A RESOLUTION CONCERNING REAUTHORIZATION OF THE RESOURCE CONSERVATION AND RECOVERY ACT (RCRA)

WHEREAS, all the oil and gas producing states are uniquely qualified to regulate exploration and production (E&P) wastes from oil and gas operations due to their existing knowledge of and regulatory responsibility for oil and gas conservation and environmental protection related to oil and gas exploration and production; and

WHEREAS, regulation of E&P wastes is an integral part of oil and gas conservation; and

WHEREAS, any additional federal regulation of E&P wastes is unnecessary and duplicative; and

WHEREAS, the IOCC has recently adopted the report of the Council on Regulatory Needs, which has reviewed state oil and gas E&P waste regulatory programs in the United States, and has established criteria necessary for an effective state oil and gas regulatory program; and

WHEREAS, this report was developed by officials from state oil and gas regulatory and environmental agencies, with assistance from representatives of industry, environmental groups, and the federal government; and

WHEREAS, IOCC has begun new projects in conjunction with the Environmental Protection Agency, for state program review, state personnel training, and a data base of state oil and gas environmental regulations, and individual IOCC member states are being encouraged to review their own programs using the Council report as a guideline; and

WHEREAS, continued designation of E&P wastes as exempt wastes, as established in the 1980 amendments to RCRA, is an essential component of RCRA reauthorization; and

WHEREAS, without the continued description of E&P wastes as exempt wastes, thousands of marginally producing oil and gas wells within the United States would become uneconomic and additional reserves would not be developed; and

WHEREAS, reauthorization of RCRA is being considered during this Congressional session.

NOW, THEREFORE, BE IT RESOLVED that

1. Oil and gas exploration and production (E&P) wastes should continue to be regulated through state-based programs, without additional federal legislation or regulation.
2. E&P wastes should continue to be treated as exempt, wastes under RCRA.
3. The states request the opportunity to and agree to participate in Congressional hearing on oil and gas E&P wastes through the IOCC.
4. The IOCC states and governors request that close communication be maintained with Congressional committee and subcommittee chairmen and staff during reauthorization proceedings.

5. IOCC will coordinate distribution of technical information and testimony between oil and gas producing states and Congressional committees regarding reauthorization of RCRA as it relates to oil and gas E&P wastes.

TESTIMONY
OF
LENA GUERRERO
CHAIRMAN OF THE RAILROAD COMMISSION OF TEXAS
TO THE UNITED STATES HOUSE OF REPRESENTATIVES
COMMITTEE ON ENERGY AND COMMERCE
SUBCOMMITEE ON TRANSPORTATION AND HAZARDOUS MATERIALS
SEPTEMBER 12, 1991

The Railroad Commission of Texas is the oldest regulatory agency in the state and one of the oldest in the nation. We have sole responsibility for the prevention of pollution of surface and subsurface water in the State which might result from activities associated with exploration, development, and production of oil and gas. The Commission regulates the drilling, completion, and plugging of all oil and gas wells; injection wells used for either enhanced recovery of oil and gas or for disposal of oil and gas wastes; and all other disposal methods for oil and gas wastes.

Because of our regulatory responsibilities in the State of Texas and the importance of the industry to our state, we are keenly interested in the issue of RCRA reauthorization as it applies to the oil and gas industry. During EPA's study and the development of its Report to Congress on oil and gas wastes, we cooperated by meeting with and supplying requested information to EPA and its contractors. To ensure a factual report, we reviewed about 5,000 pages of drafts and furnished EPA with over 300 pages of formal comments on several drafts. We were also part of the joint effort of the Interstate Oil Compact Commission and EPA in the development of the Study of State Regulation of Oil and Gas Exploration and

Production Waste, which recommends the elements necessary for effective state regulatory programs.

We intend to continue to cooperate with EPA in its efforts to improve the regulatory programs for oil and gas wastes and to participate fully in the development of any additional guidelines. However, we feel that additional federal regulation is not necessary in states, such as the State of Texas, where good regulatory programs are already established and are continuously being improved.

We support EPA's Regulatory Determination that Subtitle C regulation of oil and gas wastes would be unnecessary and inappropriate; would have a severe economic impact on the nation; would not allow the flexibility necessary to address the wide range of complex problems and management practices in different parts of the nation; and would be impractical and inefficient by disrupting and duplicating existing federal and state programs for oil and gas wastes.

While national regulations for oil and gas wastes are being considered, we should not forget that any decision made by Congress or the EPA will affect some states more than others. Producing wells across Texas, numbering more than 250,000, contribute about one-third of the total production in the United States. One-third of all the nation's stripper wells are in Texas. It has been

estimated that 75% of all active wells in Texas are marginally-producing wells. About 70% of the oil companies in Texas operate 10 or less wells. We must strike a balance between protection of the environment and the public health and safety, and energy production.

I. EXISTING STATE AND FEDERAL PROGRAMS

The EPA Regulatory Determination recognized that existing state and federal regulatory programs are generally adequate for oil and gas wastes and any necessary improvements should begin with these existing programs. The disposal of the largest volume of oil and gas waste--produced water--is usually regulated under existing federal programs under the Clean Water Act or the Safe Drinking Water Act. NPDES programs and UIC programs, whether directly implemented by EPA or delegated to the states, are satisfactory mechanisms for regulating any waste covered under those programs. In Texas more than 90% of the produced water is reinjected pursuant to a federally delegated UIC program, which EPA has repeatedly praised as being a model program. Almost all of the rest is discharged to Gulf waters.

In many instances, Texas regulations for waste disposal are more stringent than federal regulations. For example, Texas has been regulating the use of surface impoundments or pits for storage or disposal of produced water since 1969 and has strengthened those regulations over the years. There are no federal regulations for

these pits.

II. HISTORY OF OIL AND GAS REGULATION IN TEXAS

The Railroad Commission's water protection program has a long history dating back to 1919, when the Commission adopted rules requiring fresh water be protected during drilling and plugging operations. Since then, the Commission has adopted increasingly stringent and more comprehensive water protection rules. For example, in the 1930's, the Commission strengthened its plugging requirements and began regulating the use of injection wells. In 1969, the Commission issued a no-pit order that required Commission approval for the use of a surface pit for the storage or disposal or saltwater. This order also prohibited discharge of saltwater without a permit. In 1965, the Texas Legislature appropriated monies for a new State Well Plugging Fund.

The 1980 RCRA amendments directed EPA to perform a study of oil and gas wastes and report their findings to Congress. Numerous changes in the Railroad Commission's regulatory programs have occurred since 1980 and contribute to the overall environmental progress that has been made in oil and gas waste management. Texas has made an aggressive effort to strengthen regulations and increase compliance. Certain practices that were in existence in 1980 are no longer allowed. Since 1980, amendments have been adopted to all of the major statewide rules pertaining to water protection, several new rules have been adopted, and additional enforcement

authority has been granted:

1981 - the Commission amended its rules governing disposal and injection wells to require more specific technical standards, broader application notice requirements, and new monitoring and reporting requirements;

1981 - the Commission adopted a new rule governing underground hydrocarbon storage wells;

1982 - the Commission amended its rules to specify state-of-the-art requirements for casing, cementing, drilling and completion of wells;

1982 - the Commission amended its rule for plugging wells;

1983 - the legislature authorized the Commission to collect a $100 drilling permit fee to be deposited in the State Well Plugging Fund;

1983 - the Commission was given the authority to assess administrative penalties of up to $10,000 per day per violation of its statutes and rules pertaining to pollution prevention or safety, and the Commission established a legal enforcement section to administer the administrative penalty program;

1984 - the Commission amended the rule regulating surface storage and disposal of all oil and gas wastes, requiring that waste storage and disposal methods be either authorized by the rule or permitted, and requiring the repermitting of almost all previously permitted pits and the permitting of several types of pits for the first time;

1985 - the Commission was given the authority to require a performance bond or other form of financial security for closure and operation of existing and new commercial facilities;

1986 - the Commission adopted Rule 77 in anticipation of federal authorization of its NPDES program (preliminary application submitted to EPA in 1990); and

1990 - the Commission amended its rule concerning reclamation of crude oil to revise the permitting requirements, require a bond or other form of security to ensure that reclamation plants are operated and closed in accordance with Commission rules, and require a permit for the disposal of tank bottoms.

We believe that when you look at the existing state and federal programs for regulation of oil and gas wastes and the progress that has been made in these programs since the 1980 RCRA amendments, it becomes clear that these programs can be used to achieve the desired level of environmental protection.

III. RECENT AND PROPOSED CHANGES

In the 1988 Regulatory Determination, EPA did identify areas where they perceived "gaps" in federal or state regulations. We have been reviewing our regulatory programs since the issuance of the Regulatory Determination and the subsequent issuance of the EPA/IOCC Study to pinpoint areas where we needed to make changes. Some of those changes have already been made, such as upgraded

permitting requirements for surface disposal, restrictions on disposal of oil and gas wastes in municipal landfills, increased testing requirements to characterize wastes prior to disposal, additional notice requirements, additional testing/monitoring requirements, and limits on the terms of some permits.

Rule amendments are currently being considered to add new requirements for manifesting of oil and gas waste and new requirements for rule-authorized pits. We are also strengthening our oil spill cleanup standards.

We are also looking at our regulation of associated wastes, which constitute approximately 0.1% to 0.4% of the total volume of oil and gas waste. We are increasing our requirements for chemical analysis of associated wastes for constituents such as heavy metals, total petroleum hydrocarbon, and benzene to better determine the pollution potential when permits are requested for disposal of these wastes. We are also cooperating with other state agencies, such as the Texas Department of Health, to ensure that tighter regulation of these wastes does not result in a shift of the burden to another agency.

New legislation this year has given us the authority to make many more of the changes we have identified. This new legislation:

requires that producers be in compliance with all state laws

and Railroad Commission rules before new drilling permits may be granted;

requires proof of financial responsibility to correct or control any pollution associated with oil and gas activities or a demonstration of a record of past compliance;

establishes a fund of approximately $10 million a year to plug abandoned wells, cleanup oilfield pollution that threatens surface and subsurface waters, and increase enforcement action against polluters;

expands the Commission's authority to regulate haulers of oil and gas waste; and

gives the Commission the authority to develop a hazardous waste program for certain oil and gas wastes because of recent new EPA regulations.

In related areas, we have recently adopted a rule to require that operators take measures to protect migratory birds. We have also been working very closely with the Bureau of Radiation Control in developing regulations concerning handling and disposal of naturally occurring radioactive material (NORM) and will be involved in enforcing these regulations as they pertain to oil and gas wastes.

IV. SUMMARY

Most states have made tremendous improvements in their regulatory programs by adopting new regulations and amending existing ones, sometimes in order to comply with new federal requirements such as the UIC program, but in many instances because we identified a problem and were committed to correcting the problem to protect the environment and ensure the health and safety of our citizens.

Industry has also made tremendous progress. They have continuously changed their waste management practices and developed new waste management technology. Industry is also becoming increasingly active in pollution prevention through waste minimization, reduction of waste toxicity, and recycling. More companies are substituting less toxic products in oil and gas operations, such as mineral oil instead of diesel oil or nonchromium-containing additives in drilling fluids. Products containing chromium and arsenic are no longer used in gas processing. The Commission has applied for a federal grant to develop an "outreach program" to aid smaller oil and gas operators without the necessary resources to develop pollution prevention programs of their own.

The Report to Congress states that, although the documented damage cases and quantitative modeling indicate that health and environmental damage caused by oil and gas operations by exempt wastes tend to be associated with violations of existing regulations, damage and risk are possible in certain circumstances

where the practice was allowed under regulations existing at the time of EPA's study. We agree. This is the reason that Texas has revised and continues to revise its regulations.

Texas has had almost 100 years of experience in the oil and gas business. We were regulating oil and gas operations and waste management practices decades before EPA was even created. We are more familiar with the oil and gas operations and waste management practices in Texas; the characteristics of the wastes generated in Texas; regional variations associated with oil and gas operations in Texas; and unique problems we face in management of oil and gas wastes in Texas. Therefore, we feel that additional federal regulations are not required.

QUESTIONS SUBMITTED BY THE HONORABLE JACK FIELDS

RESPONSES BY ROBERT KRUEGER, COMMISSIONER

RAILROAD COMMISSION OF TEXAS

1. Question: "Are you aware of any human health damages from production wastes practices which are in conformance with existing state regulation? If so, did the state regulatory agency respond to this danger by changing its regulations?"

Answer:

I am not aware of any human health damages from production waste practices in Texas.

2. Question: "Based on your knowledge of the financial and personnel resources of various producing states, do you believe these states would be able to implement new, additional federal requirements if there is little or no additional funding?"

Answer:

States are already strapped for resources to implement and enforce their own programs. Additional federal funds would be necessary to implement any new, additional federal regulations. Moreover, if the federal requirements were

unnecessarily stringent, stripper and marginally productive wells would be abandoned by the operators, resulting in a loss of revenue to the states that would compound the need for federal funding.

Without federal funding, compliance with new, additional federal regulations would divert limited state funds from regulatory activities that directly benefit human health and the environment. State funds would have to be spent by each state to demonstrate compliance with the federal requirements, leaving fewer funds for permitting, inspection, and enforcement.

We are concerned that additional federal regulation under RCRA would not be adequately funded. Federal funding of existing programs, such as the UIC program, has not been adequate in the past. Texas has had to pay the major portion of the costs of implementing its federally approved UIC program. In recent years, the federal government has repeatedly asked the states to do more with less. For example, one of the "gaps" identified by EPA in its Report to Congress and Regulatory Determination was a lack of state effort in the area of waste minimization. Texas has twice applied to EPA, and has twice been turned down by EPA, for matching federal funds to help us in developing a pollution prevention program for oil and gas wastes. We see this lack of funding for programs required or

recommended by the federal government as a growing trend that must be reversed.

3. Question: "Please outline the efforts of the IOGCC peer review process and inspector training program. Who is on each peer review team and what have been the initial results?

(See the accompanying responses on behalf of the IOGCC.)

4. Question: "It has been suggested that produced water pits present a risk because federal law does not have jurisdiction until the water is discharged, i.e., water seeping from a pit would not be covered by regulations. It is my understanding that Texas regulations forbid migration of the water from the pit. Produced water damage to groundwater would therefore violate state regulations. Is that correct?"

Answer:
Yes. The Railroad Commission's Statewide Rule 8, entitled Water Protection, contains a general prohibition on the pollution of surface or subsurface water. In addition, the use of a pit for storage or disposal of produced water

requires a permit. The Commission may not issue a pit permit unless it determines that the use of the pit will not pollute surface or subsurface water.

Question: "Can you provide information on how other states treat the leakage of produced water from pits?"

Answer:

(See the accompanying responses on behalf of the IOGCC.)

5. Question: "It is my understanding that several states have taken action to prohibit the use of produced water pits and to close those in use. Can you provide information on state programs in this area?"

Answer:

In Texas, the unpermitted use of a pit for storage or disposal of produced water has been prohibited since 1969. Pursuant to state legislation enacted in 1983, the Railroad Commission amended its Statewide Rule 8 in 1984 to require that all permitted produced water pits be re-permitted under more stringent construction, operation, and closure standards. The amended rule requires that an applicant for an unlined pit for

storage or disposal of produced water conclusively show that use of the pit cannot cause pollution, either because there is no surface or subsurface water in the area, or because the surface or subsurface water is protected by a thick, naturally occurring impervious barrier. The only pits excepted from this stringent standard are emergency saltwater storage pits, which may be used only for temporary storage of produced water during emergency or upset conditions and must be rapidly emptied. However, the Commission requires liners for any emergency saltwater storage pits located in areas with permeable soils or shallow water tables.

Numerous produced water pits were closed after 1969, and more were closed after the 1984 amendment to Rule 8. Out of a total of 7990 produced water pits for which renewal applications were received after the 1984 rule amendments, 3773 have now been closed. Of the remaining produced water pits, which have been permitted, 64% are emergency saltwater storage pits. This pit closure trend is continuing, as evidenced by the fact that the Commission has canceled more permits for produced water pits than it has issued in each of the past two years.

QUESTIONS SUBMITTED BY THE HONORABLE JACK FIELDS

RESPONSES BY ROBERT KRUEGER FOR
THE INTERSTATE OIL AND GAS COMPACT COMMISSION

1. Question: "Are you aware of any human health damages from production wastes practices which are in conformance with existing state regulations? If so, did the state regulatory agency respond to this danger by changing its regulations?

Answer:

I am not aware of any current waste management practices that conform with state regulations and allow for any human health damages. As with any industrial regulatory program, the management practices for exploration and production waste have evolved with technology and science. I would further expect that, once discovered, the state regulatory agency would respond to any potential human health danger. These state agencies are in place on behalf of the citizens of their states.

2. Question: "Based on your knowledge of the financial and personnel resources of various producing states, do you believe these states would be able to implement new, additional federal requirements if there is little or no additional funding?"

Answer:

The response must be tied to the extent to which the additional federal requirements would affect an individual state's current regulatory program. I do know that most states' budgets are stretched to the absolute limits currently, and the last thing any state needs is to be faced with meeting another federal mandate without any financial support.

3. Question: Please outline the efforts of the IOGCC peer review process and inspector training program. Who is on each peer review team and what have been the initial results?"

Answer:

The IOGCC state review process is not a peer review program. The state review teams are made up of two state regulatory officials, one representative from the environmental community, and one representative from the oil and gas industry. This team is assisted by observers, including a local environmental representative and local industry representative, Department of Energy personnel, BLM, and EPA regional representatives, if necessary. The IOGCC staff acts as secretariat to the task force.

As of this date, the review of the State of Wyoming has been completed and an excellent report on that review has just been published. The Commonwealth of Pennsylvania will be reviewed the first week of November, with publication of that report shortly after the first of the year at which time the third state review will begin.

The IOGCC inspector training program will be conducted for the first time October 30 and 31, 1991 in Pennsylvania. A complete schedule for other state training sessions will be prepared.

4. Question: "It has been suggested that produced water pits present a risk because federal law does not have jurisdiction until the water is discharged, i.e. water seeping from a pit would not be covered by regulations. It is my understanding that Texas regulations forbid migration of the water from the pit. Produced water damage to groundwater would therefore violate state regulations. Is that correct?"

Answer:

That is correct for Texas as well as most, if not all, of the oil and gas producing states. Most state statutes or regulations charge the agency with protection of the states' surface and groundwater resources. It should also be noted that most state regulatory programs require demonstration of

pit integrity in the permitting process either by requiring liners (natural or synthetic) or by demonstrating that the pit will be constructed in an area where groundwater is not present or will not be encountered.

5. Question: "It is my understanding that several states have taken action to prohibit the use of produced water pits and to close those in use. Can you provide information on state programs in this area?"

Answer:

It is my understanding that some states no longer allow produced water pits in certain environments. For example, Louisiana no longer allows production pits in wetlands. I cannot speak for all of the states, but I know, for example, that in some of the more arid regions of Texas, pits used to store or dispose of produced water are still allowed where there is no groundwater present or no possibility for contact or contamination of groundwater sources. I believe the same to be true in some other arid western states. I also understand some states allow produced water pits at Class II injection wells for storage prior to injection.

STATEMENT OF WILLIAM A. FONTENOT

Mr. FONTENOT. Good afternoon. My name is William A. Fontenot. I have worked as an environmental specialist with the Louisiana Department of Justice for the last 13 years. Today I am here to represent the views and opinions of Attorney General William J. Guste, Jr., who has served as attorney general of Louisiana for the last 20 years.

Without question, wastes from the exploration, drilling, and production of oil and gas represents one of the most serious and widespread environmental problems in the State of Louisiana. Attorney General Guste feels that existing State laws, programs, and regulations covering oil and gas wastes have improved in recent years, but existing laws and programs are far from adequate to control oil field waste. Disposal practices are still allowed, which according to the Environmental Protection Agency, can and will cause serious problems to human health and the environment.

These current dangerous practices apply both to hazardous and nonhazardous oil field waste. Without minimum Federal standards, regulations, and oversight, the various State regulatory agencies will never adequately control the billions of gallons of hazardous and nonhazardous oil field wastes that are generated in this country every year.

Louisiana is the first and only State to regulate radioactive material which is present in saltwater and pipe scale associated with oil and gas production. Industry has been asked by the State to sample and report on sites which are contaminated with radioactive material. So far, almost 1,000 sites have been identified in Louisiana.

Recent statements by representatives of the Louisiana Department of Environmental Quality indicate that they feel as many as 10,000 locations in Louisiana may be contaminated with this naturally occurring radioactive waste. Without adequate Federal laws, dirt and other materials which are contaminated with hazardous or radioactive waste from oil and gas operations can be easily shipped across State boundaries and handled as solid waste or fill material or dirt. Clearly, present law is not adequate to protect human health and the environment.

I'd like to show you some slides, if I could, that will sort of illustrate some of these problems.

[Slides being shown.]

Mr. FONTENOT. This is a production well that has been operating a long time, and the black material on the ground is oil which has been spilled out through the years. The white material on top of it is salt, which has condensed.

Oil which comes out of the ground is a known human carcinogen, mainly because of the presence of materials like benzene.

This is a natural gas pipeline, which is warning people and the workers around it, that there is benzene present in this line.

Also because of the presence of naturally occurring materials, such as radium-226 and radium-228, this is someone checking for pipe scaling to make sure that it's not contaminated with radioactive material.

This is a workover site, and down in the left corner of this slide are a number of bags. This is typically called drilling muds, and it

is whole variety of fluids that are used by the oil industry to assist in drilling operations. These materials can contain anything from burned walnut shells to some fairly hazardous materials.

This is an identical pile that was left at a supply facility. The company went bankrupt, and if this material had been at a drilling site, it would have been handled as if it were drilling and production waste. Here, the site was handled as hazardous waste. This is located—these are part of about 600 barrels of oily waste that were left at this supply company. This is a photograph taken in 1988.

This is a photograph taken in 1991. This is near Louisiana State University in Eunice, La. The area is now classified as a hazardous waste site, and all of this material which, had it been at a drilling and production site, would have been handled as nonhazardous waste, and is now handled as hazardous waste.

This is a fairly typical open pit. It has saltwater and oil in it. This is the edge of a pit that's been fairly well maintained, but the level fluids in the pit—and this is around a tank battery—have run off. It's not very clear in this photograph, but there is extensive damage to the ground here and to adjacent soybean fields from saltwater running off into those fields.

This is a large storage area of waste materials in a coastal wetland near Lake Ponchetrain, and for years, saltwater has been draining into that system.

This is another site. The dark rectangle in the middle of this slide is a waste pit covered with oil, and the sort of halo around it is an area where the saltwater has been leaking out for years and has killed the vegetation. This can occur even with the best lined pits.

This is an area near Baton Rouge where—this is on top of a salt dome. It has quite a few wells in it. There are 13 saltwater injection wells at this site, and thousands of barrels of saltwater have been dumped onto the surface for years. Some is still leaking.

This slide was taken in 1988 after the site and all of the pits were closed. There is still no vegetation on this site, and I would anticipate that there will be no vegetation for several decades.

This is an open pit with a lot of cattle prints. These pits that are open are very accessible to wildlife, birdlife, and livestock. And here you have cattle which are drinking the water, which contains salt and oil, can become contaminated. If you've got radioactive material there, they will absorb it.

This is the top of a pit. It doesn't look like oil, but it is with an anhinga that died. The day I took this—this slide happened to be in 1982—there were three birds in the pit that had died, two on the bank and one hopping around. It was completely covered with oil. It looked like something from the Alaska spill.

This is a small pit in north Louisiana near Shreveport. And the way these pits have been cleaned up in the last year—this is a shot taken a year ago—this is an identical pit where it was simply just covered over and the oil is now migrating onto the ground.

I'm at this site with the landowners, who called me because they were concerned of residual contamination. They were told by the oil company that it had been properly cleaned up.

This is another site where a waste pit was cleaned up using the State regulations. You can't see the pit now, but the dark material

in the middle and the white around it is salt and oil that had percolated up to the surface because too much contamination was left in the pit.

This is next to another pit that was closed near Thibodaux, La., and a sugarcane field where the sugarcane is not growing on quite a few acres of land.

This is another sugarcane field near Franklin, La., where a saltwater injection well has been operated for quite a few years, and the salt has leaked out into this sugarcane field. The area that is sort of brown is where the saltwater has drained out. There is about 14 acres of land here now, and the landowner has been unable to bring in any sugarcane.

This is a picture, a closeup of the field. The white on this ground is salt that has percolated up on the ground and has killed the vegetation.

Let me go back here real quick.

The tank in this photograph—this site has been closed down because the company has gone on to other things, but this tank is still out there. Two weeks ago, the landowner contacted me to say that he was told by the operators of this facility that they could not remove that tank because it contains too much radioactive material, all right. This is nonhazardous oil field waste.

Before the State adopted some regulations this year, this material could have been cleaned off and hauled just about anywhere, and it could have been handled without a whole lot of trouble.

We do have regulations on these kinds of things, but it's still—the opportunity is there to dispose of this and presents a serious threat to human health, is very widespread.

I thank you. If you have any questions or—I was invited the day before yesterday, sort of late in the day, to appear here, while I was in Louisiana. Maureen O'Neill, who is the assistant secretary of the department of environmental quality was original asked to speak here, and due to an illness in the family was unable to make the presentation.

I understand that DEQ's presentation has been entered into the record, and I would encourage you to read it, because their position on this is probably stronger than the one that has been developed by the attorney general, and it has a lot more detail in it.

Mr. SWIFT. That has been made a part of the record.

Mr. FONTENOT. Yes, sir. Thank you.

Mr. SWIFT. Thank you, Mr. Fontenot. Mr. Larry Bell.

[Testimony resumes on p. 232.]

[The prepared statements of Mr. Fontenot and the Louisiana Authority of Environmental Quality follow:]

TESTIMONY OF WILLIAM A. FONTENOT
ON BEHALF OF WILLIAM J. GUSTE, JR.
ATTORNEY GENERAL, STATE OF LOUISIANA
BEFORE THE TRANSPORTATION AND HAZARDOUS MATERIALS
SUBCOMMITTEE OF THE COMMITTEE ON ENERGY AND COMMERCE
UNITED STATES HOUSE OF REPRESENTATIVES

September 12, 1991

My name is William A. Fontenot. I have worked as the Environmental Specialist with the Louisiana Department of Justice for the past 13 years. Today I am representing Attorney General William J. Guste, Jr. who has served as Louisiana's Attorney General for the last twenty years.

Attorney General Gust has been active with many cases involving oil and gas waste. I have also worked with dozens of state and federal agencies, local and state officials, citizens groups, and managers and employees of companies involved with oil and gas exploration and production. Without question, wastes from the exploration, drilling and production of oil and gas represents one of the most serious and widespread environmental problems in Louisiana.

In 1988 Attorney General Guste wrote to the Administrator of the Environmental Protection Agency, EPA, clearly stating that those hazardous wastes which are generated during oil and gas activities should be regulated as hazardous wastes. This remains his opinion today.

Attorney General Guste pointed out that existing state programs, laws and regulations covering oil and gas wastes have improved in recent years but, existing laws and programs are far from adequate to control oil field wastes. Disposal practices are still allowed, which according to EPA, can and will cause serious damage to human health and the environment.

These current dangerous disposal practices apply to both hazardous and non hazardous oil field wastes.

Without minimum Federal standards, regulations and oversight, the various state regulatory agencies will never adequately control the billions of gallons of hazardous and non hazardous oil field wastes that are generated in the U.S. every year.

Five years ago Louisiana regulations were changed and there were some improvements over past requirements. Unfortunately, these regulations are still far from adequate. They continue to allow use of unlined waste pits, discharges of untreated wastes into coastal waters and wetlands, annular disposal and a number of other questionable practices. This year the Louisiana Department of Environmental Quality adopted new

regulations to phase out untreated waste discharges into coastal waters.

There have also been a number of instances where the public has been denied access to state agency actions, and the agency (DNR) has issued permits or allowed disposal practices in violation of its' own regulations.

The Louisiana Office of Conservation is the agency which has primary responsibility for regulating oil and gas wastes. The agency does not have any money, equipment or trained employees to sample and analyze the billions of gallons of oil field waste which are generated in our state every year. The agency relies exclusively on industry generated data.

RCRA hazardous waste has been disposed at "non hazardous waste" facilities. Employees at "non hazardous" waste disposal facilities have become sick and overcome by chemical fumes while handling wastes which were labelled "non hazardous" oil field waste which was shipped by barge from another state.

Louisiana has a good manifest system for all oil and gas waste. Last year a shipment of waste from Alabama was listed under EXXON's New Orleans address rather than the Alabama gas facility. When we asked the state regulatory agency for a copy of the manifest, there was no record of the shipment. According to the division staff, they asked the major oil companies not to comply with the manifest requirements because the state employees couldn't handle the paperwork.

Louisiana is the first state to regulate radioactive material which is present in salt water and pipe scale associated with oil and gas production. Industry has been asked to sample and report on sites which are contaminated with radioactive material. So far almost 1,000 sites have been identified in the state. Recent statements by representatives of the Department of Environmental Quality indicate that they feel as many as 10,000 locations in Louisiana may be contaminated with this naturally occurring radioactive waste.

We understand there is only one facility in Utah which is permitted to handle some of the oil and gas wastes which are contaminated with low levels of naturally occurring radioactive waste.

Without adequate federal laws, dirt, and other materials, which is contaminated with hazardous, or radioactive, waste from oil and gas operations can be easily shipped across state boundaries and handled as solid waste or "fill" dirt.

Clearly, present law is not adequate to protect human health and the environment.

Statement of Louisiana Department of Environmental Quality

Submitted to U.S. House of Representatives - Subcommittee on Transportation and Hazardous Materials and U.S. Senate - Subcommittee on Environmental Protection

September 11, 1991

LOUISIANA OIL AND GAS WASTES

I. Introduction

Thank you for requesting Louisiana's input on whether exploration and production wastes should be regulated under RCRA. The decision to exclude wastes such as drilling fluids, produced water, and other wastes associated with the exploration for, or production of oil and natural gas under the Resource, Conservation and Recovery Act (RCRA) has resulted in a lack of regulation and some negative impacts on our state environment.

Oilfield operations in the United States result in the generation of large volumes of wastes. In 1985, approximately 361 million barrels of waste drilling fluids and cuttings were generated, with 47 million barrels originating in Louisiana. Also, 20.9 billion barrels of produced water were generated in the U.S. Of this total, 541 million barrels were discharged to Louisiana coastal surface waters and 790 million barrels reinjected. Associated wastes accounted for about 10.6 million barrels of the U.S.'s oilfield waste stream, with over one million barrels being generated in Louisiana.

The jurisdiction within Louisiana with regard to exploration and production wastes is divided mainly between the Louisiana Department of Environmental Quality (DEQ) and the Louisiana Department of Natural Resources (DNR). The DEQ controls surface discharges of drilling fluids, produced water, workover and completion fluids and other associated wastes. The DNR controls management of oilfield wastes in pits and landfarms, produced water disposal through underground injection wells and enhanced oil recovery projects (waterflood), and nonsurface water disposal of associated wastes.

II. TYPES OF WASTES

A. LARGE VOLUME

1. PRODUCED WATER

Produced water or brine is a waste separated from oil during production operations. While most is disposed of through underground injection, a substantial amount is discharged to coastal surface waters. Currently, over 541 million barrels are discharged to Louisiana surface waters each year and over 790 million barrels are reinjected. Produced water varies in composition from one geographical region to another. The water may contain high levels of salts, metals, oil and other organic compounds, and radionuclides. The discharge of produced water has been documented to cause environmental damage. Each year the equivalent of a 500,000 gallon oil spill is dumped into Louisiana's waters from produced water discharges. Sediment contamination and/or toxic impacts occur at discharge sites. The water is toxic up to dilutions of 24 to 1 by natural waters. Some impacts may extend up to 6000 feet from the discharge point. This is reflected in reduced numbers of species and individuals located in the vicinity of the discharges. Although produced water is exempt under RCRA, it would be considered hazardous waste under Toxicity Characteristic Leaching Procedure (TCLP) regulatory levels for mercury and benzene. Produced waters may also be radioactive. The Louisiana Department of Environmental Quality has concluded that the environmental risks of continued discharges are not acceptable in Louisiana's coastal waters with the exception of the major passes of the Mississippi and Atchafalaya Rivers and offshore waters. On March 20, 1991 state regulations came into effect which will require operators to meet new effluent limitations for the discharges to Louisiana's inshore waters within a maximum time period of six years. Those operators which do not meet the new limits have the option of disposing of their waste by reinjection. We believe that subsurface injection will be the disposal method of choice. In 1989, over 12 million barrels of produced water was disposed of at commercial injection facilities.

In Louisiana, coastal area produced water discharges have been found to damage the environment. Over 368,000 pounds of benzene, a known carcinogen, are released anually from produced water discharges. Other industry discharges of benzene amount to 6,600 pounds per year. These discharges also contain 6,900,000 pounds of barium, 30.6 curies of Radium and more toluene, ethylbenzene and arsenic than all of Louisiana's other industrial discharges to state waters.

2. DRILLING FLUIDS

Drilling fluids (muds) are used to cool and lubricate the bit and drill string, remove and transport cuttings from the bottom of the hole to the surface, and control subsurface pressures. Drill cuttings are the particles of subsurface material generated by the drill bit. In Louisiana, oilfield activities generate 47 million barrels of drilling fluids and cuttings each year. This is approximately 8% of the total volume of oilfield wastes generated each year in Louisiana. Drilling fluids range from relatively simple to complex combinations of finely-ground components and specialty chemical additives. Specialty additives to drilling fluids range from inorganic salts and biocides to complex organic polymers which can be highly toxic. Also, diesel fuel may be added to drilling fluids as a lubricant. Drilling fluids are a threat to organisms when the mud is discharged to surface waters. The increased solids content associated with drilling mud discharges can adversely affect oxygen concentrations in the receiving water column through oxygen depletion and by inhibiting the light penetration needed for algal oxygen production. Increased solids can also inhibit gill efficiency and bury bottom dwelling organisms. This smothering effect causes reduced populations and interferes in reproduction. Contamination by drilling fluids may also cause decreased growth and altered behavior patterns. Louisiana currently allows the disposal of certain drilling cuttings and associated drilling fluids to surface coastal waters. However, large volume batch or bulk discharges of drilling fluids are not allowed except in the territorial seas. Land disposal of these fluids is regulated by the Department of Natural Resources.

B. ASSOCIATED WASTES

1. WORKOVER AND COMPLETION FLUIDS

Over one million barrels of associated wastes are produced each year in Louisiana. This is less than one percent of total wastes produced but includes some of the more toxic materials. Associated wastes include workover and completion fluids. Workover fluids are used to keep well pressures under control during maintenance. Completion fluids are used prior to commencement of production or when the well is plugged and abandoned. Workover fluids are similar to drilling fluids and may also contain tubing scale, wax/paraffin, and salts. Completion fluids may contain acidizing agents. These two wastes account for the majority of associated wastes produced in Louisiana and may only be discharged to waters located in brackish or saline marsh areas and offshore. Discharges to upland areas are not allowed and disposal is usually by reinjection.

2. TANK BOTTOMS

Tank bottoms contain produced sand, formation solids, or emulsions (heavy hydrocarbons such as asphaltanes) that settle out in production operation vessels. Tank bottoms may contain high levels of benzene and radioactivity. In 1989, over 760,000 barrels of tank bottoms were disposed of at commercial landfarming facilities.

3. PIPE SCALE

Environmentally high concentrations of naturally-ocurring radionuclides in precipitates (scale) are collected from oil-water separators, pipes, and pits used for disposal of produced water. Soil and groundwater contamination may take place at sites where the scale is actively removed from pipe by reaming, rattling, or other means used to reclaim pipe. Soil contaminated with radioactive scale at pipe storage facilities can have a Radium-226 radioactivity of up to 8,700 pCi/gm. Natural background Radium-226 activity in Louisiana soils ranges from less than one to around 7 pCi/gm. The half-life for Radium-226 is 1,620 years. Radium-226 can enter both aquatic and terrestrial food chains leading to human consumption. Workers employed in the area of cutting and reaming oil field pipe and equipment may be exposed to very serious health risks associated with inhalation and/or ingestion of dust particles containing elevated levels of alpha-emitting particles.

4. MISCELLANEOUS ASSOCIATED WASTES

Other associated wastes include oily debris generated at production sites, spent filters and filter media, dehydration and sweetening wastes from gas processing plants, cooling water, produced sand, untreatable emulsions, spent iron sponge, used solvents and degreasers, contaminated soils, pipeline pigging wastes, crude oil, and other miscellaneous wastes. Disposal methods for these wastes include reinjection, landfarming, and landfilling. Improper disposal of these wastes can lead to ground and surface water contamination.

III. DISPOSAL METHODS

A. OILFIELD WASTE PITS

Pits are often used for storage and treatment of oilfield wastes. Contamination of underground drinking water sources may result from improperly lined pits and use of porous natural soils to construct the pits. Improperly closed pits may also cause groundwater contamination. The state lacks resources to adequately inspect pit closures.

B. LANDSPREADING AND REINJECTION

Landspreading is a method of treatment and disposal of wastes in which the wastes are spread upon, and sometimes mixed into, soils to promote reduction of organic constituents and dilution of metals. The Safe Drinking Water Act establishes a special class (Class II) of injection wells for the disposition of oilfield fluids. These injection wells are used for exploration and production waste disposal, enhanced oil recovery, and in some cases, storage of liquid hydrocarbons. Over two-thirds of produced water in Louisiana is reinjected. Underground injection wells may contaminate underground drinking water sources if not properly constructed and operated. Inspection of injection wells only takes place approximately every 5 years with some additional well inspections during workovers. A lack of resources prohibits the state from doing more frequent inspections. These wastes are disposed of at both onsite and commercial disposal facilities across the state. In 1989, over 15 million barrels of oilfield waste were either reinjected or landfarmed at commercial facilities throughout the state.

IV. RISKS AND IMPACTS

All major types of oilfield wastes and waste management practices have been associated with environmental damage. Leaching of contaminants from central treatment and disposal facilities, reserve pits, and unlined disposal pits can result in ground and surface water contamination. In addition, improperly plugged and unplugged abandoned wells, and improperly functioning injection wells contribute to contamination of groundwater. Exposure to produced water damages agricultural lands. Aquatic and bird life are threatened by metals, hydrocarbons, and radiation contained in

discharges of drilling fluids and produced water. In Louisiana, a major oil and gas producing state, environmental degradation from improper disposal of materials has been documented statewide. In particular, damage to fisheries resources and exposure of workers to radioactive pipe scale are a concern. Enormous amounts of resources are spent on wetland conservation while at the same time massive amounts of contaminants have been a contributing factor to wetland loss. Louisiana currently has a seafood industry worth over $ 1.5 billion to the state. Discharges of wastes to Louisiana surface waters can be ingested by fish and shellfish. Produced waters are toxic to aquatic life and have been shown to cause chromosome damage in juvenile fish. The fisheries of the state must be protected from all pollution sources, including oil and gas operation discharges, to ensure future harvests.

