

The *NORM* Report

Naturally Occurring Radioactive Material Contamination WINTER 1997

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Regulations for the Control of NORM - Update

The status of regulations for the control of NORM is summarized below for all 50 states. Since NORM contamination is not limited to the petroleum industry, some of the non-petroleum states are also drafting or preparing to draft NORM regulations to control NORM in other industries, e.g., mineral extraction and phosphates. The status of NORM regulations in the federal government as well as in Canada is also summarized below. Each regulatory agency was contacted during February.

The last states to enact NORM regulations were New Mexico and South Carolina. Their regulations were summarized in the Summer 1995 issue of **The NORM Report**. Louisiana, Mississippi, Arkansas, Texas and Georgia have previously enacted regulations for the control of NORM. Oregon enacted regulations in January 1990. Although the Oregon regulations were specifically written for control of NORM in zircon sand, the Oregon regulations do apply to all NORM contamination in the state. The Oregon regulations were summarized in the Winter 1996 issue of **The NORM Report**.

There currently are no federal regulations specifically for the control of NORM.

Enactment of regulations specifically for the control of NORM will require compliance by industries and companies with NORM contamination and NORM waste materials. Companies should also be in compliance with state general regulations for the control of radiation and the OSHA radiation regulations.

Summaries of the status of NORM regulation in all 50 states, the federal government and Canada follow:

ALABAMA

Alabama is waiting for the CRCPD recommendations for the control of NORM before finalizing their redraft of Alabama's proposed NORM regulations. There is no timetable for the regulations to be adopted. There has been some interest in plugging and abandoning wells, but there have been no requests for NORM regulations from industry.

ALASKA

Alaska intends to use the CRCPD recommendations as enacted by

other states as a basis for their regulations. A paralegal working with health physicists has been assigned to draft the regulations. The draft will then be available for comments. The regulations do not have to be approved by the state legislature, but the legislature has to approve the collection of fees to support the program.

ARIZONA

All radioactive materials, which would include NORM, are

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ARIZONA (continued) addressed in Arizona's general radiation regulations. At present, NORM is not specifically addressed, but consideration is being given to enacting NORM regulations at a later date, possibly late in 1997.

ARKANSAS

The revisions to the Arkansas NORM regulations have been completed and certified. They will become effective as soon as they are printed and available, probably in two or three months.

The Arkansas NORM regulations constitute *Section 7* of the *Arkansas Rules and Regulations for Control of Sources of Ionizing Radiation*. The revised regulations were summarized in the last issue (Fall 96) of *The NORM Report*.

CALIFORNIA

In 1987, the California oil and gas industry conducted a statewide survey of production facilities to determine the extent of elevated levels of Naturally Occurring Radioactive Material (NORM), if any. The industry survey consisted predominantly of external gamma radiation meter readings. Of the 10,000 measurements taken, about 93 percent were at background levels. The remaining readings were above background levels, but low enough that only routine safety measures were considered necessary to minimize employee exposure and protect human health and the environment.

In 1993, California underwent a peer review of its oil and gas exploration and production waste-management regulatory programs. The review was coordinated by the Interstate Oil and Gas Compact Commission (IOGCC), in cooperation with the U.S. Environmental Protection Agency and other inter-

ested groups. One recommendation of the review team was for a thorough evaluation of the industry NORM survey data by the appropriate State agencies to verify the extent of oil and gas field NORM in California.

Subsequent to the IOGCC peer review, and following increased public and governmental interest in NORM issues, the Department of Conservation, Division of Oil, Gas, and Geothermal Resources and the Department of Health Services, Radiological Health Branch (RHB) conducted a more comprehensive survey of selected sites. This effort was in cooperation with the oil and gas industry. The sites chosen for the study were selected because they were points where NORM was expected to occur; the sites were not selected randomly.

All six oil and gas districts in the State were sampled in this study. Four hundred seventy-five radiation measurements were taken in 70 oil and gas fields. In addition to gamma radiation meter readings, 124 samples of pipe scale, produced water, tank bottoms, and soil were collected and analyzed by the Sanitation and Radiation Laboratory of the Department of Health Services to assess the actual concentrations and radionuclides present.

The results of this study indicate that NORM is not a serious problem in California oil and gas producing operations -- confirming findings in the 1987 study. Seventy-eight percent of the measurements in this study were at background levels. A few sites had elevated levels of NORM. Further study of those sites or facilities should be considered. Routine protective measures may be all that is necessary to minimize exposure to radiation in these particular areas.

Survey results and laboratory analysis of samples are reported in: *A Study of NORM Associated with Oil and Gas Production Operations in California*. The report was issued by:

Department of Health Services
Radiological Health Branch
and
Department of Conservation
Division of Oil, Gas and
Geothermal Resources

Elevated levels of NORM were found in material from some of the production facilities. The NORM was found in water filters and softeners, gas processing equipment pipe scale, and tank bottoms. However, these elevated levels were not high enough to be of immediate health concern.

Copies of the report are available from:

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A summary of the report recommendation was included in the Fall 96 issue of *The NORM Report*.

There is nothing new in the possible development of NORM regulations in California.

COLORADO

Senate Bill 97-154 has been introduced into the Colorado General Assembly. The bill, *Controlling Regulation of Radioactive Material*, is summarized below:

(Note: This summary applies to the bill as introduced and does not
(Continued on page 3)

COLORADO (continued)
necessarily reflect any amendments which may be subsequently adopted.)

Senate Bill 97-154

Modifies the definition of "low-level waste" in the Rocky Mountain Low-level Radioactive Waste Compact and implementing statutes to exclude:

- Wastes derived from mining, milling, smelting, and other processing of ore and mineral-bearing material to obtain radium, in addition to wastes derived from such activities intended to obtain other materials; and
- Naturally occurring radioactive material.

Modifies the definition of "radioactive material" for the purposes of radiation control to exclude naturally occurring radioactive material with an activity level of less than 50 picocuries per gram.

Provides that the requirement that sites for the concentration, storage, or disposal of radioactive material, and all radioactive material received at such sites, be owned by the state does not apply to the following material:

- Radioactive material with an activity level of 2,000 picocuries per gram; and
- Naturally occurring radioactive material.

Directs the Department of Public Health and Environment to impose deed restrictions, easement provisions, and financial assurance mechanisms on any non-state owned site and facility for the storage or disposal of radioactive materials.

Allows the Department of Public Health and Environment and the governing body of the county or municipality having jurisdiction to approve the disposal of naturally occurring radioactive material prior to the adoption of rules on such subject by the state board of health.

Allows the disposal of radioactive materials, materials contaminated by radioactive substances, or naturally occurring radioactive material in a solid wastes disposal site and facility only if the certificate of designation specifically allows such disposal or if the Department of Public Health and Environment and the governing body of the county or municipality having jurisdiction approves such disposal on a case-by-case basis, rather than only if the site or facility is specifically designated for that purpose.

In the litigation between Envirocare of Utah and the State of Colorado and the EPA (see the Spring 96 and Summer 96 issues of **The NORM Report** for a summary of the litigation), Envirocare lost in District Court and is now appealing.

CONNECTICUT

The Connecticut Department of Environmental Protection (DEP) has prepared a proposal to have a contractor draft proposed regulations for the control of low level radioactive wastes, including NORM and NARM. The proposal is currently undergoing review within the DEP.

DELAWARE

There are no specific regulations for NORM in Delaware. NORM, NARM and other radioactive materials are considered to be covered in the general regulations for the control of radiation enacted in 1983. A revision of the general regulations became effective

September 1, 1995. The revision tightened the compliance aspect of the regulations. NORM is considered to be covered in *Sections C and D, Radioactive Materials*, in the regulations. NORM contamination appears to be minimal in the state. Occasionally a call is received from a salvage yard or steel mill reporting that their gamma radiation monitors had detected gamma radiation above background on a load of scrap metal.

FLORIDA

The 18 month study of phosphate NORM, funded by the Florida Institute of Phosphate Research at the state's request, began in July 1996. The study's goal is to identify and evaluate the extent of occupational and public radiation exposure risks related to phosphate NORM. The Institute, located in Bartow and affiliated with the University of South Florida, selected the Polk County Public Health Unit and a private consulting firm to conduct the study as a joint project. Florida hopes the data provided by the study will provide guidance on the extent of regulator intervention needed to address phosphate NORM in the state.

In an on-going effort to improve the characterization of NORM in Florida, state personnel have been conducting informal site surveys of NORM generators. Surveys of fields located in the Panhandle and southwest part of the state remain in the planning stage.

GEORGIA

Georgia's regulations for the control of NORM became effective in October 1994. There have been no changes in the rules since. Revisions to the general rules and regulations for the control of radiation have been drafted and are expected to be adopted by the

(Continued on page 4)

GEORGIA (continued)
Board in early 1997. However, there are no changes in the NORM rules in this revision.

HAWAII
Hawaii has drafted revisions to their antiquated rules for the control of radiation. The informational phase of the proposed rules on radiation control (which includes NORM) began in February 1997. All entities who are affected by the proposal will have the opportunity to submit written comments. The rule is not expected to be in place before July, 1998.

Hawaii does not have any particular problems with NORM at this time. Although Hawaii does not have petroleum production, it does have geothermal wells on the big island. Possible NORM contamination in these geothermal wells has not been addressed.

There is also some concern about radioactivity and radiation contamination in the state's military posts and bases, including old radium gauges and instruments. Additionally, there may be some NORM associated with the dry dock activities in the state.

