my definition of turnkey is that private industry is given a contract for the whole job and that the DOE is concerned with results and not methods.

Senator JOHNSTON. In other words, by the whole job, you'd say:

I want so many barrels of oil in such-and-such a location, with the ability to deliver that to me within such-and-such a time, and you have it in the ground within such-and-such a time, and the question of how to do it is left up to the contractor totally.

Is that what you mean?

Mr. WATKINS. That's correct. I think, for instance, in the State of Louisiana Commissioner Sutton has made it quite clear.

Senator JOHNSTON. Very well.

Now, Dow has stored inflammable and noxious liquids in salt domes for many years; have they not?

Mr. WATKINS. Well, noxious is not a word I would employ, but we certainly have stored flammable materials in salt domes; yes. Crude oil is pretty noxious, I guess; so, OK.

Senator JOHNSTON. Have you had any blowups?

Mr. WATKINS. No.

Senator JOHNSTON. No burns, and no fires, and no nothing?

Mr. WATKINS. No.

Senator JOHNSTON. In other words, you don't think this is inherently that dangerous an operation?

Mr. WATKINS. No, sir, I don't believe it is. Dow pioneered in this whole field in the United States back in the late 1940's and we haven't had problems of this nature; we've certainly had problems, but nothing that has endangered life, limb, and property, especially other people's property.

Senator JOHNSTON. In your judgment, is it unsafe to drill or to withdraw a string of pipe, rework the well, with a differential in the pressure?

Mr. WATKINS. Since the early 1950's it has been Dow's policy, since we started these wells for that matter, we would not operate using those procedures. We have always——

Senator JOHNSTON. What procedure do you use?

Mr. WATKINS. We equalize the pressure so that there is zero pressure on the surface and the annulus or the brine or whatever the product is before workover or procedures of that nature take place.

Senator JOHNSTON. And Dow has done this since the early 1950's?

Mr. WATKINS. That's correct.

Senator JOHNSTON. And that is always your policy?

Mr. WATKINS. Yes, sir.

Senator JOHNSTON. Do you know of other companies that also store crude oil in domes?

Mr. WATKINS. I know many other companies do; in fact, they're stored in the Napoleonville dome, which I keep coming back to.

Senator JOHNSTON. What procedure do they use? Do they also always equalize the pressure?

Mr. WATKINS. Let me defer to my technical expert.

Mr. CAMPBELL. I don't know as a fact, Senator, about the other people, but the general pattern that I have seen, in talking to people, and in the experience in which they have done this work, they will take the pressure off. I cannot say it's done in every instance, but I know that most of the operation on the Napoleonville salt dome has been done that way.

Senator JOHNSTON. In your judgment, Mr. Watkins, is it unsafe to do it as DOE was doing this and having a differential?

Mr. WATKINS. The facts speak for themselves, Senator.

Senator JOHNSTON. In other words, it's taking a chance and, when you take a chance like that, accidents are going to happen.

Mr. WATKINS. Well, I heard that incident described as an "industrial accident" and, of course, being in industry, I'm sensitive to that sort of thing. When a procedure is well known, even though it may take some time, that would avoid even that possibility, our policy is not to take shortcuts, and as in this case that shortcut had tragic consequences.

Senator JOHNSTON. Mr. Watkins, if we turned over, say, to Dow, as a turnkey contractor, first of all, could you do it as cheaply as DOE is doing it, or more cheaply?

Mr. WATKINS. Senator, that depends on the nature and extent of the program that you would want Dow or any other company to undertake. A Mr. Ferguson of the DOE set around a letter soliciting interest of various private companies to participate in this program and he

outlined the scope that would be, well, just tremendous, involving the purchasing, the transporting, the delivery to storage sites, providing the storage sites, taking the oil out and putting it into the transcontinental oil line systems at the rates they need and on some sort of schedule that would be required, say, in case of emergency or any other volatile change. That would be a tremendous program for a private company, and they wanted that done on a per barrel rate. For a private company to purchase a billion barrels of oil, just to start with, I'm sure you can appreciate the magnitude of such effort. But it could be broken down into pieces that private companies could handle.

Senator JOHNSTON. I understand they could handle it, but I'm talking about the cost. Can private industry do it as cheaply as the Government, in your opinion?

Mr. WATKINS. Without question.

Senator JOHNSTON. It would surprise me greatly if the Government could do something cheaper than private enterprise. But you would concur that they could not. I mean, that private industry would be cheaper.

Mr. WATKINS. I'm positive of that, based on history, if nothing else.

Senator JOHNSTON. I also notice, of course, in your statement that you talk about the Napoleonville dome and how disastrous it would be to use that kind of storage in the Napoleonville dome with DOE in operation of that Napoleonville dome, and, of course, we've been working with you for a long time on that. I very much agree with you and we're going to try to continue to preserve the Napoleonville dome for private industry. There are about 5,000 jobs involved with the Napoleonville dome; I think eight companies are involved.

Mr. WATKINS. Twelve.

Senator JOHNSTON. Twelve companies are involved. I think this accident shows that we shouldn't store that oil in populated areas, and the Napoleonville area, of course, is a populated area.

Mr. WATKINS. That is certainly true, Senator, and we would appreciate your efforts in that regard.

Senator JOHNSTON. We will continue to work with you on that.

Have you heard about the plan of DOE to store oil in the Weeks Island dome?