V. RECOMMENDATIONS

Currently, wastes associated with oil and gas exploration, development, or production activities are specifically excluded from the definition of hazardous waste [40 CFR Part 261.4 (b) (5)]. This exclusion, in our opinion, should be removed by federal legislation, or replaced by a "Special Waste" designation concurrent with a congressional mandate requiring the U. S. Environmental Protection Agency (EPA) to develop standards and best management practices which would ensure the proper management of these wastes. Congress in 1980 directed the EPA to prepare a report regarding management practices for oil and gas waste [RCRA § 8002(m)] by 1982. Congress further directed the EPA to develop regulations for the management of oil and gas wastes following the completion of this study [RCRA § 3001(b) (2)]. The EPA, however, was sued in 1985 because they had not made any progress on the study. The final product, entitled "Management of Wastes from the Exploration, Development, and Production of Crude Oil, Natural Gas and Geothermal Energy" was released in late 1987. The EPA in July, 1988 stated the position that regulation of these wastes under RCRA Subtitle C was not warranted (54 FR 25446; July 6, 1988). It is important to note that in both of the aforementioned expressions of policy, the EPA stated that it would seek to improve existing federal management programs under Subtitle D of RCRA. During the eleven years since Congress first addressed oil and gas waste they have remained largely unregulated! Recently, the EPA added new standards for hazardous waste classification (Toxicity Characteristic Leaching Procedure) which now regulate many waste streams as hazardous which contain the very same constituents that are present in the excluded oil and gas wastes. Oil and gas waste should be regulated. Congressional intent should therefore be re-emphasized through new legislation, and the EPA should be given a specific time-table and adequate resources to develop regulations which will ensure the protection of public health and the environment.

These regulations should require the characterization of oil and gas wastes as hazardous or special wastes (and therefore regulated under RCRA Subtitle C) whenever appropriate.

With respect to the question as to whether oil and gas wastes are more appropriately regulated as hazardous or only solid wastes, it is our opinion that each waste stream should be evaluated as to its own specific hazardous characteristics and management standards set accordingly. The various waste streams should be designated once and applied generally. There is no reason to generally conclude that all oil and gas wastes are hazardous and therefore subject to RCRA Subtitle C regulation. This would undoubtedly be overly burdensome to the regulated community, and result in excessive costs associated with oil and gas activities. Congress should not conclude, however, that simply because a particular waste stream is in fact non-hazardous that regulation is unnecessary. All oil and gas waste streams should be regulated, either through RCRA Subtitles C or D, or through the Clean Water Act and the Safe Drinking Water Act (NPDES or UIC programs). It is only through this "umbrella" approach that we can be sure that the EPA's mission to protect public health and the environment will be fulfilled.

It is our opinion that if legislation is enacted to regulate oil and gas waste, the federal government should retain primacy until such time as individual states demonstrate adequate capabilities. The delegation process should not, however, be turned into the arduous endeavor currently in operation within the RCRA program. Clearly, federal oversight must be available to ensure consistency. The EPA should consider approving state programs based upon self-certification demonstrations.

The health and economic implications of regulating oil and gas wastes under RCRA Subtitle C rather than under RCRA Subtitle D will be waste-specific. Clearly, disposal costs for hazardous waste are significantly higher than those for non-hazardous waste. It is quite likely, however, that it will not be environmentally necessary to regulate all oil and gas waste streams as hazardous. Each stream must be evaluated based upon its specific characteristics. As a part of the evaluation process, the EPA is required to consider economic implications, and endeavor to balance environmental benefit versus those implications. The appropriate approach is to require the EPA to go through the characterization process rather than to exclude <u>all</u> oil and gas wastes from Subtitle C regulation. This clearly has resulted in adverse health and environmental impacts, as described earlier.

It is our opinion that the role of the federal government, as stated above, should be to establish regulations governing the management of oil and gas wastes. Individual states simply lack

the wherewithal to conduct the studies necessary to properly categorize each waste stream and impose fair, yet protective management standards. This type of activity has always been the responsibility of the federal government, primarily through the EPA. To treat oil and gas waste any differently would be totally inappropriate.

With the exception of the need for Congress to more clearly express its mandate to the EPA regarding oil and gas waste management, we believe the existing RCRA statute contains sufficient authority to address these wastes. Undoubtedly, the exclusion of oil and gas waste from the definition of a hazardous waste should be repealed by legislation, and a clear statement of congressional intent to properly manage these wastes should be provided.

We also believe that Congress should encourage waste minimization. In order to avoid the use and closure liability of pits, some operators are using a closed system. This is a system in which the waste is stored in enclosed tanks or barges prior to being disposed of. When possible, use of this method should be encouraged for all oilfield operations.

We strongly urge that no blanket exemptions be allowed for stripper wells. Louisiana is a mature and well explored production area as are most of the United States. The majority of producing wells in the country are now or will eventually become stripper wells. An exemption for these wells will make any regulations meaningless. In addition, major oil producers are moving their operations offshore and selling facilities to small operators which frequently do not have the capital to adequately finance cleanup operations.

State resources are generally inadequate to regulate the oil and gas industry and must be supplemented by federal funds and research efforts. States have been forced to take the lead despite heavy political opposition and severe resource constraints in certain cases (coastal discharges and radiation) because of federal inaction. Regulation under RCRA must be accompanied by development of strong water pollution control and radiation protection measures. Louisiana is far in advance of the federal government in these areas. Louisiana, one of the largest oil producing states in the country, has promulgated strict but fair regulations; we urge the Congress to support such efforts to do so.

STATEMENT OF LARRY N. BELL

Mr. BELL. Thank you, Mr. Chairman. I appreciate the opportunity to appear here today.

The issue of oil and gas exploration and production, waste management, and regulation is clearly of overriding importance to our industry and to America's security, energy security position.

The domestic industry, from the smallest independent producer to the largest integrated company, is united in its concern about the treatment of oil and gas production waste in the context of RCRA reauthorization. I believe there is good cause for that concern. The consequences of the decisions you make could result in the loss of millions of barrels of domestic energy production and could be measured in tens of billions of dollars by our industry.

The subcommittee has been provided with extensive information concerning a study conducted by Gruy Engineering for API, as alluded to by Commissioner Krueger.

One scenario analyzed by that Gruy study assumed a hypothetical case in which oil and gas wastes were regulated under the industrial waste management provisions of Senate 976, which is, of course, the Baucus-Chafee RCRA reauthorization bill in the Senate.

This scenario would force the shutting in of 500,000 or about 80 percent of our oil wells and 200,000 or about 75 percent of our Nation's gas wells. We would lose 13 percent of our oil reserves and 9 percent of our gas reserves. Oil production would plummet 20 percent in the first year with tens of thousands of jobs being lost.

Since others have proposed that the exemption from subtitle C regulation be repealed for associated wastes, we also ran that case on the Gruy model using some very conservative assumptions. If only a small portion of the associated waste tested hazardous, 78 percent of the Nation's oil wells and 59 percent of our gas wells would be shut in with significant reserve and production losses.

It is clear that additional Federal legislation of oil and gas wastes would reduce domestic production substantially, diminish reserves, and place our country increasingly at the mercy of OPEC imports.

And it is equally clear that there is no need for additional Federal regulation of these wastes. The current mix of State and Federal regulation is uniquely suited to the effective management of production wastes. A system has been tuned and developed over time. It works well. It responds to reality. It is fully capable of meeting newly identified needs.

To apply prescriptive national standards or to regulate production wastes as hazardous wastes under RCRA would impose an enormous, unnecessary cost burden on the industry without discernible improvement in the environment or protection of human health. It would overwhelm the capacity of existing RCRA facilities.

It presumes that EPA could divert already scarce resources and personnel from the urgent business of dealing with toxic wastes to managing high-volume, low-toxicity oil and gas production wastes that are already being managed in a safe and responsible manner under State and Federal regulations.

I would suggest, Mr. Chairman, that the real issue to be considered by Congress is this: What regulatory structure best provides for environmentally and economically sound control of oil and gas exploration and production wastes. In reaching that decision, consider that State regulation of oil and gas resources and wastes has existed since the 1930's and perhaps earlier and takes into account a wide range of geological and geographical conditions that exist at over a million exploration and production sites nationwide.

Three years ago, EPA extensively studied the production waste issue and concluded that existing State and Federal regulatory programs are generally adequate for controlling oil, gas, and geothermal waste. The producing States and EPA are working to close regulatory gaps and measure State programs against a model developed by the Interstate Oil & Gas Compact Commission. The industry supports this effort and is participating fully.

The issue here is not subtitle C or subtitle D of RCRA. Neither was designed to deal with the unique structure of the oil and gas exploration and production industry. The real issue is the effective management of E&P wastes in a manner that protects human health and the environment and is consistent with the need to assure adequate production of domestic oil and gas.

Oil and gas waste management has been studied thoroughly by the EPA and other parties. The consistent conclusion is that these wastes, when properly managed, present minimal threat to health and the environment and do not warrant classification as hazardous under RCRA. A rigid subtitle C approach is not an appropriate statutory framework in which to address operations common to the oil and gas industry.

The current system works. We support it. And I would be glad to answer questions you may have.

Mr. SWIFT. Thank you very much, Mr. Bell.

Ms. Denise Bode.

[Testimony resumes on p. 291.]

[The prepared statement of Mr. Bell follows:]

Testimony of Larry N. Bell, on behalf of THE AMERICAN PETROLEUM INSTITUTE AND MID-CONTINENT OIL AND GAS ASSOCIATION

PRODUCTION WASTES TESTIMONY

I. Introduction

A. Industry Concerns

The issue of how oil and gas exploration and production (E&P) wastes are treated under the Resource Conservation and Recovery Act (RCRA) is the most far-reaching and significant policy concern confronting the oil and gas industry during this session of Congress. Oil and gas production wastes, when properly managed, present minimal threat to human health and the environment. This is because these wastes are already thoroughly regulated under a myriad of state and federal laws. At issue before Congress is whether additional federal regulations under RCRA should be required under either Subtitle C or Subtitle D. Neither is appropriate. Neither was designed to deal with the type of waste generated during oil and gas exploration and production. Nor will further federal regulation bring new resources or new expertise to the regulation of production wastes.

Yet, changes in existing procedures would have immediate and dramatic consequences for domestic energy production and America's energy security. These potential impacts are clearly documented in a study recently completed for the American Petroleum Institute (API) by Gruy Engineering of Dallas. The study demonstrates that if E&P wastes were to fall under the regulatory scheme outlined for nonhazardous industrial waste in the new Subtitle D of S.976, the result would be the premature abandonment of over 80 percent of domestic oil wells and over 75 percent of domestic gas wells. It would result in the loss of 2,500,000,000 barrels of recoverable oil reserves and 10,200,000,000,000 cubic feet of recoverable gas reserves. Domestic oil production would decrease by 440,000,000 barrels the first year, which exceeds the 407,000,000 barrels imported from Saudi Arabia in 1989. The costs of compliance to the oil and gas industry would be in the $50 to $60 billion range, which is about 3.5 times the $14.6 billion that

industry invested in onshore exploration and development according to API's 1989 Survey on Oil and Gas Expenditures.

B. Industry Position

The domestic oil and gas industry, from the smallest independent producer to the largest integrated company, is united on this issue. We believe that the Environmental Protection Agency (EPA) was correct when, only 3 years ago, the Agency determined that E&P wastes should continue to be exempt from hazardous waste regulation and continue to be regulated under existing state and federal regulations. The current regulatory process works well. It is being improved, and it is fully capable of responding to emerging E&P waste management issues. The states have decades of experience in regulating production wastes. They understand the needs unique to their jurisdictions and they should retain regulatory authority. We also support the on-going efforts of the states and EPA to improve state and federal regulatory programs where necessary.

Congressional decisions regarding the treatment of E&P wastes will be a major factor in determining the future of domestic oil and gas production. The potentially huge cost of complying with new regulations would directly affect our ability to continue production from existing wells and re-define the circumstances under which the oil and gas industry places capital at risk to drill for new oil and gas reserves.

C. National Energy Impact

There is a strong likelihood that both the House and Senate will soon be debating comprehensive energy legislation designed to make maximum effective use of America's domestic energy resources. The Administration has devoted substantial time and energy to the same important policy considerations. During the past year we have seen the dangers of energy dependence vividly demonstrated in the Persian Gulf.

There is a clear consensus that America needs to increase energy production here at home, use that energy more efficiently, and --- to the maximum practical extent --- reduce our dependence on imports. Ironically, at the same time, some are urging Congress to amend RCRA in a way that would force hundreds of thousands of oil and gas wells to be shut in, cause domestic production to plummet, diminish our reserves, and discourage future exploration. The inevitable consequence of such measures would be to increase our energy dependence and undercut any benefits that may be realized from energy policy proposals currently under consideration.

D. Production and Economic Impact Analysis - Gruy Model

In order to more accurately determine the potential economic impacts of various RCRA Reauthorization scenarios relating to E&P wastes, Gruy Engineering Corporation (Gruy) has developed a Regulatory Cost Impact Model for API.

The Gruy model is very sophisticated. It takes all onshore oil and gas wells in the U.S. and accumulates them into 37 state/areas divided into 44 oil well groups and 33 gas well groups based on common production characteristics and production rates. Production operating costs were compiled for each group using information obtained from the Department of Energy (DOE), certain confidential information from a survey of average production costs by region of 7 major oil companies and 13 independent operators, and Gruy's own confidential files that are based on over 30 years of oil and gas property evaluations. The Gruy model enables us to predict impacts such as the number of oil and gas wells shut in, loss of oil and gas reserves, and the loss of revenue and jobs that would result from various regulatory outcomes. The Gruy model predicts these outcomes for each state.

We are so confident of the integrity and validity of the model that we have invited independent scrutiny of the assumptions. Pursuant to a request from Congress,

representatives of the Congressional Budget Office have met with Gruy Engineering and are in the process of validating the model.

E. Impact of a Subtitle D Nonhazardous Waste Scenario

Using 1989 data, onshore domestic oil production had about 617,000 oil wells producing over 2.2 billion barrels of oil per year and 4,525 billion cubic feet of associated natural gas. There were about 260,000 gas wells producing approximately 11,410 billion cubic feet of natural gas and 105 million barrels of natural gas liquids per year.

The "Resource Conservation and Recovery Act Amendments of 1991" (S.976) does not require the regulation of E&P wastes. However, for input into the model, we assumed the Subtitle D industrial waste provisions of S.976 would be applied to E&P wastes. In this scenario, the Gruy model predicts petroleum industry activity would decline disastrously. At price assumptions of $20 per barrel of oil and $2 per thousand cubic feet of natural gas, the estimated impacts on the domestic industry would be:

- about 512,000 (over 80 percent) of existing oil wells would be shut in;
- about 200,000 (over 75 percent) of existing gas wells would be shut in;
- first year oil production would decrease about 440 million barrels, a 20 percent decrease;
- first year gas production would decrease about 2,000 billion cubic feet, a 13 percent decrease;
- about 40,000 workers in oil and natural gas extraction would lose their jobs and over 100,000 in other industries would lose their jobs

- ad valorem and severance tax revenues to the states would decrease about $900 million the first year, a 13 percent reduction

- net revenues to royalty owners would be reduced by about $2 billion the first year, a 17 percent reduction.

F. Certain States Especially Impacted

Certain states, due to the maturity of the oil fields and small production rates of the wells, would lose over 90 percent of their oil wells. Those states and the number of oil wells shut in include, Arkansas (5,489), Illinois (32,349), Indiana (7,549), Kansas (44,876), Kentucky (21,068), Missouri (807), New York (3,924), Ohio (30,194), Oklahoma (96,337), Pennsylvania (27,218), Virginia (50), West Virginia (15,837).

Several states would lose over 90 percent of their gas wells. These states and the number of wells lost include, Illinois (289), Indiana (1,295), Kentucky (10,768), Nevada (12), New York (5,251), North Dakota (66), Ohio (33,585), Pennsylvania (27,936), South Dakota (48), Tennessee (593), and West Virginia (34,908).

The Gruy model is the most complex and complete computer model of the economic and energy effects of E&P solid waste management designed to date. A complete copy of the Gruy Report is attached as Attachment I.

G. States Are the Logical Regulators

In 1988, EPA completed a thorough study of the E&P waste issue and concluded that:

> Existing State and Federal regulatory programs are generally adequate for controlling oil, gas, and geothermal wastes. Regulatory gaps in the Clean Water Act and UIC program are already being addressed, and the remaining gaps in

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> State and Federal regulatory programs can be effectively addressed by formulating requirements under Subtitle D of RCRA and by working with the States.[1]

The regulatory regime referred to by the EPA has a long history of effectiveness. When Congress enacted environmental legislation during the 1970s, it found that, in most cases, the formation of a federal regulatory structure served as the primary model for states and localities which were only then beginning to deal with the need for regulation.

However, in the case of regulating E&P wastes, the opposite was true. The states have been active in this area for over 70 years; for example, Oklahoma began regulation in 1916, Texas in 1919. Initially, these regulations dealt with production rates to curb waste of the resource through overproduction and to protect the safety and well being of the citizens.

These state regulatory structures were modified over time to address a wide range of environmental issues. For example, one of the earliest environmental regulations was the Texas Railroad Commission's Rule 20 issued in 1919. It stated: "Fresh water is to be protected. Fresh water, whether above or below the surface, shall be protected from pollution whether in drilling or plugging." When EPA began to implement the Underground Injection Control Program (UIC) of the Safe Drinking Water Act, it discovered that many states, such as Texas, already had far more intricate and substantial UIC programs in place that dealt with the specific geologic and other technical aspects of each state. This extensive state regulatory framework exists in the same manner for other E&P wastes.

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[1] EPA's 1988 "Regulatory Determination for Oil and Gas and Geothermal, Exploration and Production Wastes", page 4. The document is attached to this testimony as Attachment II.

H. Prior Congressional Consideration of E&P Wastes

Congress recognized the consequences of over-regulation in the late seventies when additional federal regulation of E&P wastes was first proposed. Realizing that there were serious questions about the applicability of the rigid statutory structure of Subtitle C to E&P wastes, and that extensive state and federal regulations already existed for managing these wastes, Congress chose to continue the existing regulatory structure and study the implications of alternatives.

Congress amended RCRA to exempt E&P wastes from regulation under Subtitle C and directed EPA to determine whether E&P wastes should be regulated under Subtitle C. This decision was to be based on the results of an extensive analysis of the oil and gas exploration and production industry.

I. EPA Recognizes States' Existing Regulatory Framework

EPA conducted a comprehensive two year analysis and published its results in December 1987 in a report to Congress entitled "Management of Wastes from the Exploration, Development and Production of Crude Oil, Natural Gas, and Geothermal Energy". Then in June 1988, EPA issued its "Regulatory Determination for Oil and Gas and Geothermal Exploration, Development and Production Wastes" (Attachment II).

In the 1988 Regulatory Determination, EPA stated:

> Furthermore, since existing State and Federal programs already control oil and gas wastes in many waste management scenarios, EPA needs to impose only a limited number of additional controls targeted to fill the gaps in the existing programs. Subtitle C with its comprehensive "cradle to grave" management requirement, is not well suited to this type of gap-filling regulation.[2]

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[2] Ibid., pg 5

EPA further stated:

> It is impractical and inefficient to implement Subtitle C for all or some of these wastes because of the disruption and, in some cases, duplication of State authorities that administer programs through organizational structures tailored to the oil and gas industry.[3]

J. Industry Supports Improvements at the State Level

The American Petroleum Institute (API) and Mid-Continent Oil and Gas Association generally concur with EPA's assessment of the status of existing regulations and the consequences of regulation under Subtitle C of RCRA. We endorse EPA's approach toward filling the gaps in existing state and federal regulatory programs by working with the states to encourage changes in their regulations and enforcement procedures where necessary.

The petroleum industry favors state regulation of E&P wastes because we believe state governments are better equipped to assess and address their unique oil and gas operations and environmental conditions. At the same time, the process by which states formulate regulation differs little from the federal process. Like the federal process, the development of state regulations provides the public, state and federal agencies, and industry ample opportunity to comment and testify at public hearings before proposed regulations become final.

Moreover, state regulations, along with industry practices and technology, are based on more than a century of experience that includes the drilling of over three million wells. This is expertise that the federal government will never be able to acquire. It is unlikely

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[3] Ibid., pg 5

that a federal program will ever be staffed or funded at a level that can effectively deal with the diversity of needs that are evident in the 33 producing states.

K. States Improve Regulations

The states have demonstrated an ongoing commitment to develop regulations designed to protect the environment in their jurisdiction. For example:

- Texas updated Rule 13 in 1983 to contain specific cementing criteria to ensure protection of groundwater. A state well plugging fund was established in 1983. Rule 8 was revised in 1984 to contain a "no pit order" requiring that (with few exceptions) production pits can only be constructed after public notice and a hearing. Texas recently passed legislation to establish oilfield cleanup funds with the revenues to come from wellhead taxes and increased fees.
- Oklahoma has passed oilfield environmental regulations similar to Texas'. Between 1987 and 1991, the Oklahoma Corporation Commission wrote or revised over 30 rules on E&P environmental regulation.
- West Virginia adopted a permit requirement for drilling mud reserve pits that requires detailed layout, construction, closure and remediation plans.
- Montana has significantly rewritten its E&P environmental rules to include fencing and screening of some pits, reserve pit closure requirements, reserve pit liners when salt or oil based muds are used, and disposal requirements for drilling muds.
- Louisiana established Order 29-B, its environmental regulation, in 1943. The regulation first dealt with environmental control of E&P underground injection wells. Between 1943 and 1980, Order 29-B was amended over 30 times. Since 1985, major regulatory improvements have been established in the areas of

commercial facilities, onsite disposal, abandoned oilfield waste site law and coastal zone pits.

In addition, the Interstate Oil and Gas Compact Commission (IOGCC), an organization of oil and gas producing states, with funding assistance from EPA and input from both environmental and industry, has developed a model state oil and gas E&P environmental regulatory program that was published in December, 1990. The IOGCC/EPA report contains criteria for setting performance standards and design specifications for disposal facilities and for disposal practices such as landspreading based on site specific or regional differences in geology, hydrology, climate, and waste characteristics.

Oil and gas producing states are reviewing their E&P environmental regulatory programs against the IOGCC/EPA Report. Some --- including Wyoming, Alabama, New Mexico, Montana, Oklahoma, and Louisiana --- have already taken steps to implement the IOGCC criteria. In addition, the IOGCC/EPA Report recommended a state peer review process be conducted by regulators, environmentalists, and industry. Wyoming was the first state selected for this peer review. The review is complete and the report is scheduled for release in October, 1991. Pennsylvania has volunteered to be the next state for review.

It is clear that state regulation of the E&P industry continues to work well and is fully capable of responding to the environmental needs of the future. The system meets the fundamental test of any effective regulatory program: As new issues develop, the regulatory system assesses them and develops the necessary changes. This should be the criteria that Congress uses to determine whether it should impose additional requirements. No program, federal or state, will be perfect. But, it must be able to change when change is necessary.

II. RCRA Subtitle C or Subtitle D?

One problem with the 1988 EPA Regulatory Determination is that it has tended to focus discussion on arcane arguments over whether all or part of the E&P wastes should be regulated under RCRA Subtitle C or RCRA Subtitle D. We believe these discussions miss the key issue.

A. Key Issue - Effective Management

Rather than debate the merits of regulation under Subtitle C or D, we suggest that the key issue is the effective management of E&P wastes in a manner that protects human health and the environment and is consistent with the need to assure adequate production of domestic oil and gas.

B. Unique Nature of Oil and Gas Production

Neither Subtitle C nor a more prescriptive Subtitle D of RCRA are appropriate to deal with the unique and complex nature of oil and gas production. Existing state and federal programs are designed for that purpose. When EPA evaluated Subtitle C as a regulatory structure for E&P wastes, it found several serious problems:

> First, Subtitle C contains an unusually large number of highly detailed statutory requirements. It offers little flexibility to take into account the varying geological, climatological, geographic, and other differences characteristic of oil and gas drilling and production sites across the country. At the same time, it does not provide the Agency with the flexibility to consider costs when applying these requirements to oil and gas wastes. Consequently, EPA would not be able to craft a regulatory program to reduce or eliminate the serious economic impacts that it has predicted. Furthermore, since existing State and Federal programs already control oil and gas wastes in many waste management scenarios, EPA needs to impose only a limited number of additional controls targeted to fill the gaps in the existing programs. Subtitle C, with its comprehensive "cradle to grave"

management requirement, is not well suited to this type of gap-filling regulation.[4]

The waste scenarios addressed by EPA when it promulgated the Subtitle C regulations generally focused on industries that were disposing of highly toxic wastes in poorly designed private and municipal landfills. The Subtitle C structure was designed for toxic waste characteristic of those found in some of these centrally located landfills. It set design standards for hazardous waste management facilities and established a "cradle to grave" structure for the management of hazardous wastes. These Subtitle C hazardous waste management facilities would be sited in suitable areas, designed to receive toxic wastes over a long period of time, to treat, store and dispose of these wastes, to be closed after their useful life and monitored for many years thereafter. The Subtitle C structure specifies requirements based on strict adherence to these criteria with no room for addressing site specific requirements.

Oil and gas E&P operations, however, do not fit this mold. E&P operations generate high volume/low toxicity wastes. These wastes have been effectively managed under state regulatory programs for decades. Unlike the centralized operations of RCRA Subtitle C facilities where wastes are transported to a central waste management facility, E&P activities take place at 1.25 million sites scattered nationwide. The scattered nature of E&P facilities, the wide range of ecological conditions found at these sites, and low toxicity make the prescriptive Subtitle C regulation inappropriate for E&P wastes.

C. A More Prescriptive Subtitle D is Inappropriate

Similarly, stringent nationwide Subtitle D standards are also inappropriate for E&P wastes. However, legislative proposals introduced during this and past Congresses would create a new, more prescriptive structure for Subtitle D. These proposals are largely

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[4] Ibid., pg 4

designed to address municipal and industrial landfill issues, because these type landfills are the dominant type of Subtitle D facility. The narrower Subtitle D --- one that increasingly resembles the prescriptive Subtitle C framework that EPA warned about in its Regulatory Determination --- is equally inappropriate for E&P wastes.

D. Existing Programs Provide a Suitable Framework

While neither Subtitle C nor a revised Subtitle D present an appropriate structure to deal with E&P wastes, existing state and federal programs are well suited to this purpose and are functioning well. These programs were designed to deal with the diverse conditions associated with E&P operations and have been in place for many years. Federal programs under the Clean Water Act and the UIC program of the Safe Drinking Water Act rely on site specific situations and on the continued implementation of pre-existing state regulatory programs. For other E&P wastes, state programs have been developed over the years to respond to varied regulatory requirements. Texas, for example, must regulate in coastal areas, wooded upland areas, and arid upland areas. Each area presents different waste management issues based on the topography, geography, climate, and hydrogeologic situations. Other factors unique to an area include the nature of the oil, the produced water, proximity and constituency of human and animal populations, and availability of transportation, storage, recycling, waste treatment, and disposal facilities.

In considering how best to manage oil and gas production wastes, we strongly believe that the most logical approach is to utilize the existing regulatory framework, which has evolved and been designed to assure environmental protection consistent with the need to develop domestic oil and gas supplies. Any inadequacies or gaps in this framework should continue to be addressed at the state level.

E. IOGCC and Industry Improvements

Since EPA's 1988 Regulatory Determination, as previously noted, the IOGCC has developed a report on the programs in oil producing states and a model regulatory structure for states to use in evaluating their programs. Similarly, API has developed the "API Environmental Guidance Document - Onshore Waste Management in Exploration and Production Operations" (Attachment III) for use by oil and gas producers. API has developed a training program based on this document and, along with the Gas Research Institute, is co-sponsoring training sessions for oil and gas producers across the country.

These efforts demonstrate an ongoing commitment to respond to emerging environmental issues at E&P operating sites. The existing system is fully capable of responding to the needs for increased environmental controls. But, unlike the options available under RCRA Subtitle C, these responses can be tailored to the diverse nature of oil and gas production while still protecting the environment.

III. DESCRIPTION OF INDUSTRY

The following are some of the basic facts and processes that give our industry its special character and demonstrate the need for flexibility in regulation.

A. Diversity of Oil and Gas Production

Oil and gas is produced in 33 states across the nation. Onshore there are approximately 617,000 oil wells and 260,000 gas wells served by about 219,000 tank batteries and 168,000 injection wells. There are about 13,000 collection and injection facilities where fluids or gas are processed and injected into producing oil and gas zones to enhance oil recovery. There are approximately 8,000 gas compressor and oil pumping stations. The total is about 1.25 million onshore sites across the nation.

Of the 617,000 producing oil wells in the U.S., about 450,000 are stripper wells, which produce an average of 2.3 barrels of oil per day (BOPD). Stripper wells account for about 14% of the total U.S. oil production.[5]

B. Where Does Oil and Gas Come From?

Oil and gas deposits were formed in the coastal and shallow areas of ancient seas that covered the current continental U.S. Continual burial of plants and animals by sediments and the salty seas, the sinking of these sediments and the subsequent high temperatures, high pressures, and airless environment that prevented oxidation, caused the oil and gas to form. The oil and gas migrated from the sedimentary rocks where they were formed to more porous and permeable rock. Over millions of years, this oil, gas, and saltwater accumulated in geological traps to form reservoirs.

We find potential for oil and gas deposits in those areas where the ancient seas once had a coast line or where shallow seas once existed. Ancient seas existed across the entire Gulf Coast from Florida to Texas, north through the Great Plains and Rocky Mountains, through the Canadian Rockies, and into Alaska. Drilling and production of oil and gas takes the industry to all parts of the U.S. where the potential for these deposits exists.

The wide variation of production operations and environmental settings can best be explained by an example comparing the two largest oil fields ever discovered in the U.S. - the giant Prudhoe Bay Field near Deadhorse on the north coast of Alaska and the East Texas Field, parts of which are located under the cities of Longview and Kilgore, Texas. Prudhoe Bay, discovered in 1969, is located in a harsh, arctic environment. Winter nights are long with sub-zero temperatures common. The soil is permanently frozen (permafrost) to a depth of about 2,000 feet. The oil is produced from relatively few

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[5] A stripper well is defined as a well producing 10 barrels oil per day or less.

wells. As large as Alaska is --- 586,412 square miles --- the entire state has only about 1,300 oil wells.

Compare these conditions and operations to those in the East Texas Field. Discovered in 1930, the East Texas Field was the largest oil field ever discovered in the Lower 48. It covered an area of 204 square miles when first discovered and has had over 31,000 wells drilled in this 204 square miles. Oil wells are still located in backyards of neighborhoods in Kilgore and Longview. Most require the use of a beam pumping unit to lift the oil to the production facilities, refer to the "API Introduction to Oil and Gas Production" (Attachment IV) for a picture of a beam pumping unit. The groundwater is used for drinking water and is shallow - most freshwater wells are from 100 to 300 feet in depth. The area is hot and humid for 9 months of the year and has a very mild winter. It is heavily wooded with pine and hardwoods and the lakes abound with some of the finest fishing in the U.S.

Operations that are protective of human health and the environment in one of these ecological settings may have no application or need in the other. And conversely, an environmentally sound operational practice in one may be unacceptable in the other. Consequently, each state has developed different E&P environmental regulatory programs that are protective of their respective environments.

C. Drilling Operations

In 1985, approximately 72,500 oil and gas wells were drilled onshore in the U.S. By 1989, annual drilling activity had fallen to approximately 29,500 wells.

Drilling a well consists of:

- o obtaining a "lease"
- o selecting and surveying a site to comply with state spacing regulations that prohibit waste of the resource
- o obtaining the drilling and/or construction permits
- o construction of the drilling site, including the access roads, reserve pits, fresh water supply, and foundation for the rig, and
- o drilling the well.

1. Permits

The permits required for drilling a well may be multiple. Permits are required by state agencies. Municipalities, Native American agencies, the Forest Service, the Bureau of Land Management and other federal and state agencies may also be involved. The permits issued may require a detailed construction and restoration plan. The construction plan may contain pit locations and construction detail, for example, as required by the State of West Virginia.

2. Drill Site Construction

Once the drilling permits have been issued, a level surface and adequate foundation are built for the drilling rig. Generally, a "reserve" pit is constructed to hold waste drilling mud and the rock and clay cuttings that are removed as the hole is drilled; a freshwater pit may also be dug to hold a small reservoir of freshwater for mixing of "muds" to drill the well.

3. Protecting Underground Sources of Drinking Water

Once the site is constructed and the drilling rig is in place, drilling commences. When the depth of the "hole" is below the lowermost fresh water zone, a string of pipe is run to "case" the wellbore. This pipe is called the casing string and this first casing string is called the "surface casing" or "surface pipe". Cement is circulated between the surface pipe and wellbore up to the ground surface to seal off and protect the fresh water zones. The requirement for the sealing of the water zones with casing and cement is regulated by the state and federal agencies. Other casing strings are run when the well reaches total depth to seal off the producing formation and keep the hole (wellbore) open. Again, cement is circulated between the pipe and wellbore, this time to seal and isolate zones that may be productive of oil and gas, or which may contain saltwater.

4. Completing a Well to Produce

Once the well is drilled, the drilling rig is moved off location. The reserve pit containing waste drilling muds and cuttings from the wellbore is left to settle and allow as much water as possible to evaporate. Most states have regulations governing how long a reserve pit may be left open. The remaining water is removed, the pit backfilled, and the site revegetated, usually within 2 to 4 months after drilling is completed.

Next, a portable rig with a derrick, called a "workover" rig, is moved in to finish or "complete" the well. At this point the well casing is perforated in the geologic formation (called zone) that is thought to contain oil and/or gas. The zone may have to be stimulated, that is "acidized" or "hydraulically fractured" to provide a better pathway for oil and gas to flow to the wellbore.

Hydraulic fracturing consists of pumping fluid down the well under enough pressure to "fracture" or split the rock formation containing the oil and gas. Once opened, sand or some other propping agent such as walnut hulls is pumped into the "fracture" as a slurry

to "prop" it open, thus creating a pathway for flow. The slurry of sand is made by mixing a "gel" such as guar gum (a natural gum produced by plants) with saltwater to make it viscous and able to suspend and "carry" the sand.

Acidizing to stimulate a well is done when the formation is composed of an acid soluble material such as limestone. The acid creates a flow pathway by dissolving the limestone formation until all the acid is consumed. When hydrochloric acid reacts with limestone, it is neutralized, creating a salt (calcium chloride), carbon dioxide, and water. The salt is in solution in the water and flows back to the surface where it is collected for proper disposal.

D. Construction of Production Facilities

Once the well is "completed" and ready to produce, a production facility is built. A separator is installed to separate the gas, oil, and water. The produced oil is piped from the separator to a heater treater where any oil/water/solids emulsions are treated to separate oil from the water and solids. The water and solids must be removed in order to sell the oil. The separated oil is piped to oil storage tanks and the produced water is transferred to a produced water storage tank. (See Figure 1). The separated gas may require treating to remove water vapor or hydrogen sulfide gas before being sold. If so, it is sent to a glycol treater to remove water or an amine (or similar) treater to remove the hydrogen sulfide before it is sent to gas sales. The gas treating processes described here may be accomplished on site or at a central treating facility.

For more information on oil and gas production and production facilities, refer to the "API Introduction to Oil and Gas Production" (Attachment IV).

Associated Waste Generation

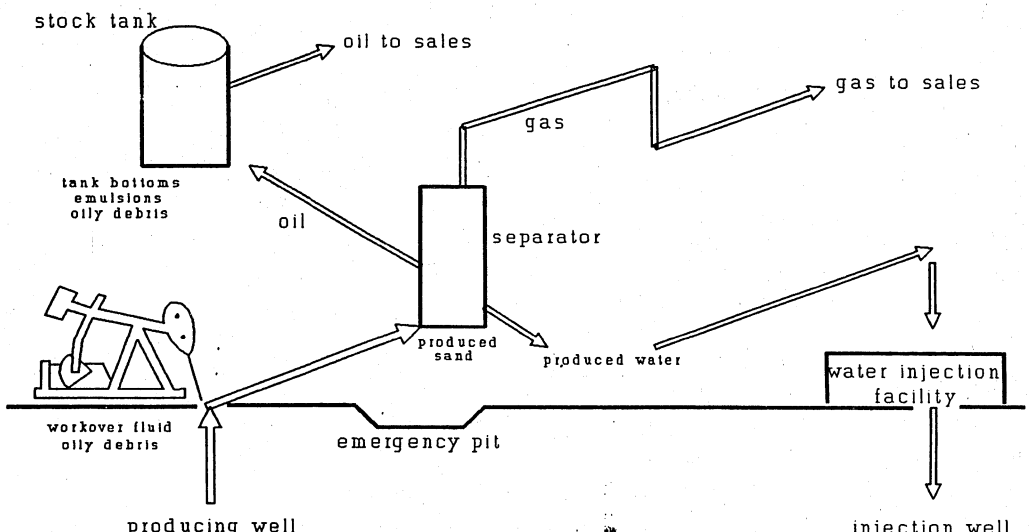

FIGURE 1

E. Waste Descriptions and Volumes

Drilling for and production of oil and natural gas results in four types of wastes: drilling "muds" and cuttings, produced waters, associated wastes, and some industrial wastes. The volumes cited below are based on a 1985 API Production Waste Survey.

1. Produced Waters

Water occurs naturally in geological formations with oil and natural gas. When oil comes out of the ground, so does water --- an average of 6 to 8 barrels of water are produced with each barrel of oil. During the life of an oil well, the volume of water produced generally increases with time. The water varies in quality but usually contains salt or other minerals. About 20.7 billion barrels of water are produced annually, representing 98 percent of the total U.S. E&P waste stream. Volumes of produced water (in billions of barrels) is broken down as follows:

Recycled for enhanced oil recovery	13.0
Disposed of by injection	5.8
Disposed of under federal NPDES permits	1.2
Disposed of by percolation (primarily California)	0.7

About 7.7 billion barrels (37%) of the 20.7 billion barrels are considered waste for disposal. The remaining 13 billion barrels (63%) are beneficially reused and recycled in enhanced oil recovery operations (EOR). This produced water is injected into the reservoirs to maintain pressure and push the oil to other producing wells. Without this technology, billions of barrels of crude oil would not have been produced.

Over 90 percent of produced waters are injected underground through some 168,000 permitted injection wells. Underground injection is regulated under the Safe Drinking Water Act (SDWA) either directly by EPA or by EPA approved state programs that contain the minimum requirements outlined in the Underground Injection Control (UIC)

program of the SDWA. Some waters are discharged into coastal and offshore areas under Clean Water Act regulations in accordance with National Pollutant Discharge Elimination System (NPDES) permits. In some cases, low salinity waters are beneficially used for irrigation and for livestock drinking water, especially in arid areas. About 0.7 billion barrels are disposed of by percolation in areas where underground sources of drinking water are not present. This practice occurs primarily in California.

2. Drilling Muds

When oil and natural gas wells are drilled, fluids are circulated through the drill pipe, through and around the drill bit, and up the hole. (See Figure 2). These fluids are known as "muds". Drilling muds are water or oil based mixtures of clays and weighting materials, with small amounts of various additives. The purpose of drilling muds is to provide safety for the workers by controlling pressure in the well, remove rock cuttings produced by the drill bit, lubricate and cool the bit, and seal the sides of the wellbore. In 1985, operators generated and disposed of 361 million barrels of drilling muds, cuttings and other related wastes, approximately 1.6 percent of the total E&P waste stream.