IDAHO
Idaho has no regulations for the control of NORM and none are planned for the near future. There has been no indication from the state legislature or anybody else concerning interest in the regulations. There are provisions in the general regulations for the control of radiation that can be used for NORM problems if the need arises.

ILLINOIS
Illinois's approach to NORM regulations is being reviewed to decide if general NORM regulations should be proposed. Or as an alternative, should rules be written to

address the NORM problems in selected industries where the potential exists for NORM contamination. No decision as to the approach to be proposed has been made yet. The Department of Nuclear Safety may go with the approach of identifying known NORM problems and writing specific rules for these problems. As new NORM problem areas are identified, new rules will be written to cover them. This approach may be preferable to generic rules which cover the whole world of NORM and results in too much unnecessary regulations without much benefit. This approach to NORM rule making is the result of reviewing the in-depth comments made on the 1994 CRCPD draft of Part N. There is no time schedule for NORM rule making in Illinois.

INDIANA
No new regulations for the control of NORM have been enacted or proposed in Indiana. There have been a few incidents involving NORM-contaminated materials in scrap yards, etc.

IOWA
At the present time Iowa has not done anything to specifically regulate NORM and has no timetable for action on rules and regulations.

There is a situation in Iowa that originally goes back to the 1950's at Ames Laboratory. The Bureau of Radiological Health recently released some land for unrestricted use, specifically for a soccer complex. A medical doctor in the area complained about the hazards of radioactive dust from the land, even though the background levels of radioactivity was essentially the same in the released land as the background radioactivity in the city itself. The 84-year old doctor is a pillar in the community, and has raised the concerns of some citi-

zens.

As of this date (2-18-97) the project is proceeding and the community should be using the soccer field this spring.

KANSAS
Regulations for the separate and specific control of NORM have not been proposed. Regulations for the control of all radioactive materials in Kansas implicitly include NORM. NORM problems that do arise are handled on a case-by-case basis taking into consideration radiation exposures to the public and workers.

Kansas regulators have been working closely with the scrap industry, but there is no indication of probable legislation concerning NORM issues.

KENTUCKY
The Kentucky Department of Environmental Protection continues to work on a satisfactory long term disposal site for NORM. In the meantime, remediation activities continue as weather and field conditions permit. Remediated materials are being stored in a temporary site pending the resolution of discussions on long term storage.

LOUISIANA
The DEQ has an application from an oil company for permission to dispose of their own NORM in an injection well. This is the first proposal for injection received by the new administration in Louisiana and it is not known what the Secretary of the DEQ will do. The issues have been outlined for him but there has been no decision yet. It is not known whether a general rule for injection will be enacted or if such requests will be decided on a case-by-case basis. If a company

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LOUISIANA (continued)

has a permit from the Department of Natural Resources and a license from the DEQ, the company could proceed with the injection of the NORM wastes. The oil company must conduct a public hearing before a license can be issued by the DEQ.

The DEQ is proposing some modifications to several chapters of the Radiation Protection Regulations, e.g., mammography, and radiography. A few suggestions have been submitted for revisions to the NORM rules, e.g., non-oil field NORM and adding a paragraph to Section 1412. Treatment, Transfer, and Disposal.

MAINE

Maine has general regulations for the control of radiation, but does not have specific NORM rules. Maine does have NORM - contaminated water treatment wastes. Many water supplies in Maine contain significant concentrations of radium and radon. Ion exchange resins used in water treatment can become "hot" with radium. Carbon filters used to remove radon from water become contaminated with the radon decay products, lead-210, bismuth-210, and polonium-210.

MARYLAND

Maryland has no specific regulations for the control of NORM. NORM is handled under the general radiation regulations. These general regulations were recently revised to bring the rules into line with 10 CFR 20 as well as making other changes deemed advisable. The revisions became effective October 9, 1995.

MASSACHUSETTS

Massachusetts does not have specific regulations for the control of NORM. NORM is a subset of

NARM and NORM is considered to be regulated in the Massachusetts general radiation regulations. The most recent revisions to the general radiation rules became effective in February 1996. NORM is not a major problem in the state.

Massachusetts has submitted a proposal to the NRC to become an Agreement State. The proposed agreement would permit Massachusetts to assume portions of the NRC's regulatory authority over certain nuclear materials. If the agreement is accepted, Massachusetts will become the 30th state to sign such an agreement with NRC.

MICHIGAN

There have been no changes in the draft of the Michigan guidance documents for the control of NORM.

Most attention at present is still focused on radium luminous products of military origin and radium contaminated warehouses. EPA has allotted over 12 million dollars toward the cleanup of the warehouses and other contaminated buildings. It is expected that after the removal of the gauges the building contamination will be small and much of the remaining debris might be able to be disposed of in a landfill under new landfill guidelines. The Michigan guidelines for disposal in a type 2 municipal solid waste landfill allow up to 50 pCi/gm radium-226 to be disposed. This can be a large cost saving. Analyses have shown that this level shows insignificant risk to the public.

The EPA superfund cleanup of the warehouses should begin at any time.

Michigan continues to find high

concentrations of NORM in pipe scale. Concentrations over 100,000 pCi/gm are commonly seen. The highest level seen has been 200,000 pCi/gm.

MINNESOTA

There has been no legislative action with regard to the disposal of radium and other NORM-type materials. Minnesota has no regulations for the specific control on NORM. The general regulations for the control of radiation are currently being revised. Specifically the revisions cover the regulations dealing with x-ray and other devices that may use NORM as a source of radiation. These revisions may be effective by the middle of 1997.

MISSISSIPPI

Responsibility for NORM in Mississippi is currently divided between the Department of Health and the Oil and Gas Board. The Oil and Gas Board has authority for NORM at the well site (effective July 1, 1995). After the petroleum leaves the well site the Department of Health has jurisdiction for any NORM contamination.

However, the Mississippi legislature has enacted legislation that gives the Oil and Gas Board jurisdiction over all oil and gas wastes. The Oil and Gas Board's NORM rules which became effective July 1, 1995 assumes jurisdiction only over NORM at the well site.

The Department of Health has asked the Attorney General for an opinion as to who will have jurisdiction for NORM in the future. This has been challenged in court by an attorney who has been very active in NORM litigation in the state. The Attorney General has stated he will not render his opinion until the court challenge is settled.

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MISSISSIPPI (continued)

It is expected that the Attorney General will find that the Oil and Gas Board has jurisdiction over all NORM associated with oil and gas production in Mississippi.

In the interim, the Department of Health continues to function. Licenses are still being processed for remediation contractors, etc. Complaints are being received by the Department of Health concerning health problems associated with exposures to NORM. However, very little is being done about the complaints since the Department of Health has been told they have no jurisdiction over NORM. The attorney for the Department of Health believes that any commercial remediation, etc. will still have to be licensed by the Department.

On August 11, 1995, the Oil and Gas Board issued a proposed **Rule 69: Control of Oil Field NORM**. The rule provides the regulations for the control of oil field NORM to ensure that radiation exposures of workers and members of the general public are negligible. The rule applies to NORM that has been derived from the exploration and production activities of oil and gas operations within Mississippi.

A public hearing on Rule 69 was to have been held in January 1996. This was postponed until March and at the request of attorneys on both sides of the issue, the hearing was again postponed until April 2-4, 1996. The changes made to the August 1995 draft were summarized in the Winter 96 issue of **The NORM Report**.

As of February 6, 1997, the Mississippi Department of Health's Part 801 Section N is still in effect. Section N is entitled *Licensing of Naturally Occurring Radioactive*

*Materials (NORM).***MISSOURI**

There are no specific NORM regulations in Missouri and none are planned at present. Occurrences of NORM problems are handled under the state's general regulations for the control of radiation.

MONTANA

There have been no new developments applicable to NORM regulations in Montana. The regulations for the control of radiation have not been revised since 1980 and NORM is not considered to be included in these general radiation regulations. The Montana Department of Health and Environmental Sciences does have the statutory authority for NORM regulations, but there is no funded program for their development.

NEBRASKA

There has been no change in the status of NORM regulations in Nebraska. The state believes NORM is included in their general rules for the control of radiation. There are no plans for specific NORM regulations at this time.

Like many other states, Nebraska receives comments and questions from recyclers. Some of these recyclers have "requested" NORM rules so they can use NORM limits, e.g., 50 $\mu\text{rem/hr}$, to know when they can refuse or accept contaminated scrap.

In another incident which illustrates the public's fear of anything radioactive, a transient broke into a storeroom and broke a 500 gram bottle of uranyl acetate. A hazmat team went in with full protective gear, respirators, etc. to clean it up. The incident was the lead story on three television stations on the five o'clock news. Some people were near panic until the authorities

were able to get on the ten o'clock news reporting there was no health hazard. It was only very low-level radiation and nothing to worry about.

NEVADA

Nevada has no specific NORM regulations and none have been proposed. Comprehensive statutes for the control of radiation address NORM and NARM similarly.

NEW HAMPSHIRE

New Hampshire considers NORM to be a subset of NARM and the state has always regulated NARM in the same manner as by-product, source, and special nuclear materials are regulated as an Agreement State. One area that may not presently be regulated and may have to be is water treatment systems. There are significant quantities of radon in New Hampshire water supplies. Some water treatment facilities actually become quite "hot". Another potential NORM problem area is the inadvertent exposure to the radiation hazards associated with construction involving granite containing uranium and thorium.