Mr. WATKINS. Yes, I have. I've read their environmental impact statement and I've read GOA's report.

Senator JOHNSTON. You're not personally familiar with that?

Mr. WATKINS. No, sir. There's some gentlemen in the crowd who are intimately acquainted with that program and involved and concerned in that area.

Senator JOHNSTON. We're going to get into that at another time. I just thought since you were here that I was going to ask you. Let me say that I am very concerned with what I know about it because, as I understand it, they would store the oil at a level above a salt mine with men actually working in the salt mine with oil stored above them, which sounds absolutely incredible to me.

Mr. WATKINS. It would bother me as a salt miner.

Senator JOHNSTON. Very good.

Do you have anything to add, Mr. Watkins?

Mr. WATKINS. I would just like your permission to add for the record some correspondence which I think is pertinent and relevant. You are involved in that. In fact, some of it——

Senator JOHNSTON. Yes, I have copies of that and your entire statement together with the correspondence will be included, and I can assure you that we will redouble our efforts to keep private industry in control of the Napoleonville salt dome. I think it would be a tragedy to do otherwise. We'll stick with you on that.

Mr. WATKINS. Thank you very much.

Senator JOHNSTON. Thank you very much, Mr. Watkins.

[The prepared statement of Mr. Watkins follows:]

STATEMENT OF GUY WATKINS, PRESIDENT, LOUISIANA CHEMICAL ASSOCIATION, BATON ROUGE, LA.

My name is Guy Watkins. I am general manager of the Dow Chemical Company's Division and president of the Louisiana Chemical Association.

I have with me Mr. Dare Campbell from our Plaquemine operations whose primary responsibility is the design, construction and operation of our solution mining facilities in which we produce salt brine for chemical production. This creates cavities in the salt dome which are then utilized for the storage of other raw materials and products. Mr. Campbell has had over 22 years of experience in the solution mining area.

The LCA collectively, and most of its individual members, has supported the basic concept of storing a reasonable amount of crude oil to be used in the event of a national emergency. We have also agreed with the DOE that salt domes, if designed and used properly, are the safest and most economical method of producing storage in the quantities needed to mitigate a major impact on the national oil requirements in case of an interruption of outside supplies. At the same time, we have objected to the way the DOE has proceeded to implement the SPR program. The principal objections are:

(1) The timetable that has been set which is unrealistic and has caused major disruptive and uneconomical events to take place, and

(2) The displacement of private industry from salt domes they have been and still are using for raw material salt and product storage.

For more than two years there has been an ongoing dialogue between the Department of Energy and Dow concerning the plans for the program. I personally have been involved in much of this dialogue.

In Dow's discussions with the DOE and in hearings related to this subject, both DOW and the LCA have many time disagreed with the methods that have been used to obtain storage facilities; we have been critical of the location of specific storage sites under consideration; we have expressed our concern that sufficient technical expertise may not be available to adequately staff and operate the storage program; and, we have stressed that more attention must be given to the impact any given storage site may have on the people, the communities and the industries involved.

The explosion and fire at the West Hackberry Dome has highly raised the anxieties and concerns that we have had from the beginning about having a group that has demonstrated little regard for the rights of others coming onto the Napoleonville salt dome to operate such a program. I might add that Dow decided years ago that the procedures used at Hackberry which led to the tragedy would never be used on Dow product storage cavities.

It seems to us that changes must take place if the program is to be both safe and viable. We offer these thoughts in that light:

(1) Alter the rigid timetable under which the SPR is being developed. Slow the program down to a more realistic pace.

This would allow proper planning thus avoiding or at least minimizing the risk to people and property and minimizing the impact on existing industries and the communities involved.

2. Utilize salt domes for the SPR that are not presently in use by industry and are in isolated and unpopulated areas where incidents such as the one that took place at West Hackberry will have a minimal impact.

A prime example of the havoc that could be caused involved the Department of Energy's present plan to store large quantities of oil in the Napoleonville salt dome. There are twelve companies which have operations on the Napoleonville salt dome. These companies are Dow Chemical, Getty Oil, Placid Oil, Hooker Chemical, Vulcan Chemicals, Georgia-Pacific, Texas Brine, Union Carbide, Gulf Oil Chemicals, Shell Chemical, Mobil Oil, and Union Oil of California.

This dome is presently being used as a source of brine and/or product storage by a number of these companies. The facilities in place and planned are vital to the operations of these companies and have a major economic impact on this and the nation as a whole. The area on the dome that is presently undeveloped is planned for future industry reserve of extremely important raw materials. In this regard the Napoleonville salt dome is unique in its structure and salt quality for this purpose.

The combined operations of the companies involved provide employment for over 5,000 persons with an annual payroll of over $97 million. Three of these companies alone transact close to $180 million worth of business each year with local and area business firms.

Many of these firms' sole source of raw material is supplied by some of the previously enumerated companies which, in turn, is produced from products made from Napoleonville brine. Most of these companies are the major tax base of the communities in which they exist.

As a further example of the magnitude and multiplying effects of the enumerated chemical companies operations on the Napoleonville dome is that the brine from that dome is used to produce 52 percent of all the chlorine manufactured in Louisiana and 16 percent of all the chlorine produced in the United States. Any disruption of those activities would have serious social, economic, and commercial effects on the employees, companies, and communities involved as well as the State of Louisiana and a significant portion of the U.S. economy.