Used drilling muds and rock cuttings are usually deposited in earthen walled reserve pits. These reserve pits are closed according to state regulations and landowner agreements, usually within 2 to 4 months after drilling is completed.

a) Water-Based Drilling Muds

Approximately 94% of muds are water-based and are usually disposed of onsite. Water in the reserve pit is allowed to evaporate or is removed. Waste mud and cuttings may be landspread, buried, or transported offsite for disposal in accordance with state regulations. The waste mud and cuttings represent about 20 percent of the original volume of waste in the reserve pit. The pit is backfilled and revegetated. In some cases, water-based muds are recycled for later use or used for plugging and abandoning wells.

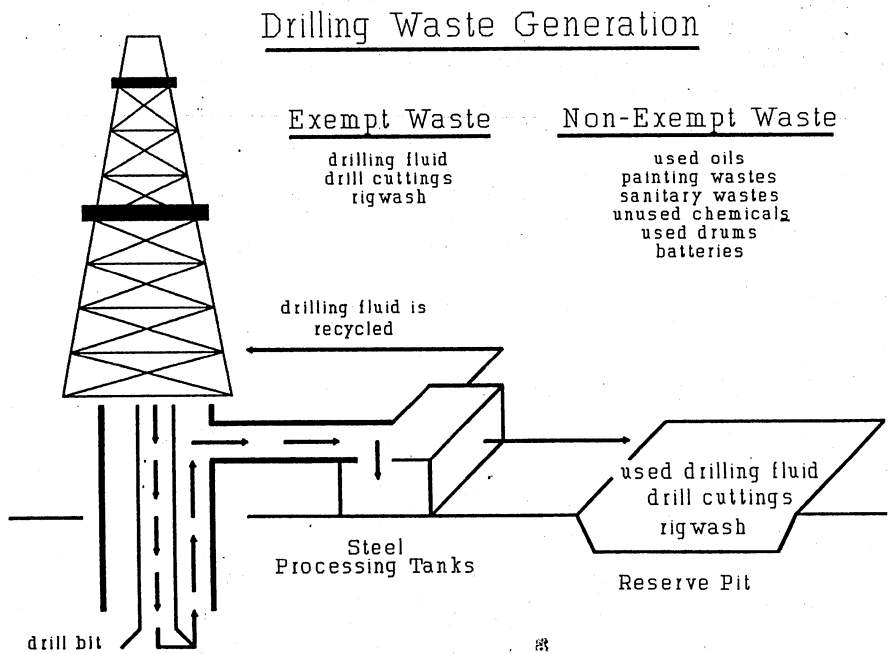
Drilling Waste Generation
Exempt Waste
drilling fluid
drill cuttings
rigwash
Non-Exempt Waste
used oils
painting wastes
sanitary wastes
unused chemicals
used drums
batteries
drilling fluid is recycled
used drilling fluid
drill cuttings
rigwash
Steel
Processing Tanks
Reserve Pit
drill bit

FIGURE 2

b) Oil-Based Drilling Muds

Oil-based muds are expensive and are almost always returned to the vendor or a reclaimer for recycling. Oil-based muds are used when water-sensitive formations (such as saltbeds) are drilled. If a freshwater mud were used to drill a saltbed, the water would dissolve the salt and cause huge caverns to be washed out, bringing large volumes of salt to the surface and causing hole instability and casing cementing problems. Oil-based muds are also required when high temperatures are encountered which would degrade water-based muds. Oil-based muds may be required when pipe sticking occurs or when necessary to protect against severe drill string corrosion (destruction of the pipe being used to drill the well).

As noted before, most oil-based mud is recycled but oil-based mud cuttings must be disposed of. These wastes may be transported offsite to a commercial waste management facility or managed onsite by landspreading or used for roadbase if applied on a percent weight basis using criteria such as that found in the API Environmental Guidance Document (Attachment III). These criteria are that the material not be ignitable and have a mixed density and metals content consistent with approved road oil mixes. Applications are at loading rates that minimize the possibility of surface runoff and, in some states, must be reviewed with landowners and appropriate state and local regulatory agencies. Some states require permits for land application of these wastes.

3. Associated Wastes

Exploration and production operations also generate about 12 million barrels annually of other wastes including:

- oily debris (1.2 million barrels)
- produced sand (1.3 million barrels)
- tank bottoms or vessel solids (1.5 million barrels)

- spent workover fluids (5.6 million barrels)

The wastes associated with production of oil and gas are often naturally occurring materials such as the oily sands, clays, water, and paraffins accumulated in the bottoms of oil and gas separators, crude oil stock tanks, and other vessels. Some of the wastes contain treating chemicals that come in contact with the oil and gas streams. These may include glycol similar to that in the radiators of automobiles, corrosion inhibitors and scale inhibitors. Associated wastes are sold to reclaimers or disposed of in accordance with state regulations and industry guidelines by roadspreading, landspreading, or injection underground into Class II wells[6].

4. Industrial Wastes

Industrial wastes generated in the production of oil and gas that are not unique to the industry and are not included in the associated waste category include construction debris, packaging material, empty drums, used lube oil, pipe thread protectors, and scrap metal. Most of these are sold to reclaimers, recycled, or disposed of according to state and federal regulations. If hazardous under RCRA, they must be managed as Subtitle C hazardous waste.

IV. STATE AND FEDERAL PROGRAMS FOR E&P WASTE MANAGEMENT

The management and disposal of E&P wastes are regulated under state and federal statutes designed to protect human health and the environment. State laws form the framework of this regulatory system and a list of applicable state laws may be found in the "EPA/IOGCC Study of State Regulation of Oil and Gas E&P Wastes". Federal laws

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[6] The Underground Injection Control Program of the Safe Drinking Water Act divides wells into different classes for purposes of regulation. Class II is the class covering underground injection of brine or other fluids related to oil and gas production.

and regulations supplement this host of state statutes. Lease agreements may also contain provisions and restrictions set by the private landowner that take into consideration special environmental needs of the property.

A. State Programs

A typical state program regulating the management of E&P wastes will contain many elements including:

1. Statutory authority which adequately details the powers and duties of the regulatory body, including enforcement;
2. Statutory authority to promulgate appropriate rules and regulations;
3. Statutes and implementing regulations which adequately define necessary terminology;
4. Provisions to adequately fund and staff the program;
5. Mechanisms for coordination among the public, government agencies and regulated industry; and
6. Technical criteria for E&P waste management practices that address pits, land applications, centralized and commercial facilities.

The states generally establish and implement specific performance standards and design specifications based on site-specific or regional differences in geology, hydrology, climate, waste characteristics, and method of operation, which may impact on the manner in which oil and gas exploration, development and production is performed. State oil and gas programs do, and should, vary from state to state and within portions of a state.

B. Nationwide Standards Are Impractical

The wide range of environmental settings in which oil and gas are produced makes setting minimum nationwide E&P waste standards impractical. For example, minimum

standards for protecting groundwater based on the deep groundwater levels in New Mexico would be unacceptable in Michigan where groundwater levels may be very near the surface. And the groundwater protection standards for the deep water table of New Mexico would not make sense for some areas of southern California where no groundwater exists. Similarly, discharge of high salinity produced water into the clear fishing streams of northeastern Oklahoma would be unacceptable, but discharge of low salinity produced water into an intermittent stream in the deserts of Wyoming for livestock watering would not only be acceptable but would be a preferred practice.

C. Federal Regulation of E&P Wastes

Major federal programs for regulating E&P wastes, usually administered by the states, include:

1. The Safe Drinking Water Act

The Safe Drinking Water Act authorizes EPA to administer the Underground Injection Control (UIC) program, which establishes minimum requirements for state, tribal, and federal injection activities in a manner that protects underground sources of drinking water (USDW). The UIC program is administered either directly by EPA or by the states under programs approved by EPA. The first state to achieve primacy was Oklahoma in 1981. Since then, 35 states have achieved primacy for the Class II UIC program, which regulates E&P operations, including injection of all produced water for disposal or to increase oil recovery from producing zones (secondary or enhanced recovery).

Some of the major Class II UIC program requirements include:

- o demonstration of mechanical integrity of injection wells;
- o casing and cementing of injection wells to prevent movement of fluid into drinking water sources;
- o maintenance of a maximum operating pressure to avoid fracturing of the confining zones;
- o mechanical integrity testing at least every 5 years;
- o permits;
- o monitoring and reporting of injection pressure and volume; and
- o reporting of noncompliance, ownership changes, well rework, mechanical integrity testing, and plug and abandonment.

For a state or tribal UIC program to be approved by EPA for primary regulatory authority, the general elements listed above or their equivalents must be in the program.

2. The Clean Water Act

The federal Clean Water Act (CWA) has several requirements applicable to oil and gas operations. The National Pollutant Discharge Elimination System (NPDES) permit program controls discharges of waste waters into waters of the U.S. The Spill Prevention Control and Countermeasure (SPCC) program of the CWA has requirements for spill prevention, containment, and reporting.

The NPDES portion of the Clean Water Act establishes a permitting system and control technology for all discharges, including intermittent streams and wetlands. EPA has determined that the control for onshore E&P operations is "no discharge". Exceptions to the "no discharge" limitation are separate rules for beneficial agricultural or wildlife use. Such beneficial uses are employed in areas, primarily in California and Wyoming, where the produced water has a low salinity. In some cases, these waters are the sole water sources for farming, cattle, or wildlife use. There are also exemptions for marginal (stripper) wells - wells that produce low volumes of oil. These discharges require NPDES permits.

Recently proposed EPA regulations will restrict or prohibit discharges to coastal waters. In contrast, the NPDES permits for all offshore discharges contain various discharge limitations, including oil and grease limits for produced water and toxicity limits for drilling muds and cuttings.

The Clean Water Act also requires SPCC plans for all E&P facilities where a spill could reach waters of the United States. Plan elements generally include providing secondary containment to contain the volume of the largest tank in the event of a tank spill, contingency plans, and oil spill reporting mechanisms. SPCC plans are required to be certified by a registered professional engineer.

At this time, EPA is preparing revisions to the SPCC program that will lead to more stringent SPCC plan requirements.

3. Resource Conservation and Recovery Act

As noted earlier, the oil and gas E&P industry does not have a "blanket exemption" from RCRA. Only specified wastes are currently exempt from regulation under Subtitle C. The exempt wastes are drilling muds and cuttings, produced water, and certain wastes uniquely "associated" with the production of oil and gas. Those wastes not unique to

E&P operations fall under the RCRA permitting and handling requirements in the same manner as all other industrial wastes of a similar nature. For example, spent solvents, paint wastes, used crankcase and lubrication oil, used engine oil filters, empty chemical drums, unused well stimulation fluids and construction debris, which may be generated at E&P sites, are all subject to the requirements of RCRA and if hazardous, must be managed under Subtitle C in the same manner as all other industrial hazardous wastes.

RCRA Subtitle D leaves to the states the regulation of nonhazardous wastes. These include those oil and gas E&P wastes specifically exempted from Subtitle C regulation: produced water, drilling muds, and associated wastes. Such regulation may include permitting for wells, pits and other facilities, and regulations for the management and disposal of drilling muds and cuttings.

V. THE EPA STUDY

A. Congress' Instructions to EPA

In the 1980 Amendments to RCRA Congress also directed EPA to study exploration and production wastes and recommend appropriate regulatory action to Congress.

The EPA followed strict legislative guidelines in assessing the production waste issue. The 1988 Determination states:

> Section 3001(b)(2)(A) of the Solid Waste Disposal Act of 1980 (Pub. L. 96-480), which amended the Resource Conservation and Recovery Act of 1976 (RCRA), prohibits EPA from regulating under RCRA Subtitle C "drilling fluids, produced waters, and other wastes associated with exploration, development, or production of crude oil or natural gas or geothermal energy" until at least 6 months after the Agency completes and submits to Congress a comprehensive study required by Section 8002(m) (also added by the 1980 amendments). Section 8002(m) directs EPA to conduct:

(A) detailed and comprehensive study and submit a report on the adverse effects, if any, of drilling fluids, produced waters, and other wastes associated with the exploration, development, or production of crude oil or natural gas or geothermal energy on human health and the environment, including, but not limited to, the effects of such wastes on humans, water, air, health, welfare, and natural resources and on the adequacy of means and measures currently employed by the oil and gas and geothermal energy drilling and production industry, Government agencies, and others to dispose of and utilize such wastes to prevent or substantially mitigate such adverse effects.

The study was to include an analysis of:

1. The sources and volumes of discarded material generated per year from such wastes;
2. Present disposal practices;
3. Potential danger to human health and the environment from surface runoff or leachate;
4. Documented cases that prove or have caused danger to human health and the environment from surface runoff or leachate;
5. Alternatives to current disposal methods;
6. The cost of such alternatives; and
7. The impact of those alternatives on the exploration for, and development and production of, crude oil and natural gas or geothermal energy.[7]

B. EPA's Conclusion

EPA conducted an extensive two year study and submitted a report to Congress on E&P wastes on December 22, 1987. On the basis of that study and comments received at public hearings held across the country in the spring of 1988, EPA decided on June 30, 1988 not to recommend regulation of these wastes as hazardous under Subtitle C of RCRA. EPA concluded that the wastes should retain the exemption from Subtitle C and continue to be regulated under existing programs. To the extent that gaps exist in these programs, EPA recommended filling the gaps by strengthening the existing programs. EPA further concluded that the wastes do not pose a significant threat to human health

[7] Ibid., pg 6

and the environment when properly managed, and that for the most part, were adequately regulated by the states. In general, EPA found that additional regulation under Subtitle C was:

- Unnecessary because a large body of state and federal laws already cover these wastes and because the Safe Drinking Water Act and the Clean Water Act "provide sufficient legal authority to handle most problems" these wastes pose.

- Impractical because administrative procedures and lengthy application processes for hazardous waste permits for drilling reserve pits would add hundreds of thousands of waste sites for regulatory tracking, with no real environmental benefit.

- Harmful to petroleum exploration and production; it could cause U.S. oil production to decline 18 percent by the year 2000 and 29 percent by 2010.

- Costly; it could cost consumers as much as $6 billion annually.

- Severely strain existing Subtitle C treatment and disposal capacity if the requirements were imposed.

In the 1988 Regulatory Determination, EPA reported the following:

> In completing the Report to Congress and this determination, EPA gathered and evaluated information on all of the issues raised in Section 8002(m), including three key factors pertaining to wastes from the exploration, development, and production of oil, gas, and geothermal energy:
>
> (1) the characteristics, management practices, and resulting impacts of these wastes on human health and the environment;
> (2) the adequacy of existing State and Federal regulatory programs; and
> (3) the economic impacts of any additional regulatory controls on industry.

In considering the first factor, EPA found that a wide variety of management practices are utilized for these wastes, and that many alternatives to these current practices are not feasible or applicable at individual sites. EPA found that oil, gas, and geothermal wastes originate in very diverse ecologic settings and contain a wide variety of hazardous constituents. EPA documented 62 damage cases resulting from the management of these wastes, but found that many of these were in violation of existing State and Federal requirements.

As to the second factor, EPA found that existing State and Federal regulations are generally adequate to control the management of oil and gas wastes. Certain regulatory gaps do exist, however, and enforcement of existing regulations in some States is inadequate. For example, some States have insufficient controls on the use of landfarming, roadspreading, pit construction and surface water discharge practices. Some States lack sufficient controls for central disposal and treatment facilities and for associated wastes. The existing Federal standards under Subtitle D of RCRA provide general environmental performance standards for disposal of solid wastes, including oil, gas, and geothermal wastes, but these standards do not fully address the specific concerns posed by oil and gas wastes. Nevertheless, EPA has authority under Subtitle D to promulgate more tailored criteria. In addition, the authorities available under the Clean Water Act (CWA) or Safe Drinking Water Act (SDWA) can be more broadly utilized, and efforts are already underway to fill gaps under these programs.

EPA's review of the third factor found that imposition of Subtitle C regulations for all oil and gas wastes could subject billions of barrels of waste to regulation under Subtitle C as hazardous wastes and would cause a severe economic impact on the industry and on oil and gas production in the U.S. Additionally, because a large part of these wastes is managed in off-site commercial facilities, removal of the exemption could cause severe short-term strains on the capacity of Subtitle C Treatment, Storage, and Disposal Facilities (TSDFs), and a significant increase in the Subtitle C permitting burden for State and Federal hazardous waste programs.

EPA went on further to say:

As explained in more detail in Section IV of this notice, EPA found that regulation under Subtitle C presents several serious problems. First, Subtitle C contains an unusually large number of highly detailed statutory requirements. It offers little flexibility to take into account the varying geological, climatological, geographic, and other differences characteristic of oil and gas drilling and production sites across the country. At the same time, it does not provide the Agency with the flexibility to consider costs when applying these requirements to oil and gas wastes. Consequently, EPA would not be able to craft a regulatory

program to reduce or eliminate the serious economic impacts that it has predicted. Furthermore, since existing State and Federal programs already control oil and gas wastes in many waste management scenarios, EPA needs to impose only a limited number of additional controls targeted to fill the gaps in the existing programs. Subtitle C, with its comprehensive "cradle to grave" management requirement, is not well suited to this type of gap-filling regulation. EPA concluded that it would be more efficient and appropriate to fill the gaps by strengthening regulations under the Clean Water Act and UIC programs and promulgating the remaining rules needed under RCRA under the less prescriptive statutory authorities set out in Subtitle D. This narrower approach would also reduce disruption of existing State and Federal control programs.

And finally, the EPA reached the following conclusions:

> ...Thus, the Agency has decided not to promulgate regulations under Subtitle C for wastes generated by the exploration, development, and production of crude oil, natural gas, and geothermal energy for the following reasons:
>
> (1) Subtitle C does not provide sufficient flexibility to consider costs and avoid the serious economic impacts that regulation would create for the industry's exploration and production operations;
>
> (2) Existing State and Federal regulatory programs are generally adequate for controlling oil, gas, and geothermal wastes. Regulatory gaps in the Clean Water Act and UIC program are already being addressed, and the remaining gaps in State and Federal regulatory programs can be effectively addressed by formulating requirements under Subtitle D of RCRA and by working with the States;
>
> (3) Permitting delays would hinder new facilities, disrupting the search for new oil and gas deposits;
>
> (4) Subtitle C regulation of these wastes could severely strain existing Subtitle C facility capacity;
>
> (5) It is impractical and inefficient to implement Subtitle C for all or some of these wastes because of the disruption and, in some cases, duplication of State authorities that administer programs through organizational structures tailored to the oil and gas industry; and
>
> (6) It is impractical and inefficient to implement Subtitle C for all or some of these wastes because of the permitting burden that the regulatory agencies

would incur if even a small percentage of these sites were considered Treatment, Storage and Disposal Facilities (TSDFs).

The Agency planned a three-pronged approach toward filling the gaps in existing State and Federal regulatory programs by:

(1) Improving Federal programs under existing authorities in Subtitle D of RCRA, the Clean Water Act, and Safe Drinking Water Act;

(2) Working with States to encourage changes in their regulations and enforcement to improve some programs; and

(3) Working with the Congress to develop any additional statutory authority that may be required.[8]

C. Industry Supports Improvements at the State Level

As stated earlier, API and Mid-Continent generally agree with EPA's assessment that, to the extent that E&P waste regulatory gaps exist, they should be filled by improving existing programs. We believe that a series of factors all combine to make additional prescriptive Subtitle C type regulation inappropriate and unnecessary. This series of factors includes:

- the diversity of ecological settings where E&P operations occur, the diversity of climatologic, geographic, and hydrologic factors;
- the diversity of production operations in the industry;
- the existing state regulatory structures;

[8] Ibid., pg 5 and 6

- o the inflexibility of the Subtitle C regulatory structure; and

- o the disastrous economic effect that prescriptive Subtitle C type regulation could have on domestic energy production and future energy prospects.

The petroleum industry agrees that the EPA should work with the states to improve current regulatory structures. We believe the states have experienced staff in place, decades of experience regulating oil and gas industry, and specific knowledge to apply regulations sensibly to the operations in the particular ecological setting where the E&P operations occur.

D. EPA And API Analyzed E&P Wastes

As noted above, EPA reached its conclusions through a process of extensive analysis. To fulfill the 1980 Congressional mandate to study the potential risks E&P wastes might pose to human health and the environment, EPA collected samples of E&P wastes and analyzed them for hazardous constituents.

Among the tools used by EPA to analyze E&P wastes was the proposed Toxicity Characteristic (TC) and its accompanying test, the Toxicity Characteristic Leaching Procedure (TCLP). The EPA has established limits on waste constituents that if exceeded, determine that a waste is characteristically hazardous with regard to toxicity. A waste can also be characteristically hazardous for corrosivity, reactivity, or ignitability. The purpose of the TCLP was to simulate the leaching of waste constituents from the environmental conditions found in a landfill (acidic, high volume, covered so that no air is present) into groundwater. Another tool used by EPA was a computer model of a municipal landfill to predict concentrations of constituents (metals) that might leach to nearby groundwater wells. The criteria for contamination of underground drinking water assumes that a person would drink 2 liters each day for 70 years from a water well

downgradient of a municipal landfill. EPA's computer model assumed an infinite source of contaminants due to the large volumes of wastes found in a typical landfill.

In addition to the EPA analysis, ERT, an environmental engineering firm under contract with API, conducted a parallel field sampling and analysis study of E&P wastes to compliment EPA's analysis. These studies were carried out over a 3 month period from July to September of 1986. The ERT survey consisted of 92 samples collected from 45 of the 49 EPA survey sites.

1. Drilling Muds - These wastes are classified as "pit solids" or "pit liquids". The July 1987 ERT Report showed that of the 26 pit solids samples taken, none exceeded reactivity, corrosivity, or TC limits.

Of the 18 pit liquids samples taken, none exceeded reactivity or TC limits. Only one, a water-based mud which used lime for pH control, was outside of the parameters for nonhazardous waste. This liquid in the pit failed the corrosivity characteristic (too high of a pH due to the lime).

To summarize, none of the drilling solids or liquids sampled failed Toxicity Characteristic levels.

2. Produced Water - The July 1987 ERT Report showed that of the 26 samples taken, none exceeded reactivity or corrosivity limits. One sample in New Mexico exceeded the arsenic limit of the TC at 8.7 mg/l (the EPA TC regulatory limit is 5.0 mg/l). No other metals limits were exceeded. However, 14 of the 26 produced water samples exceeded the TC regulatory limit of 0.5 ppm for benzene.

3. Associated Waste - There were not enough samples collected to characterize these wastes adequately in the 1987 studies by EPA and API. However, this testimony has further discussions of associated wastes on pages 20 (some workover

wastes generated), pages 27 and 28, and discussion of the Toxicity Characteristic testing results of some tank bottoms in Attachment V.

4. Analysis of Waste - Conclusions

The results of both the EPA and ERT studies combined with EPA's computer risk analysis show that the threat posed to human health and the environment by drilling wastes managed in onsite reserve pits and the disposal of produced water by underground injection were small. These wastes do not pose a significant threat to human health and the environment when properly managed. Factors considered include the concentrations of the constituents of concern and their mobility and persistence in the environment. Drilling muds have been referred to as "toxic soup" by many environmental groups. But when EPA and ERT analyzed these wastes, they found that none of the samples analyzed would exceed the TC limits. So in spite of their appearance, the wastes simply do not pose a significant threat to human health and the environment.

VI. OIL AND GAS DAMAGE CASES

The 1980 RCRA amendments directed EPA to include in its study of E&P wastes the identification of examples of practices that caused environmental or health damage. A group of 228 damage cases were collected by EPA's contractor, who indicated they had passed the agency's "test of proof" for validity.

This claim of 228 "damage cases" was promptly and thoroughly discredited. Several producing states and API conducted extensive reviews and analysis of the 228 alleged damage cases and uncovered major flaws in methodology and factual content by EPA's contractor. The analyses demonstrated that many of the allegations were inadequately documented and provided no valid basis for further assessment. Many of the alleged

damages cited by the contractor simply could not be validated when all records were reviewed.

The 1987 API study concluded that existing regulations covered 224 of 228 cases initially presented to EPA by its contractor. Current regulations now cover all 228 cases. None of the damage cases documented an impact to human health.

The EPA accepted the validity of the API and producing states analyses and used them to screen the 228 cases. This screening reduced the number of cases to 62 in the final report to Congress.

Analysis of the damage cases shows that state and federal regulations address the kinds of environmental problems that may occur if proper waste management practices are not employed. In all cases, existing legislation provided the authority to regulate E&P wastes and protect human health and the environment.

Following is a summary of the 228 cases and the findings by API.

API Analysis of 228 Cases Initially Presented to EPA

Category	Description	Number of Cases
Non-RCRA Issues	Oil spills and NPDES discharges covered under the Clean Water Act, groundwater issues covered under the Safe Drinking Water Act	45
Non-Current Practices	Waste management practices no longer used	67
Violations of Existing Regulations	Pre-1988	136
Unsubstantiated Cause/Damage	Administrative/legal action did not support claim, or a study	81
Pending Case	Case under agency or court review with decisions not reached	18

Note: Several of the 224 cases fell into more than one category, e.g. the case may be a non-current practice and a violation. Consequently, table values will exceed 224 when added. In particular, when the damage case evaluation indicates that an operator had violated current regulations, administrative or enforcement actions were taken by the state regulatory agency in 126 of the 136 cases.

VII. IOGCC/EPA MODEL STATE REGULATORY PROGRAM

While the EPA's Regulatory Determination found that existing state and federal programs were generally adequate to control E&P wastes, the Agency did identify some regulatory gaps. To fill the gaps, EPA funded an effort by the Interstate Oil and Gas Compact Commission (IOGCC) to develop a model state regulatory program for E&P wastes. The IOGCC is an organization comprised of the Governors (or their representatives) from the oil and gas producing states.

A. Background

Funded by a two year, $300,000 grant from EPA, the IOGCC formed the Council on Regulatory Needs in January, 1989 to identify methods to improve E&P waste management. The Council was co-chaired by Governor George A. Sinner of North Dakota and then-Governor Garrey Carruthers of New Mexico. This joint effort by IOGCC/EPA also included representatives from state regulatory agencies, industry, environmental groups, and the Department of Energy. The Council produced a final report in December 1990 designed to:

- establish a baseline of performance for state E&P waste management;
- demonstrate a commitment to environmental improvement shared by state governments, EPA, environmental groups and industry;
- serve as a model for future efforts to deal with complex oil and gas related environmental issues; and
- serve as a resource document for information on all state E&P waste regulatory programs.

B. State Program Criteria Identified

The IOGCC/EPA report identifies administrative and technical criteria for managing E&P wastes and outlines the need for clearly defined statutory authority and adequate levels of funding and staffing. The report does not address the disposal of produced waters by injection or by surface discharge, since these practices are already regulated under existing state and federal programs.

The report encourages states to establish and implement specific environmental performance standards and design specifications based on site specific or regional differences in geology, hydrology, climate, and waste characteristics.

C. Implementation of IOGCC Criteria

IOGCC has begun to take steps toward improving state E&P waste management plans in accordance with the report. Aided by additional funding from EPA, IOGCC has three projects currently underway:

- o establishment of a data base encompassing all state E&P waste management regulations;
- o development of a training program for state oil and gas regulators; and
- o installation of a peer review process to evaluate state regulatory programs, including the development of a comprehensive checklist and an on-the-ground evaluation of practices. The first state to be reviewed under the peer review process was Wyoming.

As an expression of commitment to the IOGCC/EPA Report's goals, the IOGCC's March 1991 executive meeting passed a resolution recommending that states proceed to

evaluate their own regulations. Some individual states, including Wyoming, Alabama, New Mexico, Montana, Oklahoma, and Louisiana, have already initiated such reviews.

The oil and gas industry strongly supports this process because these state regulatory experts have the technical knowledge and understanding of specific geological and environmental conditions in their state and are therefore in the best position to evaluate E&P environmental regulatory practices and recommend changes.

VIII. OIL AND GAS INDUSTRY ENVIRONMENTAL GUIDELINES

The oil and gas industry has developed extensive guidelines for environmentally sound management of E&P wastes. These efforts include published guidelines for E&P waste management, updating recommended operating practices and engineering standards, and a project underway to develop comprehensive environmental auditing guidelines for E&P facilities. A comprehensive training program for effective management of E&P waste has been developed. Workshops are currently being conducted for E&P operators, including independent operators, in all major producing states.

A. API Environmental Guidance Document

The "API Environmental Guidance Document - Onshore Waste Management in Exploration and Production Operations", first published in January 1989, contains recommendations for the environmentally sound management of solid waste resulting from the exploration and production of oil and gas. Wastes generated in E&P operations are outlined, along with all major laws and regulations governing waste management. Safe waste management practices for various operating environments are described, including recommended limitations on the waste constituents. The document supports development of area or statewide E&P environmental waste management plans, and includes an outline of these plans. The training program being conducted is based on this document. Although the Environmental Guidance Document was developed

primarily for use by E&P operators, it is also being used by state regulators, along with the IOGCC model regulatory program, to review state regulatory programs, help identify regulatory gaps and develop state program upgrades.

B. API Quality and Standards Programs

In addition, API has, for many years, had quality and standards programs to ensure the oilfield equipment purchased by member companies meets rigorous standards of performance. API has applied these engineering standards and quality programs to all lines of equipment, some of which may not have an obvious environmental connection to those not familiar with the oil business. Pipe standards ensure uniformity of material so that the proper grade of pipe is placed in service and that, once in service, will not be subject to catastrophic failure or corrosion. Similarly, valve standards have been developed including standards for emergency shutdown valves and subsea shutdown valves that prevent wells from leaking onto the land or in water in case of malfunction or accident.

IX. RCRA DISPOSAL CAPACITY SHORTAGE

A. Concerns About Inadequate National Capacity

In considering the question of oil and gas production wastes in the context of RCRA, Congress should be aware that any decision to regulate E&P wastes as hazardous would place an enormous burden on the existing commercial capacity to treat them. There is a strong possibility that the nation's hazardous waste disposal capacity would be overwhelmed if high volume/low toxicity E&P wastes were to be regulated as hazardous.

B. Underground Injection

The Underground Injection Practices Council (UIPC) reported that in 1990 there were 433 Class I (hazardous) injection wells nationwide. Most of these wells are for private use by their owners and are dedicated to disposal of hazardous aqueous wastestreams at manufacturing sites located along the Gulf Coast and in the Great Lakes region.

Nationwide, there are only 19 commercial Class I hazardous waste injection well facilities; twelve are in Texas, two in Louisiana, four in Ohio and one in Oklahoma.

By the industry's latest estimate, oil and gas operators dispose of 7.7 billion barrels of produced water annually. Permitted surface discharge accounts for 1.2 billion barrels, disposal by percolation accounts for 0.7 billion barrels, and the remaining 5.8 billion barrels are disposed of in approximately 45,000 Class II injection wells operated by the E&P industry. With only 19 commercial Class I wells nationwide, classification of produced water as hazardous in new RCRA legislation would cause a severe capacity shortfall.

C. RCRA Incineration

There are only eleven commercial RCRA incinerators located within the oil producing states. Manufacturing sites generate 292,000 tons/yr of hazardous liquids. An excess capacity of approximately 1.0 million tons/yr exists for hazardous liquid incineration. If drilling mud liquids from reserve pits were listed as hazardous and incineration were required, the estimated 50 to 60 million tons per year would inundate the excess national capacity.

In the case of sludges/solids, however, a national incineration capacity shortfall exists; only 171,000 tons/yr of sludges/solid incineration capacity exists. For this reason, EPA granted a national capacity variance.

As a result of the capacity shortfall, some cement kilns, boilers, and other industrial furnaces are burning organic hazardous waste if the wastes have sufficient fuel content. Currently, there are about 35 of these facilities incinerating hazardous waste as fuel. However, new monitoring and performance standards for these industrial furnaces, boilers, and cement kilns may stop many from using this waste as fuel.

Drilling mud solids and cuttings alone, if listed, would add about 20 million tons per year to the volumes for potential incineration. Since the mud solids and cuttings have no fuel value, they could not be used in the cement kilns and would have to be sent to the approved RCRA incinerators. The 20 million tons per year is more than 100 times current RCRA incinerator capacity.

D. Summary of National Hazardous Waste Disposal Capacity

Clearly, EPA was correct when the Agency determined that regulating E&P wastes as hazardous would "severely strain" hazardous waste facility capacity. Any such regulation would inundate the existing capacity and drive up costs for disposal forcing many oil and gas producers, as well as some in other industries, out of business. And considering these wastes are already appropriately managed, there would be virtually no environmental benefit.

X. ENERGY IMPACTS OF ADDITIONAL LEGISLATION

A. Concerns - Contrary to the National Energy Strategy

As noted earlier in this testimony, the vast majority of oil and gas wells in this country are "marginal" in the sense that it would take very little additional cost to render them uneconomical and cause them to be shut in. The Gruy study suggests that the costs involved in treating production wastes as industrial wastes, under the procedures

described in S.976, would result in the loss of over 700,000 oil and gas wells, dramatic decreases in domestic production, and diminished reserves.

With the United States currently importing about half of the oil we consume, it is apparent that any decline in domestic production can only be offset by increased energy imports. Even if the United States were to make dramatic progress in conservation, a decline in domestic production still increases our degree of reliance on imports.

Measures, such as costly and unnecessary RCRA regulation of production wastes, that have the effect of diminishing domestic production run counter to the energy strategies and policies currently being developed by Congress and the Administration.

B. Increased Costs Cannot be Passed to Consumers

The price of oil is not determined solely by some invisible hand of supply and demand. Most of the decisions that impact on price are made by OPEC, and OPEC producers already have a substantial cost advantage over domestic producers. Refiners will purchase oil at the lowest possible price; they will not pay a premium for domestic production. So it is clear that, if additional RCRA regulations create a new cost burden for domestic producers, that difference cannot be passed on to consumers. It must be absorbed by the producer who is operating under a global market price scheme. Those wells that can absorb this additional cost of doing business will survive: others will fail, and their production will be lost. Foreign production will gain an added economic advantage in relation to the domestic energy industry.

C. EPA's Energy Concerns in the Regulatory Determination

Like the analysis of the energy impacts of additional federal regulation conducted by Gruy Engineering, EPA analysis of the consequences of additional federal regulation,

under a different set of regulatory assumptions, produced similar results. In its 1988 Determination, EPA concluded:

> Application of RCRA Subtitle C to exploration, development, and production wastes could be extremely costly if large portions of these wastes were hazardous. The Agency estimates that implementation of RCRA Subtitle C on 10 to 70 percent of the large volume drilling waste and non-EOR produced water would cost the industry and consumers $1 billion to $6.7 billion per year in compliance cost (not including costs for land ban or corrective action regulations mandated by Congress). This would reduce domestic production by as much as 12 percent.

XI. OTHER ISSUES

A. Toxicity Characteristic

1. TC is Designed for Landfills

Due to the partial exclusion from regulation under Subtitle C of RCRA, certain E&P wastes have been exempt from the Toxicity Characteristic requirements. The issue of applying the Toxicity Characteristic to E&P waste is of tremendous concern to industry because the test values that determine if a waste is hazardous were designed for a municipal landfill type environment, which does not apply to E&P operations.

EPA designed a test, the Toxicity Characteristic Leaching Procedure (TCLP) to simulate the leaching of waste constituents from a landfill environment (acidic, high volume, covered so that no air is present) into groundwater. EPA also developed a computer model of a municipal landfill to predict concentrations of constituents (metals) that might leach to nearby groundwater wells from the landfill environment. EPA's computer model assumes an infinite source of contaminants due to the large volumes of wastes found in a typical landfill.

2. Not Intended for E&P Waste Management

EPA did not intend to apply the TCLP to the E&P waste management scenario. In fact, as EPA explained in its 1987 Report to Congress in Volume II, Page 41:

> The TCLP was designed to model a reasonable worst-case mismanagement scenario, that of co-disposal of industrial waste with municipal refuse or other types of biodegradable organic waste in a sanitary landfill. As a generic model of mismanagement, this scenario is appropriate for nonregulated wastes because those wastes may be sent to a municipal landfill. However, most waste from oil and gas exploration and production is not disposed of in a sanitary landfill, for which the test was designed. Therefore, the test may not reflect the true hazard of the waste when it is managed by other methods. However, if these wastes were to go to a sanitary landfill, EPA believes the TCLP would be an appropriate leach test to use.

The reasons the TCLP is inappropriate for determining the risks to human health and the environment posed by E&P wastes include:

- The waste management practices used by the E&P industry are fundamentally different from the municipal landfill scenario used by EPA to determine if a waste is toxic. The deep underground injection places the wastes in isolated underground reservoirs well below usable drinking waters. The landspread and roadspread practices associated with E&P wastes expose them to oxidation, biodegradation, and do not create the acidic conditions that contribute to the leaching process in a landfill.

- E&P wastes landspread and roadspread are generally managed on-site, in small volumes, or in single applications. The volumes of wastes at one site are not nearly as great as those in a municipal landfill, making the "infinite source" parameters in EPA's computer model inappropriate to predict the fate and transport of E&P wastes.

3. Risk Analysis Shows No Significant Threat

EPA's finding that E&P wastes rarely pose a significant threat to human health and the environment emerged from EPA's investigation of the three primary hazard factors; concentration, mobility, and proximity. As EPA stated in the 1988 Determination:

> For the Report to Congress, EPA conducted a limited analysis which modeled the potential effects of disposal of drilling waste in reserve pits and the disposal of produced water by underground injection and found that the potential risks to human health and the environment were small. Only a few constituents appeared to be of major concern when these wastes are managed in accordance with existing State and Federal regulations. The actual threats posed were largely dependent upon site-specific factors such as populations or sensitive ecosystems.[9]

To further illustrate the points about occurrence, mobility, and proximity, EPA said:

> The presence of constituents in concentrations exceeding health-or environmental-based standards does not necessarily mean that these wastes pose significant risks to human health and the environment. In evaluating the risks to human health and the environment, several factors beyond the toxicity of the waste should be considered. These factors include the rate of release of contaminants from different management practices, the fate and transport of these contaminants in the environment, and the potential for human health or ecological exposure to the contaminants.[10]

E&P wastes are high volume/low toxicity wastes, managed in a variety of ways at more than 1.25 million E&P sites across the country unlike the centralized management of municipal and industrial landfills. Most E&P wastes are already regulated, injected into Class II wells under the UIC program of the Safe Drinking Water Act, discharged to surface waters under the NPDES program of the Clean Water Act, and landspread and roadspread in accordance with state requirements.

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[9] Ibid., pg 29

[10] Ibid., pg 30

4. TCLP is a Costly Analysis

The TCLP is an expensive analysis. The lab fee for a two phase sample such as a crude oil tank bottom will cost approximately $1,500 - $2,000 including the matrix spiking and recovery correction procedures that EPA requires. Assuming a typical royalty of 12.5 percent and 4.5 percent state severance tax, the $1,500 - $2,000 lab fee is equivalent to the revenue from 90 to 120 barrels of oil at $20 per barrel. The labor cost for sampling, packing in ice, and shipping will add further to the costs.

B. Naturally Occurring Radioactive Materials (NORM)

The petroleum industry has been addressing the issue of naturally occurring radioactive materials (NORM) related to oil and natural gas producing operations. We have assessed the problem through surveys and studies, developed guidelines for education and training of personnel, and worked with state and federal officials as they have attempted to address NORM issues. The following is a brief summary of private and public sector activities on NORM together with some background and historical information.

1. Background

The presence of NORM in oil and gas producing operations has been recognized since the early 1930s when slightly elevated radium levels were detected in Russian oil fields. In 1981, NORM was found in scale, a debris that can accumulate inside oil production equipment, on North Sea platform equipment. In 1986, barium sulfate scale deposited in production tubing in a Mississippi well was found to contain NORM.