Future regulatory activities may consider the need to adopt regulations similar to the draft of Part N of the Conference of Radiation Control Program Directors, Inc. (CRCPD), and the specific NORM regulations which have been adopted by several states.

NEW JERSEY

The Bureau of Environmental Radiation continues to address the comments received on the interested party draft of N.J.A.C. 7:28-12, *Remediation Standards for Radioactive Mater*. There is no estimated schedule set for publication of the rule proposal in the New Jersey Register.

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NEW MEXICO

The New Mexico NORM regulations, *Subpart 14: Naturally Occurring Radioactive Materials (NORM) in the Oil and Gas Industry* became effective August 3, 1995.

Rule 714, Disposal and Transfer of Regulated NORM for Disposal provides the regulatory framework for the disposal options addressed in the Part 14 NORM regulations. Rule 714 became effective July 15, 1996. Rule 714 was summarized in the Summer 96 issue of **The NORM Report**.

Mexico is currently finalizing a guidance document for use with the NORM regulations.

New Mexico has received the first application for a specific license for NORM decontamination.

NEW YORK

New York State continues its gamma spectroscopy analysis of samples from oil and gas wells in the state. Samples include brines, crude oils, tank bottoms, oily sludges, sediments, soils, pipe scale, and paraffins. The results indicate relatively low levels of NORM constituents (<10 pCi/g) in a medium tested. Data processing continues and a final report will be issued in 1997.

NORTH CAROLINA

Nothing presently is being proposed on NORM regulations for North Carolina. The state recognizes that NORM is an issue that may need attention, but there are many other priorities, not the least of which is the low level waste disposal facility. North Carolina is the host state for the Southeast Compact.

The state is aware of NORM contamination within the state, particu-

larly in scrap metal yards. For the present, North Carolina is on the sidelines and is advocating a constructive relationship between the regulated community and the would-be regulations.

NORTH DAKOTA

North Dakota has just completed an IOGCC review of their handling of exploration and production wastes. They have received the draft report, and four different state agencies responded; three within the Health Department and one from the Industrial Commission.

All commented on the IOGCC initial report. The report should be finalized in May or June. There were no significant findings, but the report will include the handling of E&P NORM wastes.

The following is a little background on these IOGCC studies. Several years ago the EPA was considering drafting NORM regulations. In order to help EPA evaluate the need for NORM regulations, the Interstate Oil and Gas Compact Commission (IOGCC) put together a set of guidelines for the control of E&P wastes. Teams of people (in the North Dakota study, the team consisted of a DOE representative, an EPA representative, an industry representative, and two or three other state regulatory people) come into the state for several days and conduct a review of the state's E&P waste handling policies, including solid waste disposal, site reclamation, handling of NORM wastes, contaminated salvage equipment, control of produced water, etc. Based on that review, a report is prepared. The state can use the report as a guideline for implementing guidelines or regulating the handling of E&P wastes. At some point the EPA is expected to review the state reports to determine how adequately the states are

controlling E&P wastes. A number of state "inspections" have been completed with several left to review. The IOGCC review of North Dakota did recommend that the state develop specific NORM regulations. The state is waiting to review the new CRCPD draft before proceeding.

The state was approached in late 1996 by a company in North Dakota to look at adopting some specific E&P waste regulations. The state has taken the request under advisement.

OHIO

The state of Ohio has prepared and submitted to the Public Health Council for consideration rules governing the control of radioactive materials, including NARM (in Ohio, NARM includes NORM). These rules, under Chapter 3701-39 of the Administrative Code, govern the requirements for licensure for "persons who receive, possess, use, process, transfer, transport, store or commercially distribute NARM or products that contain NARM or are contaminated with NARM...". De minimus levels are provided for exemption from licensure under these rules.

Values of concentrations, amounts, or contaminations were derived from radionuclide values in Title 10 Code of Federal Regulations Parts 30.15, and 30.71 and from similar rules and regulations passed by other states where the licensure and control of NARM is a statutory requirement.

The rules submitted to the Public Health Council are not in a final form, but will serve to provide guidance to persons in the state of Ohio who use NARM. Work continues on the final version of the rules, however the values cited in

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OHIO (continued)

the "temporary" rules will be the same as those used in the finalized versions.

OKLAHOMA

The draft of the proposed NORM regulations are still under development by the Department of Environmental Quality's Radiation Management Advisory Council. The rules will be included in DEQ's *Chapter 400, Radiation Management as Subpart 14*. The next meeting of the Council is scheduled for March 6.

OREGON

There are no new developments regarding NORM in Oregon. Ray Paris, Manager of Radiation Protection Services in the Oregon Department of Human Resources is also the Chairman of CRCPD's NORM Commission. Oregon is "waiting" for the CRCPD NORM Commission to complete its work before revising or writing new NORM rules for the state.

Oregon does have NORM regulations entitled *Regulation and Licensing of Naturally Occurring Radioactive Materials (NORM)*. The rules which became effective in January 1990 are found in the Oregon Administration Rules, Chapter 333, Division 117 - Health Division. The Oregon NORM rules were summarized in the Winter 96 issue of *The NORM Report*.

PENNSYLVANIA

There has been no progress in the development of regulations for the control of NORM in Pennsylvania and nothing is planned at present.

In the past few years some of the Pennsylvania brine wells were checked for NORM contamination as were roads where brine was used. Nothing of consequence was

found.

RHODE ISLAND

Rhode Island has no specific regulations for the control of NORM and none are in the planning stage. NORM is considered to be covered under the state's general radiation control regulations.

SOUTH CAROLINA

Part IX-Licensing of Naturally Occurring Radioactive Material (NORM) became effective June 30, 1995 in South Carolina. There have been no changes in the regulation and none are proposed at the present time. Part IX was summarized in the Summer 95 issue of *The NORM Report*.

SOUTH DAKOTA

South Dakota has regulations for the control of radiation, but nothing specific to NORM. No legislation has been proposed to regulate NORM at this time.

TENNESSEE

NORM contamination in Tennessee is handled basically like any other radioactive material. If it is enhanced above background levels, an assessment is made to determine if it constitutes a problem. If it does, it is dealt with similarly to any other radioactive material, i.e., by using the general radiation regulations. There are no specific regulations for the control of NORM and none are planned. It appears that as more people learn about NORM, more instances of NORM contamination are being reported.

TEXAS

The Texas Department of Health has jurisdiction for NORM except for the disposal of NORM. The Railroad Commission has jurisdiction for the disposal of oil and gas industry NORM wastes, while the Texas Natural Resource

Conservation Commission has responsibility for the disposal of NORM wastes not associated with oil and gas exploration and production.

The Department of Health is still planning to make some modifications to their NORM rules. The changes will primarily be in classifications of NORM and adding some requirements for processing of NORM from other persons. The Department is waiting for the new CRCPD Part N draft before proposing changes. The revisions will be coordinated with the Railroad Commission, particularly where they concern jurisdictional issues.

The Texas Railroad Commission's *Statewide Rule 94: Disposal of Oil and Gas NORM Wastes* took effect February 1, 1995. This rule sets forth requirements for the safe disposal of NORM that constitutes, is contained in, or has contaminated oil and gas wastes. Rule 94 was summarized in the Winter 95 issue of *The NORM Report*. There are no plans at present to revise Rule 94.

The Texas Natural Resource Commission has not started drafting rules for the disposal of NORM wastes not associated with oil and gas exploration and production. Although there is no firm schedule yet, the drafting of specific NORM disposal rules could begin later in 1997.

UTAH

NORM is considered to be included in Utah's comprehensive radiation control regulations. No specific NORM regulations have been proposed at the present time in Utah.

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VERMONT

Vermont has no regulations for the specific control of NORM and none are planned at the present time.

Concern has been expressed as to the radiation received by some workers in granite plants due to radioactive materials in dust and the air. An excess of lung cancers has been reported in employees who have worked for a long time in the stone working industry. Silicosis used to be the primary result of working with stone, but now lung cancer is reported to be a serious hazard as well. Some persons have expressed a desire to investigate this in more detail, but limited time and testing capability permit only so much activity. The bottom line is that the regulators are being watched to see what they decide appropriate concentrations of NORM (radium) should be.

VIRGINIA

Virginia has no specific regulations for the control of NORM. NORM is considered to be covered in the general regulations for the control of radiation. These general regulations are in the process of being revised.

WASHINGTON

The Department of Health and Ecology have reviewed the environmental checklists and supporting information for three upcoming actions related to US Ecology's commercial low-level radioactive waste disposal facility located near Richland, Washington.

The three actions are: renewal of the facility operating license, approval of a closure plan, and a rule making establishing an annual disposal limit for naturally occurring and accelerator produced radioactive materials (NARM). In making the determination of signif-

icance, the two agencies have found that among the proposed actions, there are several probable direct or indirect impacts to elements of the environment such as air quality, soils, groundwater, and habitat. When considered together, these impacts may be significant. Therefore, an Environmental Impact Statement (EIS) must be prepared before any of the actions may be taken.

The scoping process for the EIS was scheduled to begin February 26, 1997. Public comments will be accepted on the scope of the analysis until March 27, 1997. Following that, a Draft and Final EIS will be prepared, a process expected to take one to two years to complete. While the EIS is in preparation, US Ecology may continue to operate under the timely renewal provisions of its license.

US Ecology has always met state regulations. The Environmental Impact Statement will evaluate the effects of the three actions to show that the site will be safe for at least 1,000 years.