Also equally significant, if not more so, is the effect that a problem such as the West Hackberry incident would have on residents in that area had it taken place at Napoleonville.

People are living within 3,000 feet of the area that the DOE is planning on locating their activity. The homes and families of these people, as well as plant facilities housing the employees of several companies, are located in this area. A repeat of the West Hackberry experience would put the lives of these residents and employees in grave danger. Additionally, such a happening would force the shutdown of the brine supply to several plants and jeopardize the inventory of hydrocarbons presently stored in this area.

(3) Obtain or train and use properly qualified people to plan and implement the needed procedures. Remember that the area of salt dome operation is a totally different thing from oil field operations and because a person is well qualified to operate in the oil patch, does not necessarily mean they are qualified to operate on a salt dome.

The benefits of the Strategic Petroleum Reserve at the time it was conceived seemed positive and needed; however, the risks to life and property inherent in the way the program is being operated may well outweigh the benefits.

With these things in mind, we urge that the DOE step back and take another, more realistic look at the program, implementing a timetable and procedures that will allow the utilization of storage facilities that will have the least negative impact on the people, the industry, and communities involved, both from a safety and economic point of view.

Thank you, Mr. Chairman, for allowing us to be here to again express our grave concern over the direction the DOE has taken in implementing the Strategic Petroleum Reserve Program.

If there are any questions, either Mr. Campbell or I will attempt to answer them.

U.S. SENATE,
Washington, D.C., January 25, 1978.

Hon. DALE D. MYERS,
Undersecretary, Department of Energy,
Old Executive Office Building,
Washington, D.C.

DEAR MR. SECRETARY: This is a follow-up to the meeting with you regarding the use of the Napoleonville salt dome by the Department of Energy for strategic petroleum storage. As you will recall, the companies presently using the dome are Dow Chemical, Getty Oil, Placid Oil, Hooker Chemical, Vulcan Materials, Georgia Pacific, Texas Brine, Union Carbide, Gulf Oil Chemicals, Shell Chemical, Mobil Oil, and Union Oil of California.

In November, 1977 we learned that a draft Environmental Impact Statement, DES 77-9, Capline Group Salt Domes, had been completed in September. The statement spelled out in a comprehensive manner the physical plans and environmental effects of utilizing the Napoleonville salt dome as a storage reservoir for

the Strategic Petroleum Reserve. Considering the fact that the four storage sites currently possessed by the SPR have all been acquired for condemnation, the belated knowledge of the existence of EIS, DES 77–9 caused great concern among the companies operating on the Napoleonville dome.

Because of this concern, Mr. Carlyle Hystad was invited to come to Louisiana to bring this group of companies up to date on his plans and the status of the SPR program as it exists so far. This he did on January 4, 1978.

The facts as we understand them from Mr. Hystad are as follows:

Three domes in southern Louisiana on the Capline system are being considered for phase two of the storage program. Due to the urgency of the program, the storage capacity schedule necessitates the taking of existing caverns. The EIS plus additional comments by Mr. Hystad make it obvious that the Napoleonville dome was the best technical and logical choice of the three. Mr. Hystad stated further that Economic Impact Assessment Studies would begin immediately so that the final decision for the taking of the dome could be made by late April, 1978.

We would like to point out several facts for your consideration in evaluating the possible selection of the Napoleonville dome. There are no inactive cavities on the dome. All are in commercial use, either as a source of brine or as hydrocarbon or chemical storage. Although the exact storage capacity of the dozens of cavities in the dome is not known, it is known to be in the order of magnitude of the volume required as stated by Mr. Hystad. Consequently, it has been assumed that if Napoleonville is taken, the whole dome operation would be affected adversely. Furthermore, there can be no viable alternatives for brine and storage available to the affected companies for the foreseeable future due to the EPA position on virgin domes in the wetlands. In the case, plants would have to shut down, some totally, some partially. The socio-economic effect on only those companies would be extreme. The combined Louisiana operations of the enumerated companies, including maintenance and construction function, currently is providing employment for over 50,000 persons with an annual payroll over $97 million. Three of these companies alone transact $180 million worth of business annually with local and area business firms. Many of these firms' sole source of raw material is supplied by some of the enumerated companies which, in turn, is produced from products made from Napoleonville brine. Most of these companies are the major tax base of the communities in which they exist.

A further example of the magnitude and multiplying effects of the enumerated chemical companies operations on the Napoleonville dome is that the brine from that dome is used to produce 52 percent of all the chlorine manufactured in Louisiana and 16 percent of all the chlorine produced in the United States. Any disruption of those activities would have serious social, economic, and commercial effects on the employees, companies and communities involved, as well as the State of Louisiana and a significant portion of the U.S. economy.

The structure of the Napoleonville dome and the quality of its salt are both excellent for the manufacture of chlorine and the subsequent storage of high purity chemicals and hydrocarbons. On this latter point, it is estimated that over $150 million worth of hydrocarbons and high purity chemicals are presently stored in Napoleonville caverns which over the last twenty years have been brined especially for this purpose. In a sense many of the companies have their own strategic energy reserve in this dome. Furthermore, crude oil can be stored in salt domes for low or unknown quality while high purity domes, such as Napoleonville, should be reserved for high purity chemicals. It should also be pointed out that the Napoleonville dome represents the irreplaceable and invaluable long term salt reserves of the several chlorine producing companies.