NORM is common and difficult to avoid. Our natural environment contains many substances that emit very low levels of radiation to which everyone is exposed. Radiation is present in rocks and soils, in the air we breathe, in public water supplies and mineral

waters. It is even in the foods we eat. Brazil nuts, mustard, mint, cinnamon, ginger, and black pepper are a few of the foods that contain small amounts of NORM. These and other natural sources expose individuals to "background levels" of radiation totalling about 300 millirems per year.

While some level of NORM has been detected at most oil and gas production operations, it is typically at background levels and rarely exceeds government standards.

For example, a 1988 American Petroleum Institute (API) nationwide survey on NORM in petroleum producing and gas processing facilities showed that more than 99 percent of the 36,000 external gamma radiation measurements taken were less than 0.6 millirems per hour. This level is well below the limits set by the U.S. Occupational Safety and Health Administration (OSHA). OSHA allows workers to be exposed to no more than 1250 millirems each calendar quarter or about two millirems per hour, eight hours per day, five days per week.

2. Protecting Workers and the Public

The oil and gas industry meets health, safety and environmental concerns associated with NORM through traditional industrial hygiene practices and work procedures, which include:

- Flushing oil-water separators and other equipment before cleaning;
- Using respirators and breathing apparatus while working inside equipment;
- Using masks while performing grinding and chipping operations;
- Using protective clothing; and,

- Avoiding eating, smoking, or chewing around open equipment.

We responded to the discovery of NORM at a Mississippi location by (1) notifying appropriate state agencies and informing the Mid-Continent Oil & Gas Association and other oil and gas operators, employees, and contractors, (2) initiating field surveys to locate the presence of NORM, (3) initiating training programs, and (4) reviewing operating practices.

For example, API and its member companies, working with scientists and engineers in universities and independent consulting firms, have conducted studies and research on NORM found in oil producing regions. API has developed a videotape describing NORM in oil and gas operations and outlining basic hygiene precautions when cleaning equipment contaminated with NORM. Industry has used the videotape to educate employees who work on equipment where NORM is present. API has also published "Management of Disposal Alternatives for NORM Wastes in Oil Production and Gas Equipment and Methods for Measuring NORM in Petroleum Production Equipment". And API is now developing an environmental guidance document on NORM management and disposal with publication planned for late 1991.

Finally, industry has been cooperating with environmental officers of the federal and state governments by providing them with its research data and seeking their advice. We will continue to do so as research proceeds.

3. Regulating NORM

OSHA has regulations relating to worker radiation exposure. Other federal agencies such as the Environmental Protection Agency, the Department of Transportation and the Department of Energy also have regulations regarding radioactive materials. These government regulations, some of which affect oil operations, were implemented before the oilfield NORM issue gained public attention.

We note that the states have been active on this issue. Louisiana adopted regulations for cleaning up NORM-contaminated production sites in 1989. Texas, Alabama, Arkansas, Mississippi and Oklahoma are currently considering similar guidelines or regulations. These state efforts on NORM provide additional evidence that the regulation of E&P wastes at the state level works well and is fully capable of responding to new waste management issues.

C. Consequences Related To Altered Scope Of RCRA

There are three other issues related to RCRA reauthorization and the oil and gas industry that should be called to the Committee's attention.

1. Enhanced Oil Recovery and Recycling

First, if recycling definitions preclude the reinjection of produced waters, there will be serious implications for enhanced oil recovery .

Congress clearly intends to address the question of recycling wastes. Some people are advocating hazardous waste recycling programs --- and this is where definitions become so important.

As stated earlier, 63% of produced water is reinjected for enhanced oil recovery that creates the production of billions of barrels of oil. If Congress writes the definitions in the recycling program so as to prohibit this reinjection of produced water for enhanced oil recovery, the consequences to energy supply would be catastrophic.

2. Permitting Costs

The cost of permitting is another issue that could have unintended results unless definitions are carefully reviewed. For example, E&P wastes are currently included in the general score of Subtitle D. But, Subtitle D covers various municipal and industrial

wastes that are landfilled. Proposals to assure that the permitting costs of new Subtitle D facilities are recovered from the users of these landfills could capture oil and gas E&P operations even though these wastes would be managed differently. Particularly in the care of marginal wells, the application of even a modest fee for a municipal landfill user could result in a cost increase that would compel the capping of a well. No one benefits from such an outcome. Oil capacity is lost and there is no purpose for such a permit fee.

3. Class II UIC Program

Finally, as stated earlier, new TCLP requirements could encompass some produced waters already regulated under the Class II UIC program. However, if an interpretation of RCRA compelled these waters to be sent to Class I wells, the consequences would again be significant and adverse. There would be no environmental benefit, but there would be dramatic pressure on the Class I UIC wells. Rough estimates show that produced water disposal volume to be about 7,700 million barrels/yr, which exceeds commercial Class I capacity by a orders of magnitude. Existing Class II wells can not be simply converted to Class I wells. Nor is it feasible from a cost, permitting, or technical standpoint to drill Class I wells at existing E&P operations. As a result, both the commercial Class I UIC facilities and existing E&P operations would be adversely effected. Class I wells could not accommodate all their current waste streams and handle produced waters. And, existing E&P operations would be compelled to shut down if they could not dispose of the produced waters.

XII. CONCLUSIONS

Independent and major producers of oil and gas in all regions of the country are united in the belief that additional RCRA regulation of production wastes is both unnecessary and unwise.

It is unnecessary because the current mix of state and federal regulation is uniquely suited to the effective management of these wastes. The system works well and is fully capable of responding to newly identified needs. Moreover, state regulations, along with industry practices and technology, are based on more than a century of experience that includes the drilling of nearly three million wells. This is expertise that the federal government will never be able to acquire. No federal program will ever be staffed or funded at a level that can effective deal with the diversity of needs that the 33 producing states demand.

The industry fully supports the effort being undertaken by the IOGCC and the EPA to close any gaps in existing state regulatory programs.

Additional RCRA regulation of production waste would be unwise because it would place a major cost burden on domestic producers that would force them to shut in hundreds of thousands of marginal properties all across America. The ensuing loss of domestic production would increase our reliance on imports and run counter to national energy strategies being developed in Congress and by the Administration. The additional costs of regulation would provide no discernable improvement in the environment and human health beyond that which is already provided by the existing mix of state and federal regulation.

The question of oil and gas production waste management has been studied thoroughly by the EPA and other parties. The consistent conclusion has been that these wastes present minimal threat to human health and the environment when properly managed and do not warrant classification as "hazardous" under RCRA.

The rigid RCRA structure is not suitable for the management of high-volume, low-toxicity wastes generated at over one million oil and gas production sites nationwide. What makes sense in the Louisiana wetlands does not necessarily provide sound, efficient waste management policy in the arid areas of West Texas, the high plains of Wyoming,

or the Appalachian fields of West Virginia. The individual states, however, understand factors unique to their producing regions, have extensive experience in oil and gas waste management, and are in the best position to assume this responsibility in the future.

Any move to impose RCRA regulation on oil and gas production wastes would overwhelm the capacity of existing RCRA facilities. It would also divert scarce resources and personnel from dealing with toxic wastes and overlay an unnecessary, costly, cumbersome system of regulation on wastes that already are being managed in a safe and responsible manner by state and federal regulation.

In conclusion, when considering the whole picture, there is no justification to establish a federal regulatory program to control the management and disposal of E&P wastes.

NOTE: Attachments retained in subcommittee files.

STATEMENT OF DENISE A. BODE

Ms. BODE. Thank you, Mr. Chairman.

I am Denise Bode, president of the Independent Petroleum Association of America. I welcome the opportunity to testify on behalf of the IPAA and 44 State and regional associations that represent the approximately 10,000 domestic oil and natural gas producers in 33 States.

As previously noted, the domestic petroleum industry, large and small, is united in its concern about additional Federal regulation of oil and gas waste in the context of RCRA reauthorization.

But I want to share with you a perspective on this issue from the smaller oil and gas producers. Today's independent producers are small businessmen and women, who share the concerns of other small businesses—rising health care costs, the high cost of capital, taxes, and the increasing costs of regulatory compliance.

As a recent IPAA membership survey clearly showed, today's independent producers are well-educated, established, and experienced businesspeople, who share national economic and environmental policy concerns with the rest of the American public.

Of course, what makes independents unique from other small businesses are the commodities we produce, oil and natural gas, and the low volumes at which we produce our product. The majority of our members have 10 employees or less, and the lion's share of their production comes from stripper wells. Notwithstanding, when you add up the total contributions that independents make to energy security, the numbers are significant. We drill 85 percent of the wells in this country and produce 60 percent of the natural gas and 30 percent of the Nation's crude oil.

Additional RCRA regulation of the oil and natural gas industry raises a level of alarm among independents which is unquestionably greater than that of many large multinational companies. For them, it is a question of where they will drill and produce oil and natural gas. For us, it is a question of whether we can drill or produce at all.

We believe that oil and gas wastes are safely managed under current State and Federal requirements, such as the Safe Drinking Water Act and the Clean Water Act. And additional layer of Federal regulation is not needed. Additional Federal RCRA requirements would weaken the domestic oil and natural gas industry with little, if any, environmental benefit.

And finally and from my perspective the most important, the most severe economic consequences of a Federal RCRA-based regime will fall on domestic independent producers. Being good environmental stewards is a challenge for any small business, especially for independents, because there are many environmental requirements specific to our industry. But it is a challenge we are determined to meet.

That's why IPAA hired consultants to compile a comprehensive listing of environmental requirements. Let's take a look at what we've got. And I think this is interesting for those people who think our industry is underregulated.

First, we received this compilation of Federal environmental requirements. It's up here. Next to it, on top of that, we needed and

developed compilations of State environmental regulations for oil and gas producers, because many independents work in more than one State. We have Texas and Louisiana up here, and we have a number of others that they have, depending on the other States they work in.

We also produced a 30-hour videotape training program for independents to demonstrate real world methods and practices that ensure compliance with these environmental regulations. Those are right here.

I brought these materials to show you as graphically as I can that the oil and gas drilling and production wastes are currently extensively regulated, and the industry is actively working to ensure compliance.

Now you are right to ask: Do these regulations protect human health and the environment?

After an extensive 2-year nationwide study of that question, the EPA produced its report to Congress, which says unequivocally yes. Here is a report, which you can see is quite voluminous for those who think EPA missed something.

In addition to the EPA report, the Interstate Oil & Gas Compact Commission issued its report in consultation with State and Federal officials, EPA, industry, and environmental representatives to recommend a framework to improve the existing State programs.

The process recommended has just begun with the State of Wyoming. These represent the current laws and regulations, the scientific studies and conclusions about our waste, and the dynamic process of ongoing improvements in State-based programs that we offer as evidence to support our position that further RCRA regulation is not required.

We realize that sensational, anecdotal information is being offered on drilling operations that caused environmental damage, which frankly resulted from a violation of the law. Independents are as appalled as anyone, perhaps more so. The bad apples in our industry make all of us look bad, but the facts are, existing laws and regulations, as well as currently industry waste management practices, are doing the job, are capable of doing the job.

Anecdotes do not justify a new overlay of regulation on law abiding businesses whose operations do not pose a threat to our environment.

Finally, as you consider the potential changes in environmental policy, we believe it is absolutely vital to balanced the energy impacts of these proposals and to understand the contribution of small oil and gas wells to our domestic energy security. Independents operate most of the Nation's 452,000+ stripper wells that individually produce less than 10 barrels of oil or 60 mcf of natural gas per day equivalent. Together, these wells make up 75 percent of all of the producing wells in the United States and produce more than a million of barrels of oil a day. That's more oil than the U.S. imports from Saudi Arabia, our largest foreign oil supplier, and more than half of all the oil we import from the Persian Gulf.

A Federal RCRA-based regulatory program would shut down practically all stripper wells in the first year and a sizable number of additional low-volume levels. That would force many more do-

mestic independent producers and almost all smaller independents out of business.

I already feel like an advocate for the homeless, when you consider that two-thirds of the domestic producers have gone out of business in the last decade—most oil imported by tanker, more oil imported by tanker, less domestic clean burning natural gas, and the diversion of scarce resources away from real toxic waste problems and to very low toxicity, high-volume wastes that EPA says are already being managed in a safe manner by State and Federal regulations.

Is that good environmental policy? Not from our perspective.

Thank you, Mr. Chairman.

Mr. SWIFT. Thank you very much, Ms. Bode.

Mr. W. Clark Street.

[Testimony resumes on p. 338.]

[The prepared statement and attachment of Ms. Bode follow:]

INDEPENDENT PETROLEUM ASSOCIATION OF AMERICA

STATEMENT OF
DENISE A. BODE
FOR THE
INDEPENDENT PETROLEUM ASSOCIATION OF AMERICA
AND

AMERICAN ASSOCIATION OF PETROLEUM LANDMEN
ASSOCIATION OF OILWELL SERVICING CONTRACTORS
CALIFORNIA INDEPENDENT PETROLEUM ASSOCIATION
COASTAL OIL AND GAS ASSOCIATION
COLORADO OIL AND GAS ASSOCIATION
EAST TEXAS PRODUCERS AND ROYALTY OWNERS ASSOCIATION
EASTERN KANSAS OIL AND GAS ASSOCIATION, INC.
ENERGY CONSUMERS AND PRODUCERS ASSOCIATION
FLORIDA INDEPENDENT PETROLEUM PRODUCERS ASSOCIATION, INC.
GEORGIA OIL AND GAS ASSOCIATION
ILLINOIS OIL AND GAS ASSOCIATION
INDEPENDENT OIL AND GAS ASSOCIATION OF NEW YORK
INDEPENDENT OIL AND GAS ASSOCIATION OF WEST VIRGINIA
INDEPENDENT OIL PRODUCERS' AGENCY
INDEPENDENT OIL PRODUCERS ASSOCIATION TRI-STATE, INC.
INDEPENDENT PETROLEUM ASSOCIATION OF MOUNTAIN STATES
INDEPENDENT PETROLEUM ASSOCIATION OF NEW MEXICO
INDIANA OIL AND GAS ASSOCIATION
INTERNATIONAL ASSOCIATION OF GEOPHYSICAL CONTRACTORS
KANSAS INDEPENDENT OIL AND GAS ASSOCIATION
KENTUCKY OIL AND GAS ASSOCIATION
LOUISIANA ASSOCIATION OF INDEPENDENT PRODUCERS AND ROYALTY OWNERS
LOUISIANA LANDOWNERS ASSOCIATION, INC.
MICHIGAN OIL AND GAS ASSOCIATION
NATIONAL STRIPPER WELL ASSOCIATION
NEW MEXICO OIL AND GAS ASSOCIATION
NEW YORK STATE OIL PRODUCERS ASSOCIATION
NORTH TEXAS OIL AND GAS ASSOCIATION
OHIO OIL AND GAS ASSOCIATION
OIL INVESTMENT INSTITUTE
OKLAHOMA INDEPENDENT PETROLEUM ASSOCIATION
ORANGE COUNTY PETROLEUM ASSOCIATION
PANHANDLE PRODUCERS AND ROYALTY OWNERS ASSOCIATION
PENNSYLVANIA GRADE CRUDE OIL ASSOCIATION
PENNSYLVANIA NATURAL GAS ASSOCIATES
PENNSYLVANIA OIL AND GAS ASSOCIATION
PERMIAN BASIN PETROLEUM ASSOCIATION
PETROLEUM EQUIPMENT SUPPLIERS ASSOCIATION
ROCKY MOUNTAIN OIL AND GAS ASSOCIATION
SOCIETY OF INDEPENDENT PROFESSIONAL EARTH SCIENTISTS
TENNESSEE OIL AND GAS ASSOCIATION
TEXAS INDEPENDENT PRODUCERS & ROYALTY OWNERS ASSOCIATION
VIRGINIA OIL AND GAS ASSOCIATION
WEST CENTRAL TEXAS OIL AND GAS ASSOCIATION

Before the United States House of Representatives
Subcommittee on Transportation and Hazardous Materials
of the
Committee on Energy and Commerce
September 12, 1991

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The **Independent Petroleum Association of America** is the national association representing independent crude oil and natural gas explorers/producers. Together with 44 unaffiliated national, state, and regional associations, which join in these comments, we represent the 10,000 independent crude oil and natural gas wildcatters in the United States and the companies which provide services and supplies to the domestic industry. Independents operate in all 33 states that have oil and natural gas production, drill about 85 percent of all wells in the United States and account for almost one third of domestic crude oil, and about 60 percent of natural gas output. They range in size from large firms to very small, one-person ventures. But they all have one thing in common -- the primary profit center for independents is the sale of oil and natural gas at the wellhead. The increased cost of compliance with any new environmental requirements cannot be passed on to consumers or allocated to other profit centers.

I welcome the opportunity to discuss the regulation of oil and natural gas wastes, particularly from the perspective of the majority of the industry which is the smaller independent oil and gas producer. As you consider questions of environmental policy, we believe it is absolutely vital to understand the contribution of the small oil and gas wells on our domestic energy security. Stripper wells, or wells that produce less than 10 barrels of oil or 60 Mcf of natural gas per day, make up 75 percent of all the producing wells in the United States. The production from domestic stripper wells exceeds this country's imports from Saudi Arabia, which is our largest importer.

With most of the world's oil reserves located in the Middle East, Americans have seen the danger of energy dependence vividly demonstrated in the Persian Gulf. Yet, as the war recedes in our memory, so too will the realization that the price we paid to liberate Kuwait was, in significant part, the cost of imported oil. Despite America's brilliant military victory in the Persian Gulf and our nation's greater influence in that troubled region of the world, independent oil producers remain concerned about the ability of OPEC to force, as it has in the recent past, the premature abandonment of existing U.S. oil production capacity by

driving world oil prices below the cost of operating U.S. wells. A strong domestic oil and natural gas industry is our country's best defense against foreign governments using our oil dependence to influence U.S. economic and foreign policies.

The Administration spent more than a year preparing a National Energy Strategy designed to improve domestic energy security. The House and Senate will soon be debating comprehensive energy legilsation designed to make effective use of America's energy resources. Ironically, at this time of bipartisan concern about energy security, some are urging Congress to amend RCRA in a way that would force hundreds of thousands of wells to shut in all across America and cause domestic energy production to further plummet.

At the same time, the domestic oil and natural gas industry continues to face difficult times. The industry's infrastructure virtually collapsed in the late 1980s. Today, the situation remains precarious: drilling rig utili4zation is only slightly above all-time lows, U.S. crude oil production is stalled near its lowest point since the early 1950s, and the seismic crew count, a leading indicator of future drilling activity, likewise is near record lows.

I can't overemphasize the importance of your deliberations in this area to the independent oil and gas producers. For many smaller domestic oil and gas producers, basic survival is at stake. Since 1986, the number of active drilling operations declined by about 50%. Since 1982, the drop is about two thirds.

The exploration and production of oil and gas is large and complex -- utilizing over 1.25 million sites located throughout the country in a wide variety of physical, geological, and hydrological settings. The wastes of the industry are of high volume, but of very low toxicity, and are extensively and effectively regulated under existing federal and state programs which take into account the diversity of local conditions. These regulatory programs are based on many years of experience and continue to evolve to meet current needs.

The special nature of oil and gas wastes was recognized by Congress in 1980 when it exempted such wastes from additional federal regulation under RCRA and asked EPA to study both the wastes and existing waste management practices. In doing so, Congress recognized, among other things, the low toxicity of these wastes and the potential adverse impact on domestic energy security, employment, and the balance of trade which would result if additional federal regulations were imposed.

Our message is simple. It is that oil and gas exploration and production wastes are being properly regulated under current rules and regulations at the state and federal levels and that additional federal regulation is not justified..... certainly not RCRA Subtitle C regulation. The imposition of unnecessary regulation on the oil and gas industry would undermine the

Nation's energy security by further weakening the domestic industry.

My testimony elaborates on three key points.

FIRST, IPAA AGREES WITH EPA'S REPORT TO CONGRESS THAT PETROLEUM EXPLORATION AND PRODUCTION WASTES RARELY POSE A SIGNIFICANT THREAT TO HUMAN HEALTH OR THE ENVIRONMENT.

SECOND, IPAA ALSO AGREES WITH EPA THAT THE CURRENT REGULATORY STRUCTURE MANAGES EXPLORATION AND PRODUCTION WASTES WASTES EFFECTIVELY AND IS CAPABLE OF RESPONDING TO NEWLY IDENTIFIED NEEDS.

THIRD, FURTHER FEDERAL REGULATION IS UNNECESSARY AND WILL HAVE MAJOR COST AND ENERGY IMPACTS, PARTICULARLY ON STRIPPER WELLS.

I. EPA HAS STUDIED EXPLORATION AND PRODUCTION WASTES EXTENSIVELY AND CONCLUDED THAT WHEN MANAGED PROPERLY, THESE WASTES RARELY POSE A SIGNIFICANT THREAT TO HUMAN HEALTH OR THE ENVIRONMENT

The 1980 Amendments to RCRA included an exemption for wastes from oil, gas and geothermal exploration and production from the Subtitle C hazardous waste requirements. The exemption is specifically for drilling muds, produced waters and other wastes "associated" with exploration and production operations. Congress also directed EPA to study exploration and production wastes and recommend appropriate regulatory action to Congress. The EPA study was to include an analysis of:

- Source and volume of waste.
- Present disposal practices.
- Danger to human health and the environment.
- Documented cases of danger to human health and the environment.
- Alternative disposal methods.
- Impact of alternative disposal methods on exploration and production.

The EPA conducted an extensive two-year study and submitted a report to Congress on exploration and production wastes on December 22, 1987. EPA concluded that the wastes should retain the exemption from Subtitle C regulation and continue to be regulated by state agencies using Subtitle D and other

authorities. EPA further concluded that the wastes do not pose a significant threat to human health and the environment when properly managed, and that for the most part, were adequately regulated by the states.

EPA's finding that E&P wastes rarely pose a significant threat to human health and the environment emerged from EPA's investigation of the three primary hazard factors; concentration, mobility, and proximity.

To further illustrate the points about concentration, mobility and proximity, EPA said:

> The presence of constituents in concentrations exceeding health-or environmental-based standards does not necessarily mean that these wastes pose significant risks to human health and the environment. In evaluating the risks to human health and the environment, several factors beyond the toxicity of the waste should be considered. These factors include the rate of release of contaminants from different management practices, the fate and transport of these contaminants in the environment, and the potential for human health or ecological exposure to the contaminants.[1]

The 1980 RCRA amendments directed EPA to include in its study of E&P wastes the identification of examples of practices that caused environmental or health damage. A group of 228 damage cases were collected by EPA's contractor. However, many of the alleged damages cited by the contractor simply could not be validated when all records were reviewed.

A 1987 API study concluded that existing regulations covered 224 of 228 cases initially presented to EPA by its contractor. None of the damage cases documented an impact to human health. The EPA used this analysis to screen the 228 cases. This screening reduced the number of cases to 62 in EPA's final report to Congress.

EPA concluded that regulations under RCRA's hazardous waste provisions would be:

- Unnecessary because a large body of state and federal laws already cover these wastes and because the Safe Drinking Water Act and the Clean Water Act "provide sufficient legal authority to handle most problems" these wastes pose.

- Impractical because administrative procedures and lengthy application processes for hazardous waste permits for

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[1]EPA's 1988 "Regulatory Determination for Oil and Gas and Geothermal, Exploration and Production Wastes", page 29.

drilling reserve pits would add hundreds of thousands of waste sites for regulatory tracking -- with no real environmental benefit.

- Harmful to petroleum exploration and production; it could cause the U.S. oil and gas production to decline 18 percent by the year 2000 and 29 percent by 2010.

- Costly; it could cost consumers as much as $6 billion annually. An independent study conducted by the American Petroleum Institute in 1987 projected that hazardous waste regulation under RCRA could cost the petroleum industry $44 billion initially and $5 billion annually, while reducing the number of wells drilled by 40 percent and causing the premature abandonment of over 150,000 wells (29% of the total).

II. CURRENT STATE AND FEDERAL PROGRAMS EFFECTIVELY REGULATE EXPLORATION AND PRODUCTION WASTES

(1) STATE REGULATORY PROGRAMS REFLECT THE DIVERSITY OF LOCAL GEOGRAPHIC CONDITIONS AND ENVIRONMENTAL NEEDS AND HAVE A LONG HISTORY OF EFFECTIVENESS

IPAA strongly agrees with EPA's conclusion in the regulatory determination that:

> Existing State and Federal regulatory programs are generally adequate for controlling oil, gas, and geothermal wastes. Regulatory gaps in the Clean Water Act and UIC program are already being addressed, and the remaining gaps in State and Federal Regulatory programs can be effectively addressed by formulating requirements under Subtitle D of RCRA and by working with the States.[2]

The regulatory structure referred to by EPA has a long history of effectiveness. The states have been active in this area for over 70 years. For example, Oklahoma and Texas began regulations in this area in 1916 and 1919 respectively.

The states generally establish and implement specific performance standards and design specifications based on site-specific or regional differences in geology, hydrology, climate, and waste characteristics. Fundamental differences exist in terms of climate, hydrology, geology economics, and method of operation, which may impact on the manner in which oil and gas exploration, development and production is performed. State oil

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[2]EPA's 1988 "Regulatory Determination for Oil and Gas Geothermal, Exploration and Production Wastes", page 4.

and gas programs do, and should, vary from state to state and within portions of a state.

A typical state program regulating the management of E&P wastes will contain many elements including:

- Statutory authority which adequately details the powers and duties of the regulatory body;
- Statutory authority to promulgate appropriate rules and regulations;
- Statutes and implementing regulations which adequately define necessary terminology;
- Provisions to adequately fund and staff the program;
- Mechanisms for coordination among the public, government agencies and regulated industry; and
- Technical criteria for E&P waste management practices that address pits, land applications, centralized and commercial facilities.

The states have continued to develop regulations designed to protect the environment unique to their jurisdiction. For example:

- Texas updated Rule 13 in 1983 to contain specific cementing criteria to ensure protection of groundwater. A state well plugging fund was established in 1983. Rule 8 was revised in 1984 to contain a "no pit order" meaning production pits are unlawful and can only be constructed after public notice and a hearing. Texas recently passed legislation to establish oilfield cleanup funds with the revenues to come from wellhead taxes and increased fees.
- Oklahoma passed oilfield cleanup regulations similar to Texas. Between 1987 and 1991, the Oklahoma Corporation Commission wrote or revised over 30 rules on E&P environmental regulation.
- West Virginia adopted a permit requirement for drilling mud reserve pits that require detailed layout, construction, closure and remediation plans.
- Montana has significantly rewritten their E&P environmental rules to include fencing and screening of some pits, disposal of trash in licensed facilities, reserve pit closure requirements, reserve pit liners when salt or oil based muds are used, and disposal requirements for drilling muds.
- Louisiana established Order 29-B, its environmental regulation, in 1943. The regulation first dealt with

environmental control of E&P underground injection wells. Between 1943 and 1980, Order 29-B was amended over 30 times. Since 1985, major regulatory improvements have been established in the areas of commercial facilities, onsite disposal, abandoned oilfield waste site law and coastal zone pits.

(2) FEDERAL REGULATION ADMINISTERED BY EPA AND THE STATES IS EXTENSIVE AND REGULATES ALMOST 97% OF THE TOTAL VOLUME OF OIL AND GAS WASTES

1. The Safe Drinking Water Act

The Safe Drinking Water Act contains the Underground Injection Control (UIC) program which establishes minimum requirements for state, tribal, and federal programs for controlling all injection activities in a manner that protects underground sources of drink water (USDW). It also provides mechanisms for implementation and delegation of primary enforcement authority. The UIC program is administered either directly by EPA or by the states under programs approved by EPA. The first state to achieve primacy was Oklahoma in 1981. Since then, 35 states have achieved full primacy for the UIC programs. E&P operations that fall under the UIC regulations are all produced water injected for disposal and all water reinjected to increase oil recovery from producing zones (secondary or enhanced recovery).

Some of the major UIC program requirements include:

- casing and cementing to prevent movement of fluid into or between USDWs
- assurance that the owner or operator will maintain financial responsibility to properly plug and abandon the well
- a maximum operating pressure to avoid fractures in the confining zones
- monitoring and reporting requirements
- mechanical integrity testing at least every 5 years
- permits are required for injection and are issued for a limited period of time, and must be reviewed at least once every five years
- existing wells must have a mechanical integrity test if the tubing is disturbed
- monitoring and reporting of injection pressure, annulus pressure, flow rate, and volume is required

- reporting of noncompliance, ownership changes, well rework, mechanical integrity testing, and plug abandonment are required.

For a state or tribal UIC program to be approved by EPA for primary regulatory authority, the elements listed above or their equivalent must be in the program.

2. The Clean Water Act

The Federal Clean Water Act (CWA) has several requirements applicable to oil and gas operations. The National Pollutant Discharge Elimination System (NPDES) permit program controls surface discharges of waste waters into the streams of the U.S. The Spill Prevention Control and Countermeasure (SPCC) program of the CWA has requirements for spill prevention, containment and reporting. The NPDES portion of the Clean Water Act establishes a permitting system and Best Practicable Technology (BPT), controls for all discharges to waters of the United States, including intermittent streams and wetlands. EPA has determined that BPT for onshore E&P operations to be "no discharge". Exceptions to the "no discharge" limitation are beneficial for agricultural or wildlife use. There are also exemptions for marginal (stripper) wells - wells that produce low volumes of oil. There are areas, primarily in California and Wyoming, where the water produced with the oil production has a low salinity, and where the produced water has historically been used for beneficial purposes. In some cases, these waters are the sole water sources for farming, cattle, or wildlife use. These uses also require NPDES permits. Recent EPA regulations will restrict or prohibit discharges to coastal waters. All offshore (OCS) discharges require NPDES permits. The NPDES permits contain BPT discharge limitations, including oil and grease limits.

The Clean Water Act also requires Spill Prevention, Control and Countermeasure (SPCC) plans for all E&P facilities where a spill could reach waters of the United States. Plan requirements include providing secondary containment to contain the volume of the largest tank in the event of a tank spill, and certification of the plan by a registered professional engineer. At this time, EPA is reviewing the SPCC program.

3. Resource Conservation and Recovery Act

As noted earlier, the oil and gas E&P industry does not have a "blanket exemption" from RCRA. Only specified wastes are currently exempt from regulation under Subtitle C. The exempt wastes are drilling muds and cuttings, produced water, and certain wastes uniquely "associated" with the production of oil and gas. Those wastes not unique to oil and gas operations fall under the RCRA permitting and handling requirements in the same manner as all other industrial wastes of a similar nature. For example, spent solvents, paint wastes, used crankcase and lubrication oil, used engine oil filters, empty chemical drums, unused well stimulation fluids and various other items such as

construction debris. They are all subject to the requirement of RCRA and if hazardous, must be managed under Subtitle C like all other industrial hazardous wastes.

RCRA Subtitle D gives states the authority to regulate management of nonhazardous wastes. These include those oil and gas E&P wastes specifically exempted from Subtitle C regulation; produced water, drilling muds, and associated wastes. It includes permitting authority for wells, pits and other facilities and regulations for the management and disposal of drilling muds and cuttings.

(3) CURRENT PROGRAMS ARE CONTINUING TO IMPROVE BASED ON NEWLY IDENTIFIED NEEDS. THIS PROCESS IS OVERSEEN BY EPA AND PARTICIPATED IN BY TECHNICAL EXPERTS IN ENVIRONMENTAL PROGRAMS FROM THE STATES, INDUSTRY AND THE ENVIRONMENTAL COMMUNITY

1. The Interstate Oil and Gas Compact Commission (IOGCC) recommended standards for state programs.

While the EPA's Regulatory Determination dated June 30, 1988 found that existing state and federal programs were generally adequate to control oil and gas wastes, some regulatory gaps were identified. To plug the gaps, EPA funded an effort by the IOGCC to develop a model regulatory program for oil and gas exploration and production wastes. The IOGCC is an organization comprised of the Governors (or their representatives) from 29 oil and gas producing states.

Funded by a two year $300,000, grant from EPA, the IOGCC formed the Council on Regulatory Needs in January, 1989 to identify methods to improve E & P waste management. The council was co-chaired by Governors George A. Sinner of North Dakota and Garrey Carruthers of New Mexico. This joint effort by IOGCC/EPA also included representatives from state regulatory agencies, industry, environmental groups, and the Department of Energy. The Council immediately undertook a two-year study to develop guidelines and standards for state E & P waste management. The Council produced a final report in December 1990 that was intended to:

- establish a baseline of performance for state E & P waste management
- demonstrate a commitment to environmental improvement shared by state governments, EPA, environmental groups and industry
- serve as a model for future efforts to deal with complex oil and gas related environmental issues
- serve as a resource document for information on all state E & P waste regulatory programs.

The IOGCC report identifies administrative and technical criteria for managing E & P wastes and outlines the need for clearly defined statutory authority and adequate levels of funding and staffing.

The report encourages states to establish and implement specific performance standards and design specifications based on site specific or regional differences in geology, hydrology, climate, and waste characteristics.

IOGCC has begun to take steps toward improving state E & P waste management plans along the lines suggested in their report. Aided by funding from EPA, IOGCC has three projects currently underway:

- Establishment of a data base encompassing all state E & P waste management regulations;
- A training program for state oil and gas regulators; and
- A peer review of state regulatory programs, including the development of a comprehensive checklist and an on the ground evaluation of practices. The first state to be reviewed was Wyoming.

As an expression of commitment to the report's goals, the IOGCC's March 1991 executive meeting passed a resolution recommending that states proceed to evaluate their own regulations. Some individual states, including New Mexico, Montana, and Louisiana, have already initiated such reviews.

The oil and gas industry supports this process because these experts have the technical knowledge and understanding of specific geological and environmental conditions in their state and are therefore in the best position to evaluate regulatory practices and recommend change.

2. EPA's Federal Advisory Committee for Underground Injection Control--Class II Wells is an ongoing effort aimed at improving the UIC program.

In addition to the work of the IOGCC, EPA has also established an advisory group to provide substantive and administrative recommendations concerning the UIC program. The committee includes members from environmental groups, industry, and other Federal Agencies (DOE and BLM), and state regulatory agencies. The Committee works via monthly face-to-face meetings to reach agreement on the best options--based on technical, economic, and human health requirements concerning changes in the operation of the UIC program. The Committee may recommend specific language for proposed guidance and regulations under Part C of the Safe Drinking Water Act. IPAA is an industry representative in this group and strongly supports this process.

III. FURTHER FEDERAL REGULATION OF OIL AND GAS WASTES UNDER RCRA IS UNNECESSARY AND WILL HAVE MAJOR COST AND ENERGY IMPACTS, PARTICULARLY ON STRIPPER WELLS

Additional regulation of oil and gas wastes under the Resource Conservation and Recovery Act (RCRA) would have serious energy and economic consequences for the oil industry and the nation. This impact would be particularly severe for the smaller producers.

In EPA's report to Congress various regulatory scenarios were analyzed which resulted in costs to the industry ranging from billions to tens of billions of dollars. Obviously costs of this magnitude will drive many producers out of business, cause domestic production to diminish substantially and increase the nation's dependence on imports unnecessarily. An industry study conducted by the American Petroleum Institute in 1987 projected that hazardous waste regulation under RCRA could cost the petroleum Industry $44 billion initially and $5 billion annually, while reducing the number of wells drilled by 40 percent and causing the premature abandonment of over 150,000 wells (29% of the total).

More recently a 1990 study of environmental regulations by the Department of Energy (DOE) confirmed EPA's findings. DOE estimates the high cost estimate for additional regulation under RCRA reached approximately $25 billion initially and nearly $2 billion annually.

In addition, a study just completed by Gruy Engineering Corporation for API analyzes the impact of Subtitle D requirements on exploration and production. This study shows over 80 percent of existing oil wells and 75 percent of existing gas wells would be shut in.

Although the assumptions differ somewhat on the major studies that have been done, it seems clear that most stripper wells would be shut in by the hazardous waste requirements of Subtitle C or the Subtitle D nonhazardous requirements that may be made more stringent.

As a result, the impact would fall more heavily on small oil and gas producers in certain states.

Figure 1 shows those states where stripper wells (production of less than 10 barrels per day) make up more than 50 percent of the total production for that state. The states listed below have particularly high percentages of production from stripper wells:

Virginia	100%
Indiana	100%
West Virginia	99%
Pennsylvania	96%
Illinois	90%
New York	87%
Tennessee	86%
Missouri	85%
Kansas	83%
Kentucky	80%
Ohio	73%
Oklahoma	70%

Table 1 shows the wellhead value of crude oil from stripper wells. The number of producing stripper oil wells, stripper well reserves and the number of employees in E & P operations attributable to stripper wells by state. These wells and reserves would be particularly vulnerable to burdensome new requirements. Complete state profiles are attached in Appendix 1.

To further illustrate the regional impact, the Appalachian Energy Group, a group of nine oil and gas trade organizations in the seven states that comprise the Appalachian Basin, recently did a survey to determine the impact of increased operating and maintenance costs on the economic viability of 20,000 stripper wells in the region.

The principal results of this survey are as follows:

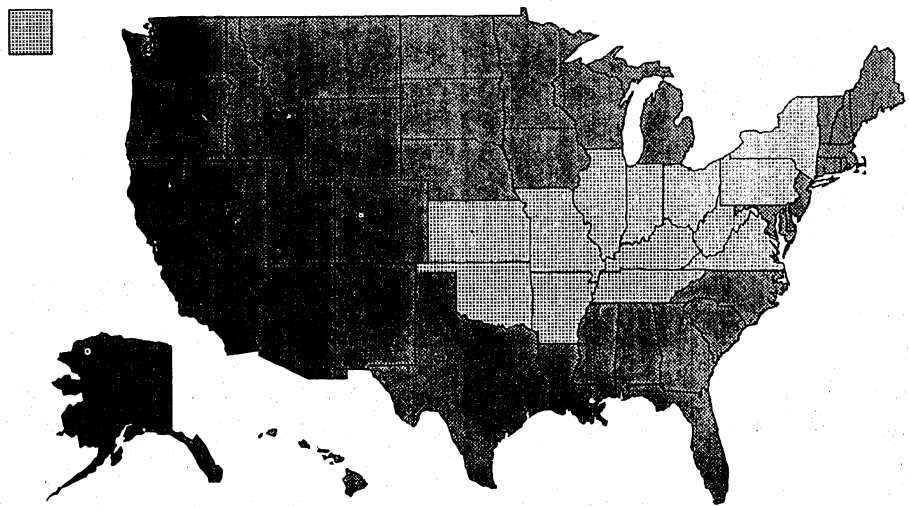
Increased Annual Costs	Percent of Wells That Would Be Rendered Uneconomical
$ 200.00	23%
$ 500.00	28%
$ 1,000.00	31%
$ 2,000.00	41%
$ 5,000.00	49%
$ 10,000.00	55%
$ 25,000.00	62%

Thus, even very minor cost increases would result in a significant impact on the overall economic viability of Appalachian operations.