WEST VIRGINIA

There are no specific regulations for the control of NORM in West Virginia. NORM is considered to be adequately covered by other regulations that require registration of facilities that own, possess, etc. radioactive materials.

A revision of the general regulations for the control of radiation should be ready for consideration by the next legislature in February, 1998. NORM will be part of the general regulations.

WISCONSIN

Wisconsin has no specific regulations for the control of NORM except those imposed by the Department of Natural Resources

for the disposal of materials containing radium-226. The state does have general regulations for the control of radiation.

Wisconsin is drafting an enforcement standard for radioactive contaminants in ground water with the primary isotopes being radium-226 and radium-228. The main purpose is to establish a ground water enforcement standard for use in monitoring, controlling, and if necessary, limiting human exposure to radioactive materials introduced into ground water by regulated human activities.

The rule making is proceeding with the next step a public hearing which should be in late spring or early summer.

WYOMING

Wyoming has no regulations for the control of NORM and none have been proposed at this time. There is a restriction on produced water. Produced water cannot be discharged if it contains more than 60 picocuries radium per liter.

Wyoming no longer has regulations that require the registration of radioactive materials.

FEDERAL ACTIONS**ENVIRONMENTAL PROTECTION AGENCY (EPA)**

The EPA has begun finalizing the draft report *Diffuse NORM Wastes - Waste Characterization and Preliminary Risk Assessment* issued in April, 1993. The report has been reviewed by EPA's Radiation Advisory Committee (RAC). The RAC issued their report *A SAB Report: Review of Diffuse NORM Draft Scoping Document. Review of the Office of Radiation and Indoor Air Draft*
(Continued on page 10)

EPA (continued)

Document on Diffuse Naturally Occurring Radioactive Material (NORM): Waste Characterization and Preliminary Risk Assessment in May 1994. The final draft of the EPA Report will respond to the comments detailed in the RAC Report. The goal for the EPA is to complete the final report later this year.

The EPA has completed negotiations with the National Academy of Sciences for a study to be conducted later this year on the scientific basis for EPA recommendations on NORM. This study was mandated in the last session of Congress.

EPA pulled back their site cleanup report on January 3, 1997 after being released 294 days previously. DOE was planning to release a report dealing with cleanup and site management (10 CFR 834) previously released. DoE wanted to combine the two reports. It was decided further discussions between the two agencies were necessary.

NUCLEAR REGULATORY COMMISSION (NRC)

The NRC continues to monitor NORM developments but is doing nothing specific on NORM at this time.

MINERALS MANAGEMENT SERVICE (MMS)

The MMS released the document entitled *Issuance of Notice to Lessees and Operators of Federal Oil and Gas Leases on the Outer Continental Shelf Gulf of Mexico Region - Guidelines for the Offshore Storage and Subseabed Disposal of Wastes Resulting from the Development and Production of Oil and Gas on the Outer Continental Shelf* on May 8, 1996.

The document outlines specific

guidelines for wastes which contain NORM above background concentrations. The guidelines were summarized in the Spring 96 issue of **The NORM Report**.

Copies of the report are available from:

Melanie Stright
U.S. Department of the Interior
Minerals Management Service
Offshore Environmental
Assessment Division
Branch of Environmental
Operation
(703) 787-1736

MMS is reviewing a DOE draft report. The report is entitled *Radionuclides, Metals, and Hydrocarbons in Oil and Gas Operational Discharges and Environmental Samples Associated with Offshore Production Facilities on the Texas/Louisiana Continental Shelf with an Environmental Assessment of Metals and Hydrocarbons*. The report prepared by Continental Shelf Associates for the DOE and dated January 1997 evaluates the fate and effect of NORM in produced water and sand discharges in offshore oil and gas production.

DEPARTMENT OF ENERGY (DOE)

(I have been unable to confirm the following, but my information came from a very reliable source - Editor)

In a recent newsletter the Department of Energy is initiating a waiver of sovereign immunity with regard to X-ray and NORM. The DOE will yield to state and local authorities for responsibility for X-ray and NORM contamination.

CANADA

The *Guidelines for the Handling*

of Naturally Occurring Radioactive Materials (NORM) in Western Canada was released in August 1995. There are no plans to make the guidelines into regulations at the present time. It is expected that the oil and gas and the fertilizer industries will use the NORM guidelines to develop their own code of operating practices in order to give their front-line workers specific guidelines to enable them to work with NORM safely. Some of the rationale used in developing the guidelines was given in the Spring 96 issue of **The NORM Report**.

CONFERENCE OF RADIATION CONTROL PROGRAM DIRECTORS (CRCPD)

The NORM Commission met February 20-23 in Florida to discuss the comments on the NORM draft received from the Advisory Committee. The Commission was not able to accommodate all the concerns of the Committee (e.g. some industries thought they shouldn't be regulated.) As of February 24, Ray Paris, Chairman of the NORM Commission, has asked CRCPD's Executive Board for direction as to whether they want to accept the NORM draft and go out for public comment or if they want to reconvene another meeting of the NORM Commission and the Advisory Committee.

The Board will have a conference call within the next two to three weeks. If the decision is to release the draft for public comment, the report may be available by the first of April. If another meeting is recommended the release of the draft will be delayed.

The Commission discussed every comment submitted by the

(Continued on page 11)

CRCPD (continued)
Advisory Committee. The Commission will respond back to the Committee on those comments which couldn't be used.

The NORM draft document will be summarized in **The NORM Report** after it has been released.

A draft guidance for landfill operations and state response on incidents involving radioactivity in landfills is still under development and should be completed shortly.

The latest version of the CRCPD mission statement is:

"CRCPD is a partnership of radiation protection officials dedicated to the protection of the public, the radiation worker, and the patient from unnecessary radiation exposure and the protection of the environment from radioactive contamination. Our mission is to promote consistency in addressing and resolving radiation protection issues, to encourage high standards of quality in radiation protection programs, and to provide leader-

ship in radiation safety and education."

Information about the CRDPD is available on the Internet. The CRCPD Home Page discusses the purpose of the CRCPD, types of memberships, and examples of working groups. Information is given for those who desire to become members. The Home Page also includes CRCPD's publication lists and other pertinent information. The CRCPD Web address is:

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The table below is included through the courtesy of Kevin Grice, Texaco E&P, Houston.

NORM Disposal Options and Range of Costs

Type of Disposal / Facility	Disposal Cost Range Dollars per Drum
Burial at a perpetual care sites	\$300 - 730
Treatment dilution to non hazardous oilfield wastes (NOW)	\$100 - 325
Injection into UIC wells as NORM (dilution of NORM to NOW prior to injection)	\$49 - 1000
Injection into UIC wells, well bores, and formations	\$151 - 2300
Encapsulation in plugged and abandoned wells	\$792 - 3333
Landspreading with dilution on site (5 pCi/gm + BKG only NORM on site)	\$1 - 20
Smelting of NORM metal (no domestic smelters are accepting NORM at this time but the option is approved in some state rules).	no net costs, price of scrap pays for transportation costs

Letter to the Editor

Dear Dr. Gray:

I want to thank you for the forum you are providing for the discussion of health and safety issues regarding NORM. I am responding to Mr. Kevin J. Grice's letter which commented on my letter published in the Summer 96 issue of The NORM Report.

While Mr. Grice and I certainly differ in our perspective regarding the issue, I hope we desire the same result, protection of individuals and the environment from the hazards of radiation. However, I must take issue with several of Mr. Grice's comments as follows:

Mr. Grice states that state radiation control programs (RCP's) cannot regulate NORM waste because they lack the specific authority of the State's Oil and Gas Board or the Department of Environmental Quality. I believe this is incorrect, as most state RCP's are authorized to promulgate rules and regulations necessary to protect the public from the hazards of radiation. This generally is a broad mandate allowing the agency to address all radiation hazards. The only Oil and Gas Boards for which radiation safety is a specific issue are those where the authority has been removed from the state RCP and redelegated. One can only question the reasoning here, given the relative understanding of the hazard by the agencies involved.

I stand by my statement regarding the risks. In Tennessee, we are routinely requested to approve alternate disposal of materials containing low levels of radioactive material. In almost every case when NORM is involved, the risk at levels generally accepted, e.g., 5 pCi/gm for Ra-226 is well beyond that accepted for other radioactive material.

In Tennessee, we believe that radiation is radiation, there is no good radiation or bad radiation; it is just radiation with concurrent benefits and risks. In all endeavors, the benefits must be maximized and the risks must be minimized. Economic impact should only be factored in after you have reached a plateau of adequate protection.

I agree with Mr. Grice that spending vast resources to control theoretical risks from low level radioactive material is a questionable practice; however, when the projected risks from these proposed practices are well above the marginally accepted risk of equivalent practices, it is easy to make an informed technical judgment

as well as a common sense judgment. I should note that, technically, radium is one of the more dangerous or hazardous radionuclides, exhibiting the properties of transuranic radioactive materials more than the properties of conventional radioactive materials. In addition, because of an inert gaseous daughter, its progeny are highly mobile in the environment.