In closing, we believe that the severe and adverse economic impact on the enumerated companies, their employees, communities and customers which would result from any disruption of their activties on the Napoleonville dome are obvious and do not need long, costly assessment studies for either verification or of magnitude.

Thank you for your attention to this urgent matter.

Sincerely,

J. Bennett Johnston,
U.S. Senator.
Russell B. Long,
U.S. Senator.
David C. Treen,
Member of Congress.
Gillis Long,
Member of Congress.

U.S. SENATE,
COMMITTEE ON APPROPRIATIONS,
Washington, D.C., March 7, 1978.

Mr. GUY WATKINS,
General Manager, Dow Chemical, U.S.A.,
Louisiana Division, Plaquemine, La.

DEAR GUY: I have attached a copy of the response from Dale Myers regarding my letter to him on your behalf concerning the Napoleonville salt dome.

I know you will be pleased with his reply and I would appreciate it if you would notify all concerned with the decision.

If I can be of assistance to you in any other matter, just ask.

With kindest regards and best wishes,

Sincerely,

J. BENNETT JOHNSTON,
U.S. Senator.

Enclosure.

DEPARTMENT OF ENERGY,
Washington, D.C., March 2, 1978.

Hon. J. BENNETT JOHNSTON,
U.S. Senate,
Washington, D.C.

DEAR SENATOR JOHNSTON: Thank you for your letter of January 25, 1978. I appreciate your efforts to inform us of the concerns of the companies currently operating at the Napoleonville salt dome.

Napoleonville is one of three new sites in the Capline area under consideration for Strategic Petroleum Reserve (SPR) storage. The other two salt domes being analyzed are Iberia Dome in Iberia Parish, and Chacahoula Dome in LaFourche Parish. In addition, expansion of two current SPR sites, Bayou Choctaw and Weeks Island, is also being evaluated. All five sites are regarded as alternatives for expansion of the Reserve in the Capline/St. James area beyond the initial 250 million barrels (MMB) and are currently undergoing the Environmental Impact Statement (EIS) process. The initial plans presented in the EIS are designed to illustrate potential development of a site in order to permit a meaningful environmental assessment, and should not be considered as a final decision regarding the Department's intent to use the site or to reflect decisions on the extent or nature of such use.

At the January 4, 1978, meeting in Plaquemine, Louisiana, Mr. Hystad, the Program Director, informed the operators at the Napoleonville salt dome that the SPR would not utilize that site for SPR storage unless we could work out arrangements to avoid any serious disruption of current or planned brine production or storage activities at that site. We are aware of the importance of this particular dome to the chemical industry in Louisiana.

It is true that the four sites which have been selected for the SPR were acquired through condemnation, although in one instance this was merely to perfect title, following successful negotiation of a purchase agreement. The time provided for site acquisition and construction of the infrastructure required to initiate fill to achieve storage of 250 MMB by the end of 1978 was extremely limited. This tight timeframe prohibited effecting fully negotiated agreements with all owners and leaseholders at these sites. While the SPR had no realistic alternative other than condemnation, we worked out extensive arrangements with the operators at the sites to permit them to continue their brining and/or mining activities, to avoid any adverse economic impacts on these companies and surrounding communities.

At Bayou Choctaw, the SPR modified property lines to acquire the minimum salt buffer required around each cavern. We did not acquire the surface area on which an Allied Chemical Company processing plant is located. Two caverns, with a combined capacity of 20 MMB, were deleted from the Declaration of Taking to minimize any disruption to Allied's ongoing ethylene and ethane storage operations at Bayou Choctaw. The SPR has also assured Allied an adequate supply of brine to maintain their brine commitments to other companies through December of 1980, while they develop new caverns at Bayou Choctaw to support their brining operation.

At West Hackberry, we limited the property acquired to leave sufficient salt reserves for Olin Chemical Corporation to permit it to continue to meet its brine supply commitments.

The SPR did successfully negotiate a purchase agreement with the Morton Salt Company for the acquisition of the Weeks Island site; this was followed by a condemnation action for purposes of perfecting the Government's title. When the SPR acquired Weeks Island, the minimum volume of salt required to implement storage was taken so that Morton Salt Company would have adequate space to develop a new mine. We did not acquire the existing processing plant and agreed to take a minimum amount of surface area. The SPR agreed to permit Morton Salt to continue mining the existing mine through this spring (or longer if the SPR schedule permits) as Morton begins developing a new mine to avoid a shutdown of their operations. Morton has joint use of a portion of the current production shaft for up to five years.

SPR staff now are studying whether some portion of the Napoleonville salt dome could be used for the SPR without disrupting commerical operations. Individual discussions have been conducted with each of the companies which were represented at the January 4, 1978, meeting in Plaquemine. The purpose of these follow-up discussions is to collect specific information on existing acreage, capacities and uses of existing caverns, and future development plans for portions of the dome which are currently unused.

Examination of the individual components of the Napoleonville operation has been useful. It now appears that it may not be feasible to develop up to 150 MMB of capacity at the site within the timeframe required for the SPR program. There are a few large existing caverns on the dome, however, that appear to be too large for storage use for any purpose other than the SPR. It also may be feasible for the operators of those caverns to develop new caverns on the dome as alternative sources of brine supply. Over a period of 18 months to 2 years, it may be feasible for these firms to phase out brining operations in these few large caverns and begin new caverns for brine supply, in order to free up those caverns for the SPR.