This would result in a great many wells being forced to be plugged and abandoned, not only depriving the region and the nation of the loss of the production from those wells, but also causing operators to incur extremely significant financial obligations related to the plugging and abandonment of those wells. By their estimate, a cost increase of only $200 a year would result in some 46,000 wells in all Appalachian states being forced into plugging and abandonment, causing operators to incur plugging liabilities in excess of $46 million. The economic

Figure 1

States with 50% or more Stripper Well Production



% of Total Crude Oil Output produced by Stripper Wells			
Arkansas 58%	Kentucky 80%	Ohio 73%	Tennessee 86%
Illinois 90%	Missouri 85%	Oklahoma 70%	Virginia 100%
Indiana 100%	New York 87%	Pennsylvania 96%	W. Virginia 99%
Kansas 83%			

Source: National Stripper Well Association

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Table 1

THE ENERGY AND ECONOMIC ROLE OF STRIPPER WELLS BY STATE

	(1) Wellhead Value of Stripper Crude Oil (Thous. $)	(2) Number of Producing Stripper Oil Wells	(3) Stripper Oil Reserves (Thous. bbls.)	(4) % of Oil Production from Stripper Wells	(5) Total Number of Employees— Oil & Gas Extraction	(6) Estimated Employment Effect
Arkansas	114,017	7,428	150,829	58%	2,540	1,473
Illinois	337,953	34,417	99,120	90%	3,136	2,822
Indiana	60,794	6,281	37,300	100%	463	463
Kansas	839,718	45,559	256,680	83%	8,141	6,757
Kentucky	80,712	19,358	25,036	80%	1,810	1,448
Missouri	2,045	668	1,934	85%	75	64
New York	7,638	3,968	1,566	87%	1,618	1,408
Ohio	134,076	29,634	63,409	73%	5,790	4,227
Oklahoma	1,488,944	70,741	390,750	70%	40,736	28,515
Pennsylvania	47,226	22,338	41,563	96%	3,700	3,552
Tennessee	8,228	839	595	86%	248	213
Virginia	387	44	78	100%	266	266
West Virginia	38,200	15,970	30,305	99%	4,500	4,455
Texas	2,313,421	119,693	1,795,087	18%	159,261	28,667
Louisiana	136,257	14,788	110,710	2%	52,700	1,054
New Mexico	255,562	15,050	97,880	21%	8,529	1,791
California	523,867	25,828	205,167	10%	31,367	3,137
Colorado	112,772	6,357	60,466	20%	12,325	2,465
Wyoming	90,148	2,982	145,750	5%	8,228	411
Arizona	468	13	98	19%	114	22
Alabama	25,220	498	597	7%	1,961	137
Michigan	56,692	3,110	47,062	15%	4,090	614
Mississippi	12,029	561	14,080	3%	5,375	161
Montana	41,683	3,116	33,544	12%	1,712	205
Nebraska	36,642	1,247	19,730	34%	462	157
North Dakota	32,961	1,180	66,260	5%	2,541	127
South Dakota	957	24	407	3%	109	3
Utah	17,237	897	24,010	3%	1,891	57
Other States	0	0	0	0%	13,943	0
Total U.S.	6,132,615	452,589	3,720,013	14%	377,631	52,868

Sources: (1) Department of Energy
(2), (3) & (4) National Stripper Well Association
(5) Bureau of Labor Statistics
(6) Employment effect is estimated by multiplying the number of oil and gas extraction employees(5) by percentage of oil production from stripper wells(4). Since data is not available for the number of oil extraction employees separately, the oil and gas total is used as a reasonable estimate.

Note: 1989 data used because it is the latest available stripper well information.
Other States include Florida, Maryland, Nevada, Oregon and Alaska.

impact of any new regulatory requirements on Appalachian production will be extremely significant.

Were such an impact justified by the need to protect human health and the environment, the public policy issues involved might be more clouded. Here, however, the environmental impact of the oil and gas industry is very carefully regulated and controlled. Existing state and federal regulatory programs are working in a way that protects the environment and assures the economic viability of the industry. Accordingly, there is neither environmental nor economic justification for modifying RCRA in a way that would eliminate or change the current scope of the oil and gas hazardous waste regulatory exemption.

IV. CONCLUSION

The real issue to be considered by Congress is this: what regulatory structure best provides for environmentally and economically sound management of oil and gas exploration and production wastes? To answer that question IPAA would make the following points:

- IPAA strongly supports the conclusion of EPA's report to Congress that existing Federal and State programs effectively regulate oil and gas waste.

- The oil and gas industry, from the smallest independent producer to the largest integrated company, is united in the belief that exploration and production wastes should retain the exemption from Subtitle C regulation and continue to be regulated by state agencies using current Federal and State authorities.

- We support the IOGCC's on-going effort to improve state regulatory programs.

- A Congressional determination that oil and gas production wastes should be regulated as hazardous would run contrary to the basic themes of the Administration's National Energy Strategy, since it would force many producers out of business, cause thousands of marginal wells to be shut in, diminish domestic production dramatically, and increase substantially our dependence on imported energy.

- The application of RCRA to some or all production wastes will not discernably improve the environment beyond what the existing regulatory structure can do and will overwhelm the capacity of existing RCRA waste facilities.

We appreciate this opportunity to testify.

Appendix 1 – STATE PETROLEUM INDUSTRY PROFILES

THE PETROLEUM INDUSTRY IN ALABAMA

CRUDE OIL PRODUCTION:

-- Of the 33 oil and natural gas producing states in the United States, Alabama ranks 16th in oil output. Almost 18 million barrels of crude oil were produced last year, a decline of about 6% from the year earlier.

-- Alabama crude oil production peaked in 1980 at 22 million barrels, and has followed a downward trend ever since.

-- Alabama began producing crude oil in 1944. Since then the all-time total wellhead value has been almost $7 billion.

DRILLING:

-- Alabama ranks 21st in oil well completions in the U.S. In 1990, of the 1,041 total well completions, 33 were oil wells.

-- On a cumulative basis as of 1990, over 1,000 oil wells have been drilled in the state.

PRODUCING OIL WELLS:

-- Alabama had 872 producing oil wells in 1990.

-- Almost 60% of the producing oil wells are stripper wells (wells that produce less than 10 barrels per day). The production from these wells-- almost 1.5 million barrels in 1989--accounts for about 7% of Alabama's total oil production.

WELLHEAD VALUE:

-- The wellhead value of the state's crude oil output last year was approximately $7 billion.

-- Crude oil is the third most important mineral produced in Alabama, ranked in terms of the value of production. It comprises 15% of the total value of all the state's principal mineral output in 1989.

MISCELLANEOUS INFORMATION:

-- Over 22,000 people are employed in jobs related to the oil and gas industry in Alabama. Approximately 13% of these are in the oil and gas extraction sector.

THE PETROLEUM INDUSTRY IN ARIZONA

CRUDE OIL PRODUCTION:

-- Of the 33 oil and natural gas producing states in the United States, Arizona ranks 30th in oil output. More than 122 thousand barrels of crude oil were produced last year, an decrease of less than 11% from the year earlier.

-- Arizona crude oil production peaked in 1968 at 3 million barrels.

-- Arizona began producing crude oil in 1958. Since then the all-time total wellhead value has been over $70 billion.

DRILLING:

-- In 1990, of the 4 total well completions in Arizona, none were oil wells.

-- On a cumulative basis as of 1990, nearly 50 oil wells have been drilled in the state.

PRODUCING OIL WELLS:

-- Arizona had 22 producing oil wells in 1990.

-- Almost 60% of the producing oil wells are stripper wells (wells that produce less than 10 barrels per day). The production from these wells-- almost 25 thousand barrels in 1989--accounts for about 20% of Arizona's total oil production.

WELLHEAD VALUE:

-- The wellhead value of the state's crude oil output last year was approximately $3 million.

-- Crude oil is the eighth most important mineral produced in Arizona, ranked in terms of the value of production. It comprised less than 1% of the total value of all the state's principal mineral output in 1989.

MISCELLANEOUS INFORMATION:

-- Almost 13,000 people are employed in jobs related to the oil and gas industry in Arizona. Less than 1% of these are in the oil and gas extraction sector.

THE PETROLEUM INDUSTRY IN ARKANSAS

CRUDE OIL PRODUCTION:

-- Of the 33 oil and natural gas producing states in the United States, Arkansas ranks 17th in oil output. More than 10 million barrels of crude oil were produced last year, a decline of about .5% from the year earlier.

-- Arkansas crude oil production peaked in 1925 at 75 million barrels, and has followed a downward trend ever since.

-- Arkansas began producing crude oil in 1921. Since that time, more than 1.5 billion barrels of oil have been produced for an all-time total wellhead value of over $8 billion.

DRILLING:

-- Arkansas ranks 19th in oil well completions in the U.S. In 1990, of the 318 total well completions, 55 were oil wells.

-- On a cumulative basis as of 1990, nearly 18,000 oil wells have been drilled in the state.

PRODUCING OIL WELLS:

-- Arkansas had 7,265 producing oil wells in 1990.

-- Almost 60% of the producing oil wells are stripper wells (wells that produce less than 10 barrels per day). The production from these wells-- more than 6 million barrels in 1989--accounts for almost 60% of Arkansas' total oil production.

WELLHEAD VALUE:

-- The wellhead value of the state's crude oil output last year was approximately $220 million.

-- Crude oil is the second most important mineral produced in Arkansas, ranked in terms of the value of production. It comprised 23% of the total value of all the state's principal mineral output in 1989.

MISCELLANEOUS INFORMATION:

-- Arkansas' oil and natural gas industry paid over $8 million in severance taxes in 1989, the latest available data.

-- Almost 14,000 people are employed in jobs related to the oil and gas industry in Arkansas. Almost 20% of these are in the oil and gas extraction sector.

THE PETROLEUM INDUSTRY IN CALIFORNIA

CRUDE OIL PRODUCTION:

-- Of the 33 oil and natural gas producing states in the United States, California ranks 4th in oil output. More than 350 million barrels of crude oil were produced last year, a decline of about 4% from the year earlier.

-- California crude oil production peaked in 1985 at 424 million barrels, and has followed a downward trend ever since.

-- California began producing crude oil in 1861. Since then the all-time total wellhead value has been over $130 billion.

DRILLING:

-- California ranks 2nd in oil well completions in the U.S. In 1990, of the 1,756 total well completions, 1,464 were oil wells.

-- On a cumulative basis as of 1990, nearly 118,000 oil wells have been drilled in the state.

PRODUCING OIL WELLS:

-- California had 43,375 producing oil wells in 1990.

-- Almost 60% of the producing oil wells are stripper wells (wells that produce less than 10 barrels per day). The production from these wells-- more than 32 million barrels in 1989--accounts for about 10% of California's total oil production.

WELLHEAD VALUE:

-- The wellhead value of the state's crude oil output last year was approximately $6.2 billion.

-- Crude oil is the most important mineral produced in California, ranked in terms of the value of production. It comprised 54% of the total value of all the state's principal mineral output in 1989.

MISCELLANEOUS INFORMATION:

-- Almost 150,000 people are employed in jobs related to the oil and gas industry in California. Approximately 22% of these are in the oil and gas extraction sector.

THE PETROLEUM INDUSTRY IN COLORADO

CRUDE OIL PRODUCTION:

-- Of the 33 oil and natural gas producing states in the United States, Colorado ranks 10th in oil output. More than 30 million barrels of crude oil were produced last year, a decline of about .7% from the year earlier.

-- Colorado crude oil production peaked in 1956 at 58 million barrels, and has followed a downward trend ever since.

-- Colorado began producing crude oil in 1887. Since then the all-time total wellhead value has been over $13 billion.

DRILLING:

-- Colorado ranks 11th in oil well completions in the U.S. In 1990, of the 1,114 total well completions, 137 were oil wells.

-- On a cumulative basis as of 1990, over 11,000 oil wells have been drilled in the state.

PRODUCING OIL WELLS:

-- Colorado had 6,596 producing oil wells in 1990.

-- Almost all of the producing oil wells are stripper wells (wells that produce less than 10 barrels per day). The production from these wells-- almost 6 million barrels in 1989--accounts for almost 20% of Colorado's total oil production.

WELLHEAD VALUE:

-- The wellhead value of the state's crude oil output last year was approximately $700 million.

-- Crude oil is the most important mineral produced in Colorado, ranked in terms of the value of production. It comprises 33% of the total value of all the state's principal mineral output in 1989.

MISCELLANEOUS INFORMATION:

-- Over 27,000 people are employed in jobs related to the oil and gas industry in Colorado. Almost half of these are in the oil and gas extraction sector.

THE PETROLEUM INDUSTRY IN ILLINOIS

CRUDE OIL PRODUCTION:

-- Of the 33 oil and natural gas producing states in the United States, Illinois ranks 15th in oil output. Almost 20 million barrels of crude oil were produced last year, a decline of about 3% from the year earlier.

-- Illinois crude oil production peaked in 1940 at 148 million barrels, and has followed a downward trend ever since.

-- Illinois began producing crude oil in 1889. Since that time, more than 3.3 billion barrels of oil have been produced for an all-time total wellhead value of $16 billion.

DRILLING:

-- Illinois ranks 7th in oil well completions in the U.S. In 1990, of the 748 total well completions, 398 were oil wells.

-- On a cumulative basis as of 1990, over 80,000 oil wells have been drilled in the state.

PRODUCING OIL WELLS:

-- Illinois had 31,874 producing oil wells in 1990.

-- Almost all of the producing oil wells are stripper wells (wells that produce less than 10 barrels per day). The production from these wells-- more than 18 million barrels in 1989--accounts for almost 90% of Illinois' total oil production.

WELLHEAD VALUE:

-- The wellhead value of the state's crude oil output last year was approximately $460 million.

-- Crude oil is the second most important mineral produced in Illinois, ranked in terms of the value of production. It comprised 18% of the total value of all the state's principal mineral output in 1989.

MISCELLANEOUS INFORMATION:

-- Almost 60,000 people are employed in jobs related to the oil and gas industry in Illinois. Over 5% of these are in the oil and gas extraction sector.

THE PETROLEUM INDUSTRY IN INDIANA

CRUDE OIL PRODUCTION:

-- Of the 33 oil and natural gas producing states in the United States, Indiana ranks 22nd in oil output. About 3 million barrels of crude oil were produced last year, a decline of about 9% from the year earlier.

-- Indiana crude oil production peaked in 1953 at 13 million barrels, and has followed a downward trend ever since.

-- Indiana began producing crude oil in 1889. Since that time, more than 500 million barrels of oil have been produced for an all-time total wellhead value of about $3 billion.

DRILLING:

-- Indiana ranks 16th in oil well completions in the U.S. In 1990, of the 144 total well completions, 43 were oil wells.

-- On a cumulative basis as of 1990, over 38,600 oil wells have been drilled in the state.

PRODUCING OIL WELLS:

-- Indiana had 7,506 producing oil wells in 1990.

-- Almost 97% of the producing oil wells are stripper wells (wells that produce less than 10 barrels per day). The production from these wells-- more than 3 million barrels in 1989--accounts for almost 100% of Indiana's total oil production.

WELLHEAD VALUE:

-- The wellhead value of the state's crude oil output last year was approximately $70 million.

-- Crude oil is the fifth most important mineral produced in Indiana, ranked in terms of the value of production. It comprised 40% of the total value of all the state's principal mineral output in 1989.

MISCELLANEOUS INFORMATION:

-- Indiana's oil and natural gas industry paid over $804,000 in severance taxes in 1989, the latest available data.

-- Almost 30,000 people are employed in jobs related to the oil and gas industry in Indiana. Only 2% of these are in the oil and gas extraction sector.

THE PETROLEUM INDUSTRY IN LOUISIANA

CRUDE OIL PRODUCTION:

-- Of the 33 oil and natural gas producing states in the United States, Louisiana ranks 3rd in oil output. Almost 400 million barrels of crude oil were produced last year, a decline of about 3% from the year earlier.

-- Louisiana crude oil production peaked in 1971 at 935 million barrels, and has followed a downward trend ever since.

-- Louisiana began producing crude oil in 1902. Since then the all-time total wellhead value has been over $197 billion.

DRILLING:

-- Louisiana ranks 6th in oil well completions in the U.S. In 1990, of the 622 total well completions, 445 were oil wells.

-- On a cumulative basis as of 1990, over 85,000 oil wells have been drilled in the state.

PRODUCING OIL WELLS:

-- Louisiana had 23,812 producing oil wells in 1990.

-- Almost 60% of the producing oil wells are stripper wells (wells that produce less than 10 barrels per day). The production from these wells-- more than 7 billion barrels in 1989--accounts for about 2% of Louisiana's total oil production.

WELLHEAD VALUE:

-- The wellhead value of the state's crude oil output last year was approximately $9 billion.

-- Crude oil is the second important mineral produced in Louisiana, ranked in terms of the value of production. It comprises 44% of the total value of all the state's principal mineral output in 1989.

MISCELLANEOUS INFORMATION:

-- Over 85,000 people are employed in jobs related to the oil and gas industry in Louisiana. More than 60% of these are in the oil and gas extraction sector.

THE PETROLEUM INDUSTRY IN MICHIGAN

CRUDE OIL PRODUCTION:

-- Of the 33 oil and natural gas producing states in the United States, Michigan ranks 15th in oil output. More than 19 million barrels of crude oil were produced last year, a decline of about 9% from the year earlier.

-- Michigan crude oil production peaked in 1979 at 35 million barrels, and has followed a downward trend ever since.

-- Michigan began producing crude oil in 1900. Since then the all-time total wellhead value has been over $11 billion.

DRILLING:

-- Michigan ranks 22nd in oil well completions in the U.S. In 1990, of the 981 total well completions, 28 were oil wells.

-- On a cumulative basis as of 1990, over 14,000 oil wells have been drilled in the state.

PRODUCING OIL WELLS:

-- Michigan had 4,570 producing oil wells in 1990.

-- Almost 70% of the producing oil wells are stripper wells (wells that produce less than 10 barrels per day). The production from these wells-- more than 3 million barrels in 1989--accounts for almost 15% of Michigan's total oil production.

WELLHEAD VALUE:

-- The wellhead value of the state's crude oil output last year was approximately $450 million.

-- Crude oil is the third most important mineral produced in Michigan, ranked in terms of the value of production. It comprised 16% of the total value of all the state's principal mineral output in 1989.

MISCELLANEOUS INFORMATION:

-- Over 45,000 people are employed in jobs related to the oil and gas industry in Michigan. More than 10% of these are in the oil and gas extraction sector.

THE PETROLEUM INDUSTRY IN MISSISSIPPI

CRUDE OIL PRODUCTION:

-- Of the 33 oil and natural gas producing states in the United States, Mississippi ranks 12th in oil output. More than 27 million barrels of crude oil were produced last year, a decline of about 1% from the year earlier.

-- Mississippi crude oil production peaked in 1970 at 65 million barrels, and has followed a downward trend ever since.

-- Mississippi began producing crude oil in 1889. Since then the all-time total wellhead value has been over $13 billion.

DRILLING:

-- Mississippi ranks 14th in oil well completions in the U.S. In 1990, of the 277 total well completions, 73 were oil wells.

-- On a cumulative basis as of 1990, nealry 8,000 oil wells have been drilled in the state.

PRODUCING OIL WELLS:

-- Mississippi had 2,169 producing oil wells in 1990.

-- Almost 25% of the producing oil wells are stripper wells (wells that produce less than 10 barrels per day). The production from these wells-- more than 700 thousand barrels in 1989--accounts for about 3% of Mississippi's total oil production.

WELLHEAD VALUE:

-- The wellhead value of the state's crude oil output last year was approximately $600 million.

-- Crude oil is the most important mineral produced in Mississippi, ranked in terms of the value of production. It comprised 61% of the total value of all the state's principal mineral output in 1989.

MISCELLANEOUS INFORMATION:

-- Over 20,000 people are employed in jobs related to the oil and gas industry in Mississippi. Almost 30% of these are in the oil and gas extraction sector.

THE PETROLEUM INDUSTRY IN NEBRASKA

CRUDE OIL PRODUCTION:

-- Of the 33 oil and natural gas producing states in the United States, Nebraska ranks 19th in oil output. More than 5 million barrels of crude oil were produced last year, a decline of about 5% from the year earlier.

-- Nebraska crude oil production peaked in 1962 at 25 million barrels, and has followed a downward trend ever since.

-- Nebraska began producing crude oil in 1939. Since then the all-time total wellhead value has been over $3 billion.

DRILLING:

-- Nebraska ranks 19nd in oil well completions in the U.S. In 1990, of the 123 total well completions, 38 were oil wells.

-- On a cumulative basis as of 1990, over 5,000 oil wells have been drilled in the state.

PRODUCING OIL WELLS:

-- Nebraska had 1,440 producing oil wells in 1990.

-- Almost 85% of the producing oil wells are stripper wells (wells that produce less than 10 barrels per day). The production from these wells-- more than 2 million barrels in 1989--accounts for almost 34% of Nebraska's total oil production.

WELLHEAD VALUE:

-- The wellhead value of the state's crude oil output last year was approximately $130 million.

-- Crude oil is the most important mineral produced in Nebraska, ranked in terms of the value of production. It comprised 51% of the total value of all the state's principal mineral output in 1989.

MISCELLANEOUS INFORMATION:

-- Over 12,000 people are employed in jobs related to the oil and gas industry in Nebraska. Less than 4% of these are in the oil and gas extraction sector.

THE PETROLEUM INDUSTRY IN KANSAS

CRUDE OIL PRODUCTION:

-- Of the 33 oil and natural gas producing states in the United States, Kansas ranks 8th in oil output. More than 54 million barrels of crude oil were produced last year, a decline of about 1% from the year earlier.

-- Kansas crude oil production peaked in 1953 at 13 million barrels, and has followed a downward trend ever since.

-- Kansas began producing crude oil in 1889. Since that time, more than 5 billion barrels of oil have been produced for an all-time total wellhead value of about $32 billion.

DRILLING:

-- Kansas ranks 4th in oil well completions in the U.S. In 1990, of the 2,388 total well completions, 821 were oil wells.

-- On a cumulative basis as of 1990, more than 123,000 oil wells have been drilled in the state.

PRODUCING OIL WELLS:

-- Kansas had 45,470 producing oil wells in 1990.

-- Almost 100% of the producing oil wells are stripper wells (wells that produce less than 10 barrels per day). The production from these wells-- more than 46 million barrels in 1989--accounts for over 80% of Kansas' total oil production.

WELLHEAD VALUE:

-- The wellhead value of the state's crude oil output last year was approximately $1.3 billion.

-- Crude oil is the most important mineral produced in Kansas, ranked in terms of the value of production. It comprised 44% of the total value of all the state's principal mineral output in 1989.

MISCELLANEOUS INFORMATION:

-- Kansas's oil and natural gas industry paid over $170 million in severance taxes in 1989, the latest available data.

-- Over 27,000 people are employed in jobs related to the oil and gas industry in Kansas. Almost 30% of these are in the oil and gas extraction sector.

THE PETROLEUM INDUSTRY IN KENTUCKY

CRUDE OIL PRODUCTION:

-- Of the 33 oil and natural gas producing states in the United States, Kentucky ranks 21st in oil output. More than 5 million barrels of crude oil were produced last year, a decline of about .1% from the year earlier.

-- Kentucky crude oil production peaked in 1959 at 27 million barrels, and has followed a downward trend ever since.

-- Kentucky began producing crude oil in 1860. Since that time, more than 700 million barrels of oil have been produced for an all-time total wellhead value of about $16 billion.

DRILLING:

-- Kentucky ranks 21st in oil well completions in the U.S. In 1990, of the 418 total well completions, 105 were oil wells.

-- On a cumulative basis as of 1990, more than 54,000 oil wells have been drilled in the state.

PRODUCING OIL WELLS:

-- Kentucky had 22,741 producing oil wells in 1990.

-- Almost 85% of the producing oil wells are stripper wells (wells that produce less than 10 barrels per day). The production from these wells-- more than 4 million barrels in 1989--accounts for almost 80% of Kentucky's total oil production.

WELLHEAD VALUE:

-- The wellhead value of the state's crude oil output last year was approximately $125 million.

-- Crude oil is the fifth most important mineral produced in Kentucky, ranked in terms of the value of production. It comprises 2% of the total value of all the state's principal mineral output in 1989.

MISCELLANEOUS INFORMATION:

-- Kentucky's oil and natural gas industry paid over $10 million in severance taxes in 1989, the latest available data.

-- Over 23,000 people are employed in jobs related to the oil and gas industry in Kentucky. Almost 8% of these are in the oil and gas extraction sector.

THE PETROLEUM INDUSTRY IN OHIO

CRUDE OIL PRODUCTION:

-- Of the 33 oil and natural gas producing states in the United States, Ohio ranks 18th in oil output. About 9.5 million barrels of crude oil were produced last year, a decline of about 6% from the year earlier.

-- Ohio crude oil production peaked in 1896 at 24 million barrels, and has followed a downward trend ever since.

-- Ohio began producing crude oil in 1860. Since that time, almost 1 billion barrels of oil have been produced for an all-time total wellhead value of about $6 billion.

DRILLING:

-- Ohio ranks 5th in oil well completions in the U.S. In 1990, of the 992 total well completions, 636 were oil wells.

-- On a cumulative basis as of 1990, nearly 81,000 oil wells have been drilled in the state.

PRODUCING OIL WELLS:

-- Ohio had 30,089 producing oil wells in 1990.

-- Almost 98% of the producing oil wells are stripper wells (wells that produce less than 10 barrels per day). The production from these wells-- more than 7 million barrels in 1989--accounts for over 70% of Ohio's total oil production.

WELLHEAD VALUE:

-- The wellhead value of the state's crude oil output last year was approximately $220 million.

-- Crude oil is the fifth most important mineral produced in Ohio, ranked in terms of the value of production. It comprised 7% of the total value of all the state's principal mineral output in 1989.

MISCELLANEOUS INFORMATION:

-- Ohio's oil and natural gas industry paid almost $5 million in severance taxes in 1989, the latest available data.

-- Almost 62,000 people are employed in jobs related to the oil and gas industry in Ohio. Almost 9% of these are in the oil and gas extraction sector.

THE PETROLEUM INDUSTRY IN OKLAHOMA

CRUDE OIL PRODUCTION:

-- Of the 33 oil and natural gas producing states in the United States, Oklahoma ranks 5th in oil output. More than 110 million barrels of crude oil were produced last year, a decline of about 6% from the year earlier.

-- Oklahoma crude oil production peaked in 1927 at 278 million barrels, and has followed a downward trend ever since.

-- Oklahoma began producing crude oil in 1891. Since that time, more than 63 billion barrels of oil have been produced for an all-time total wellhead value of over $72 billion.

DRILLING:

-- Oklahoma ranks 3rd in oil well completions in the U.S. In 1990, of the 2,628 total well completions, 975 were oil wells.

-- On a cumulative basis as of 1990, over 235,000 oil wells have been drilled in the state.

PRODUCING OIL WELLS:

-- Oklahoma had 81,687 producing oil wells in 1990.

-- Almost 75% of the producing oil wells are stripper wells (wells that produce less than 10 barrels per day). The production from these wells-- more than 81 million barrels in 1989--accounts for almost 70% of Oklahoma's total oil production.

WELLHEAD VALUE:

-- The wellhead value of the state's crude oil output last year was approximately $2.5 billion.

-- Crude oil is the second most important mineral produced in Oklahoma, ranked in terms of the value of production. It comprised 35% of the total value of all the state's principal mineral output in 1989.

MISCELLANEOUS INFORMATION:

-- Oklahoma's oil and natural gas industry paid over $375 million in severance taxes in 1989, the latest available data.

-- Almost 65,000 people are employed in jobs related to the oil and gas industry in Oklahoma. Almost 63% of these are in the oil and gas extraction sector.

THE PETROLEUM INDUSTRY IN PENNSYLVANIA

CRUDE OIL PRODUCTION:

-- Of the 33 oil and natural gas producing states in the United States, Pennsylvania ranks 24th in oil output. More than 2.6 million barrels of crude oil were produced last year, a decline of about .8% from the year earlier.

-- Pennsylvania crude oil production peaked in 1891 at 31 million barrels, and has followed a downward trend ever since.

-- Pennsylvania began producing crude oil in 1859. Since that time, more than 1.3 billion barrels of oil have been produced for an all-time total wellhead value of over $4 billion.

DRILLING:

-- Pennsylvania ranks 14th in oil well completions in the U.S. In 1990, of the 426 total well completions, 1 was an oil well.

-- On a cumulative basis as of 1990, more than 250,000 oil wells have been drilled in the state.

PRODUCING OIL WELLS:

-- Pennsylvania had 22,338 producing oil wells in 1990.

-- Over 80% of the producing oil wells are stripper wells (wells that produce less than 10 barrels per day). The production from these wells-- more than 2.5 million barrels in 1989--accounts for almost 96% of Pennsylvania's total oil production.

WELLHEAD VALUE:

-- The wellhead value of the state's crude oil output last year was approximately $60 million.

-- Crude oil is the seventh most important mineral produced in Pennsylvania, ranked in terms of the value of production. It comprised 1% of the total value of all the state's principal mineral output in 1989.

MISCELLANEOUS INFORMATION:

-- Almost 60,000 people are employed in jobs related to the oil and gas industry in Pennsylvania. Almost 6% of these are in the oil and gas extraction sector.

THE PETROLEUM INDUSTRY IN NEW MEXICO

CRUDE OIL PRODUCTION:

-- Of the 33 oil and natural gas producing states in the United States, New Mexico ranks 7th in oil output. More than 67 million barrels of crude oil were produced last year, a decline of about 2% from the year earlier.

-- New Mexico crude oil production peaked in 1969 at 129 million barrels, and has followed a downward trend ever since.

-- New Mexico began producing crude oil in 1911. Since then the all-time total wellhead value has been over $30 billion.

DRILLING:

-- New Mexico ranks 6th in oil well completions in the U.S. In 1990, of the 1,227 total well completions, 409 were oil wells.

-- On a cumulative basis as of 1990, over 31,000 oil wells have been drilled in the state.

PRODUCING OIL WELLS:

-- New Mexico had 18,546 producing oil wells in 1990.

-- Almost 82% of the producing oil wells are stripper wells (wells that produce less than 10 barrels per day). The production from these wells-- more than 14 million barrels in 1989--accounts for about 20% of New Mexico's total oil production.

WELLHEAD VALUE:

-- The wellhead value of the state's crude oil output last year was approximately $1.5 billion.

-- Crude oil is the second most important mineral produced in New Mexico, ranked in terms of the value of production. It comprised 21% of the total value of all the state's principal mineral output in 1989.

MISCELLANEOUS INFORMATION:

-- Almost 20,000 people are employed in jobs related to the oil and gas industry in New Mexico. 44% of these are in the oil and gas extraction sector.

THE PETROLEUM INDUSTRY IN MISSOURI

CRUDE OIL PRODUCTION:

-- Of the 33 oil and natural gas producing states in the United States, Missouri ranks 30th in oil output. More than 135 thousand barrels of crude oil were produced last year, a decline of about .7% from the year earlier.

-- Missouri crude oil production peaked in 1984 at 285 thousand barrels, and has followed a downward trend ever since.

-- Missouri began producing crude oil in 1889. Since then the all-time total wellhead value has been over $65 million.

DRILLING:

-- Missouri ranks 28th in oil well completions in the U.S. In 1990, of the 7 total well completions, 2 were oil wells.

-- On a cumulative basis as of 1990, nearly 700 oil wells have been drilled in the state.

PRODUCING OIL WELLS:

-- Missouri had 854 producing oil wells in 1990.

-- Almost 83% of the producing oil wells are stripper wells (wells that produce less than 10 barrels per day). The production from these wells-- more than 115 thousand barrels in 1989--accounts for almost 85% of Missouri's total oil production.

WELLHEAD VALUE:

-- The wellhead value of the state's crude oil output last year was approximately $3 million.

-- Crude oil is the tenth most important mineral produced in Missouri, ranked in terms of the value of production. It comprised less than 1% of the total value of all the state's principal mineral output in 1989.

MISCELLANEOUS INFORMATION:

-- Almost 31,000 people are employed in jobs related to the oil and gas industry in Missouri. Less than 1% of these are in the oil and gas extraction sector.

THE PETROLEUM INDUSTRY IN MONTANA

CRUDE OIL PRODUCTION:

-- Of the 33 oil and natural gas producing states in the United States, Montana ranks 14th in oil output. More than 19 million barrels of crude oil were produced last year, an decrease of about 5% from the year earlier.

-- Montana crude oil production peaked in 1968 at 48 million barrels.

-- Montana began producing crude oil in 1889. Since then the all-time total wellhead value has been over $11 billion.

DRILLING:

-- Montana ranks 20th in oil well completions in the U.S. In 1990, of the 330 total well completions, 38 were oil wells.

-- On a cumulative basis as of 1990, nearly 11,000 oil wells have been drilled in the state.

PRODUCING OIL WELLS:

-- Montana had 3,845 producing oil wells in 1990.

-- Almost 80% of the producing oil wells are stripper wells (wells that produce less than 10 barrels per day). The production from these wells-- almost 2 million barrels in 1989--accounts for about 12% of Montana's total oil production.

WELLHEAD VALUE:

-- The wellhead value of the state's crude oil output last year was approximately $428 million.

-- Crude oil is the second most important mineral produced in Montana, ranked in terms of the value of production. It comprised 25% of the total value of all the state's principal mineral output in 1989.

MISCELLANEOUS INFORMATION:

-- Almost 8,000 people are employed in jobs related to the oil and gas industry in Montana. 22% of these are in the oil and gas extraction sector.

THE PETROLEUM INDUSTRY IN NEW YORK

CRUDE OIL PRODUCTION:

-- Of the 33 oil and natural gas producing states in the United States, New York ranks 28th in oil output. More than 400 thousand barrels of crude oil were produced last year, a decline of about 12% from the year earlier.

-- New York crude oil production peaked in 1882 at 6.7 million barrels, and has followed a downward trend ever since.

-- New York began producing crude oil in 1865. Since then the all- time total wellhead value has been over $1 billion.

DRILLING:

-- New York ranks 25th in oil well completions in the U.S. In 1990, of the 9 total well completions, 0 were oil wells.

-- On a cumulative basis as of 1990, over 9,000 oil wells have been drilled in the state.

PRODUCING OIL WELLS:

-- New York had 4,043 producing oil wells in 1990.

-- Over 90% of the producing oil wells are stripper wells (wells that produce less than 10 barrels per day). The production from these wells-- more than 430 thousand barrels in 1989--accounts for almost 87% of New York's total oil production.

WELLHEAD VALUE:

-- The wellhead value of the state's crude oil output last year was approximately $10 million.

-- Crude oil is the sixth most important mineral produced in New York, ranked in terms of the value of production. It comprised 19% of the total value of all the state's principal mineral output in 1989.

MISCELLANEOUS INFORMATION:

-- Almost 47,000 people are employed in jobs related to the oil and gas industry in New York. Almost 3% of these are in the oil and gas extraction sector.

THE PETROLEUM INDUSTRY IN NORTH DAKOTA

CRUDE OIL PRODUCTION:

-- Of the 33 oil and natural gas producing states in the United States, North Dakota ranks 9th in oil output. More than 36 million barrels of crude oil were produced last year, an incrase of less than .1% from the year earlier.

-- North Dakota crude oil production peaked in 1984 at 57 million barrels.

-- North Dakota began producing crude oil in 1951. Since then the all-time total wellhead value has been over $14 billion.

DRILLING:

-- North Dakota ranks 10th in oil well completions in the U.S. In 1990, of the 256 total well completions, 162 were oil wells.

-- On a cumulative basis as of 1990, nearly 6,000 oil wells have been drilled in the state.

PRODUCING OIL WELLS:

-- North Dakota had 3,546 producing oil wells in 1990.

-- Almost 33% of the producing oil wells are stripper wells (wells that produce less than 10 barrels per day). The production from these wells-- almost 2 million barrels in 1989--accounts for about 5% of North Dakota's total oil production.

WELLHEAD VALUE:

-- The wellhead value of the state's crude oil output last year was approximately $800 million.

-- Crude oil is the most important mineral produced in North Dakota, ranked in terms of the value of production. It comprised 66% of the total value of all the state's principal mineral output in 1989.

MISCELLANEOUS INFORMATION:

-- Over 9,000 people are employed in jobs related to the oil and gas industry in North Dakota. About 33% of these are in the oil and gas extraction sector.

THE PETROLEUM INDUSTRY IN SOUTH DAKOTA

CRUDE OIL PRODUCTION:

-- Of the 33 oil and natural gas producing states in the United States, South Dakota ranks 26th in oil output. More than 1 million barrels of crude oil were produced last year, an incrase of about 2% from the year earlier.

-- South Dakota crude oil production peaked in 1988 at 1.6 million barrels.

-- South Dakota began producing crude oil in 1954. Since then the all-time total wellhead value has been over $400 million.

DRILLING:

-- South Dakota ranks 26th in oil well completions in the U.S. In 1990, of the 14 total well completions, 5 were oil wells.

-- On a cumulative basis as of 1990, over 200 oil wells have been drilled in the state.

PRODUCING OIL WELLS:

-- South Dakota had 149 producing oil wells in 1990.

-- Almost 16% of the producing oil wells are stripper wells (wells that produce less than 10 barrels per day). The production from these wells-- more than 55 thousand barrels in 1989--accounts for about 3% of South Dakota's total oil production.

WELLHEAD VALUE:

-- The wellhead value of the state's crude oil output last year was approximately $36 million.

-- Crude oil is the third most important mineral produced in South Dakota, ranked in terms of the value of production. It comprised 9% of the total value of all the state's principal mineral output in 1989.

MISCELLANEOUS INFORMATION:

-- Over 5,000 people are employed in jobs related to the oil and gas industry in South Dakota. More than 3% of these are in the oil and gas extraction sector.

THE PETROLEUM INDUSTRY IN UTAH

CRUDE OIL PRODUCTION:

-- Of the 33 oil and natural gas producing states in the United States, Utah ranks 11th in oil output. More than 27 million barrels of crude oil were produced last year, a decline of about 3% from the year earlier.

-- Utah crude oil production peaked in 1975 at 42 million barrels.

-- Utah began producing crude oil in 1907. Since then the all-time total wellhead value has been over $11 billion.

DRILLING:

-- Utah ranks 16th in oil well completions in the U.S. In 1990, of the 93 total well completions, 50 were oil wells.

-- On a cumulative basis as of 1990, about 3,500 oil wells have been drilled in the state.

PRODUCING OIL WELLS:

-- Utah had 1,972 producing oil wells in 1990.

-- Almost 45% of the producing oil wells are stripper wells (wells that produce less than 10 barrels per day). The production from these wells-- more than 900 thousand barrels in 1989--accounts for about 3% of Utah's total oil production.

WELLHEAD VALUE:

-- The wellhead value of the state's crude oil output last year was approximately $624 million.

-- Crude oil is the most important mineral produced in Utah, ranked in terms of the value of production. It comprised 22% of the total value of all the state's principal mineral output in 1989.

MISCELLANEOUS INFORMATION:

-- Over 12,000 people are employed in jobs related to the oil and gas industry in Utah. 17% of these are in the oil and gas extraction sector.

THE PETROLEUM INDUSTRY IN VIRGINIA

CRUDE OIL PRODUCTION:

-- Of the 33 oil and natural gas producing states in the United States, Virginia ranks 31st in oil output. More than 20 thousand barrels of crude oil were produced last year, a decline of about 23% from the year earlier.

-- Virginia crude oil production peaked in 1983 at 65 thousand million barrels, and has followed a downward trend ever since.

-- Virginia began producing crude oil in 1943. Since then the all-time total wellhead value has been over 9 billion.

DRILLING:

-- Virginia ranks 29th in oil well completions in the U.S. In 1990, of the 6 total well completions, 0 were oil wells.