Michael H. Mobley, Director
Division of Radiological Health
Department of Environment and Conservation
State of Tennessee
615-532-0360 ■

Envirocare President in Major Scandal

In a series of copyrighted articles, The Salt Lake Tribune has reported on a scandal involving Khosrow Semnani, owner of Envirocare of Utah, and Larry F. Anderson, former Utah state radiation control director. Semnani claims that Anderson extorted \$600,000 from him over eight years. Semnani paid Anderson with \$100 bills, gold coins and a Park City, Utah condominium. Semnani said Anderson came to him in 1987 -- after the application to build the disposal site was filed -- and offered to work as a "consultant" on the project. Anderson said he would do the work in his spare time through a private company he owned. This was a clear conflict of interest since, in his day job, Anderson was a state official responsible for approving Semnani's project.

Semnani said he feared Anderson would use his state position to cause problems for the disposal project, so he agreed to make the secret payments. When he finally refused to continue making the payments, Anderson sued him for more than \$5 million in "unpaid compensation." Anderson contends he had a valid business agreement with Semnani.

A state attorney general's investigation has been ongoing. In late February, the criminal investigation was turned over to the U.S. Attorney's office for further action. The state could still bring criminal or civil charges against Anderson. Charles Judd, executive vice president at Envirocare says that the ongoing legal and ethical squabble between Semnani and Anderson does not threaten the continuing operation of the company's hazardous waste landfill. Envirocare's licenses and permits are in order and he does not expect the legal proceedings to affect their operations now or in the future. ■

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Health Physics Society Board Approves RSO Section

At the Midyear meeting in San Jose, California, the HPS Board of Directors approved a petition for establishing an RSO Section. The new Section will address the technical and regulatory issues that challenge Radiation Safety Officers (RSOs) and others engaged in operational and applied health physics.

The initiative for starting at RSO Section was based on the recognition that most of the HPS membership is involved with day-to-day operational activities for radiation safety. These include surveys, sampling and laboratory analyses, bioassay, instrument calibration, training, decontamination and decommissioning, waste processing and disposal, and many other operational functions.

The challenges facing radiation safety programs have never been more demanding. The scrutiny of every facet of radiation safety by regulatory agencies, the media, and the public have often led to overreaction. The role of RSOs has become a matter of ensuring that

process is served, rather than true safety. We are required to enforce scientifically and economically indefensible processes for securing insignificant amounts of radioactive materials. We are also cited for violations and noncompliance for insignificant events such as missing a signature on a form.

We believe it is time for RSOs to unite and articulate a voice of reason for implementing safe radiation programs. It is time to recognize that the quality of radiation safety programs is generally excellent and health physicists are minimizing radiation exposures with exceptional competence.

The RSO Section will host a 1/2-day session at the annual meeting in San Antonio.

BIER IV residential dose conversion factor for radon in homes is: 1 pCi/l = 2.31 Rem/yr to the lung.

Things That Are Difficult to Understand

The following appeared in the February 1997 Health Physics Society Newsletter. It is reprinted here with the kind permission of the author, Dade W. Moeller.

As one moves along life, there are certain policies and developments that are difficult to understand. This is particularly true in terms of the uses and applications of nuclear energy and ionizing radiation. Areas that fall into this category include:

1. Our regulatory system concentrates on the control of nuclear energy, a relatively minor source of radiation exposure. There are essentially no regulations for the control of radiation sources of natural origin, which contribute over 80 percent of the dose to the average member of the public. The regulatory attention is inversely related to the dose contributed.

2. Although the United States will spend billions of dollars on war to preserve access to oil in the Middle East, our Congress is reluctant to approve the spending of a few tens of millions of dollars on research and development to design, build, construct, and operate newer, safer designs of nuclear power plants.

3. Although irradiation could be an excellent method for destroying disease organisms in food, such as E. coli in beef and Salmonella in chicken, many groups (including fast-food chains) continue to oppose the application of this process or the use of any products treated by it. In many ways, the path being followed here is exactly the same as that which occurred during the initial days of the pasteurization of milk, and the early attempts to fluoridate public drinking water sup-

plies. Why must history repeat itself?

4. While selected members of the public are opposed to nuclear power, they strongly endorse solar energy. One wonders whether they would be so supportive if they realized that the source of heat from the sun is nuclear (fusion) energy?

5. Although a host of epidemiological studies have demonstrated that electric and magnetic fields have no effects on human health (or, as a maximum, they are minuscule), the conclusion is that surely there must be some effect and the way to find it is to conduct more studies involving larger population groups.

6. The development of electric cars is being pursued as an alternative to gasoline-engine-powered units, even though 80 percent of the electricity used to recharge their batteries will be generated by fossil-fueled electric power stations and studies have shown that the manufacture, use, and disposal of lead-acid batteries, at present the most cost-effective type, would represent an additional source of significant environmental pollution.

7. Although the globe is warming due to the continued use of fossil fuels, most members of the public appear not to be concerned. This situation has certainly not been a source of strong support for nuclear power. Yet, the potential effects could be devastating. The accompanying rise in the sea level could over the next century inundate much of the Atlantic and Gulf Coasts of the U.S., as well as other parts of the world such as the Netherlands and Bangladesh. Other possible effects include an increase in a host of human diseases transmitted by various insects and other vectors whose habitat will expand beyond the tropics, and a discontinuation of the Gulf Stream with an accompanying cooling of Western Europe.

8. The nation continues to spend billions of dollars in attempting to confirm the acceptability of Yucca Mountain as a suitable site for a high-level waste repository. It would have been far better to have set binding temporal and fiscal limits on these studies and, in the meantime, to have mandated a monitored dry-cask facility for interim centralized storage of these wastes.

9. States either individually or as members of compacts continue to seek to gain acceptance for the estab-

(Continued on page 16)

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Things That Are Difficult to Understand (continued)

ishment of new facilities for the disposal of low-level radioactive wastes. It is both unfortunate and fortunate that their efforts have not been successful -- unfortunate in that the efforts have led to needless expenditure of large sums of money, fortunate in that the suggested approach would have led to the development of far more disposal facilities than are needed.

10. At the same time, the problem of developing acceptable facilities for the disposal of mixed wastes is only partially being solved. This has caused many scientists to restrict and/or avoid the use of radioactive materials in their medical and biological research. The significance of such actions is illustrated by the fact that 70 percent to 80 percent of the research conducted at the National Institutes of Health involves the use of radioactive materials and that of the 15 Noble prizes granted in physiology and medicine from 1975 to

1989, 10 were based on research using radioactive materials.

Having enumerated this list, the obvious question is "what is the role of the Health Physics Society?" Although there are many steps that might be taken, one of the most important is to interact with governing officials, particularly at the federal level, to try to bring more reasoning into the legislative process.

The U.S. Congress, for example, is increasingly micro-managing many aspects of the energy and nuclear field, especially from the standpoint of the development of policies on nuclear power and waste disposal. Another is to seize every opportunity to speak out with factual information on these and related issues through, for example, the writing of letters to the editor and the preparation of commentaries. ■

NORM Manual Available

The manual which I use in teaching my course **NORM Contamination - An Emerging Environmental Problem** is available. The manual contains over 600 copies of the slides used in the course. Although designed originally for the oil and gas industry, the manual offered contains material about NORM contamination in other industries with NORM contamination problems.

In addition to being an inclusive text on NORM, the manual can be easily used to structure in-house information or training courses on NORM.

The Table of Contents shown below indicates the range of topics in the manual.

1. Fundamentals of Radiation Protection
2. Radiation / Radioactivity Units
3. Biological Effects of Radiation
4. Radiological Protection
5. Introduction to NORM Contamination
6. NORM Contamination - Radium
7. NORM Contamination - Radon
8. NORM in Other Industries
9. Fundamentals of Radiation Detection
10. NORM Surveys
11. Disposal of NORM Wastes
12. Regulations - General
13. Federal Regulations
14. State Regulations
15. Regulations - Conclusions
16. Recommended Industrial Hygiene
17. Program Suggestions for NORM Control
18. Radiation Litigation & Minimization
19. Conclusions
20. Glossary

For further information contact:

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Campbell Wells Sold to U.S. Liquids

December 1996, a privately held company U.S. Liquids, Inc. purchased the assets of the Campbell Wells Ltd. division of Sanifill USA Waste.

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Analysis: EPA/DOE/NRC Disagreement Over Site Cleanup Standards

Recent communications between the U.S. Environmental Protection Agency ("EPA"), Department of Energy ("DOE") and Nuclear Regulatory Commission ("NRC") suggest that federal authorities charged with establishing radiation cleanup standards have reached, at least for the time being, an apparent impasse in agreeing on numerical dose-based standards for cleanup of sites contaminated by radioactive materials. The current posture of federal agencies with respect to radiation site cleanup rulemakings by EPA/DOE and NRC is not necessarily antagonistic, but suggests that federal authorities' diverse views on the appropriate dose-based cleanup level are firmly entrenched.

In a December 19 letter to the Office of Management and Budget (OMB), EPA tersely stated that it was

withdrawing the radiation site cleanup rule. Prior review and approval by OMB is required before a proposed rulemaking is published in the Federal Register. EPA has assumed responsibility for developing residual radioactivity cleanup levels that will apply to all sites contaminated with radioactive materials, including facilities regulated by the NRC and the states. On May 18, 1994, EPA released a draft regulation establishing radiation cleanup standards to the National Advisory Council for Environmental Policy and Technology ("NACEPT"). This draft proposes a site cleanup standard of 15 mrem/yr above background for unrestricted use, and a groundwater cleanup standard of 4 mrem/yr. If remediation of a site to meet the 15 mrem/yr standard for unrestricted use is not feasible, an alternative cleanup standard of 75 mrem/yr over

(Continued on page 20)

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Analysis: EPA/DOE/NRC Disagreement Over Site Cleanup Standards (continued)

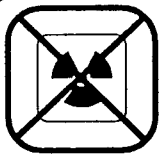
background could be permitted for sites restricted to commercial use." EPA relied on the Atomic Energy Act of 1954 ("AEA") as its statutory authority for implementing these draft regulations.