We plan no further study at this time of the possibility of Government development of new capacity at the Napoleonville dome for the SPR. We will, however, be holding further discussions with one or two of the companies regarding potential use of a few of the existing large caverns, to determine if these could be used without impacting current or future brine production or commercial storage at the dome.

We will be happy to discuss this matter with you or your staff in more detail, if you wish.

Sincerely,

DALE D. MYERS,
Under Secretary.

Senator JOHNSTON. Our final witness of the day will be Mr. Michael Tritico with the Ecology Center of Louisiana, of New Orleans, La.

Will you please identify yourself and the Ecology Center, Mr. Tritico, for those who are not familiar with you?

STATEMENT OF MICHAEL TRITICO, ECOLOGY CENTER OF LOUISIANA, NEW ORLEANS, LA.

Mr. TRITICO. My name is Michael Tritico and I am here representing two groups; the statement has two portions. The first portion of the statement is from the Ecology Center of Louisiana, which is based in New Orleans and operates as a sort of a nucleus for the various local environmental groups. One of the local environmental groups in Louisiana is RESTORE, which is based here in southwest Louisiana, and I'm the president of that group. That will be the second portion of the statement.

The first portion of the statement was compiled by Mr. Ross Vincent; I'm speaking on behalf of Mr. Vincent in this portion.

Senator JOHNSTON. If you have a written statement, let's put the written statement in the record, and if you would summarize the chief points of that we would appreciate it.

Mr. TRITICO. The members of the Ecology Center are interested in energy development and adverse impact on wetlands, they wonder whether or not the program is cost effective, the Ecology Center very early raised the question whether or not the program was proceeding too fast, they didn't have time to review all the materials, the fire at Hackberry illustrates how accidents that couldn't happen can and will happen. The fortunate thing was that the wind was favorable, the spilled oil was effectively contained, the next time we may not be so lucky. The wetlands have already suffered extensive deterioration. It's encouraging that public officials and citizens are becoming aware of the need to protect wetland resources. And thank you for the opportunity to present the views. That's about as quick as I can summarize that.

Senator JOHNSTON. That was very quick. And that's from Ross Vincent?

Mr. TRITICO. That's from Ross Vincent.

Senator JOHNSTON. He is president of the Ecology Center.

Mr. TRITICO. Yes, he is.

Senator JOHNSTON. Let me ask you this from the standpoint of the Ecology Center. They are concerned about the program going too fast, as Mr. Watkins was, the previous speaker. Are they still concerned about that?

Mr. TRITICO. Yes.

Senator JOHNSTON. All right.

The second question. In your judgment, how much damage has been done to the wetlands by virtue of this fire?

Mr. TRITICO. In my personal judgment, very little, if any.

Senator JOHNSTON. Very little, if any?

Mr. TRITICO. Yes.

Senator JOHNSTON. All right.

Why don't you go ahead and complete your statement and then I'll ask you questions.

Mr. TRITICO. OK. This one if I try to summarize it'll become harder to follow so, if you don't mind, it's only three pages.

Senator JOHNSTON. Fine.

Mr. TRITICO. I'll read it and it'll be a little clearer.

This is the RESTORE portion of the statement. [Reading:]

In correspondence with Federal Energy Administration and then Department of Energy officials, RESTORE has supported the concept of the Strategic Petroleum Reserve because we believe that the Program could provide extra time for the President to study an emergency oil shortage situation and react in a more efficient way, less subject to the pressures of energy supply and demand. Our greatest concern in that situation would be that an oil shortage, whether induced by exorbitant demand, by Arab, oil company, or State Government embargoes, or by a takeover of oil supplies by hostile groups, could lead to a nuclear war, a war which would be the greatest environmental disaster possible, one which would turn this entire planet into a hell for several generations of survivors, should there be any survivors.

RESTORE had several questions earlier, in the planning stages of the SPR Program, questions on the necessity of certain pipeline construction, necessity for land expropriation and homeowner displacement, questions on the ecological hazards which could become a consequence of oil transportation and storage as well as possible ecological damages which could result from improper brine disposal plans. Although the Environmental Impact Statement addressed most questions adequately and although we decided not to press others since the overall importance of the Program outweighs the potential adverse effects, the recent

blowout and fire and 30,000 barrel oil spill raises some new questions and forces us to ask for a reexamination of the assessment of probabilities which is a basic part of the Environmental Impact Statement, especially in Chapter 3 (Environmental Impact of the Proposed Action) and in Chapter 4 (Probable Adverse Environmental Effects Which Cannot Be Avoided After Application of Mitigating Measures). Additionally, the Section on Safety Precautions (1.4.2) has been shown to be inaccurate in several places; for example, there was a statement that only 100 barrels of oil could escape from the dome if a wellhead should be damaged. It was to be expected that experience would point out some defects in the Environmental Impact Statement and in the various Program implementation procedures. What is discouraging is the apparent degree of error involved in the projections of the potentially adverse events which could have and, in fact, have occurred, both during construction of the pipeline and during the filling phase. Credibility of the remainder of the Environmental Impact Statement is automatically lessened by these errors. Credibility of the Statement can be restored only by a thorough investigation and public explanation of all factors which contributed to the discrepancies between the Statement and what has actually happened. The loss of human life is a measure of the seriousness of the deficiencies which are still inherent in our impact assessment capabilities. RESTORE hopes that such loss of life can be avoided in the future and that further human and wildlife suffering can be prevented.