-- On a cumulative basis as of 1990, 66 oil wells have been drilled in the state.

PRODUCING OIL WELLS:

-- Virginia had 25 producing oil wells in 1990.

-- All of the producing oil wells are stripper wells (wells that produce less than 10 barrels per day). The production from these wells-- more than 21 thousand barrels in 1989-- accounts for 100% of Virginia's total oil production.

WELLHEAD VALUE:

-- The wellhead value of the state's crude oil output last year was approximately $370 thousand.

-- Crude oil is the eighth most important mineral produced in Virginia, ranked in terms of the value of production. It comprised less than 1% of the total value of all the state's principal mineral output in 1989.

MISCELLANEOUS INFORMATION:

-- Over 28,000 people are employed in jobs related to the oil and gas industry in Virginia. Almost 1% of these are in the oil and gas extraction sector.

THE PETROLEUM INDUSTRY IN WEST VIRGINIA

CRUDE OIL PRODUCTION:

-- Of the 33 oil and natural gas producing states in the United States, West Virginia ranks 25th in oil output. More than 2 million barrels of crude oil were produced last year, a decline of about 4% from the year earlier.

-- West Virginia crude oil production peaked in 1900 at 16 million barrels, and has followed a downward trend ever since.

-- West Virginia began producing crude oil in 1860. Since that time, more than 554 million barrels of oil have been produced for an all-time total wellhead value of over $2 billion.

DRILLING:

-- West Virginia ranks 20th in oil well completions in the U.S. In 1990, of the 694 total well completions, 21 were oil wells.

-- On a cumulative basis as of 1990, nearly 50,000 oil wells have been drilled in the state.

PRODUCING OIL WELLS:

-- West Virginia had 15,950 producing oil wells in 1990.

-- Almost 100% of the producing oil wells are stripper wells (wells that produce less than 10 barrels per day). The production from these wells-- more than 2 million barrels in 1989--accounts for almost 98% of West Virginia's total oil production.

WELLHEAD VALUE:

-- The wellhead value of the state's crude oil output last year was approximately $38 million.

-- Crude oil is the fifth most important mineral produced in West Virginia, ranked in terms of the value of production. It comprised less than 1% of the total value of all the state's principal mineral output in 1989.

MISCELLANEOUS INFORMATION:

-- West Virginia's oil and natural gas industry paid over $25 million in severance taxes in 1989, the latest available data.

-- Almost 16,000 people are employed in jobs related to the oil and gas industry in West Virginia. Almost 27% of these are in the oil and gas extraction sector.

THE PETROLEUM INDUSTRY IN TENNESSEE

CRUDE OIL PRODUCTION:

-- Of the 33 oil and natural gas producing states in the United States, Tennessee ranks 27th in oil output. More than 500 thousand barrels of crude oil were produced last year, a decline of about 5% from the year earlier.

-- Tennessee crude oil production peaked in 1982 at 1.1 million barrels, and has followed a downward trend ever since.

-- Tennessee began producing crude oil in 1860. Since then the all-time total wellhead value has been almost $300 million.

DRILLING:

-- Tennessee ranks 23rd in oil well completions in the U.S. In 1990, of the 30 total well completions, 11 were oil wells.

-- On a cumulative basis as of 1990, over 1,800 oil wells have been drilled in the state.

PRODUCING OIL WELLS:

-- Tennessee had 736 producing oil wells in 1990.

-- Almost 100% of the producing oil wells are stripper wells (wells that produce less than 10 barrels per day). The production from these wells-- more than 450,000 barrels in 1989--accounts for more than 80% of Tennessee's total oil production.

WELLHEAD VALUE:

-- The wellhead value of the state's crude oil output last year was approximately $280 million.

-- Crude oil is the seventh most important mineral produced in Tennessee, ranked in terms of the value of production. It comprised 1% of the total value of all the state's principal mineral output in 1989.

MISCELLANEOUS INFORMATION:

-- Tennessee's oil and natural gas industry paid over $337 thousand in severance taxes in 1989, the latest available data.

-- Almost 20,000 people are employed in jobs related to the oil and gas industry in Tennessee. Almost 1% of these are in the oil and gas extraction sector.

THE PETROLEUM INDUSTRY IN TEXAS

CRUDE OIL PRODUCTION:

-- Of the 33 oil and natural gas producing states in the United States, Texas ranks first in oil output. More than 700 million barrels of crude oil were produced last year, a decline of about 2% from the year earlier.

-- Texas crude oil production peaked in 1972 at 1.3 billion barrels, and has followed a downward trend ever since.

-- Texas began producing crude oil in 1889. Since then the all-time total wellhead value has been over $390 billion.

DRILLING:

-- Texas ranks first in oil well completions in the U.S. In 1990, of the 8,488 total well completions, 4,033 were oil wells.

-- On a cumulative basis as of 1990, over 510,000 oil wells have been drilled in the state.

PRODUCING OIL WELLS:

-- Texas had 188,829 producing oil wells in 1990.

-- Almost 65% of the producing oil wells are stripper wells (wells that produce less than 10 barrels per day). The production from these wells-- more than 129 million barrels in 1989--accounts for almost 20% of Texas' total oil production.

WELLHEAD VALUE:

-- The wellhead value of the state's crude oil output last year was approximately $15 billion.

-- Crude oil is the most important mineral produced in Texas, ranked in terms of the value of production. It comprised 49% of the total value of all the state's principal mineral output in 1989.

MISCELLANEOUS INFORMATION:

-- Almost 280,000 people are employed in jobs related to the oil and gas industry in Texas. Over 56% of these are in the oil and gas extraction sector.

THE PETROLEUM INDUSTRY IN WYOMING

CRUDE OIL PRODUCTION:

-- Of the 33 oil and natural gas producing states in the United States, Wyoming ranks 6th in oil output. More than 103 million barrels of crude oil were produced last year, a decline of about 3% from the year earlier.

-- Wyoming crude oil production peaked in 1970 at 160 million barrels, and has followed a downward trend ever since.

-- Wyoming began producing crude oil in 1894. Since then the all-time total wellhead value has been over $45 billion.

DRILLING:

-- Wyoming ranks 9th in oil well completions in the U.S. In 1990, of the 849 total well completions, 253 were oil wells.

-- On a cumulative basis as of 1990, over 27,000 oil wells have been drilled in the state.

PRODUCING OIL WELLS:

-- Wyoming had 11,397 producing oil wells in 1990.

-- About 25% of the producing oil wells are stripper wells (wells that produce less than 10 barrels per day). The production from these wells-- more than 5 billion barrels in 1989--accounts for about 5% of Wyoming's total oil production.

WELLHEAD VALUE:

-- The wellhead value of the state's crude oil output last year was approximately $2 billion.

-- Crude oil is the most important mineral produced in Wyoming, ranked in terms of the value of production. It comprised 37% of the total value of all the state's principal mineral output in 1989.

MISCELLANEOUS INFORMATION:

-- Over 15,000 people are employed in jobs related to the oil and gas industry in Wyoming. 58% of these are in the oil and gas extraction sector.

STATEMENT OF W. CLARK STREET

Mr. STREET. Thank you, Mr. Chairman.

My name is Walter Clark Street, Sr. I'm a resident of Waynesboro, Miss. My testimony today will consist of my involvement and experience with radioactive oil field waste.

In 1982, I was employed by a small business, Street, Inc. This company offered the petroleum industry the services of recycling production tubing.

In 1986, Chevron USA had a problem with barium sulfate scale in its tubing in one of its wells in Mississippi. Chevron decided to perform a radiation survey on this material. This survey indicated it was radioactive.

They notified the Mississippi State Department of Radiological Health of their findings. Through a series of events, Street, Inc. was identified as having recycled this type of tubing. The State Radiological Health performed a radiation survey on the Street property, and based on their findings, they in turn asked the EPA to run a radiation survey also. They also confirmed that the Street, Inc. property was radioactively contaminated above allowable limits for the general public, and I will read from that article:

> Regardless of the assumed occupancy time, with the exception of the south boundary location at the main site, all annual exposure are equal to or greater than the recommended limit of 0.5 rems a year for members of the general population.

This caused Street, Inc. to close its doors. We have had two people—one, my nephew's wife and one a fellow employee—diagnosed as having radium, osteonecrosis or bone death. Karen, my nephew Michael, and their two small children lived in a mobile home parked in an area that had been used for recycling oil field tubing. This site was later identified as being contaminated with radioactive pipe scale.

While Karen was pregnant with her third child, she simply went to sit down one day, and her hip snapped. As I stated, she suffers from radium osteonecrosis contracted from living on radioactive oil field waste, and that will be supported by the medical statement I have attached to my written statement.

My interest and curiosity about radiation had led me to search the areas where this radioactive oil field waste may be a problem. I have discovered this in numerous schools, and I have asked the State of Mississippi Radiological Health to require its removal, but have been told that there are no Federal or State guidelines to follow.

The reason there are none is because this is a naturally occurring material.

Mr. Chairman, I do not believe this material naturally occurs in schools, in recreational parks, farmers' pastures, cattle gaps, and trucks in the amounts and concentrations that we see.

The oil industry has been well aware of this phenomenon for at least 40 years and to some lesser extent since the turn of the century.

We must have Federal guidelines to protect our citizens, young and old, and the environment.

Mr. Eddie Fuentes, the director of the State of Mississippi Division of Radiological Health has stated to me and in newspaper arti-

cles and on the McNeil/Lehrer Newshour that there was a need for Federal guidelines. Mr. Fuentes told me his job was to check license and known radiation sources such as x-ray machines, and if I would help to get him congressional help, he would be glad to enforce the legislation.

And here I am.

In closing, I would like to tell you a story. In 1984, some oil field scrap was moved from the north slope of Alaska by train to the lower 48 States for disposal at a scrapyard. When this trainload of scrap arrived at the scrapyard, it set off radiation detectors. No one knew what to do at this point. This type of radioactive material does not fall under the State Radiological Health or any Federal agency's jurisdiction.

After tying up a railroad car for several months, it was decided to dispose of it at the Hanford Nuclear Reservation. This State, Mr. Chairman, was your great State of Washington. You have no oil or gas production, but yet your State has been touched by this issue.

I thank you, sir.

Mr. SWIFT. Thank you very much.

And our last witness, Mr. David J. Lennett.

[Testimony resumes on p. 361.]

[The prepared statement and attachments of Mr. Street follow:]

Testimony of Clark Street

My name is Walter Clark Street, Sr., I am a resident of Wayne County, Waynesboro Mississippi and I am here to testify before the U.S. House of Representatives Subcommittee on Transportation and Hazardous Materials in hopes that my testimony, involving my personal experience and research will lead to more effective guidelines for the handling and disposing of naturally occurring radioactive material.

In 1982 I was president of Non-Destructive Inspection Services of Laurel, Mississippi, Inc. This corporation subsequently merged with Street, Inc. and I became an employee of the corporation. During this period and for a number of years prior to 1982 Street, Inc. was engaged in the business of machine shop repair, manufacturing and tubing "drill out." The latter having been performed since 1979. The tubing drill out consisted of drilling out any material from inside the tubing that might serve to impede the flow of oil through it. Some of this material was a gray-white substance known as barium sulphate.

These drill out jobs were performed both on the oil company sites and on the Street, Inc. property. Beginning in approximately 1984 these jobs were done almost exclusively on Street, Inc. property. In April 1986 Chevron USA, one of our customers, was performing maintenance work on one of its wells in Raleigh Field, Raleigh, Mississippi, and in the course of doing this work, as they were pulling the pipe out of the well, some material began to fall out. This material was collected by the Chevron representative on location. He knew this material was barium sulphate. It was at this time that Chevron USA decided to do a radiation survey on the material. This survey revealed that indeed the pipe material was radioactive. At that time Chevron decided to search its records to identify contractors that had done work on this type of pipe and material. It was discovered that Street, Inc. and one other company in Mississippi were the only ones that drilled out barium sulphate-scaled pipes.

Chevron notified the Mississippi State Department of Radiological Health of these findings. A few days later representatives of the State Radiological Health and Chevron conducted a survey of the property with geiger counters and determined that the property was indeed contaminated with radioactive material.

These dangerous radioactive levels prompted the Environmental Protection Agency to conduct its own radiation survey of the Street Inc. property. The EPA survey found that the annual exposure rate for people working on the Street property exceeded federal radiation exposure standards that were in place at the time. (See Attachment A.)

Not surprisingly, I became very interested in the subject of radiation. During the next few months I received conflicting answers from state, federal and oil company representatives when I asked if it was dangerous. As a result of their conflicting answers I became convinced that I needed to know as much as possible about the subject of radiation and its effects on the human body. The more I researched the matter, the more frightened I became. I began going to our local university, the University of Southern Mississippi. I would be there when the library doors opened and stayed until it closed. This went on for months. I talked to the professor of geology and anyone else that I thought may be able to help me understand the occurrence and effects of radiation. During my research I realized that this type of pipe was used in all kinds of construction projects.

I then obtained a geiger counter and began a search for the places these pipes were used. My first stop was at the local school that I attended as a child and where I had three sons enrolled. The pipe on the school property was radioactive, just like the pipe discovered on Street, Inc. This finding led me to other schools in other areas with the same results. Upon determining that this was more than one isolated case, I notified school officials. When I failed to get satisfactory results, I then notified the proper state authorities.

This set in motion a number of activities on the part of state officials. When everything was said and done, nothing was accomplished. The pipe stayed in the schools because guidelines for its removal and disposal were nonexistent. Since that time some of the pipe has been removed but a large amount remains, and some pipe has never been identified (See Attachment B.)

Since the time of my discovery I have talked with many people in numerous agencies both, state and federal (e.g.,.Nuclear Regulatory Commission, various state radiological officers, Union of Concerned Scientists, Environmental Protection Agency, etc.). All that came out of these conversations was the fact that no one knew whose

responsibility it was to take actions to remedy the problem (See Attachment C.) The problem was that this was naturally occurring radioactive material. No state or federal guidelines exist for the control of such radioactive wastes, although they are equally as dangerous to human health and the environment as commercial and industrial radioactive materials.

I do not believe this material naturally occurs in school yards, public parks, private businesses, farmers pastures and cattle gaps in the amounts or concentrations that we see. I believe we should protect our school children, citizens and the environment first. People, young and old, are being put at risk of serious harm every moment we delay in failing to impose controls on these wastes.

This hazard has already caused one small business (Street, Inc) to close its doors resulting in the loss of several jobs, taxes to the city of Laurel, and revenue to local businesses. But more importantly, the risks to our health are considerable. Currently, two individuals are diagnosed as having radium osteonecrosis. Karen Street, my nephew's wife, is one of these people. She and her husband Michael lived in a mobile home that was parked on an area where radio active scale (i.e., radium-contaminated barium sulphate) had been deposited from pipe drilling operations. My relatives grew and ate vegetables from their garden and allowed their children to play in the yard without fear, because they had never been warned what the petroleum industry had known for more than forty years -- that barium sulphate could be radioactive.

Karen is a young woman in her early thirties with three children. Early in her pregnancy with her third child she began to sit down and in the motion of bending, before she ever reached the chair, her hip broke. As I've said, she has been diagnosed with radium osteonecrosis, or "bone death." (See Attachment D.) Who knows what lies ahead for her small children and husband?

Dusty Todd, a fellow employee of Street, Inc. is also in his early thirties and has been diagnosed with the same disease. Dusty faces the grim possibility of total hip replacement (See Attachment D.)

I realize the petroleum industry is trying to down play the harmful effects of radioactive oilfield wastes to humans and the environment. But, if it's not harmful, then why has Dusty been advised to tell his doctors before surgery that they may be working

with irradiated bone? Why can't radioactive barium sulphate be sent by mail without special lead lined containers? Why can't it be taken on a train, plane or bus, if it is simply a harmless substance?

Scientists for the petroleum industry, since the filing of a lawsuit by Street, Inc. and former employees, have admitted that they had knowledge of this phenomenon occurring some forty years ago. This suit alleges that Shell Oil and Chevron USA failed to warn of the dangers involved with the handling of this material and failed to instruct on the safe handling of the material, and caused loss of business, fear of cancer, and emotional stress.

I have personally traveled over several states and found this problem is one of enormous proportions. throughout the United States I have found this radioactive oilfield waste scattered alongside roadways, in woods, streams, recreational parks, school playgrounds, trucks, buildings, and pastures. If a nationwide survey was done, the results would be staggering, and the ramifications frightening.

As I have stated, the need for federal regulations pertaining to radioactive oilfield wastes are not just for the benefit of the oil producing states, and their citizens, but also for states that have no oil or gas production. Mr. Chairman, I would like to tell you a short story about one such state. Back in 1984 some used oilfield equipment was sent by railroad from the North Slope of Alaska to the lower states to be disposed of as scrap. When this scrap reached a scrap yard it set off radiation alarms. The question became, what was to be done with this radioactive junk? After tying up a railroad car that held the scrap for some months, the radioactive wastes were finally disposed of at the Hanford Nuclear Reservation. The state that this occurred in, was, Mr. Chairman, your great state of Washington.

The really sad part is that all of this could have been prevented before it grew to this magnitude. There was technology in the form of chemical treatment,(which was developed by and available to the oil industry).to prevent this very problem. Yes, it would be a little more expensive and profits may not have been as high, but the petroleum industry should have been held accountable. As responsible citizens, they should have put human health and the environment first, profit motive second. If the industry was unwilling to prevent the problem from occurring when the extra cost

was only in the thousands, why should we think that oil companies would be willing to remedy the problem now? Yet unfortunately, the cost incurred to Karen Street's children is already much too high.

The current clean-up cost will be tremendous. The problem must now be addressed by our federal government, as the oil industry is unwilling to take responsibility for its unforgiveable negligence. Mr. Edward Fuentes, Director of the Mississippi Department of Radiological Health, stated in previous conversations, that he is unable to address this burgeoning problem because of staffing and resource shortages, as well as a lack of uniform federal standards. Mr. Fuentes agrees, and has stated this in numerous letters to EPA and other government agencies (Attachment E), newspaper articles, and on the MacNeil/Lehrer Newshour. He believes, and has told me so, that we have a major problem that must be addressed from a health and environmental standpoint, by Congress. Every state official, who has tried to deal with the oilfield waste dilemma, encounters the same roadblocks: lack of clear guidelines to follow, lack of staffing and a lack of funding.

Now is the time to meet this problem head on and develop acceptable ways to protect our children's health and the environment.

Some of the things that could and should be implemented are:

(1) Require that oil companies, when pulling the tubing or sucker rods out of wells, have their representative on location or someone qualified to do so, check for radioactive contamination and file a report to the proper authority of their survey, allowing for stiff penalties in case of failure to do so.

(2) Require oil companies to survey their well locations for radioactive contamination, requiring that it be cleared up or posted and restricted as such.

(3) Set up an agency for receiving their listings and reports, giving them power to require the cleanup to acceptable standards, either at the time of discovery or the time of abandonment of the well and locations.

(4) Prohibit the transfer or sale of property containing NORM waste unless the levels are safe.

(5) Establish standards and regulations for the disposal of radioactive oilfield wastes.

I feel that if these standards are not implemented and we allow it to be business as usual, there will come a time when we pay for it in loss of life, pain and suffering that radiation is known to cause There are a number of well respected doctors, scientists and health physicians who agree that there is strong basis for these fears. All agree that radiation, in large doses, can cause cancer, leukemia, and death, and most, including the federal government, agree that there is no safe level of radiation. The best path to follow would be better safe than sorry.

UNITED STATE ..NVIRONMENTAL PROTECTION AC ..

OFFICE OF RADIATION PROGRAMS
Eastern Environmental Radiation Facility
1890 Federal Drive, Montgomery, AL 36109

Attachment A

January 23, 1987

Eddie S. Fuente, Director
Division of Radiological Health
State Department of Health
Post Office Box 1700
Jackson, MS 39215-1700

Dear Mr. Fuente: Eddie

Enclosed is a copy of the report we prepared as a result of our surveys at Laurel and Brookhaven, Mississippi. I apologize for the delay in getting the report to you; however, I hope you find the results useful in assessing the situation at these two sites.

If you have any questions about the survey or the results, please contact Mr. Sam Windham at (205) 272-3402.

Sincerely,

Charles R. Porter, Director
Eastern Environmental Radiation Facility

Enclosure

cc: H. Richard Payne, EPA/Region 4, w/enclosure
Sheldon Meyers, OD/ORP (ANR-458), w/o enclosure
David E. Janes, ASD/ORP (ANR-461), w/enclosure
Floyd L. Galpin, CSD/ORP (ANR-460), w/enclosure
Raymond A. Brandwein, OD/ORP (ANR-458), w/o enclosure

INTRODUCTION

In August 1986 personnel from the EPA-Office of Radiation Programs, Eastern Environmental Radiation Facility conducted radiological surveys at sites located near Laurel and Brookhaven, Mississippi. The surveys were conducted at the request of Mr. Eddie Fuente, Director, Division of Radiological Health of the Mississippi State Health Department. The two sites are facilities at which pipe used by the petroleum industry had been cleaned. During use, a scale material deposits inside the pipe until the bore is reduced such that cleaning is necessary. The pipe was taken to contractors at these two sites who used drills to ream material from the pipes. This material, which had been dispersed in the area in which the work had been done, was suspected of containing elevated concentrations of natural radioactivity (Sm85). The objectives of the surveys were (1) to determine the concentration of radioactivity in the scale material and the extent to which it had been dispersed about the sites, and (2) to assess the potential for exposure to workers and the local population.

INSTRUMENTS AND METHODS

Gamma Radiation - Direct gamma radiation was measured with portable survey instruments (Ludlum Model 19 Micro-R-Meters) that are sensitive to gamma radiation over a range of 1 micro Roeutgen per hour (μR/hr) to 5,000 μR/hr. These instruments were calibrated on site immediately before each survey by comparison to a pressurized ionization chamber (PIC), the Rueter-Stokes Model RS-111. Measurements were made with the instrument approximately 3 feet above the ground unless otherwise specified. Each entire site was thoroughly surveyed while walking over the site with the survey instrument. In this report, only measurements above normal background that help define the area of contamination and the highest exposure rates are presented on the site drawings. The total area of each site; however, was surveyed for completeness.

Time-averaged gamma measurements was made using thermoluminescent dosimeters (TLD's) which were left at the sites for approximately 1 month. The TLD's used were the Victoreen Model TL-15 bulb dosimeters that were read-out at the laboratory using the Victoreen Model 2810 reader.

drainage ditch and pond. The soil sample collected on the shore of the pond (C5) contained 2465 pCi/g of radium. Sample C4 was collected between 1/4 and 1/2 mile down the drainage ditch near where it crosses under the road from the site. Soil at the location contained 54.1 pCi/g of radium.

The highest radium concentration at the residential site was 1775 pCi/g at location C11. Soil collected from the agricultural field (C13) had a radium concentration of 784 pCi/g. The vegetation crop being grown on this soil had a radium concentration of 167 pCi/g.

CONCLUSIONS

The following conclusions may be drawn from the surveys conducted at the sites:

I. Laurel, MS Sites

1. Gamma exposure rates exceeding natural background were found at both the main and secondary sites. Results from the two sites are shown below:

Location	Exposure Rate (μR/hr)	Annual Exposure for 2080 hrs (R/yr)	Annual Exposure for 8760 hrs (R/yr)
Highest rate at main site	595(1)	1.2	5.2
Drill operators location	382(2)	0.8	3.5
South boundary of main site	180(3)	0.4	1.6
Highest rate at secondary site	225(3)	0.5	2.0

(1)Exposure rate based on PIC measurement.
(2)Exposure rate based on TLD measurement (see page 6).
(3)Exposure rate based on micro-R-meter measurements.

The annual exposures were calculated for two assumed exposure times, normal employment (40 hr/wk X 52 wk/yr = 2080 hours) and full time (365 days X 24 hrs/day = 8760 hours). For the main site which is still an operable facility, the exposure for 2080 hours would probably be more appropriate. The exposure for 8760 hours, a conservative overestimate, would be assumed for the secondary site since it is no longer an operable facility and could be occupied for longer times, possibly as a homesite.

Regardless of the assumed occupancy time, with the exception of the south boundary location at the main site, all annual exposures are equal to or greater than the recommended limit of 0.5 R/yr for members of the general population.

Exposure rates in the office and shop buildings and along the northwest, north and east property boundaries of the main site are at or near natural background. At the secondary site the exposure rates decrease quickly from the highest of 225 μR/hr and are at or near background at 50 feet away.

2. High concentrations of radium (1582 pCi/g maximum) were found in soil samples at both the main and secondary sites. These levels exceeded the background concentration of radium which was 0.4 pCi/g. Elevated radium concentrations in samples collected at locations L4 and L5 indicate the contaminated material had moved beyond the south and west property boundaries of the main site.

3. Material which appeared to be scale removed from a pipe (sample from L9) contained only 1.1 pCi/g radium indicating all scale did not contain grossly elevated concentrations of radium.

4. All samples analyzed for radium, uranium, and thorium isotopes had severe disequilibrium between the radium and uranium-thorium indicating a partitioning had taken place.

5. The water sample collected in the stream south of the property boundary at the main site had no detectable radioactivity.

6. Radon in air samples collected in the shop and office areas did not contain detectable radon concentrations i.e. less than 0.5 picocuries per liter. This is in the range of normal background for radon as would be expected in a building with the openness of the areas sampled.

II. Brookhaven, MS Sites

1. Gamma exposure rates exceeding natural background were found at both the wooded and residential sites near Brookhaven. Results from the two sites are shown below:

Location	Exposure Rate (μR/hr)(1)	Annual Exposure for 2080 hrs (R/yr)	Annual Exposure for 8760 hrs (R/yr)
Highest rate at wooded site	3,500	7.3	30.7
Drill operators location	2,600	5.4	22.8
Highest rate at residential site	750	1.6	6.6

(1)Exposure rates based on micro-R-meter measurements.

The annual exposures for the Brookhaven sites were calculated using the same two assumed occupancy times used for the Laurel sites. The use of 2080 hours per year, an employment situation, would only apply to past use of the sites, prior to their closing. The use of 8760 hours is a conservative overestimate of the actual exposure time, which would depend on the present and future use of the sites.

For both the above assumed exposure times, the calculated annual exposures exceed the recommended limit of 0.5 R/yr for members of the general population.

2. High concentrations of radium-226 were found in samples at the wooded and residential sites. The natural background concentrations of radium in soil for the area was 1.6 pCi/g. At the wooded site contaminated material had been washed into a nearby pond and drainage ditch and down the ditch about 1/4 to 1/2 mile from the site.

At the residential site radium had been washed or moved into an agricultural field and had been taken up into the vegetation crop being grown on the field. Dose implications of this finding are elaborated in Appendix A.

3. Water samples collected from the pond at the wooded site (C5) and from the pond (C15) and well (C14) at the residential site contained no detectable radioactivity.

4. No accessible buildings were present at either Brookhaven site in which to make meaningful radon-in-air measurements.

ATTACHMENT (B)

[From the Clarion-Ledger, Jackson, Miss., September 17, 1989]

Radioactive pipes remain in 4 schools

(By Susan Spear, Staff Writer)

Radiation-contaminated steel pipe is still hiding in the schoolyards of at least two Mississippi counties where officials thought it had been removed.

A Wayne County parent and a *Clarion-Ledger* reporter found potentially unsafe radiation levels in playground equipment, baseball field fixtures and walkway railings in Wayne and Marion counties.

Using a calibrated Geiger counter, Clark Street of Waynesboro measured radioactivity as high as 2,000 microrems per hour in steel pipe at all four schoolyards visited.

"That kind of level of radiation is too much," said James Gruhlke of the U.S. Environmental Protection Agency's Office of Radiation Programs in Washington. "The more exposure to radiation, the greater your risk of developing cancer."

Street became concerned in 1987 when he discovered radiation in structures built of discarded oil- and gas-drilling pipe at Beat Four Attendance Center in Wayne County, where his three sons and stepson have studied.

Street's detective work in 1987 prompted the state Department of Health to call for voluntary testing of all school structures built of drilling pipe. Twenty-three schools in seven counties eventually reported they removed some or all of the contaminated pipe from their campuses.

The schools visited with the Geiger counter last week were the Beat Four Attendance Center in Wayne County, and East Marion High, Columbia Primary School and West Marion High, all in Marion County.

The schools previously informed the Radiological Health Division of the state Department of Health that contaminated pipe had been removed.

The radiation comes from an inner scale of naturally occurring Radium-226, which is deposited in pipe during deep drilling. For many years, schools purchased low-price drilling pipe from oil and gas companies or accepted it freely without knowing it was contaminated.

Dr. Karl Z. Morgan of Atlanta, a health physicist and a pioneer in his field of study, said 2,000 microrems of radiation is hazardous for students. "In children, there's no such thing as a safe level of exposure," said Morgan, who explained that even a minor exposure to radiation as a child can cause difficulties in later life.

A microrem is a comparative measure of the energy that radioactive atoms emit. During the average dental X-ray, a child is exposed to about 30 microrems. Federal guidelines limit a nuclear industry worker's exposure to 5,000 microrems per year, or .57 microrems per hour.

"I can't believe it's still out there," Wayne County Superintendent Dewey McKee said Friday when told of radiation-contaminated posts at a baseball field at Beat Four Elementary. "What I can do is verify it's there now and remove it immediately, for we have the means to do that."

Street said his Little League team sometimes practices at the field if other fields are in use. "I don't let them get around the mess, but I still have to let them use the area to practice," he said as he traced the clicking Geiger counter's probe along a contaminated post that supports the roof of a dugout.

The post registered 250 microems per hour. Street ran the meter's sensor over another pipe that supports a water spigot where children drink during practice.

"Their heads and necks are all up against this thing," he said as the Geiger counter hummed and its indicator again hit 250 microrems per hour.

Numerous lenths of pipe in the fence bordering the field also registered between 250 to 2,000 microrems of radiation per hour.

"I've offered to take the stuff out myself, but McKee told me they would take care of it," Street said.

In a Feb. 3 letter, McKee responded to Street's request to remove all contaminated pipe from the school: "I do appreciate your earlier call on the matter and have taken action to get the job done before the week is over."

"I was satisfied that they would move the stuff, but they didn't," Street said.

At East Marion High, student boy sat on a low pipe railing waiting for his ride home. Where he rested the pipe measured 2,000 microrems per hour, and the rail's rusted ends were open.

"There's no question if there's radiation contamination children might inhale or ingest it," said health physicist Morgan, explaining that the open pipe potentially permits any scale containing Radium-226 to flake off into the air.

"If those pipes are contaminated, it means the contamination could be transferred from the hands and people could end up ingesting it and that's very serious," said Dr. Bob Zoon, acting deputy branch chief of Rdiation Safety for the National Institutes of Health in Bethesda, Md.

East Marion Principal Carnell Lewis said his school has been surveyed by Marion County Civil Defense and he was unaware of the contaminated rail. "I'm going to report this to the Civil Defense and see if they observe it," he said Friday.

In the dusty yard of Columbia Primary School, several sweeps of the Geiger counter detected radiation of 2,000 microrems per hour along the base of monkey bars and across the top.

"Suddenly, I'm thinking of myself as a sixth-grader, shimmying on the playground," said Dr. Howard Prichard, associate professor of environmental health at University of Texas School of Public Health at Houston. "You've got to remember that kids will climb up pipes and not be content to sit still on certain areas of a toy.

"I would not be comfortable with that level of radiation on the surface contact under those circumstances," he said of the monkey bars.

"If a child plays four days a week, straddling monkey bars ... say he plays on the equipment one hour a week, 50 weeks a year, that's about 100 microrems of radiation to the gonads, double his normal background dose of radiation for someone who lives in Mississippi," Prichard said.

Columbia Primary Principal Glenda Shivers said as far as she knew radiation had never been detected in the monkey bars. "The (Marion County) Civil Defense Department came out and checked all of our equipment," she said. "I will pass this information on to the superintendent."

"You must have a more sensitive Geiger counter than we use," said Marion County Civil Defense Director Charlie Conerly. "We checked every piece of pipe we could. We didn't carry step ladders or anything like that to get overhead high, but we marked the ones (pipes) we got any readings from."

A green patch of grass outside West Marion High's shop building is a hot spot in disguise, the Geiger counter showed. Readings went over 2,000 microrems per hour on contact with the grass behind the school's vocational-agriculture building.

Beside the 3-by-5-foot patch was a steel cattle trailer. The area is readily accessible to students from the school parking lot.

Officials speculated students' past welding or cutting of pipe to build or repair trailers may have littered the ground with flakes of radioactive scale.

"I can assure you that over the past 30 years or so, maybe 500 of those cattle trailers have been brought there and worked on by students," said Principal Billy Bourne. "There's no telling how much drill stem pipe was used there."

[From the Clarion-Ledger, Jackson, Miss., September 17, 1989]

State to check schoolyards this fall, official says

(By Susan Spear, Staff Writer)

The state Department of Health will rake radiation detectors over Mississippi schoolyards this fall to uncover an invisible menace — radiation-contaminated steel pipe.

"This is a problem that merits our immediate attention and it looks like a job that somebody from our division may actually have to go out and do, survey all of this pipe," said Bob Bell, health physicist for the Health Department's Division of Radiological Health.

Bell learned Friday that a Wayne County parent and a *Clarion-Ledger* reporter found radiation lurking in pipes on four schoolyards in Wayne and Marion counties.

"This survey has really shaken the confidence I had in the previous inspections" by schools, Bell said. The schools had reported that contaminated pipe had been removed.

Radiation measured as high as 2,000 microrems per hour in railings, baseball field fixtures and monkey bars, all believed to be fashioned from discarded oil- and gas-drilling pipe. Exposure at that level of radiation is a health risk that can taint children's developing tissues and cause cancer in later life, experts say.

Bell said his staff will examine at least nine school districts beginning next month, but his division may not be able to finance a statewide inspection right away. "I would say from mid-October until the end of the year I will try to get to as many facilities as I can possibly justify traveling to," Bell said.

"It's certainly is the purview of the state to take control of this matter, and certainly with levels that high, it would merit a decent survey to find out the extent of the problem," urged James Gruhlke of the the U.S. Environmental Protection Agency's Office of Radiation Programs in Washington.

"It's a real potential liability once it's identified," said Dr. Howard Prichard, associate professor of environmental health at the University of Texas School of Public Health at Houston.

"We're not talking about taking roofs off of buildings for heaven's sakes," Prichard said about removal. "It sounds like it would be prudent to limit access to it immediately and get rid of the stuff."

The four schools where contaminated pipe was found were Beat Four Attendance Center in Wayne County, and East Marion High, Columbia Primary School and West Marion High, all in Marion County.

In the past two years, the schools were among 23 in seven counties reporting they had removed some or all of contaminated pipe from their campuses with the help of civil defense departments.

Unaware of the contamination by radiation from deep drilling, schools around the state for years accepted donated pipe or bought it for low prices.

Bell said his department needs more manpower to comb every schoolyard in the state.

A nuclear waste disposal company in Utah on Sept. 5 offered to get rid of the contaminated schoolyard pipe for free.

The company, Envirocare Utah in Salt Lake City, is the nation's largest low-level natural radioactive waste depository. Bell previously estimated Mississippi could face a $1 million bill to properly dispose of the pipe.

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Mississippi edition ■ Jackson, Mississippi

Wednesday ■ September 20, 1989 ■ 3

Radioactive pipes an unhealthy issue for at least 2 parks, officials say

■ The oil field pipe remains at the facilities despite detection two years ago.

By Susie Spear
Clarion-Ledger Staff Writer

Good clean fun isn't all that's waiting at two Mississippi public parks, where radioactive oil field pipe has stood for at least two years after being detected.

The pipe is used for more than a dozen posts at Bogue Homa Lake State Park in east Jones County, and about 50 yards of the pipe serves as railing at Waynesboro's Hogan Park.

"The more and more I look at it, especially it getting into counties and city parks, I'm beginning to think this (pipe cleanup) is a job for the EPA and the Superfund," Bob Bell, a health physicist for the state Health Department's Division of Radiological Health, said Tuesday.

Bell classified the pipe as an "unnecessary exposure" of radiation to the public.

"It's just something we shouldn't tolerate," Bell said explaining that low levels of radiation can pose potential health risks, such as cancer.

"When you get many many people exposed to it, the same exposure does nothing to 99 people," he said, "but could actually generate a cancer clone in one individual."

Using a Geiger counter, Clark Street of Waynesboro and a *Clarion-Ledger* reporter detected radiation levels between 250 and 500 microrems per hour last week in open-ended pipes separating state-owned Bogue Homa Lake from a dirt path. A microrem is a comparative measure of the energy that radioactive atoms emit.

Civil defense investigators marked sections of the contaminated pipe with orange paint after it was discovered by Street in 1987.

Many sections of the low pipe railing that borders the Hogan Park athletic field gave readings of 1,000 microrems per hour. The rail is low

Pipes

enough to the ground for a child to sit comfortably.

"I remember about a year or so somebody did a reading on it, but nobody actually gave me the amounts (of radiation) on it," said Waynesboro Parks and Recreation Department Director Larry Marsh.

Marsh said he built two soccer goals from pipe, and noticed when he moved them recently that they were marked with orange paint. He said he didn't know why they had been painted.

For decades, oil companies and surplus pipe distributors have sold or donated discarded oil field pipe to schools, parks and other institutions for construction use. Unknown to buyers, some of the pipe contained Radium-226, a naturally occurring radioactive material that can coat the inside of the pipe during deep drilling.

Marsh said the pipe at Hogan Park was installed in the late 1970s when the park was built. He said he was never notified that the pipe was dangerous. "It ought to be looked at," he said.

"What I'd have to do is get with Larry Marsh and see if I can find out anything I can do," said Wayne County Civil Defense Director Bennie May. "I would have to research it and see whose responsibility it is to remove it."

Street checked the parks and many other schools and public facilities two years ago after finding similar pipe at Beat Four Attendance Center in Wayne County where his sons attended school. He detected high levels of radioactivity at facilities in Wayne, Jones and Marion counties.

Alerted by Street's discoveries, the state Department of Health asked schools to screen campuses for contaminated pipe. Twenty-three schools from seven counties identified radioactive pipe and are responsible for removing it with the help of local civil defense authorities.

The Health Department and the federal Environmental Protection Agency unsuccessfully asked for Superfund money in 1987 to help the state's 154 public school districts identify and remove radioactive pipe.

Because radioactive pipe is showing up in other public facilities such as parks, Bell said, the state may now have a better bid for Superfund money. "This begins to make it a diverse problem," he said.

Street said he reported the radioactive readings at Bogue Homa Lake to state Department of Wildlife, Fisheries and Parks in the fall of 1987.

"I talked to these people about this stuff being out in the open," Street said.

Commission Director Jack Herrin said Street told the commission about radioactive pipe, "but I do not remember any statement about the Bogue Homa Lake."

"If it's classified unsafe . . . I would have to assume it would be relatively simple to remove it," Herrin said. "I've got access to the proper procedures to go check it out. I will immediately notify the (county) supervisors to go locate the pipe and see what the situation is."

ATTACHMENT (C)

[From the Clarion-Ledger, Jackson, Miss., July 5, 1989]

It didn't take an expert to find radioactive danger

(By Alan Huffman, Staff Writer)

WAYNESBORO — When Clark Street told his neighbors that he'd found radioactivity at the local elementary school, he got some blank stares.

Street was no radiation expert, after all. He had to borrow a Geiger counter from his brother.