In a subsequent February 7 letter from Carol Browner, EPA Administrator, to Shirley Jackson, Nuclear Regulatory Commission Chairman, EPA's firm opposition to less stringent cleanup standards was clearly articulated:

We understand that NRC is giving particular consideration to making significant changes from its proposed rule of August 22, 1994. The Environmental Protection Agency (EPA) finds these changes, such as increasing the pro-

posed dose limit from 15 mrem/yr to as much as 30 mrem/yr and eliminating a separate requirement for protecting ground water that could be used as drinking water to the Maximum Contaminant Levels (MLCs) established under the Safe Drinking Water Act, to be disturbing. If in fact our understanding is correct, then EPA would also consider NRC's rule to be not protective under the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) and not consistent with this and previous Administration's Ground Water Policy.

(Continued on page 21)



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Analysis: EPA/DOE/NRC Disagreement Over Site Cleanup Standards (continued)

I view these changes to the NRC rule-making on radiological criteria for license termination, and the potential action that may be required of EPA, to be very serious matters. We will be happy to work with your staff to ensure the promulgation of a rule, and the development of related guidance, that are consistent with CERCLA.

The NRC Chairman's February 21 response to EPA suggested the NRC's position on cleanup standards was equally firm. Site cleanups for radioactive materials -- including NORM -- according to Chairman Jackson, should focus on significant hazards, cleanup levels should be established on the basis of cost/benefit review, and standards should be implemented on a site specific basis. NRC's response to EPA suggested, however, that the agencies' disparate views on site cleanup might be harmonized through legislation:

To begin, the Commission believes that the nation deserves a uniform approach to radiation regulation which protects

people from significant hazard regardless of the source, whether it is Atomic Energy Act materials, naturally occurring materials, or other materials, and which focuses regulatory resources on the most significant hazards. Further, below an upper safety limit, cost benefit considerations must apply in site specific implementation of the radiation protection standards.

I also appreciate the offer of continued exchange between the EPA and NRC staffs. As you know the two staffs have been engaged in continuous dialogue on the difficult issues related to this rulemaking for some time, and the Commission believes that a thorough exchange of views at the staff level has already occurred without progress on reaching a mutually agreeable approach to risk harmonization. However, if you would find it useful, I would be pleased to meet with you to discuss general EPA-NRC interface issues. In the event

(Continued on page 22)

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Analysis: EPA/DOE/NRC Disagreement Over Site Cleanup Standards (continued)

that we agree that legislation is needed to achieve risk harmonization, as contemplated in our 1992 MOU, I am prepared to discuss that option.

The immediate result of the exchange between EPA, DOE and NRC was the withdrawal of EPA's site cleanup rulemaking, for the time being. Another consequence is that facilities with NORM outside the scope of NRC jurisdiction are faced with continuing uncertainty as to whether federal site cleanup standards will be promulgated, how such standards will be applied in practice, and what numerical dose defines how clean is clean." Notwithstanding the fact that EPA's site cleanup rule expressly targeted federally licensed activities, or that NRC's site decommissioning rule is intended to apply to cleanup of NRC-

licensed activities, the following discussion illustrates that under CERCLA ("Superfund") jurisprudence once a federally enforceable cleanup standard has been established for CERCLA "hazardous substances, pollutants or contaminants," courts are free to apply such standards as "Applicable or Relevant and Appropriate Requirements" ("ARARs") under CERCLA.

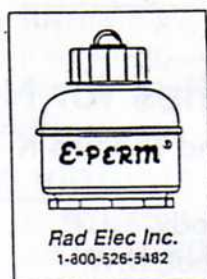
In Superfund cases involving NORM, some defendants have argued that materials emitting only low levels of radiation are not governed by CERCLA because such materials are not "hazardous substances" within the meaning of that Act. Courts to date have rejected this argument, most notably the Fifth Circuit in *Amoco Oil Co. vs. Borden, Inc.*, 889 F. 2d 664 (5th Cir. 1990). In that case, the court pointed out that EPA had

(Continued on page 23)

E-PERM^(R): *The First Integrated System for Characterizing NORM*

Based on the electret ion chamber technology, the most used indoor radon monitoring method

- Radon and thoron in air
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- Radon and radium in water
- Radium in pipes, in materials and on irregularly shaped objects
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- Alpha contamination on surfaces and in soils
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Analysis: EPA/DOE/NRC Disagreement Over Site Cleanup Standards (continued)

expressly designated radionuclides as "hazardous substances" under Section 9602(a) of CERCLA and concluded that "the plain statutory language [of CERCLA] fails to pose any quantitative requirement on the term hazardous substance...."

In the Amoco Oil case, defendant Borden, Inc. had operated a phosphate fertilizer plant, producing a large pile of NORM-containing phosphogypsum as a by-product. More highly radioactive sludges and scales from processing equipment were added to the phosphogypsum pile, creating "hot spots" within the pile. Some of these sites exhibited levels of radioactivity that were significantly elevated above background. A year after it purchased the property from Borden, Amoco learned of the radioactive contamination and sued Borden under CERCLA and state law, seeking to recover its cleanup costs.

In addition to finding that radionuclides in NORM were "hazardous substances" under CERCLA, the court in *Amoco* ruled that both the disposal of NORM containing phosphogypsum wastes and the emanation of radon gas from the radionuclides fell within the definition of "release" under CERCLA Section 101(22). Borden argued that because all matter is radioactive to some extent, there must exist some threshold of radiation that must be exceeded before there can be "release" of a "hazardous substance" under CERCLA. Otherwise, argued Borden, the reach of CERCLA liability would extend to virtually all matter without limit. To overcome this dilemma, the court focused on a third element of CERCLA liability: the provision that only response costs incurred as a result of a release of hazardous substances are recoverable. The court concluded that Amoco must show it was justified in incurring the response costs it sought to recover and,

(Continued on page 24)

Analysis: EPA/DOE/NRC Disagreement Over Site Cleanup Standards (continued)

so, it must show that the response actions taken are necessary to protect human health or the environment. Following CERCLA Section 121, the court concluded that "a plaintiff who has incurred response costs meets the inability requirement as a matter of law if it is shown that any release violates, or any threatened release is likely to violate, any applicable state or federal standard, including the most stringent." The court found that federal radiation protection standards intended to be applied to inactive uranium mill tailings were applicable to the phosphogypsum piles because inactive uranium mill tailings piles, which [the standards] regulate, emit the same radioactive material and present similar environmental problems." Based on this rationale, the court concluded that all costs incurred in remediating the property to achieve uranium mill tailings standards were justified.

Thus, once stringent federally enforceable radiation site cleanup standards are promulgated, even if such standards are intended to apply only to federally licensed materials at DOE facilities, they could be found equally applicable to NORM cleanups under CERCLA. For this reason, industries involved in NORM should be aware of the far reaching cost and

liability implications of the federal radiation site cleanup standards that are ostensibly applicable only to federally licensed materials and facilities. For now, EPA's standards appear to be on hold pending EPA's and NRC's harmonizing their differences. It is possible that legislation reauthorizing Superfund or establishing "Brownfields" cleanup standards could be a vehicle for achieving this goal.

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Editor's note: I have copies of the letters referred to above, i.e., Ms. Browner's (EPA) letter of February 7 to Ms. Jackson (NRC) and Ms. Jackson's response to Ms. Browner on February 21. I also have a copy of Ms. Nichol's (EPA) letter of December 19, 1996 to Ms. Katzen (OMB) withdrawing the cleanup rule from consideration. Please contact me if you would like a copy of the correspondence. ■

"Managing Liabilities for NORM"

Charles T. Simmons and Thomas K. Bick

Kilpatrick & Cody, L.L.P.
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 Washington, DC 20005
 (202) 508-5800

(Presented at the Beneficial Reuse Conference University of Tennessee October 23, 1996)

STATUTORY/REGULATORY SOURCES OF NORM LIABILITY

FEDERAL

- Comprehensive Environmental Response, Compensation and Liability Act ("CERCLA" or "Superfund")
- Atomic Energy Act of 1954 ("AEA")
- Department of Transportation ("DOT") Hazardous Materials Regulations
- Occupational Safety and Health Administration ("OSHA")

- Radiation Site Cleanup and Decommissioning Rule (Not Final)

II. STATE

- General Radiation Control Regulations
- NORM-Specific Regulations
 - Licensing
 - Possession
 - Use and Reuse
 - Commercial Distribution
 - Disposal

(Continued on page 25)

“MANAGING LIABILITIES for NORM” (Continued)

- Equipment Decontamination

TRENDS

I. FEDERAL

- Superfund Reauthorization
- Radiation Site Cleanup Rule
- Definition of “Source Material”

II. STATES

- New Jersey - Site Cleanup
- Ohio - NORM
- Florida - NORM

III. CONFERENCE OF RADIATION CONTROL PROGRAM DIRECTORS (CRCPD)

NORM LIABILITY AND INSURANCE ISSUES

I. LIABILITY FROM NORM EXPOSURE

A. SOME INDUSTRIES AT RISK

1. Oil and Gas Producers
2. Phosphate Miners
3. Metal Miners and Mineral Processors
4. Fertilizer Manufactures
5. Uranium Miners and Processors
6. Scrap Metal Dealers
7. Foundries
8. Refractories Industries using Zircon or Alumina Bauxite
9. Medical Waste Generators and Managers
10. Zircon/Zirconium Producers and Users