Undoubtedly, the Department of Energy has learned some very important lessons from the pipeline and fire incidents which have occurred in association with the West Hackberry Salt Dome operation, and undoubtedly the Department of Energy will take whatever minimum remedial action they decide to be necessary to prevent recurrences of the proved problems. What is not so certain is whether or not other salt dome oil storage operators will learn from the sad happenings we have observed. RESTORE wonders, most especially, whether or not LOOP will review its voluminous Impact Statements on the Offshore Oil Superport and Clovelly Dome Storage Facility.

The oil companies who will be running the LOOP operation anticipate handling over eight times as much oil per day as the Hackberry dome handles.

Senator JOHNSTON. Let me interrupt you at that point, Mr. Tritico.

Mr. TRITICO. I thought you might.

Senator JOHNSTON. To make sure that we understand that LOOP is making that review of their impact statement and of their dome storage as a result of this fire.

Please proceed.

Mr. TRITICO. [Reading:]

Unlike the projected intermittent fill/refill cycles which are projected for the local dome, the LOOP Salt Dome will be undergoing a constant flux, oil being moved in and out in cycles of only 90-day lengths compared to Hackberry Salt Dome cycles of no more often than every other year. It should be very obvious that the LOOP operation has at least eight times as much risk of catastrophe as has the Department of Energy Hackberry operation. Fortunately, the LOOP activities have not progressed to the extent that additional safeguards cannot be practically incorporated immediately. Department of Energy officials could perform a valuable service in the national interest if they would share the lessons that they have learned. LOOP officials could greatly reassure the public if they would impose voluntary new and stronger precautionary policies for their activities. Should LOOP be unwilling to show such initiative and should the Department of Energy itself not realize the value of strict adherence to all safety and environmental regulations (and discontinue the practice of taking advantage of their legal exemptions from some regulations) RESTORE would reluctantly ask that Congress and the President issue a joint directive to all salt dome activity operators, instructing them in as much detail as would be necessary on how to run their day-to-day operations. The risks to human safety and environmental integrity are too great to allow continued unjustified underestimation of hazards.

Let us explore for a moment one of the environmental risks, that of oil spill damage to natural systems. Although oil is mostly biodegradable and therefore of less concern to RESTORE than are more toxic synthetic substances such as halogenated hydrocarbons, the acute and chronic ill effects of crude oil spillage upon natural systems are increasingly well documented. The Environmental

Impact Statements for both the West Hackberry Dome and the LOOP Superport are in general agreement on both the potential adverse impacts on fisheries and on the amount of water and marsh areas which would be covered by an uncontrolled spill. According to the LOOP figures on page B–97 of their EIS, a 30,000-barrel oil spill, such as the one which occurred during the Hackberry fire incident, would have, if not controlled within three days, covered an open water area of 7,830 acres. Black Lake has an area of 2,176 acres. It should be apparent that, had there not been a steady northeast wind throughout the incident, and had not the DOE and Coast Guard pollution containment efforts been so efficient, all of Black Lake and a marsh area of twice the size of Black Lake would have been covered with oil, and not just a thin covering but a covering of sufficient thickness to inflict severe stress on the biological systems of the area, an area which is already stressed beyond its capacity for self-healing. Had the spill occurred a week earlier or a week later, the winds would not have been from the northeast and severe environmental damage could have been prevented only by an even more intensive effort by the Strike Forces.

How could such a terrible accident happen? What was the source of the pressure within the dome? Could a standing wave have been set up within the cavern by the mechanical actions of the drilling rig? Could microbial contamination of the oil have resulted in a sudden buildup of methane causing an unanticipated pressure rise? Why did the packer fail at such low pressures? Why did the blowout preventor fail? How could two such safety devices fail simultaneously? Was the pressure being monitored by a continuously-recording gauge or simply by intermitent measurements? Could a massive flake of salt have caved in from the ceiling of the cavern causing a sudden rise in pressure? During the incident did the salt surrounding the well casing show any signs of collapse? What is the possibility that some intentional pressurizing mechanism became uncontrolled and drove the pressure up rapidly beyond tolerable limits?

The reason I ask that question is because I heard that there was an engine running which suddenly raced rapidly to a much higher rpm. I don't know what that means because I——

Senator JOHNSTON. Immediately prior to the accident?

Mr. TRITICO. Yes.

Senator JOHNSTON. You heard that from where? Could you give us the source?

Mr. TRITICO. No, I can't. I have a radio program and after the radio show often I get telephone calls and I cannot verify it. [Continues reading:]

Such questions must be carefully considered and satisfactorily answered before any additional oil storage work be allowed at any salt dome.

There is another less pleasant set of questions which must be faced immediately, questions of possible breaches of security.

RESTORE believes that it is fundamental that henceforth all individuals who participate in Department of Energy policymaking, planning, and implementation activities be subjected to a rigorous security check. No one should feel that we are implying that any treason was involved in this particular incident. What we are saying is that the potential is obviously there. Someone with something to gain as a result of undermining the Strategic Petroleum Reserve concept could easily and in a variety of ways set the Program back on almost no advance notice.