He was a disabled former oil field worker, a member of a family so firmly rooted in rural Wayne County that they had moved only once — when, in Street's words, they "migrated across the road" in the Whistler community.

The playground equipment and building materials Street claimed were radioactive at the Beat Four School had been fashioned from used oil well pipes, common in the area. People had used them for cattle gaps, clotheslines, fences, shed supports, you name it, for years.

On June 25, within a week of Street's unlikely announcement, the State Department of Health verified that a considerable problem existed.

At least four schools in Wayne and Jones counties had pipes contaminated with naturally occurring radium 226, an element from deep within the earth that is potentially harmful if breathed or eaten. The Health Department said the pipes must be removed.

Eddie Fuente, director of radiological health for the department, said he expected similar problems to crop up statewide and possibly in every oil-producing state.

Last week, U.S. Environmental Protection Agency investigators flew in from Cincinnati and Atlanta to see if Superfund money could be used to aid in the removal of the pipes, and to see if the federal government could justify helping with a state study of the possible health effects on students.

Street now says the discovery wasn't entirely by accident, and anyone who tried could have made it sooner.

"There were people who knew about this type problem as far back as 1953, according to the studies I've read, but they didn't notify anybody of the danger," said Street, 41. "I wanted to know why they didn't tell us about it, and what else hadn't they told us? It makes me mad they didn't tell us."

"They waited so long to do something that now it's infiltrated the general public," said his brother, Winston Street, 45.

Clark Street discovered the school radiation after Winston Street's Laurel machine shop was found to be radioactive in June 1988. Over a 14-year period, oil field pipes had been cleaned and refurbished at the shop, where Clark Street also worked for a time.

Clark Street said he was unfamiliar with the dangers of radiation, despite nearly two decades spent in oil fields, until the discovery at his brother's shop prompted him to study it.

"I started going to the library at the University of Southern Mississippi," he said. "I'd be there when they opened the doors and stay until 11 o'clock at night, reading."

After studying 85 radiation and oil field reports with names like "Isotopic Disequilibrium of Uranium" and "How barium sulfate is formed," Street said he borrowed a Geiger counter from his brother and started checking for radiation. He found it in the schools, around oil wells, on road sides.

He reported his findings to the Health Department, the state Department of Wildlife Conservation, the Nuclear Regulatory Commission, consumer advocate Ralph Nader and others. He said he isn't satisfied with the overall response.

"I don't trust the government," Street said. "They're saying it's not dangerous, but don't go near it. What we want is for them to follow the people that's been in the oil fields. And we want chromosome studies. A lot of these problems won't show up for years and years and years."

The radioactivity at Winston Street's shop was discovered after Chevron USA announced in April 1988 that it had found radiation at one of the company's oil wells in Smith County — the first official notification of the problem in the state.

Now Street Inc. and 31 former employees, including Clark Street, have filed suit against Chevron and Shell Oil Co., saying the companies should have warned them of the potential dangers from radiation. Plaintiffs in the suit, filed in May in U.S. District Court in Hattiesburg, are seeking $2 million each in damages and $1 million each in punitive damages.

"I found radiation in Whistler, Buckatunna, Clara, all over Wayne County," Clark Street said. "The amount is staggering, and it's going to be very expensive to clean up. I think it's the generator of this product who it ought to fall back on — every major producer and a number of independents."

He said he wanted to prove that the radiation had been broadly dispersed, and force its removal.

Chevron spokesman Joe Bethea of Jackson declined to discuss the suit, but denied that the company ignored the problem.

"We have no knowledge or notice of any radiation being associated with scale formed in

Radioactive

Street, from 1A

production tubing in Mississippi before the discovery of it in April 1986," Bethea said.

Scale is a clay-like deposit that accumulates in some oil well pipes and can contain radiation.

Bethea said eight employees from Chevron's Raleigh field were sent to New York for tests after radium contamination was discovered in the scale there, and none showed signs of radiation.

But he said the arrival of a radiation tester to be provided by Chevron to test former Street Inc. employees has been delayed at the request of Street Inc.'s attorney, Stephen Murray of New Orleans, who recently took over the case. Murray wanted time to study the case, Bethea said.

Winston Street declined to discuss the lawsuit, but said he had not been told the material in the pipes he cleaned for oil companies was radioactive. He said he closed the shop, half of which had been designated a restricted area by state health officials, in January.

Gregg Dempsey, with the division of radiological health at the state Health Department, said he believed Chevron had responded quickly when the company discovered the radioactivity. Low-level radiation has long been associated with oil fields, but it seldom rises above background levels and there was little knowledge of its ability to concentrate in pipe scale, Dempsey said.

"I don't think they realized it was in this area," he said.

Mid Continent Oil and Gas Association, a trade group based in Jackson, has developed a set of temporary guidelines for producers since the discovery, said President Joe Simms. Mid Continent is pushing for uniform national guidelines to help producers cope with the problem, particularly what to do with the waste, which low-level nuclear disposal sites won't accept.

As a result of the discovery at Winston Street's machine shop, Dempsey said, "the next person that gets in the scale business will be licensed with us."

But most everyone is concerned about what's already been done.

"I've been letting my garden lay out ever since this started," said Elisha Burch, who lives next to Winston Street's shop. "The water from where they cleaned those pipes ran right over the garden."

Burch said he doesn't really understand the dangers of radiation and wants the Health Department to sample his soils. Dempsey said a preliminary sample showed no cause for concern, but more studies of Burch's property may be done later.

Wayne County School Superintendent Randall Lee said when Clark Street told him about the radiation, "I didn't know hardly what to think."

"Just based on what they've checked here, the radiation is going to be in a piece or two of pipe, here and yonder," Lee said. "It's not all that way. And it's low-level, but I don't know what that word means. One of those fellows told me if you were to sit down on this pipe for 1,000 hours you'd likely get some damage, and if you didn't, you likely wouldn't. That's all I know."

Winston Street said it worries him to think of the effect on his former employees.

"It's touched so many people," he said. "I keep thinking about how the men in my shop would stop for lunch and their wives and kids would come eat with them. Those kids would be playing in piles of this stuff with their toy trucks."

Dempsey said the highest concentration of radiation the Health Department has found was at Street's shop — 2 millirems per hour, which would constitute a restricted area for a licensed radiation handler. The highest level in the schools was "not even close" to a restricted area level — half a millirem per hour, he said.

A person could get 2 millirems exposure "from carrying a Coleman lantern around all day, because the mantle is radioactive," Dempsey said. A chest X-ray, by comparison, is 10 to 15 millirems, he said.

"But an X-ray is a quick dose. This stuff, it's hard to get a handle on it. If it was deposited inside your body and gave off radiation as it decayed, there's cause for concern," Dempsey said. "At this point, we don't know how much risk is associated with this — a kid would have to sit on that railing until he was an old man to get a significant exposure, but we consider it unnecessary exposure."

Dempsey said the department has not found evidence of bone cancers often associated with radium overexposure. He said they've gotten calls from concerned residents who have used the pipe for fences and posts, but there's been no rush for medical exams.

Superintendent Lee said he's received no calls from concerned parents of students.

"My opinion is the parents are not worried at all," Lee said. "If school was going on that might be different. But we're going to remove the pipes, we hope, by the time school starts."

Attachment D

WILLIAM D. SHARPE, M. D.
62 UNIVERSITY COURT
SOUTH ORANGE, NEW JERSEY 07079

November 13, 1990

Thomas J. Callender, M.D.
Suite 102
913 South College Road
LaFayette, Louisiana 70503

Dear Dr. Callender:

I have, as you requested, reviewed the medical records that you sent me to see whether the opinions I expressed in my letter to you of October 23, 1990, require modification.

Martha K. Street: Records indicate that her unstable first husband, Eubanks, beat her. Her bone changes do not suggest old trauma from such beatings. During 1981, without known trauma, she had pain and swelling in her right foot and, later that year, had pain in the left side of her rib cage.

Dusty Todd: Records indicate that in 1984, he broke his big toe by dropping a heavy object on it, and that as early as 3-18-84, his orthopedic surgeon, Dr. Turnbull, raised the possibility of a lesion in the superior aspect of his femoral neck, and that on 10-15-89, he expressed his fear of death from radiation and of being crippled.

My opinion remains that Martha K. Street and Dusty Todd, more likely than not, have radium osteonecrosis, and that their prognoses warrant some concern.

Curtis Bradley: He complains of bone pains, fatigue and of feeling "old." Records document that in 1981 he very nearly drowned and was given adrenocortical steroids for his subsequent aspiration pneumonia. A 2 inch segment of rib was removed on 8-14-81 during a "minithoracotomy," but histologic sections were not taken. I do not think that any hotel swimming pool is deep enough to cause intravascular nitrogen bubbles (as in the bends, or caisson disease) nor do I think that he got enough exogenous corticosteroids long enough to affect cancellous bone remodeling.

Charles Grey: 1988 hospital records are consistent with diabetes mellitus and hypertension, only fairly well controlled, but these records do not suggest the small vessel insufficiency that would be associated with even minimal avascular or ischemic bone necrosis. He does describe, while drilling pipe scale during the winter of 1985, nausea and "lots of colds that winter." Although a viral infection is probable, I cannot exclude the possibility of an acute radiation syndrome, however transient.

Walter Clark Street Jr.: No change from my October 23, 1990, report.

[redacted]

Winston Street: He described the same winter, 1985, syndrome as did Charles Grey, but again, whether a viral infection or an acute radiation syndrome is not clear in retrospect, although I cannot exclude the latter. On 10-25-90, a central vestibular abnormality, significant bilateral hearing loss, tinnitus and imbalance, is described.

David Thornton: No change from my October 23, 1990, report. He does complain of chronic joint pain, but I do not know how to interpret the 10-16-90 roentgenographic evidence of mild maxillary sinusitis, although because radon concentrates in the paranasal sinuses of the skull, he should be watched.

Thomas E. Touchstone: No change from my October 23, 1990, report.

Tim Walters: No change from my October 23, 1990, report.

As you see, although review of fuller records that you provided me yielded some additional information, it has not changed my original view that Martha K. Street and Dusty Todd probably already have radium osteonecrosis, and that the others should be carefully observed.

Very truly yours,

William D. Sharpe

William D. Sharpe, M.D.

Attachment (E)

MISSISSIPPI
STATE DEPARTMENT OF
HEALTH

Alton B. Cobb, M.D., M.P.H.
State Health Officer

Reply To:

P.O. Box 1700/2423 North State Street/Jackson, Mississippi 39215-1700/(601)960-7400

October 9, 1989

Mr. William K. Reilly
U.S. Environmental Protection Agency
401 M Street, SW
Washington, D.C. 20460

Dear Mr. Reilly:

Enclosed are several articles which recently appeared in the Jackson Clarion-Ledger newspaper. These articles characterize for you, me, and other public health officials public concern regarding radioactive contaminated pipes on school properties.

The oil and gas production states sharing this potential problem need assistance from the U.S. Environmental Protection Agency (EPA) in the establishment of radiation protection standards. The control and disposal of radioactive contaminated oil and gas production tubing and the associated deposition of naturally occurring radioactive materials in the form of scale must be regulated.

There are many problems associated with the radioactive scale which need to be addressed by the state and federal governments. Some of the following problems were called to EPA's attention in my earlier correspondence:

1. Federal regulations/guidelines (non-existent)
2. Internal dose assessment (inhalation/ingestion pathways)
3. Occupational exposure (scale/radon)
4. Residual contamination
5. Waste disposal
6. Superfund

In May and August, 1986, EPA's assistance was requested through Messrs. Sheldon Meyers and Jack Ravan, respectively, but to date, EPA has not given the proper attention to this developing public health issue. By no means is this radioactive contamination problem unique to Mississippi, but one which it has in common with any oil and gas production state. Enclosed are copies of my letters to Messrs. Meyers and Ravan.

In August 1986, representatives from the Eastern Environmental Radiation Facility (EERF), Montgomery, Alabama, participated with members of my staff in collecting environmental samples from properties in Laurel and Brookhaven, Mississippi. In January 1987, EERF issued their official report on the analyses of the samples.

I hope EPA's plans call for immediate action on this important environmental issue. If additional information is needed by you or your staff, please contact me or Mr. Bob Bell at (601) 354-6657.

Sincerely,

Eddie S. Fuente

Eddie S. Fuente, Director
Division of Radiological Health

ESF/ims
Enclosures

CC: Dr. Alton B. Cobb
Mr. Greer Tidwell

STATEMENT OF DAVID J. LENNETT

Mr. LENNETT. Thank you, Mr. Chairman.

I am David Lennett, and I'm testifying this afternoon on behalf of the National Audubon Society and a series of groups and citizens who are concerned about the need to improve waste management practices of E&P wastes.

I just want to make three points in my oral statement. The first point is that E&P wastes are not benign. In produce waters, which is the largest volume of the material, benzene is typical at levels of over 100 times Federal drinking water standards and would be a hazardous waste, if it wasn't for the statutory exemption.

There is also significant radioactivity in some parts of the country, and the chloride content is far in excess of sea water.

As for the associated waste category, which we are probably going to talk about to a very significant extent, these are low-volume, high-toxicity wastes. In January of this year, API submitted tank bottom samplings, dated to EPA, which showed 13 of the 17 samples exhibited the hazardous waste characteristics for toxicity; 15 of the 17 exhibited the characteristic for ignitability.

If those tank bottoms were at a refinery, they would be a hazardous waste. The tank bottoms, because they were at E&P sites, are not hazardous wastes.

I would like—I wish Mr. Ritter was here, because I would like to talk to him, whether that makes sense from a risk management perspective.

The second point I would like to touch on is whether the IOGCC process is an adequate substitute for a Federal program.

There are a number of reasons provided in my written statement about why it is not an adequate substitute for a Federal program. But the one I want to focus on here is the nature of that program. It is a voluntary program. States volunteer to be reviewed and volunteer to make improvements in their State programs as a result of those recommendations.

To date, I would note that Mr. Krueger's State of Texas has not volunteered, and even if Mr. Krueger volunteered the State of Texas today, that would only make six States that have volunteered in the almost 1 year that the States have had an opportunity since this process has gotten underway.

The third series of points I want to make concerns the Gruy Report, since conclusions about the Gruy Report are already being discussed in the public domain, and I think it's important to examine the assumptions that went into that report as well.

We have begun a preliminary review of that report, and I want to share with you just a couple of those preliminary observations.

One, one of the assumptions API assumes is that a permit fee of $100,000 is charged for every noncommercial brine disposal facility. At API's assumption at two injection wells per facility, that's $50,000 permit fee for each injection well in the United States or the equivalent of a fulltime inspector at every injection well in the United States. Clearly, that's not a reasonable assumption, but that's what's in the Gruy Report.

Second, the report assumes a certain number of pits per site which would have to be closed and replaced with tanks. We are ex-

tremely concerned that the assumed numbers do not reflect reality for at least some jurisdictions.

For example, API assumes 15 percent of the gas wells have evaporation blowdown pits, and so for the State of Texas, Mr. Fields, API assumes 7,470 evaporation blowdown pits in Texas. We contacted the Texas Railroad Commission staff, who produced a printout for us on the number of blowdown pits in Texas. There are 205.

Similarly in Kansas, API assumes that there are 1,950 evaporation blowdown pits there. We contacted Bill Bryson of the Kansas Corporation Commission. He said there aren't any, because they've been phased out beginning in 1970.

There are discrepancies on other types of pits in these two States as well, and we haven't contacted other States. But clearly, pit closure costs, tank replacement cost, and eventual corrective action costs have been assumed where pits don't exist and where tanks may be already onsite.

The third area I want to probe about the API report is in the area of corrective action, which is by far the largest compliance cost consideration in that report. API assumes a very high percentage, 67 percent, of noncommercial saltwater facilities and evaporation blowdown pits will require both site investigations and site remediation. Site remediation will involve either decontamination of soil, either through bioremediation or evacuation and offsite disposal.

In addition to the soil remediation, API assumes 9 percent of all existing noncommercial injection well facilities are so contaminated that the pumping—they will require the pumping and treating of groundwater at a cost of $2.5 million per site. Then rather than assigning those remediation costs to the problem, 9 percent of the facilities, API averages that cost over every facility in the country, resulting in a $450,000 charge to each facility. That form of Lenin Socialism would not occur in the real world, but it serves the purpose of forcing a large number of well closures.

The same criticism would apply to their assumptions about corrective action for evaporation blowdown pits.

Putting all that aside, I think it's important that you understand the environmental implications of API's assumptions. They assume on a national basis that almost 15,000 noncommercial brine disposal facilities and over 26,000 gas pit facilities will require site remediation. The total cost of remediation at these sites is over $8 billion. In addition, existing sites are so contaminated that groundwater remediation would be required at 2,000 brine disposal facilities and over 3,500 gas facilities at a total cost of over $18 billion. This would not include sites contaminated with radioactive waste or totally abandoned sites.

I ask you how those assumptions square with the assertions we've heard already today that oil and gas have been adequately regulated for decades?

Let me put this in perspective for four States which I think are of concern to this subcommittee.

In Kansas, API assumes 1,850 brine disposal facilities would require soil decontamination, and 248 sites would require groundwater cleanup. Over 1,300 gas facilities would require soil decontami-

nation, and 176 would require groundwater remediation. The total cost, over $2.5 billion.

In Texas, Mr. Fields, over 4,600 brine disposal facilities would require soil decontamination, and 639 would require groundwater remediation; 5,005 gas facilities would require soil remediation, and 672 would require groundwater remediation. The total cost of cleanup in the State of Texas is $7 billion under the API assumptions.

I'm anxious to hear what Mr. Krueger thinks about these numbers.

Louisiana, over 950 brine disposal facilities would require soil decontamination, and 128 would require groundwater remediation. And almost 1,500 gas facilities would require soil decontamination, and 195 of those would require groundwater remediation. The total cleanup cost, over $1.5 billion.

In Pennsylvania, 616 brine disposal facilities requiring soil decontamination and 84 facilities requiring groundwater remediation. Almost 3,000 gas facilities requiring soil decontamination and 392 requiring groundwater remediation. Total cost, almost $2 billion.

Now our assessment of this report is not yet complete. There are other aspects of the report we have questions about.

They assume increased costs for the use of closed-loop drilling fluid systems. At they same time, the representatives of Amoco presented a paper at an EPA conference last year showing that that technology was cost-effective at present disposal cost. They assumed no jobs are created by all these facility upgrades. Whether robots are coming in or doing it is not clear to me, but not one job is created by upgrading these facilities in the API report.

We have determined that tank replacement and the pit closure costs are overestimated. We are obtaining quotes from service vendors in the field, and we are getting quotes much less than what is in the API report.

So before we discuss the conclusions and the Armageddon assessments of what a program might look like, I think it's important that we fully explore the assumptions, and I thank the chairman for asking CBO to take a look at that in some detail. I'm anxious to hear the results of that analysis as well.

That concludes my oral remarks. I look forward to answering any questions that you or other members of the subcommittee may have.

Mr. SWIFT. I thank you very much, and I thank everybody on the panel.

[Testimony resumes on p. 411.]

[The prepared statement and attachments of Mr. Lennett follow:]

TESTIMONY OF DAVID LENNETT
ON BEHALF OF THE NATIONAL AUDUBON SOCIETY
AND THE NATIONAL CITIZENS' NETWORK ON OIL AND GAS WASTES
BEFORE THE HAZARDOUS MATERIALS AND TRANSPORTATION SUBCOMMITTEE
OF THE ENERGY AND COMMERCE COMMITTEE
UNITED STATES HOUSE OF REPRESENTATIVES

SEPTEMBER 12, 1991

I. Introduction

Good morning. My name is David Lennett. I am testifying today on behalf of the National Audubon Society and the National Citizens' Network on Oil and Gas Wastes. Audubon is a national, nonprofit organization dedicated to the conservation of natural resources. Audubon has more than 550,000 members affiliated with over 500 chapters in the United States and several foreign countries. Audubon staff and members are engaged in a variety of scientific studies, conservation education projects, litigation, and policy projects aimed at the protection of wetlands, wildlife habitat, clean air, hazardous waste control, and other environmental concerns. The National Citizens' Network on Oil and Gas Wastes is a compilation of more than 125 national, state and local environmental and grass-roots citizens' groups whose memberships include millions of people across the country. The Network's member and supporting groups and individuals are concerned about contamination caused by the storage and disposal of wastes generated during the exploration for and production of oil and gas. Member and supporting national organizations include the Southwest Research and Information Center, Mineral Policy Center, Sierra Club, the Environmental Defense Fund, and more. A list of the Network's member and supporting organizations is appended as Exhibit A.

As Congress begins the process of reauthorizing the Resource Conservation and Recovery Act (RCRA), Audubon and the rest of the Network urge this committee to include comprehensive federal standards for the treatment, storage and disposal of oilfield wastes in any reauthorization bill the Committee considers.

The current lack of requirements in the statute for oil and gas wastes is perhaps the most gaping loophole in RCRA's regulatory scheme. Wastes generated during the exploration and production for oil and gas constitute the largest category by volume of solid wastes generated annually in the United States. More than 2.8 billion tons of oilfield wastes are generated every year, an amount that is equivalent to approximately 25 percent of the all

the wastes generated annually in the U.S. In contrast, municipal solid waste constitutes approximately 1.5 percent of the total waste stream (approximately 160 million tons).

Oilfield wastes contain high levels of benzene and other organic contaminants, radioactive isotopes (radium-226 and -228), and a variety of inorganic constituents including heavy metals and salt-forming elements. Current methods of disposal of in unlined pits and other techniques have led to contamination of ground water, wetlands, and other sensitive ecological areas. In addition, oilfield pits have killed hundreds of thousands of birds and migrating waterfowl that mistake oily pit wastes for fresh-water ponds. In 1989 alone, the U.S. Fish and Wildlife estimated that more than twice the number of birds that were killed in the Exxon Valdez accident -- more than 500,000 -- perished in oil and gas pits in just four of the oil-producing states: Texas, New Mexico, Oklahoma, and Kansas.

Despite their demonstrated toxicity, oilfield wastes are exempt from the provisions of Subtitle C of RCRA. As a consequence, no RCRA standards apply to oil and gas waste disposal. Congress should lift the statutory exemption for one category of oilfield wastes, the so-called "associated wastes." With respect to the large-volume wastes -- i.e., produced water and drilling fluids -- Congress should specify minimum standards for their treatment, storage and disposal as part of a federal oil and gas regulatory program administered by the states.

II. Categories of Oil and Gas Wastes

By way of background, it would be useful to describe the three categories of oil and gas wastes.

1. Produced water/NORM wastes. Produced water is the briny fluid that is brought to the surface with oil and gas during the production process, and then separated from the product and disposed of. Produced water is the single largest source of oilfield-related pollutant discharges; about 21 billion barrels of produced water are generated and disposed of annually in the United States. Produced water contains elevated concentrations of organic and inorganic constituents, salts and, in a large number of formations, naturally occurring radioactive materials (NORM).

Data compiled by the American Petroleum Institute (API), a number of state regulatory agencies, and independent scientists indicate that produced water almost always contains high levels of benzene, a proven human carcinogen. Benzene levels in produced

water often range from one to 10 parts per million (ppm), and have been detected as high as 65 ppm. If not for the RCRA statutory exemption from Subtitle C, produced water would almost always meet the definition of hazardous waste in the federal regulations because of its benzene content. The toxicity characteristic level for benzene under federal law is 0.5 milligrams per liter (mg/l), or 500 parts per billion (ppb), a level consistently exceeded in samples of produced water. For comparison purposes, the federal drinking water standard for benzene is 5 ppb.

That produced water contains high concentrations of benzene and other organics is why we remind the public that oilfield brines are not "just saltwater." But even if salinity was the only measure of its toxicity, produced water would nonetheless be a harmful substance. The salt content of produced water ranges up to 300,000 ppm, according to data assembled by API. The average salinity of sea water, by comparison, is approximately 35,000 ppm.

Produced water may also contain elevated levels of certain radioactive materials, especially isotopes of radium. The mean concentration of radium-226 detected in produced waters in Louisiana in a recent study was 175 picocuries/ liter (pCi/l); the maximum concentration was 930 pCi/l. In southeast New Mexico in 1989 and 1990, mean radium-226 levels in produced water were 1,346 pCi/l, with a maximum concentration of 6,000 pCi/l. The maximum concentration of radium-226 in Michigan brines was 9,000 pCi/l in 1990. By comparison, the federal drinking water standard for total radium is 5 pCi/l, and discharges from commercial nuclear facilities to unrestricted areas are limited by regulation to 30 pCi/l.

During production, changes in temperature and pressure cause NORM constituents (i.e., radium-226 and -228 and the solid decay products of radon gas) to concentrate inside production pipes as "scale." (API defines scale as radium co-precipitated in barium sulfate). These constituents also precipitate inside production processing and storage equipment (i.e., heater treaters, separators and storage tanks), forming radioactive sludges with sands and silts that are co-produced with the oil and gas.

Oilfield workers are exposed to dangerous levels of radiation when they clean process equipment contaminated with radioactive scale or sludges. Moreover, oilfield equipment is often used for other purposes. In this way, "hot" pipe and other equipment has been introduced into commerce and has exposed unknowing citizens to radiation. A chilling example of citizen exposure to radioactive oilfield equipment was recently documented in Mississippi, where radioactive pipe had been installed as part of a chain link

fence that surrounded an elementary school playground.

2. Drilling Fluids. Drilling fluids are the second-largest category of oilfield wastes. Drilling fluids are water or oil-based fluids in which reactive solids and inert solids are suspended or dissolved. Drilling muds are used during the drilling process to transport drill cuttings to the surface, suspend cuttings when circulation is stopped, cool and lubricate the drill bit, support the walls of the well bore, among other things. Various chemicals may be added to the muds to obtain particular properties necessary for drilling, depending on the type and depth of the formation, the ambient temperature, and other factors.

The toxicity of drilling muds and the environmental threat that may be posed by disposal practices depends on whether the mud is water or oil-based, and on the chemical additives used during the process. The majority of drilling muds in use are water-based. However, diesel-based fluids are used in certain operations. Oil-based muds pose the greatest environmental risk when improperly disposed of, because of the organics and heavy metals they contain. Water-based muds are almost always a viable substitute for oil-based muds. In those instances where oil-based fluid is more desirable, mineral-oil based mud is a ready substitute for diesel-based mud. Mineral oil presents fewer environmental risks than diesel-based fluids.

In addition, the technology exists to substantially reduce the quantity of drilling fluids requiring disposal. The closed loop drilling fluid system consists of improved solids removal equipment which enables greater quantities of liquids to be recycled. Available literature indicates the technology is both cost effective and environmentally beneficial.

3. Associated wastes. Associated wastes are low in volume (EPA estimates that approximately 1.7 million metric tons are generated per year, or about 0.1 percent of the oil and gas waste stream), yet, due to their toxicity, they have been responsible for a large proportion of the documented damage cases. Associated wastes are often very similar in chemical composition to wastes generated by other industries.

Examples of associated wastes are tank bottoms (which are closely similar to API separator sludge, a listed hazardous waste); workover wastes (which often contain solvents and corrosion inhibitors that may be hazardous); completion fluid wastes (which include solvents and corrosion inhibitors); stimulation fluids (which may contain highly corrosive hydrochloric acid or hydro-

fluoric acid); and spent carbon filters (that are often contaminated with organics). Associated wastes are routinely disposed in unlined pits, spread on roads, or placed in nonhazardous waste local landfills.

III. Shortcomings in the EPA Report to Congress and July 1988 Regulatory Determination

As you know, Section 3001(b)(2) of RCRA exempts exploration and production wastes from hazardous waste regulation until EPA prepares a Report to Congress and a regulatory determination for the wastes. Regardless of the results of EPA's Report, Congress reserved for itself the final decision by requiring an Act of Congress prior to subjecting oilfield wastes to regulation as hazardous wastes. Accordingly, the EPA actions were never intended by Congress to be the last word on the issue.

EPA submitted its Report to Congress in December 1987. In the Report, EPA concluded that the threat of significant health and environmental effects from "properly managed" E&P waste operations was low, particularly when the wastes were managed in accordance with existing state requirements. EPA based its conclusion on the Report's risk modeling and assessment of damages to human health and the environment. However, because of substantial shortcomings in EPA's Report, EPA's conclusion lacked a valid foundation in 1987 and remains flawed today. The following shortcomings of the Report are particularly important:

* Many of the most significant risks posed by E&P waste management practices were not analyzed. These included potential ground water contamination from production waste pits, at both onsite and offsite (centralized and commercial) facilities; the exposure of workers and the public to radioactive pipe, pipe "scale," and other wastes; and potential damages to wildlife from uncovered pits and tanks.

* EPA sampled oilfield wastes using a conventional leaching procedure that underestimates the concentration of leachable contaminants in the wastes. Though EPA had developed the Oily Waste Extraction Procedure in 1985 to more accurately predict the release of contaminants from the oil, see Fed. Reg. 48908 (November 27, 1985), the procedure was not employed for the Report.

* EPA's methodology for collecting damage cases assured that the Agency would understate the size of the problem. Much of the field research was conducted over the December 1986 Christmas

holidays when state contacts or private parties were unavailable; entire states were completely omitted from the investigation[1]; and the Agency would only consider a damage case where the site was already the subject of a "scientific study," court order, or state enforcement proceeding. Given these data collection methods, scores of damage cases were either not considered or never researched.

Significantly, despite these fundamental flaws, EPA reached other more compelling conclusions that warrant your attention. First, EPA concluded that some waste management practices are "less reliable" than others, including the use of produced water pits. Report to Congress at VIII-1. Second, because some low-volume wastes (i.e., the associated wastes) exhibit hazardous characteristics and constituents, EPA concluded that:

". . . it may be appropriate to require that they be segregated and that some of these wastes be managed in accordance with hazardous waste regulations. [T]he Agency . . . seeks to avoid any deliberate and unnecessary use of reserve pits as a disposal mechanism. Segregation of these wastes from high-volume wastes appears to be desirable and should be encouraged where practical." Report to Congress at VIII-3.

EPA published its regulatory determination in July 1988. Based on the damage cases documented in the Report, EPA staff recommended that associated wastes be regulated as hazardous when they exhibited a characteristic. (Exhibit B to this testimony). However, senior management at the Agency reversed this recommendation in the published version.

As part of this reversal, several significant factual findings reached by EPA staff were omitted or modified as well. For example, the staff-prepared regulatory determination emphasized the need to segregate associated wastes from the higher volume wastes, stating:

"The Agency believes that the mixing of hazardous waste with nonhazardous waste prior to disposal is an undesirable practice. The Agency believes that waste segregation is technically and economically feasible and environmentally desirable." Exhibit B at 21.

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[1]Only 14 of the 33 oil- and gas-producing states were visited as part of the EPA study in support of the Report to Congress.

However, in the published regulatory determination, the Agency merely indicated that only "under certain circumstances" - circumstances that were never specified - is waste segregation technically and economically feasible and desirable. See 53 Fed. Reg. 25451 (July 6, 1988).

In addition, the staff-prepared regulatory determination concluded that "relative to total production and the total volume of product, the overall impacts on the industry [of regulating associated wastes as hazardous] should not be unduly burdensome." See Exhibit B at 45. This conclusion was eliminated from the version published in the Federal Register.

The staff-prepared regulatory determination also focused on the high proportion of damage cases involving associated wastes:

> "Although associated wastes make up less than one-tenth of one percent of total waste generated by the crude oil and natural gas industry, of the sixty-two damage cases assembled for the Report to Congress, at least seven involve damages resulting from the improper management of associated wastes. Many of the wastes are hazardous in nature. In addition, many states do not adequately regulate associated wastes, nor are these wastes effectively regulated under federal programs." Exhibit B at 47 (emphasis added).

In contrast, while the published version of the regulatory determination acknowledged gaps in state programs for associated wastes, the text suggested that "general standards that provide partial control of these wastes" are somehow sufficient. See 53 Fed. Reg. 25455 (July 6, 1988).

But the most glaring difference between the staff-prepared determination and the published version was the Agency's conclusions regarding regulation of associated wastes under Subtitle C. Said the staff:

> "The Agency has determined that regulation under RCRA Subtitle C of associated wastes generated by crude oil and natural gas exploration, development, and production is warranted. Associated wastes are generated in very small quantities, and the likely economic impact of regulation of these wastes under RCRA Subtitle C is very small." Exhibit B at 47.

The published version states:

> "The Agency has decided not to promulgate regulations under Subtitle C for large volume and associated wastes...[because among other reasons] EPA would not be able to craft a regulatory program to reduce or eliminate the serious economic impacts that it has predicted." See 53 Fed. Reg. 25456 (July 6, 1988).

Interestingly, those "serious economic impacts" that the staff alternatively described as "very small" did not change from the staff-prepared determination to the published version. Both documents found that regulation of associated wastes as hazardous wastes would cost the oil and gas industry between $200 million and $500 million per year - or 3.5 cents to 11 cents per barrel of crude oil production. See Exhibit B at 45; 53 Fed. Reg. 25455.

Winston Porter, then-assistant administrator, was quoted in newspaper accounts in 1989 as justifying a continued exemption for associated wastes on the grounds that Congress would not have approved removing the exemption. That kind of reasoning is a self-fulfilling prophecy, particularly when the facts presented to the Congress and the public are modified to achieve an intended result.

IV. SHORTCOMINGS IN THE IOGCC E&P WASTE GUIDANCE CRITERIA

Opponents of a federal program for E&P wastes suggest that the development of technical and administrative criteria for E&P waste management by the Interstate Oil and Gas Compact Commission (IOGCC) ("IOGCC guidance" or "IOGCC criteria")[2] can substitute for the enactment and issuance of federal standards. However, the IOGCC criteria were never intended to serve as a basis for national standards. They cannot be because they are not based on the performance standard that lies at the heart of RCRA: protection of human health and the environment.

The guidance itself states the limits of its scope: "The criteria by themselves are not intended to form the sole basis of any future federal statutory or regulatory authorities that may be sought by EPA for oil and gas production wastes." IOGCC guidance at 2. The document simply "establishes a baseline of performance...of E&P waste management." IOGCC guidance at 3.

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[2]Interstate Oil and Gas Compact Commission. EPA/IOCC Study of State Regulation of Oil and Gas Exploration and Production Waste. IOGCC: Oklahoma City. December 1990.

The environmental participants in the IOGCC's E&P waste study went even further in addressing the limitations of the criteria. In a minority report appended to the study (see Exhibit C), the environmental participants stated that the guidance "...is essentially a restatement of the status quo, a reaffirmation by the states of practices they already allow regardless of whether those practices are protective of public health and the environment." They enunciated several major weaknesses in the criteria themselves, including vague standards to prevent ground water contamination from pits, the lack of emphasis on segregating associated wastes, and the failure to protect vulnerable environments from produced water discharges.

Equally important, several technical matters intimately related to E&P waste management were outside of the scope of the guidance document. Corrective action requirements for existing or future facilities, criteria for the identification and management of sites containing radioactive oilfield wastes, and guidance for identification and remediation of abandoned sites were not addressed. Those matters were left for "future work." IOGCC guidance at 33.

V. NEED FOR A FEDERAL OIL AND GAS WASTE MANAGEMENT PROGRAM

A federal E&P waste management program is needed, regardless of whether some or all of the waste remains exempt from hazardous waste regulation. State programs are deficient both as to substantive requirements and enforcement. Even EPA acknowledged significant shortcomings in state programs in its July 1988 regulatory determination when it stated its intention to "design and implement" a federal program for E&P wastes that would consider engineering and operating practices, closure procedures, monitoring, and corrective action. See 53 Fed. Reg. 25457 (July 6, 1988). EPA has initiated no regulatory action to date.

The IOGCC State Review Process is Insufficient. It is apparent that the IOGCC state review process is too severely limited in scope and force to substitute for a federal program. As discussed earlier, the criteria upon which the state programs are principally being reviewed are especially weak in areas that are critical to achieving protection of human health and the environment. Nor do the state program reviews purport to assess a program's effectiveness in the field, where it counts, in part because IOGCC reviewers are in a state for only one week and review the program against questions largely based on the IOGCC criteria. While the reviews can provide useful guidance to the states, their limitations must be expressly acknowledged.

The pace of the state review process is, by design and necessity, extremely slow. Only one state program has been reviewed to date and only four to five more states will be reviewed within the next year. At this rate, a minimum of six years will be required just to review the programs; implementation of program changes, if implementation occurs, will take even longer.

Perhaps most important, there is no mechanism in IOGCC's state program review process that ensures that the states will make the program changes identified as warranted. "Peer pressure," or friendly persuasion among colleagues, is the only mechanism IOGCC has to convince the states to implement the recommendations of the review process. As such, even if the IOGCC criteria were comprehensive, the criteria are simply guidance that need not be followed by individual states. In contrast, a federal program would establish minimum federal requirements that states must follow to obtain and retain authorization to administer an E&P waste regulatory program.

Finally, a federal program can improve enforcement in two substantial ways: (1) by ensuring that adequate financial and personnel resources are available through a permit fee system similar to the system Congress adopted last year in the Clean Air Act; and (2) by supplementing the enforcement activities of state regulators through RCRA's citizen-suit provisions and through EPA's oversight and enforcement.

Rapid Improvement is Needed. The need for rapid improvement in the management of E&P wastes is documented by statistics in EPA's October 1988 Report to Congress on municipal and industrial wastes and in recent documented damage cases:

* Of the approximately 191,000 industrial waste impoundments in the U.S., 65 percent are E&P waste pits. There are 19 times more E&P waste pits than there are municipal landfills.

* At the time EPA's data were collected, approximately 70 percent of E&P waste pits were unlined, less than 2 percent were equipped with leak detection systems, and only 23 percent were equipped with overtopping controls. Moreover, notwithstanding the lack of engineering controls, only 0.1% percent of the pits had groundwater monitoring. While improvements in regulation at the state level in recent years have forced the closure or upgrading (i.e., lining) of some pits, the implications of these data cannot be ignored.

* About 1.5 million gallons of natural gas condensate and 0.8 million gallons of produced water leaked from a gathering line south of a gas-processing plant in Eddy County, New Mexico, over a six-month period beginning last November. Benzene was detected in ground water monitoring wells three-quarters of a mile from the leak point and condensate was found floating on the water table in monitoring wells about a mile from the leak point. Today, the company is pumping condensate and water from the vadose zone and ground water beneath the leak site.

* Unlined produced water disposal pits that receive less than one-half barrel a day of fluids were shown to cause ground water contamination above regulatory standards in 50 percent of the cases in a study conducted by officials of the New Mexico Oil Conservation Division in 1987 and 1988. Contamination of ground water by pollutants in excess of background levels was discovered at 70 percent of the sites.

* Ponds designed to hold fresh water were instead found to contain oilfield brines more salty than seawater in northeastern Oklahoma in mid-1990. A report of the Oklahoma Corporation Commission's SOUPP (Special Operations Unit for Pollution Prevention) team said that local field inspectors warned investigators that if civil or criminal charges were filed against the offending companies, most would go out of business, according to news accounts.

* Several domestic water wells near Guthrie in Logan County, Oklahoma, were contaminated by saltwater flowing from an unplugged well. Owners of the wells have been hauling drinking water for several years.

* Residents of north-central Oklahoma allege in eight pending lawsuits that oilfield brines have damaged farm lands and water wells. Unplugged and improperly plugged oil wells and the reinjection of saltwater in secondary recovery projects are blamed for the contamination, according to news accounts.