B. MOST LIKELY NORM LIABILITY SCENARIOS

1. WORKER EXPOSURE

- Such claims first surfaced 50 years ago (LA PORTS vs. U.S. RADIUM (D.N.J. 1935)--radium painted watch dials)
- Many such claims in nuclear energy industry (e.g., Silkwood claim against Kerr-McGee) Supreme Court: Government standards are not a shield
- Other cases: oil and gas production workers, uranium miners, radon ointment producers, phosphate miners
- Initially, Plaintiff's could not overcome

“CAUSATION” hurdles (JOHNSON vs. U.S. (D. Kan. 1984) (workers repaired radium-coated aircraft instruments)

- Major issue besides causation: Does workers compensation law provide exclusive remedy?
- Not exclusive remedy in some states if Deliberate or Reckless Conduct
- Not exclusive remedy in some states if Ultrahazardous Activity
- Not applicable if exposure was away from the work place
- Injured worker will often look to the supplier

2. CERCLA-TYPE LIABILITY FOR PROPERTY CONTAMINATION

Example: Amoco Oil Co. vs. Borden, Inc. (5th CIR. 1990)

Facts:

- Amoco purchased property from Borden
- Site contaminated with phosphogypsum, by-product of Borden's fertilizer manufacturing
- Phosphogypsum pile contained low-level radioactivity from radium and radon

Held:

- Radon and daughter products are CERCLA hazardous substances (court rejected Borden's argument that there was no CERCLA liability because radiation was naturally occurring)
- No quantitative requirement on amount of hazardous substance released
- However, court did establish threshold: No liability unless radiation levels were greater than the most stringent government standard (Here: radium levels violated standard for inactive uranium mill tailings standards)

Example: Gray vs. Murphy Oil USA, Inc., (D.S.D. Miss. 1994)

Facts:

- Property owner alleged that defendants' oil and gas production operations contaminated his property with radium and radon
- Property owner alleged trespass, negli-

(Continued on page 26)

“MANAGING LIABILITIES for NORM” (Continued)

gence, nuisance, strict liability for ultra-hazardous activity, assault and battery (No CERCLA Claim)

Lesson: CERCLA amendments will not be a cure-all

Example: T&E Industries, Inc. vs. Safety Light Corp. (D. N.J. 1988)

Facts:

- T&E purchased property and then discovered it was contaminated with radon by prior owner's radium extraction operations
- T&E sued prior property owner under CERCLA and Common Law counts

Held:

- Radioactive ore tailings were not excluded from CERCLA definition of “Hazardous Substances” under mining waste exclusion (“Bevill Amendment”)
- Most of T&E response costs were recoverable under CERCLA
- T&E could compel further site remediation by prior site owner under Common Law claims
- T&E also filed suit in state court for and recovered business relocation costs and lost property value
- N.J. Supreme Court (1990): Defendant strictly liable (No Fault) because processing and disposal of radium = “Abnormally Dangerous Activity”

Example: Amax, Inc. vs. Sohio Independent Products CO. (S.Ct. N.Y. 1983)

Facts:

- Defendant operated ore processing plant to produce zirconium metals, and buried NORM- containing waste on-site
- Plaintiff bought property and sued defendant for cleanup costs

Held:

- No statute of limitations bar because injury to property was “continuous trespass” under N.Y. Law

3. PRODUCT LIABILITY

Falcon Products vs. INS. Co. of State of PA (D.C. MO. 1985)

Facts:

- Scrap dealer bought obsolete medical teletherapy equipment which contained radioactive material (Cobalt-60)
- Equipment housing ruptured at scrap dealer's facility, causing radiation contamination of other scrap metal, which was then sold to foundry
- Foundry made table base castings, and sold them to his customers
- When customers discovered contamination, foundry incurred huge loss

Results:

Scrap dealer insolvent and foundry's insurance company refused to pay

Example: Wayne vs. Tennessee Valley Authority (5th CIR. 1984)

Facts:

- Concrete blocks made with phosphate slag used in homeowner's basement construction had high radon levels
- Homeowner sued TVA (which produced the phosphate slag as a by-product in its fertilizer plant), the block manufacturer, and the block seller
- Homeowner alleged breach of implied warranty, negligence, product liability, and fraudulent concealment (by TVA), claiming loss of property value and bodily injury from radon exposure

Held: All claims barred by 10-year statute of limitations

II. INSURANCE COVERAGE FOR BODILY INJURY OR PROPERTY DAMAGE FROM NORM EXPOSURE**A. POLLUTION EXCLUSIONS****1. “QUALIFIED” POLLUTION EXCLUSION**

- Exclusion reads: “[This insurance does not apply] to bodily injury or property damage arising out of the discharge, dispersal, release or escape of smoke, vapors, soot, fumes, acids, alkalis, toxic chemicals, liquids or gases, waste materials or other irritants, contaminants or pollutants

(Continued on page 27)

“MANAGING LIABILITIES for NORM” (Continued)

into or upon land, the atmosphere or any water course or body of water; but this exclusion does not apply if such discharge, dispersal, release or escape is sudden and accidental.”

- Added to most CGL policies in 1972 or 1973
- Ambiguity of phrase “sudden and accidental” has created enormous amount of litigation from contamination exposure claims
- Unsettled Question: Does this exclusion apply to property damage or bodily injury due to NORM exposure?
- Generally, this a two-part question:
 - (1) Is NORM an “irritant,” “contaminant” or “Pollutant”?
 - (2) If so, was its release into the environment sudden and accidental?

Examples

- EAD Metallurgical vs. Aetna Casualty & Surety (2D CIR. 1990) (Exclusion precludes insurance coverage for CERCLA liability resulting from disposal of NORM into sewer lines by manufacturer of foil elements in smoke detectors--such continuous disposal was not “Sudden and Accidental.”)
- Borden, Inc. vs. Affiliated FM Insurance (S.D. Ohio 1987) (Long-Term depositing of radioactive phosphate waste on property fertilizer producer not “Sudden and Accidental.”)
- Canadian Radon v. Uranium Corp. seven month exposure of worker to “Radon Ointment” not “Sudden and Accidental”
- However, Courts in GA, WV, WI, NJ, IL, WA, OR, IN, and SC might have ruled otherwise (in those states, even gradual releases of NORM are “Sudden and Accidental” if they’re expected or intended)

2. ABSOLUTE POLLUTION EXCLUSION

- Added to most CGL Policies in 1985 or 1986 because of adverse “Sudden and Accidental” cases

- Typical language: “[This exclusion does not apply] to bodily injury or property damage arising out of the actual, alleged, or threatened discharge, dispersal, release or escape of pollutants.”
- “Pollutants” are defined as “Any solid, liquid, gaseous or thermal irritant or contaminant, including smoke, vapor, soot, fumes, acids, alkalis, chemicals and waste.”
- Some policies define waste to include “Materials to be recycled, reconditioned or reclaimed.”
- Some courts: “Pollutants” Do not include non-environmental contaminants (e.g., lead paint) or non-waste-type contaminants (gasoline fumes; sewage; water in oil tank).
- Many courts: This exclusion does not apply to product liability claims (because a product is not a “Waste”).

Issue: Does absolute pollution exclusion apply to NORM?
Yes: Constitution State Ins. Co. vs. ISO-TEX Inc. (5th CIR. 1995)

Facts:

- Waste handling company allegedly was liable for death and bodily injury of persons exposed to radioactive medical waste stored on company’s property.

Held:

- Court concluded that the medical waste was clearly a “Pollutant” because it was in a waste product.

See Also: USF&G vs. B&B Oil Well Service (S.D. Miss. 1995)

Held:

- NORM-containing pipe scale, rust and saltwater deposited on property from oil and gas production was a “Pollutant”

But Compare:

- Situations where NORM-containing material can be characterized as a “Product” rather than as “Waste”

Example: Minnesota Mining and Manufacturing Co. v. Walbrook Ins. Co. (Minn. CT. of Appeals, Jan 9, 1996)

Facts:

(Continued on page 28)

“MANAGING LIABILITIES for NORM” (Continued)

- 3M manufactured and sold static eliminators containing tiny beads of a radioactive isotope which emits alpha particles that eliminate static by ionizing surrounding air. 3M was sued by several customers after beads came loose and spilled out of eliminators, causing customers to incur substantial cleanup costs.

Held:

- The radioactive beads were not “Pollutants” and therefore exclusion did not apply. Court: “We do not agree . . . that the beads were pollutants simply because they were radioactive.” “We conclude that the beads were not pollutants because their release did not affect surrounding air, soil or water.”