If we were the federal contractors, the federal officials involved, if we were the state inspectors, or if we were subcontractors and on-site workers, we would not resent such a full security check; in fact, RESTORE members would unanimously welcome such a rigorous security scrutiny because we would understand that this project is of national importance and could be of serious local safety and environmental consequence. It is most unfortunate, but it must be admitted that there are citizens of our area who are unsavory and prone to commit violence to gain short-term gratifications. It is also most unfortunate that our recent past has demonstrated that the existing system of justice in our vicinity is fraught with weaknesses to the extent that there is little confidence that the system can deter criminal actions with any sort of predicability. Changes are forthcoming, the people have begun to end their withdrawal, break out of their apathy, and demand reform and efficiency, and soon Southwest Louisiana will enter a grand era of restoration of principles and of natural health. In the meantime, it would be prudent for federal officials to temper their optimism with firmness.

Another set of serious questions which could be studied more thoroughly now that we see how vulnerable the Strategic Petroleum Reserve Program is concerns the International Politics of this installation. President Carter's Energy Plan is an admirable first step toward energy independence, yet there are people who do not seem to realize how little time there is to make that Plan work and that, should the Plan be made weaker or delayed, everyone will suffer, everyone that is except "Enemies of the People," profiteers or other shortsighted fiscal anarchists or hostile nations. RESTORE implores Senator Johnston and his colleagues to elevate their plane of thought to a farsighted consideration of how to best employ the Strategic Petroleum Reserve in maneuvering toward a global energy policy, one which would ensure fair allocation of all energy sources among all mankind, a just policy which would not sacrifice proved concepts of fair trade in the international marketplace. All competing economic systems are equally challenged by the energy question. Destruction of competitors is a negative way of dealing with the problem. RESTORE believes that we are approaching a threshold, which, if we can all work toegther, should be crossed within President Carter's term of office and which will serve as a secure foundation for long-term peace, just global resource utilization and the magnification of human opportunity through restoration of planetary viability.

Thank you for allowing us the opportunity to speak today, and thanks again to the EPA, the Department of Energy and the Coast Guard Strike Forces for preventing a severe local environmental disaster.

Senator JOHNSTON. Thank you, Mr. Tritico.

In your judgment, then, there was no environmental damage done by this fire?

Mr. TRITICO. Nothing significant, especially when you compare it to the previous private enterprise operations that have taken place in the Hackberry area.

Senator JOHNSTON. Was the cleanup procedure done well and properly?

Mr. TRITICO. Yes.

Senator JOHNSTON. Would you recommend anything for the future as a result of this fire to improve on cleanup procedures? Are they using the best technology and the best safety devices for cleanup?

Mr. TRITICO. The best that I know of. Now, there would be one slight improvement that I would make if I were in charge. That would be to have the booms a this particular location, have them already deployed without the skirts being submerged so that there could still be free flow of organisms beneath the booms but that, if it occurred again, the skirts could be immediately dropped and the oil would be contained. There wouldn't be a lag time. This could be very important if the wind were from the south. If the wind were from the south and the flames were over that lake area, there would be no way to get the boom out there before the oil would be already free and loose. So I would have the booms continuously deployed but with the skirts raised and, you know, have a lever to just drop the skirts.

Senator JOHNSTON. Do you have an opinion with respect to whether or not you should be able to drill or to workover a well with a pressure differential?

Mr. TRITICO. I feel like the pressure differential should not be there. I do not understand fully how the plug came up when it had 2,000 pounds above it and 300 pounds below it. To me, it seems more reasonable that the plug was forced down into the cavity and then reforced up along with the oil. I really do not understand from what I've seen today and from what I've heard, I do not understand how it could have happened. That's why I raised the questions about exotic reasons for pressure buildup, such as microbial activity, a standing wave within the cavity, that sort of thing.

Senator JOHNSTON. Well, it would hardly seem reasonable to me, and it would to you, that you could have that kind of exotic buildup, 2,000 pounds per square inch, for example, and not have any higher column of oil coming out of that well than came out?

Mr. TRITICO. Well, the 2,000 pounds they were talking about was what they had used to inflate that packer, and that was from above, the pressure was from above, and that was much greater than the potential pressure from below, and to me it seems more reasonable that the packer blew out downward and that the material then had a free way to go up after the 2,000 pounds of mud pressure had drained on down into the cavity and the engine was racing because it had no resistance against it, that the material would have then begun moving up at 300 pounds per square inch. It would have corresponded with the fountainhead that was described. I think that—not being an engineer, I can't fully explain to you what I think happened, but there's always a reasonable explanation.

Senator JOHNSTON. Mr. Tritico, thank you very much for appearing; and I thank Mr. Vincent, the Ecology Center and RESTORE, for submitting this evidence for us.

Mr. TRITICO. Thank you, sir.

[The prepared statement of Mr. Tritico follows:]

STATEMENT OF MICHAEL TRITICO, ECOLOGY CENTER OF LOUISIANA, NEW ORLEANS, LA.

My name is Michael Tritico. I am a resident of Lake Charles, Louisiana and today I am speaking on behalf of Mr. J. Ross Vincent, President of the *Ecology Center of Louisiana.*

Mr. Vincent regrets that he could not be here today but he had a prior commitment to visit energy facilities in the western and northwestern states. His trip is part of the Ecology Center's continuing effort to develop a broader understanding of energy issues.