* The Ohio Attorney General in early August filed a 94-count lawsuit against an Ashtabula County oil company for contamination resulting from leaking oil wells and storage tanks. The lawsuit, which seeks $676,000 in damages for violations at 51 oil and natural gas sites owned by the company, calls for the company to repair or replace oil storage tanks, construct and maintain berms around tank batteries, and remove and legally dispose of brine water and oil found floating on the ground

surface at well sites and tank batteries.[3]

State Program Resources. Despite the need to closely regulate active sites and evaluate the impact of abandoned sites, some state programs are experiencing substantial cuts or uncertain funding. For example, budget shortfalls in Ohio this year led to the dismissal of more than half of the state's 55 oil and gas field inspectors. The cuts left 26 inspectors to oversee 65,000 producing oil and gas wells in the state. About 40 percent of the 112 employees of the Ohio Department of Natural Resources's Division of Oil and Gas were eliminated in the cuts.[4]

State Regulation of Oilfield NORM. Louisiana is the only state which has adopted regulations governing radioactive oilfield wastes. Two different sets of regulations address radioactive materials in produced water discharges and in oilfield equipment and facilities. Radium-226 and radium-228 are limited to 30 picoCuries/liter (pCi/l) each in discharges of produced water from permitted facilities. In addition, sites suspected of containing oilfield NORM are to be identified and surveyed. Those sites, facilities and equipment that exceed a specified exposure level cannot be transferred or sold until they are decontaminated. Standards for site decontamination are also specified in the rules.

To our knowledge, only one other state has proposed regulations. The Texas Department of Health issued draft rules on February 28, 1991.[5] The Michigan Supervisor of Wells issued an advisory regarding oilfield NORM last December. The advisory warned operators that equipment exposed to oilfield brines "could be contaminated with radium-226 and pose a risk to workers or the general public if improperly handled." The advisory noted that tank bottom sediments "represent the highest level of naturally-occurring radium-226 accumulation...Operators are advised to use

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[3]Willard, D. J. Suit filed for well problems. Star-Beacon (Ashtabula, Ohio), August 3, 1991, page A11; and Barrett, J. Unicorn faces fine. The Gazette (Jefferson, Ohio), August 8, 1991.

[4]Kuehner, J. C. 29 oil and gas well inspectors laid off. Cleveland Plain Dealer, August 23, 1991.

[5]Texas Department of Health. Draft 2 of Texas Regulations for Control of Radiation, Part 46, "Licensing of Naturally Occurring Radioactive Materials (NORM)." February 28, 1991.

extreme caution in handling this waste material." Kansas, Louisiana, Michigan, Mississippi, New Mexico and Wyoming are among the states that have conducted gamma radiation surveys or collected and analyzed oilfield waste samples for radium-226 and other naturally occurring radioactive materials.

Nevertheless, Louisiana stands alone at the present time. The inability of most states to develop comprehensive programs for radioactive E&P wastes is further compelling evidence of the need for and importance of a federal program.

VI. Minimum Elements of a Federal Program

The Network urges Congress to impose stringent standards for the treatment, storage and disposal of oil and gas wastes in the RCRA reauthorization statute. A comprehensive RCRA program for oilfield wastes should include at least the following elements:

1. The statutory exemption from Subtitle C regulation should be lifted with respect to associated wastes.

2. The storage or disposal of produced water in unlined pits should be prohibited.

3. The storage or disposal of diesel oil-based drilling fluids and other fluids that exhibit a characteristic of a hazardous waste in unlined pits should be prohibited. Use of closed-loop drilling fluid systems should be encouraged.

4. EPA should be required to promulgate requirements applicable to the treatment, storage and disposal of radioactive oilfield wastes. Transfers of contaminated equipment and property for general public use should be prohibited until the equipment or property is decontaminated.

5. Congress should establish a program to identify and provide for the remediation of abandoned oilfield waste facilities that are posing a threat to human health and the environment. Several states have "plugging and abandonment" funds which can be used for the plugging of improperly abandoned wells. However, in many cases the funds are inadequate because the funding mechanism in insufficient, or because the state legislature has "raided" the fund to cover budget shortfalls elsewhere in government. Similar programs may not be available for abandoned pits or radioactive waste sites.

6. Netting for pits and enclosed tanks should be required to

protect wildlife from exposure to oilfield wastes. The U.S. Fish and Wildlife Service estimates that the cost of netting the average-sized pit is approximately $60. Some states have adopted pit-netting requirements, but those rules do not necessarily apply to all pits, only those that are greater than a certain size.

7. The states should be required to upgrade their existing oilfield waste programs to meet the federal minimum standards as a condition of federal authorization to implement and enforce a RCRA program for oil and gas wastes. The federal government and citizens should retain a vigorous oversight and enforcement role.

I appreciate the opportunity to appear before you and present this testimony and supporting documentation. The National Audubon Society and other members of the National Citizens' Network stand ready to assist the subcommittee in its further deliberations on the need for a federal oil and gas waste program under RCRA.

EXHIBIT A

NCNOGW MEMBERS AND SUPPORTERS
As of September 2, 1991

MEMBERS

ORGANIZATION/INDIVIDUAL	CITY	STATE
Alaska Center for the Environment	Anchorage	AK
Alaska Society of American Forestdwellers	Point Baker	AK
Alaska Survival	Talkeena	AK
Ambler, Marjane	Yellowstone	WY
AuSable Conservation Trust	Grayling	MI
Bryce, Robert	Austin	TX
Cahaba River Society	Birmingham	AL
Citizens Clearinghouse for Hazardous Wastes/Appalachia Office	Floyd	VA
Cedar Hill Clean Water Coalition	Aztec	NM
Citizens for Alternatives to Chemical Contamination	Lake	MI
Clark, H.C.	Houston	TX
Cochtaw Bit and Tool Company	Waynesboro	MS
Concerned Citizens Against Injection Wells	Gregory	MI
Concerned Citizens of Cenla, Inc.	Libuse	LA
Cook Inlet Vigil	Homer	AK
Dickenson County Citizens Committee	Clincho	VA
Environmental Research Foundation	Washington	DC
Friends Insist Stop Toxics	Huffman	TX
Friends of Cache Creek; Citizens Concerned About Injection Wells	Woodland	CA
Four Corners Action Coalition	Aztec	NM
Great Lakes Indian Fish & Wildlife Commission	Odanah	WI
Greenpeace-Alaska	Anchorage	AK
Greenpeace-USA/Alaska	Anchorage	AK
Harris, Julie Schwam	New Orleans	LA
Help Our Polluted Environment	Crowley	LA
Hottell, Jake and Sharon	Aztec	NM
Kentucky Resources Council	Frankfurt	KY
Kessler, Stephanie	Lander	WY
Land and Water Fund of the Rockies	Boulder	CO
Lennett, David	Litchfield	ME
Lowerre, Henry & Kelly, P.C.	Austin	TX
Malek-Wiley, Darryl	New Orleans	LA
Michigan Environmental Council	Lansing	MI
Mineral Policy Center	Washington	DC
Montana Environmental Information Center	Helena	MT
National Aubudon Society/Alaska-Hawaii Ch.	Anchorage	AK
National Aubudon Society/ Juniata Valley Chapter	Altoona	PA
National Aubudon Society/Mobile Bay Chapter	Mobile	AL
National Aubudon Society/National Office	Washington	DC
National Aubudon Society/Pennsylvania Chap.	Holidaysburg	PA
National Aubudon Society/Southwest Region	Austin	TX

National Parks and Conservation Association/Alaska Office	Anchorage	AK
National Toxic Campaign Fund	Boston	MA
Native Americans for a Clean Environment	Tahlequah	OK
Ohio Environmental Council	Columbus	OH
Ohioans for Safe Water	Cleveland	OH
Perry (OH) Area Neighborhood Association	Perry	OH
Powder River Basin Resource Council	Sheridan	WY
Public Awareness Committee for the Environment	Kenai	AK
San Juan Citizens Alliance	Durango	CO
Saunders, Patti	Anchorage	AK
Sierra Club-Houston Chapter	Houston	TX
Sierra Club-No. Florida Chapter	Gulf Breeze	FL
Sierra Club-Pennsy. Chapter	W. Brownville	PA
Southern Environmental Law Clinic	Charlottesville	PA
Southwest Research and Information Center	Albuquerque	NM
Street Welding and Machine Shop	Laurel	MS
Subra Company	New Iberia	LA
Temple, Pati and David	Durango	CO
Texas Center for Policy Studies	Austin	TX
Trustees for Alaska	Anchorage	AK
Tulane University Environmental Law Clinic	New Orleans	LA
Young Leadership Conference	New Orleans	LA
Water Information Network	Albuquerque	NM
Western Colorado Congress	Montrose	CO
Western North Carolina Alliance	Asheville	NC
Weston, Carl	Durango	CO
Wind River Environmental Quality Commission (Arapahoe and Shoshone Tribes)	Ft. Washakie	WY
Women for a Better Louisiana	Metairie	LA
Wyoming Outdoor Council	Lander	WY

SUPPORTERS

American Cancer Society/Terrebonne Parish Unit Coalition for the Environment	Houma	LA
Ascension Parish Residents Against Toxic Pollution	Geismer	LA
Bird Rehabilitation	Midland	TX
Cankton Cleaners of Land and Water	Carencro	LA
Cedar Grove Community Group	Belle Chasse	LA
Clean Water Action-National Office	Washington	DC
Concerned Citizens Committee of Sweetlake	Lake Charles	LA
Concerned Citizens of Avoyelles	Simmesport	LA
Concerned Citizens of Cameron	Lake Charles	LA
Concerned Citizens of Cenla	Alexandria	LA
Crush, Verna	Wheatland	WY
Dakota Resource Council	Dickenson	ND
Delta Greens	New Orleans	LA
Environmental Action	Washington	DC
Environmental and Occupational Medical Research Institute	Lafayette	LA
Environmental Defense Fund	Washington	DC
Ferriz, Barbara	Aztec	NM

Fontenot, Willie	Baton Rouge	LA
Frankland, Peggy (CLEAN)	Sulphur	LA
Friends of the Earth	Washington	DC
Greater Restrictions On Waste (GROW)	Maringouin	LA
Hewitt, Bill and Amaryllis	Aztec	NM
Iberia Parish Citizens Recycling Committee	New Iberia	LA
League of Women Voters of Lafayette	Lafayette	LA
League of Women Voters of Louisiana	Baton Rouge	LA
League of Women Voters of the United States	Washington	DC
Louisiana Environmental Action Network	Baton Rouge	LA
Louisiana Labor-Neighbor Alliance	Baton Rouge	LA
Louisiana Workers Against Toxic Chemical Hazards (LA WATCH)	New Orleans	LA
Maloney, Ken	Morgan City	LA
Mennonite Central Committee	Washington	DC
National Aubudon Society/Jayhawk Chapter	Baldwin	KS
National Aubudon Society/Manhattan Chapter	Manhattan	KS
National Aubudon Society/ Northern Flint Hills Chapter	Warmengo	KS
National Aubudon Society/Oklahoma Aubudon Council	Rush Springs	OK
National Council of Churches	Washington	DC
Natural Resources Defense Council, Inc.	New York	NY
New Mexico Environmental Law Center	Santa Fe	NM
People Organized to Win Environmental Rights	Highlands	TX
Protecting Environmental and Ecological Resources (PEER)	Buras	LA
Save Our Homes and Land	Lafayette	LA
Sierra Club-National Office	Washington	DC
Sierra Club-Oklahoma Chapter	Norman	OK
South Louisiana Against Pollution	Morgan City	LA
Southern Research and Development Corp.	New Iberia	LA
SouthWest Organizing Project	Albuquerque	NM
St. Bernard Citizens for Environmental Quality	Chalmette	LA
St. John Citizens for Environmental Justice	LaPlace	LA
Street, Clark and Winston	Laurel	MS
Swingle, Jerry	Durango	CO
Texans United	Houston	TX
United Methodist Board of Church and Society	Washington	DC
US PIRG	Washington	DC
Vermilion Association for the Protection of the Environment	Kaplan	LA
Young, Linda	Odessa	TX
War on Waste (Dr. Arthur White)	Breaux Bridge	LA
Western Organization of Resource Councils	Washington	DC

DRAFT EPA STAFF REGULATORY DETERMINATION, CIRCA JUNE 1988 (NOT ADOPTED)

EXHIBIT B

ENVIRONMENTAL PROTECTION AGENCY

Regulatory Determination for Oil and Gas and Geothermal Exploration, Development and Production Wastes

ACTION: Regulatory Determination

SUMMARY: This is the regulatory determination required by Section 3001 (b) (2) (B) of the Resource, Conservation and Recovery Act (RCRA) for drilling fluids, produced waters, and other wastes associated with the exploration, development, or production of crude oil or natural gas or geothermal energy. RCRA requires the Administrator to determine whether to promulgate regulations under Subtitle C of the Act for these wastes or determine that such regulations are unwarranted. In making this determination, the Administrator is required to utilize information developed and accumulated by the Agency pursuant to a study required under Section 8002 (m). The Agency completed this study and published its results in a Report to Congress entitled "Management of Wastes from the Exploration, Development, and Production of Crude Oil, Natural Gas, and Geothermal Energy," dated December 1987.

In accordance with the requirements of Section 3001 (b) (2) (B) of RCRA and utilizing the information developed and accumulated pursuant to Section 8002 (m), the Agency has determined that regulation under RCRA Subtitle C of large-volume wastes generated by the exploration, development, and production of crude oil and natural gas is not warranted at this time. These large-volume materials are waste drilling fluids, cuttings, rigwash, and produced water.

The Agency has also determined, however, that regulation under RCRA Subtitle C is warranted for previously exempt low-volume, often relatively high-toxicity associated wastes generated by the exploration, development, and production of crude oil and natural gas. These associated wastes include any crude oil or natural gas field wastes, other than

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the large-volume wastes explicitly noted above, which meet listing descriptions, or which the generator, based on knowledge of the waste, declares to be hazardous.

EPA has further determined that regulation under RCRA Subtitle C of large-volume wastes generated by the exploration and development of geothermal energy resources is not warranted. These large-volume wastes are drilling fluid, rigwash, and cuttings. The Agency has also determined that regulation under RCRA Subtitle C of two wastes uniquely related to geothermal energy production, specifically geothermal energy production fluids and hydrogen sulfide abatement sludges, is not warranted as well.

The Agency has also determined that regulation under RCRA Subtitle C is warranted for previously exempt low-volume, often relatively high-toxicity associated wastes generated by the geothermal energy industry. These associated wastes include any geothermal energy wastes, other than the large-volume wastes explicitly noted above, which meet listing descriptions, or which the generator, based on knowledge of the waste, declares to be hazardous.

Section 3001(b)(2) of RCRA temporarily exempted crude oil, natural gas, and geothermal energy wastes from RCRA Subtitle C regulation pending EPA's Report to Congress and this Regulatory Determination. That section also states that EPA must submit any proposed RCRA Subtitle C regulations to Congress, and that such regulations shall take effect only when authorized by an Act of Congress. Therefore, in accordance with Section 3001(b)(2) and this Regulatory Determination, EPA will draft a proposed regulation, to be submitted to Congress for authorization, which will subject associated wastes generated by the crude oil, natural gas or geothermal energy industries to provisions of RCRA Subtitle C.

EPA is concerned about actual and potential problems associated with some management practices used by the crude oil and natural gas industry, such as landspreading of high chloride drilling waste and trenching of reserve pits. The Agency thus plans to revise regulations under RCRA Subtitle D to address the management of large-volume wastes generated during oil and natural gas operations. This effort will include development of revised regulations under RCRA Subtitle D for the management of these

called for increased use of more advanced technologies to control crude oil and natural gas wastes. Those who disagreed with this conclusion felt that existing technologies are inadequate, and that many new technologies are available but seldom used. A few State regulatory agencies called for increased technical assistance and guidance from EPA.

EPA Response: The Agency continues to believe that there are very few techniques that are not in use under some conditions; however, there is a need to disseminate knowledge of improved methods nationwide. States and the industry should continue to develop, refine, and encourage the implementation of new and improved waste management techniques.

Conclusion from Report to Congress:

3. Increased segregation of waste may help improve management of oil and gas wastes.

Public Comments: Many commenters were strongly opposed to the proposal for segregation of wastes, and believed that the scope of the exemption in RCRA section 3001 should be construed to include, and should be maintained for, all associated wastes (i.e., lower volume, potentially higher toxicity wastes) in addition to the currently exempt large-volume wastes. Many commenters stated that mixing various wastes with produced water prior to injection is environmentally safe and economically beneficial.

Other commenters stated that each waste stream generated by the crude oil and natural gas industry should be tested separately to determine its RCRA characteristics, and that wastes determined to be hazardous according to RCRA definitions should remain segregated and be disposed of according to RCRA regulations. Some individuals stated that many hazardous wastes generated by the crude oil and natural gas industry are commingled with nonhazardous wastes prior to landspreading or injection, causing significant environmental damage.

EPA Response: The Agency believes that the mixing of hazardous waste with nonhazardous waste prior to disposal is an undesirable practice. The Agency believes waste segregation is technically and economically feasible and environmentally desirable.

Conclusion from Report to Congress:

4. Stripper operations constitute a special subcategory of the oil and gas industry.

Public Comments: Many commenters strongly agreed with this conclusion, stating that new or additional Federal regulations would be financially harmful to already economically ailing stripper well operators. Other commenters were of the opinion that some stripper wells can cause significant environmental damage, which must ultimately be paid for through general taxes. Some commenters urged that stripper operations should be treated in the same manner as the rest of the crude oil and natural gas industry.

EPA Response: The Agency recognizes that stripper operations are vulnerable to economic and regulatory burdens and thus will make provisions for strippers in tailoring RCRA Subtitle D regulations for large volume wastes generated by the stripper industry. The Agency believes, however, that because the associated wastes generated by stripper operations are the same as those generated by the rest of the industry, RCRA Subtitle C regulations must apply to all associated wastes equally.

Conclusion from Report to Congress:

5. Documented damage cases and quantitative modeling results indicate that when managed in accordance with State and Federal requirements, exempted oil and gas wastes rarely pose significant threats to human health and the environment.

Public Comments: Opinion on this conclusion was sharply divided. Some commenters strongly agreed, saying that State regulations are fully adequate to control crude oil and natural gas operations, and challenging the validity of a few selected damage cases. Others strongly opposed this conclusion, saying that State and Federal regulations are inadequate and seldom enforced. A number of commenters stated that many documented damage cases were omitted from the final Report to Congress. Some commenters provided studies and analytical data alleging environmental damage from crude oil and natural gas wastes; others stated that the risk modeling conducted for the report underestimated damage to the environment and did not adequately characterize the significance of human health risks from crude oil and natural gas wastes.

D. Determination of the Scope of the Original RCRA Exemption

The Agency believes that based on the language of RCRA section 3001(b)(2)(A) of the 1980 amendments to RCRA, review of the statute, and supporting legislative history, the following wastes were included in the temporary exemption set forth in the statute.

Large-volume wastes:

- Produced water;
- Drilling fluids;
- Rigwash;
- Drilling fluids from offshore operations disposed of onshore;
- Drill cuttings;
- Geothermal production fluids; and
- Hydrogen sulfide abatement wastes from geothermal energy production.

Associated wastes:

- Well completion, treatment, and stimulation fluids;
- Basic sediment and water and other tank bottoms from storage facilities that hold product and exempt waste;
- Accumulated materials such as hydrocarbons, solids, sand, and emulsion from production separators, fluid treating vessels, and production impoundments;
- Pit sludges and contaminated bottoms from storage or disposal of exempt wastes;
- Workover wastes;
- Gas plant dehydration wastes, including glycol-based compounds, glycol filters, filter media, backwash, and molecular sieves;
- Gas plant sweetening wastes for sulfur removal, including amines, amine filters, amine filter media, backwash, precipitated amine sludge, iron sponge, and hydrogen sulfide scrubber liquid and sludge;
- Cooling tower blowdown;

- Spent filters, filter media, and backwash (assuming the filter itself is not hazardous and the residue in it is from an exempt waste stream);
- Packing fluids;
- Produced sand;
- Pipe scale, hydrocarbon solids, hydrates, and other deposits removed from piping and equipment prior to transportation;
- Hydrocarbon-bearing soil;
- Pigging wastes from gathering lines;
- Wastes from subsurface gas storage and retrieval, except for the nonexempt wastes listed below;
- Constituents removed from produced water before it is injected or otherwise disposed of;
- Liquid hydrocarbons removed from the production stream but not from oil refining;
- Gases removed from the production stream, such as hydrogen sulfide and carbon dioxide, and volatilized hydrocarbons;
- Materials ejected from a producing well during the process known as blowdown;
- Waste crude oil from primary field operations and production; and
- Light organics volatilized from exempt wastes in reserve pits or impoundments or production equipment.

The Agency believes that the following wastes were not included in the original exemption:

- Unused fracturing fluids or acids;
- Gas plant cooling tower cleaning wastes;
- Painting wastes;
- Oil and gas service company wastes, including empty drums, drum rinsate, vacuum truck rinsate, sandblast media, painting wastes, spent solvents, spilled chemicals, and waste acids;

- Refinery wastes;
- Liquid and solid wastes generated by crude oil and tank bottom reclaimers;
- Used equipment lubrication oils;
- Waste compressor oil, filters, and blowdown;
- Used hydraulic fluids;
- Waste solvents;
- Waste in transportation pipeline-related pits;
- Caustic or acid cleaners;
- Boiler cleaning wastes;
- Boiler refractory bricks;
- Boiler scrubber fluids, sludges, and ash;
- Incinerator ash;
- Laboratory wastes;
- Sanitary wastes;
- Pesticide wastes;
- Radioactive tracer wastes;
- Drums, insulation, and miscellaneous solids; and
- Anything else not included in the list of exempt wastes.

The Agency has determined that produced water injected for enhanced recovery is not a waste for purposes of RCRA regulation and therefore is not subject to control under RCRA Subtitle C or RCRA Subtitle D. However, if the produced water is stored in surface impoundments prior to injection, it may be subject to RCRA Subtitle D regulations. Produced water used in enhanced recovery is beneficially recycled and is an integral part of some crude oil and natural gas production processes. Produced water injected in this manner is already regulated by the Underground Injection Control program under the Safe Drinking Water Act.

II. Criteria for Regulatory Determination

EPA has concluded that the criteria for determining whether to regulate oil, gas, and geothermal energy wastes under RCRA Subtitle C should include not just the impact of these wastes on human health and the environment, but also the other factors that section 8002(m) required EPA to study. The basis of this conclusion is the language of section 3001(b)(2)(B), which states that in making the regulatory determination, the Agency must "utilize the information developed or accumulated pursuant to the study required under Section 8002 (m)." Clearly, Congress envisioned that the determination would be based on all factors specifically enumerated in section 8002(m), as well as the general issues raised by the text of section 8002(m) as a whole.

EPA has concluded from its review of section 8002(m) and its legislative history that Congress intended certain factors to have particular importance in making the Subtitle C regulatory determination.

First, Congress instructed EPA to study the potential dangers to human health and the environment from oil, gas, and geothermal energy wastes, indicating that the decision whether to regulate under RCRA Subtitle C must be based primarily on such considerations. Second, Congress expected EPA to study the industry's disposal practices and efforts to prevent or mitigate adverse effects. Third, Congress instructed EPA to include in its study of these issues an analysis of the costs of various alternative methods for managing these wastes, as well as the impact of those alternatives on the exploration for, and development and production of, crude oil and natural gas or geothermal energy. Therefore, EPA must consider both the cost and impact of any RCRA Subtitle C regulations in deciding whether they are warranted. Finally, EPA was also directed to study the adequacy of means and measures currently employed by government agencies for the purpose of mitigating adverse effects, and to review the actions of other Federal agencies that deal with oil, gas, and geothermal energy wastes "with a view toward avoiding duplication of effort." From these provisions, EPA concludes that Congress believed RCRA Subtitle C regulation might not be necessary if other Federal or State programs adequately control health and environmental risks associated with oil, gas, or geothermal energy wastes.

IV. Regulatory Determination for Crude Oil and Natural Gas Wastes

A. *Hazard Assessment for Large-Volume and Associated Crude Oil and Natural Gas Wastes*

1. Large-Volume Wastes (Produced water, drilling mud, drill cuttings, rigwash).

Further analysis of field data collected by EPA and presented in the January 1987 technical report shows that a significant portion of the large-volume wastes contain constituents of concern considerably above EPA health- or environmental-based standards. For example, large-volume wastes at 7 percent of the statistically weighted sample sites generating drilling fluids and 23 percent of the statistically weighted sample sites generating produced water contain one or more of the constituents of concern at levels greater than 100 times the health-based standards, and 4 percent of the statistically weighted sample sites generating drilling fluids exceed the health-based standards by 1,000 times. The constituents typically exceeding the standards in drilling fluids are fluoride, lead, cadmium, and chromium. The constituents exceeding the standards in produced water are benzene, arsenic, barium, and boron. Large-volume wastes at 78 percent of the statistically weighted sample sites generating drilling fluids and 75 percent of the statistically weighted sample sites generating produced water contain chlorides at levels greater than 1,000 times the EPA secondary maximum contaminant level for chloride.

However, health and environmental risks from these large-volume wastes are relatively low because existing State and Federal regulatory programs, for the most part, effectively control their disposal. Therefore, because of these existing regulatory programs, the extremely large volumes of these wastes, and the fact that produced water is most effectively handled as nonhazardous waste (the principle constituent in produced water that causes acute damage is chlorides which is not a traditional "hazardous" constituent), the Agency maintains that Subtitle C regulations are both unnecessary and impractical for these large-volume wastes. Damages may occur where States do not adequately regulate crude oil, natural gas, and geothermal energy wastes, and where States have appropriate regulations but where compliance and adequate State enforcement are lacking. These concerns can be addressed through the development of improved State and

Federal regulations. However, the Agency believes that significant noncompliance in specific geographic regions can best be addressed through Federal enforcement authority.

As stated in the Report to Congress, the volume of waste drilling fluids, cuttings, and produced waters is very high. For 1985, it was estimated that 361 million barrels of waste drilling fluids and cuttings were generated at 69,734 drilling sites, and 20.9 billion barrels of produced water were generated from 800,000 production sites. (This number includes produced water used for enhanced recovery.) In contrast, RCRA Subtitle C is currently applied to approximately 56,000 generators of hazardous waste, 12,500 transporters, and 4,800 treatment, storage, and disposal facilities (TSDFs) nationwide. Approximately 1.7 billion barrels of RCRA hazardous waste are generated by these facilities annually.

2. Associated Wastes

According to American Petroleum Institute survey estimates, about 10.6 million barrels (1.7 million metric tons) of exempt associated waste were generated onshore in 1985. Of this total, just over one-third (560,000 metric tons) was reportedly disposed of more or less directly on or in the land via roadspreading, landspreading, and onsite pits, or by burial. An additional 55 percent (almost 1 million metric tons) was transported offsite for centralized treatment and/or disposal at commercial waste management sites. Depending on waste types and local conditions, these centralized commercial facilities may use a variety of approaches, including waste storage, chemical or physical treatment, crude oil or other material recovery, landfarming, landfilling, NPDES wastewater discharge, and/or deep injection of aqueous wastes in Class II injection wells.

These wastes may typically be stored in barrels and drums, tanks, or open surface pits at various handling points. State regulations regarding storage, handling, and other management practices, vary considerably. Although the NPDES and UIC programs do provide Federal regulatory coverage over the disposal of treated or untreated aqueous effluent to surface water or deep well destinations, it is clear that the authority and jurisdictions of these Agency programs are quite limited with respect to these associated wastes. For example, these programs would not apply to either the almost 40 percent

(600,000 metric tons) of associated wastes that are generated as solids or to the majority of current disposal practices now in use. Furthermore, there are at present no Federal regulations under RCRA or any other EPA program governing storage at generating sites or commercial waste handling sites. There are also no EPA regulations governing the transportation of these waste streams.

On the basis of available data, it is not possible to estimate precisely how much currently exempt associated waste would be considered hazardous under current or proposed RCRA standards. However, these available data indicate that for all 11 different associated waste types evaluated, at least some portion of each type would be considered hazardous by current or proposed RCRA standards. Although exceedances of health-based standards in the data are not always large, the Agency has observed many instances in which exceedances in the sample data equal several orders of magnitude. It also appears that some samples of most waste types would "pass" current or proposed RCRA standards. Based on available information, the Agency's initial estimate is that possibly 40 to 60 percent of these wastes (660,000 to 990,000 tons per year) could be potentially hazardous under existing standards.

At the same time, it must be noted that existing extraction test procedures do not necessarily provide accurate leachate test results for oily wastes; as a result, some of these wastes might not be effectively brought under the RCRA Subtitle C system until or unless new rules are implemented. Changes in currently proposed toxic characteristic standards or the introduction of new standards in the future would be likely to increase the proportion of waste testing as hazardous under RCRA Subtitle C criteria.

Many associated wastes contain constituents that are similar in chemical composition and/or toxicity to other wastes currently regulated under RCRA Subtitle C. Some examples are given below.

a. Tank Bottoms.[5] Tank bottoms generated from crude oil storage and oil/water separation in the oil field may contain high concentrations of RCRA hazardous constituents such as

5 U.S. EPA. 1988. Office of Solid Waste. Best Demonstrated Available Technology (BDAT) Background Document for Petroleum Refining Treatability Group.

lead, chromium, benzene, benzopyrene, and chrysene. These contaminants are inherently found in varying concentrations in the raw crude oil. Tank bottoms generated from the oil field can be similar, if not identical, to RCRA-regulated API separator sludge (listed as K051 under RCRA).

The raw crude oil received by refineries, typically via pipelines or tank trucks, contains varying amounts of water, heavy sludges, and solids. These heavy sludges and solids, or API separator sludge, are virtually identical to the currently exempted tank bottoms generated by oil field production activities. Sludges generated in the initial refinery separation process, before any chemical additives are introduced[6], are proposed for listing as hazardous waste in 53 FR 12164, April 13, 1988.

The primary oil/water/solids separation process performed in a refinery usually consists of gravity separation and skimming, similar to the separation process performed in the oil field. According to the Agency, "the primary treatment sludges are intended to be subject to [RCRA] listing, even if they are generated in a ditch carrying the raw wastewater to the first oil/water/solids separator."[7] Primary treatment sludges from refineries contain the following average levels of hazardous contaminants in units of mg/kg, dry weight basis:[8] lead (300), chromium (400), benzene (34), benzopyrene (12), and chrysene (34). The sole source of these particular contaminants is raw crude oil. Maximum levels of benzene identified during EPA's field sampling for the Report to Congress ranged from 98 mg/kg in central treatment tank bottoms to 129 mg/kg for production site tank bottoms.

Thus, crude oil tank bottoms generated at primary field operations during the exploration for and production of crude oil are chemically similar to crude oil tank bottoms and sludges generated at refineries, which are proposed for listing under RCRA as hazardous wastes.

b. Workover Wastes. Workover fluids are used during remedial operations on producing and injection wells. Workover fluids can include crude oil, produced water, weighted

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6 Additives such as tetraethyl lead and detergents are not added in the refining process until the product is ready for distribution.

7 53 FR 12164, April 13, 1988.

8 Ibid., page 12164.

water, and water-based and oil-based muds. Workover objectives include well pulling, stimulation, washout, reperforating, reconditioning, gravel packing, casing repair, and completion operations. While performing a workover, typically production piping or tubing is pulled out of a well, sometimes as often as a few times per year. The pipe sections are laid horizontally on a rack where they are hydrostatically pressure tested with water. The water used for this testing is often produced water. The runoff from the hydrostatic testing, which contains the same contaminants found in produced water, may be discharged to the nearby soil. If the production casing or the bottom hole pump contains paraffin or sludge buildup, solvents such as methylene chloride, naptha, or trichloroethylene may be used to dissolve and remove the paraffin and sludges. This solvent rinsate may be discharged to the nearby land surface. When methylene chloride and trichloroethylene (listed as F002 under RCRA) are generated by nonexempt industries, they are regulated as RCRA hazardous wastes. In addition, naptha is a RCRA-regulated hazardous waste because of the ignitability characteristic.

Corrosion inhibitor fluids, which may be placed in the annulus to prevent corrosion of production tubing, are often brought to the surface and discharged during workover operations. The chemical composition of corrosion inhibitors varies; however, the inhibitors typically contain naptha, phenols, and isobutyl alcohols, all of which are RCRA hazardous wastes when generated by nonexempt industries. Additionally, various chromium compounds are often used as corrosion inhibitors.

c. Completion Fluid Wastes. Various solvents and corrosion inhibitors may be added to the well as a pre-flush prior to injection of stimulation fluids during the initial completion of a well. Stimulation acidizing fluids, used to increase the permeability of the oil-producing zone, often consist of a mixture of 15 to 28 percent hydrochloric acid and 6 to 8 percent hydrofluoric acid. The fluid mixture that contains the solvents, corrosion inhibitors, and acids is brought back to the surface in order to initiate the flow of oil. The solvents and corrosion inhibitors have flash points of between 50 and 80°F, and are thus considered RCRA hazardous because of ignitability (EPA hazardous waste No. D001) in nonexempt industries. The hydrochloric and/or hydrofluoric acid has a pH below 2, which meets the RCRA hazardous characteristic for corrosivity (EPA hazardous waste No. D002) in

nonexempt industries. Although some of this acid mixture is neutralized while it is downhole, mixtures of hydrofluoric and hydrochloric acid are difficult to neutralize because of the extremely low pH that results from this mixing. Therefore, much of this acid may not be neutralized while downhole, and when brought uphole, is present as a waste.

d. Dehydration and Sweetening Wastes from Natural Gas Plants. Dehydration is the process of removing formation water from natural gas. Sweetening is the term used for removing sulfur compounds, primarily hydrogen sulfide, from natural gas. Both dehydration and sweetening processes may occur at gas processing plants; at large, central, or multilease field facilities; or at small individual leases or tank battery facilities.

Molecular sieves are typically alkali metal aluminosilicates that are used to absorb water and remove hydrogen sulfide from natural gas. When molecular sieve is no longer able to absorb contaminants, it is disposed of as a nonregulated waste in many States. Depending on the composition of the raw natural gas, arsenic can be found in waste molecular sieve because of its affinity to absorb arsenic. Arsenic is a commonly occurring constituent of hydrocarbon production in some areas of the country. Additionally, hydrogen sulfide-contaminated water is found in waste molecular sieve. Hydrogen sulfide and arsenic and its compounds are listed as hazardous constituents in Appendix VIII, 40 CFR 261;[9] in addition, arsenic is regulated as a RCRA extraction procedure (EP) toxicity contaminant, which is regulated as a RCRA hazardous waste in nonexempt industries.

Organic liquids, such as dialkylaniline, mono-, di-, and triethanolamine, and methyldiethanolamine, are used for absorption of acid gases, such as carbon dioxide and hydrogen sulfide, found in natural gas. These waste organic liquids, when saturated by hydrogen sulfide, are often commingled with produced water and disposed of via underground injection.

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9 Appendix VIII is a list of compounds that the Agency has identified as hazardous and which may be used as a basis for listing wastes as hazardous. (See criteria for listing hazardous waste at 40 CFR 261.11.)

Iron sponge is a material commonly used in natural gas plants to remove hydrogen sulfide from natural gas. Iron sponge, which is less expensive to use than amine-based sulfur removal systems, is made of ferric oxide-impregnated wood chips. Hydrogen sulfide from natural gas is converted to ferric sulfide on the wood chip. In the presence of air, some spent iron sponge spontaneously combusts and thus exhibits the RCRA hazardous characteristics of reactivity (EPA hazardous waste No. D003) and ignitability (EPA hazardous waste No. D001). Additionally, in the presence of an acidic environment, spent iron sponge emits hydrogen sulfide gas, which may render it a reactive hazardous waste (EPA hazardous waste No. D003). Currently, some natural gas plants have constructed treatment facilities to manage spent iron sponge. More often, however, spent iron sponge is buried onsite or landfilled or landfarmed as a nonregulated waste in many States.

e. Cooling Tower Blowdown. Cooling towers, which are commonly present at natural gas plants, must be drained periodically in order to prevent blockages from scaling and damage from corrosion. The fluids in a typical cooling tower are primarily water, with various additives such as ethylene glycol, corrosion inhibitors, antiscaling compounds, biocides, and oxygen scavengers. Depending on the chemical composition of these additives, cooling tower blowdown may contain RCRA toxic concentrations of chromium. When generated by a non-exempt industry, cooling tower blowdown containing toxic concentrations of heavy metals must be managed as a RCRA hazardous waste.

f. Spent Filters. Charcoal filters are used in gas plants to filter chlorinated and nonchlorinated hydrocarbon contaminants from natural gas. The chlorinated hydrocarbon contaminants that are trapped in charcoal filters may include hazardous spent solvents such as trichloroethylene (EPA hazardous waste No. F002) and carbon tetrachloride (EPA hazardous waste No. F001). The nonhalogenated contaminants may include phenol and napthalene (Appendix VIII hazardous constituents), as well as benzene and toluene (EPA hazardous waste No. F005). When filters containing hazardous constituents are generated by a non-exempt industry, the filters must be treated as a RCRA hazardous waste.

g. Pigging and Hydrostatic Testing Wastes. A pig is a mechanical device used to clean natural gas and oil pipelines. These pipelines, including both gathering lines and

production lines, are periodically cleaned with a pig before being hydrostatically tested for leaks. (Gathering lines are within the temporary exemption; production lines are outside of the temporary exemption.) Additionally, pigging is used to remove buildup of paraffin, scale, and sludge, which can cause pipeline blockages. A number of RCRA listed hazardous wastes can be present in pipeline scale and sludges. The sludges usually contain contaminants similar to those found in tank bottoms. Some solvents may also be used to aid in the removal of scale and sludges.

Produced water is often used for hydrostatic testing during the pigging process. RCRA listed wastes generated from pigging and hydrostatic testing operations can include napthalene (Appendix VIII hazardous constituent), benzene and toluene (listed under RCRA as F005), and xylene (listed under RCRA as F003).[10] The pigging wastes are often buried in unlined pits near where the pig is removed from the pipeline. Hydrostatic test waters are either discharged into evaporation/percolation pits or disposed of in Class II underground injection wells.

B. Economic Impact Analysis

1. Large-Volume Wastes

Application of RCRA Subtitle C to large-volume exploration, development, and production wastes could be extremely costly if large portions of these wastes were hazardous. The Agency estimates that implementation of RCRA Subtitle C on 10 to 70 percent of these wastes would cost the industry and consumers $1 billion to $6.7 billion per year in compliance costs (not including costs for prospective land ban or corrective action regulations mandated by Congress). This would reduce domestic production by as much as 12 percent.[11] Even if only a small portion of all wastes

10 Eicemen, Gary Alan. Hazardous Organic Wastes from Natural Gas Products Processing and Distribution: Environmental Fates. Technical Completion Report Project No. 1345630. New Mexico Water Resources Research Institute. New Mexico State University. Las Cruces, New Mexico. 1987.

11 These numbers were developed for the Report to Congress. At that time, the Agency was defining produced water used for enhanced recovery as a waste. The Agency has since determined that produced water injected (but not stored) for enhanced recovery is not a waste and is not subject to regulation under RCRA. Approximately 59 percent of all produced water is used for enhanced recovery. Excluding produced water used for enhanced recovery as a waste would decrease cost and subsequent impact projections resulting from regulation under RCRA Subtitle C by approximately fifty percent.