The members of the Ecology Center have long been interested in energy development and the challenges facing the United States in meeting future energy needs. We are also deeply concerned about the adverse impacts of energy related operations in Louisiana's coastal wetlands.

In looking at the economics of the Strategic Petroleum Reserve Program, one wonders whether or not the program is really cost effective. Would our country be more energy secure if the program resources had been put into energy conservation and the research and development of alternative energy sources? Unfortunately, we never had an opportunity to really evaluate and comment on the program.

The Ecology Center raised the question very early whether or not the program was proceeding too fast. The first program documents we had access to related to site specific evaluations rather than the Program design. Then, to make matters worse, we were confronted with the impossible task of reviewing five draft impact statements on five sites in only thirty days time. There was no way to review the thousands of pages of impact statements in such a short period of time. By this time it was simply too late to comment on the program. Thus most of the affected people in Louisiana were not given any opportunity to review and comment on the program.

We understand that the technology of storing oil in salt domes is a proven technology. While the program may be engineeringly feasible, we question the wisdom of selecting storage facilities in such close proximity to a fragile wetland environment. Storage sites outside of the Louisiana coastal wetlands and even outside of Louisiana were apparently never given serious consideration if they were considered at all.

The recent fire at Hackberry illustrates how accidents and adverse impacts that couldn't happen can and will happen. Fortunately, in this instance, the wind was favorable and the spilled oil was effectively contained in a relatively small area. Next time we may not be this lucky.

Louisiana's coastal wetlands have already suffered extensive deteroiation as a result of exploration, development and transportation for oil and gas re-

sources. Oil and gas are important to the state's economy but the productive wetlands are also important to the economy. It is encouraging to see that many of Louisiana's public officials and citizens are finally becoming aware of the need to protect the state's valuable wetland resources.

The Strategic Petroleum Reserve Program was rushed into Louisiana before the public had any way of knowing if the project is good or bad. Maybe there should be a reevaluation of the program before more oil is pumped into Louisiana salt domes.

If a reevaluation is in order, then every effort should be made to put the program report in a readable form and the public should be given an opportunity to review and comment on the program. At the very least there should be a serious evaluation of salt dome storage facilities that are not surrounded by wetlands.

We thank you for this opportunity to present our views. If we can be of any further assistance, please contact us.

Senator JOHNSTON. I would like to put in the record at this point a statement from Louisiana Offshore Terminal authorities, so-called LOOP, signed by Shepard F. Perrin, Jr., executive director, which indicates that they are reviewing the details of this fire with respect to what implications it may have for LOOP and to insure that their dome storage will be done as safely as possible, using the latest and best technology.

[The statement follows:]

STATE OF LOUISIANA,
DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT,
OFFSHORE TERMINAL AUTHORITY,
Baton Rouge, La., September 25, 1978.

Memorandum: LOOP storage of crude oil in salt dome.

The recent fire and personnel fatality at the Department of Energy's West Hackberry salt dome crude oil storage area have resulted in inquiries about LOOP's plans for storage of imported crude oil in the Clovelly Salt Dome near Galliano. Both storage areas involve salt domes, but there are considerable differences between the West Hackberry facility and that being constructed by LOOP. These are:

1. The DOE Storage Reserve Program involving salt domes at West Hackberry, Bayou Choctaw and Weeks Island utilized existing interior caverns which were haphazardly mined to produce brine as a chemical raw material, or salt itself, as in the case of Weeks Island. Details of the West Hackberry accident have been requested of the DOE, but are not yet available.

2. The LOOP salt dome facility has been designed and reviewed over several years using the services of experienced salt dome mining/design engineers. The caverns in the Clovelly Dome will be carved out according to an approved plan with close control being maintained over the shape and size of the caverns; they will be located and mined in conformity with Order No. SDS–4 issued by the Office of Conservation after a review of the plans (including a public hearing) was made by that Office.

3. The piping and valve arrangements will be designed and installed in accordance with the Office of Conservation requirements and necessary safety features will be built into the facility.

In summary, the LOOP Clovelly Salt Dome storage facility will be a grass roots installation designed in conformity with the State's requirements, specifically for the storage of crude oil, utilizing the latest design features and safety precautions. Once we receive details of the DOE fire discussions will be held with LOOP's management to insure that their Clovelly Dome storage will be built as safely as possible using the latest and best technology.

SHEPARD F. PERRIN, JR.,
Executive Director.

Senator JOHNSTON. Let me say in conclusion of this hearing, we appreciate very much all of these witnesses coming forward. It has been very helpful to us.

A few things I think are pretty obvious from this hearing. First of all, the bridge plug or blowout preventer obviously failed. Why it failed, in my judgment, based on the testimony here today, it was unsafe to proceed with a pressure differential in that dome. The usual practice of industry is to equalize that pressure at the surface and failure to do so was obviously a direct cause of this accident. It appears that the speed dictated by both congressional policy and DOE Director has resulted in gaps in safety and, unless we slow down this program, it is reasonable to expect that future accidents of this sort can happen because of cutting corners on safety.

Finally, it seems obvious to me that private industry that has been operating these domes for many years and can do so on a turnkey basis without dealing with many different Government agencies would be preferable to having DOE operate the strategic storage program in the future.

I want to thank again the witnesses for coming. I want to thank the audience for being so patient and so cooperative with us this morning.

The hearing is adjourned.

[Whereupon, at 1 p.m. the hearing was adjourned.]

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