NUCLEAR EXCLUSIONS

1. NUCLEAR ENERGY LIABILITY EXCLUSION (NELE)

- Typical language excludes coverage for injury, sickness, death or destruction by (1) an insured who is also insured under a nuclear energy liability policy issued by nuclear energy liability insurance association; (2) an insured entitled to financial protection under the Atomic Energy Act of 1954; or (3) exposure to “Nuclear Material” that is at or dispersed from an insured’s “Nuclear Facility” or is “Contained in spent fuel or waste.”
- “Nuclear Material” is defined as source, special or by-product material.
- This exclusion has been a common endorsement in CGL policies since the mid 1950’s.
- Courts have generally interpreted this exclusion narrowly to apply to nuclear fuel cycle material only.
- Example: Chemetron investments vs. Fidelity & Casualty Co., (W.D. Pa. 1994): Even though property contamination by insured was by “Source Material,” exclusion did not apply because the property was not a “Nuclear Facility” and source material was not contained in “Spent Fuel” or “Waste”

2. ABSOLUTE NUCLEAR EXCLUSION

- In some policies since mid 1980s.
- Typical Language: “[This exclusion does not apply] to any “injury or damage to or arising out of any nuclear device, radioactive material, isotope . . . or any other chemical element having an atomic number above 83 or any other material having similar properties of radioactivity.”
- Note: No “Pollutant” or “Waste” requirement

3. RADIOACTIVE EXCLUSION

- Began appearing in commercial liability insurance policies in 1994.
- Typical language: “This policy does not apply to bodily injury or property damage arising out of the actual, alleged or threatened exposure of persons or property to any radioactive matter.”

III. PRECAUTIONS AGAINST NORM LIABILITY

A. STATUTORY/REGULATORY (e.g., CERCLA Amendments)

B. MANAGEMENT SAFEGUARDS (e.g., Product Stewardship)

C. INSURANCE COVERAGE

1. RETROACTIVE MEASURES:

- If you believe you may be subject to a third-party claim, notify your insurers immediately
- Notify all carriers on the risk from date of earliest possible exposure
- If a product liability claim and no absolute nuclear exclusions, there is usually coverage
- If a CERCLA-Type claim and no absolute nuclear exclusions, may be coverage, especially if pre-1985 exposure

2. PROACTIVE MEASURES:

- Avoid absolute nuclear exclusions in your policies
- Consider buying special nuclear liability insurance (offered by commerce & industry and others) ■

MEETING CALENDAR**NCRP Annual Meeting**

The thirty-third annual meeting of the National Council on Radiation Protection and Measurements (NCRP) will be April 2-3, 1997 at the Crystal Forum, Crystal City Marriott, 1999 Jefferson Davis Highway, Arlington, Virginia. The principal scientific session is "The Effects of Pre- and Postconception Exposure to Radiation." For additional information, contact NCRP at 7910 Woodmont Avenue, Suite 800, Bethesda, Maryland 20814-3095, telephone: 301/657-2652, fax: 301/907-8768.

**29th Annual National Conference on Radiation Control
Tacoma, Washington
April 27 - May 3, 1997**

The meeting will have several papers on NORM, including an update on the NORM Commission's new draft of Part N, and discussions of NORM activities in Louisiana and Oregon.

For further information:

CRCPD, Inc.
Office of Executive Director
(502) 227-4543
Fax: (502) 227-7862

**American Industrial Hygiene Conference & Exposition
Dallas Convention Center
Dallas, Texas
May 17-23, 1997**

The premier conference for occupational and environmental health and safety professionals

There are many industrial hygienists who have Radiation Safety Officer responsibilities in industries and medical centers across the country. Your willingness to share your health physics experience with this audience would be of value to these professionals, as witnessed by their enrollment in professional development courses for health physics that occur prior to the conference.

For further information:

American Industrial Hygiene Association
Phone: (703) 849-8888
Fax: (703) 207-3561

**Conference on Radionuclide Metrology and its Application
ICRM 97**

**National Institute of Standards and Technology
Gaithersburg, Maryland, USA
May 19-23, 1997**

The International Committee for Radionuclide Metrology (ICRM) is pleased to announce its next conference, ICRM '97. The Conference goal is to provide an opportunity for the exchange of information on techniques and applications of radionuclide metrology, and to encourage international cooperation in this field.

**The 42nd Annual Health Physics Society Meeting
San Antonio, TX
June 26 - July 3, 1997**

**1997 Rocky Mountain Symposium on Environmental Issues in Oil and Gas Operations
Colorado School of Mines
Golden, Colorado
July 14-15, 1997**

The Colorado School of Mines and the U.S. Bureau of Land Management will sponsor the third symposium on all aspects of environmental protection, remediation, and reclamation involved with oil and gas operations.

The Symposium will address a wide range of issues pertaining to oil and gas development and the environment. Papers or poster presentations on any of the following topics are invited. Papers and presentations on any other topic relevant to the theme of the Symposium will also be considered. Proceeding will be published and distributed at the Symposium.

For further information:

Petroleum Engineering Management
Colorado School of Mines
Golden, Colorado 80401
Phone: (303) 273-3746
Fax: (303) 273-3189
Email: rgraves@mines.edu

Regulatory Reference

	U.S. AEC 1974 ----	Termination of Operating Licenses for Nuclear Reactors, NUREG 1.86 U.S. Atomic Energy Commission, Washington, D.C. June 1974
Title 10 CFR Part 20 ----	Standards for Protection Against Radiation	
Title 10 CFR Part 61 ----	National Emission standards for Radionuclide	ARKANSAS Rules and Regulations for Control of Sources of Ionizing Radiation. Section 7 NORM
Title 29 CFR Part 1910.96 ----	Ionizing Radiation	
Title 33 U.S.C. 466, et seq. ----	Federal Water Pollution Control Act as amended	GEORGIA Rules and Regulations for Radioactive Materials, Chapter 391-3-17, Section 08-Regulation and Licensing of NORM
Title 40 CFR Part 141 ----	National Primary Drinking Control Program; Criteria and Standards	LOUISIANA Title 33: Environmental Quality Part XV: Radiation Protection. Chapter 14: Regulation and Licensing of NOR)
Title 40 CFR Part 190 ----	Environmental Radiation Protection Standards for Protection Power Operations	MISSISSIPPI Part 801 Section N Licensing of NORM Oil and Gas Board, Rule 69, Control of Oil field NORM
Title 40 CFR Part 192 ----	Health and Environmental Protection standards for Uranium and Thorium Mill Tailings	NEW MEXICO Subject 14: NORM in the Oil and Gas Industry Regulations and Licensing of NORM Oregon Administrative Rules, Chapter 333, Division 117 -- Health Division
Title 40 CFR Part 440 ----	Ore Mining and Dressing Point source Category	OREGON
Title 42 U.S.C. 300, et seq. ----	Safe Drinking Water Act, as amended	
Title 42 U.S.C 2011, et seq. ----	Atomic Energy Act of 1954, as amended	SOUTH CAROLINA Part IX, Licensing of NORM
Title 42 U.S.C 4321, et seq. ----	Toxic Substances Control Act (TSCA)	TEXAS Texas Department of Health-- Texas Regulations for Control of Radiation (TRCR) Part 46, Licensing of NORM Railroad Commission of Texas-- Rule 94, Disposal
Title 42 U.S.C. 4341, et seq. ----	Conservation and Recovery Act of 1976 (RCRA)	
Title 42 U.S.C 7401, et seq. ----	Clean Air Act; as amended	
Title 42 U.S.C. 7901, et seq. ----	The Uranium Mill Tailings Radiation Control Act of 1978	

Comparison of NORM Rules by State

<u>Radium Exemption Concentration</u>		<u>Radium Cleanup Standard</u>	
AR	5 pCi/g	AR	5/15 pCi/g ⁽³⁾
CO (proposed)	5 pCi/g	CO (proposed)	5 pCi/g
GA	5 pCi/g with high radon factor ⁽¹⁾ 30 pCi/g with low radon factor ⁽²⁾	GA	5/15 pCi/g with high radon factor 30/15 pCi/g ⁽⁴⁾ with low radon factor
LA	5 pCi/g above background	LA	5/15 pCi/g, or 30 pCi/g if the effective dose equivalent to members of the public does not exceed 100 millirem per year
MI (proposed)	5 pCi/g	MI (proposed)	5/15 pCi/g
MS	5 pCi/g with high radon factor 30 pCi/g with low radon factor	MS	5/15 pCi/g with high radon factor 30 pCi/g with low radon factor
NM	30 pCi/g	NM	30/15 pCi/g
ND	5 pCi/g.	ND	5 pCi/g
NJ	Variable- depending on concentrations and volumes- annual dose less than 15 mrem/yr.	NJ	Variable- depending on concentrations and volumes- annual dose less than 15 mrem/yr.
OK (proposed)	30 pCi/g	OK (proposed)	30/15 pCi/g
OR	5/15 pCi/g	OR	5 pCi/g
SC	5 pCi/g with high radon factor 30 pCi/g with low radon factor	SC	5/15 pCi/g with high radon factor 30/15 pCi/g with low radon factor
TX	5 pCi/g with high radon factor 30 pCi/g with low radon factor	TX	5/15 pCi/g with high radon factor 30/15 pCi/g with low radon factor
CRCPD (proposed)	5 pCi/g	CRCPD (proposed)	5/15 pCi/g

NOTES

- (1) High radon factory is a radon emanation rate greater than 20 pCi per square meter per second
- (2) Low radon factory is a radon emanation rate less than 20 pCi per square meter per second.
- (3) 5/15 pCi/g of radium of radium in soil, averaged over any 100 square meters and averaged over the first 15 centimeters of soil below the surface.

- (4) 30/15 pCi/g is 30 pCi/g of radium in soil, averaged over any 100 square meters and averaged over the first 15 centimeters of soil below the surface.

(Continued on page 30)

NORM Training Course Offered by OGCI & Peter Gray

OGCI (Oil & Gas Consultants International, Inc.), a world leader in petroleum training, has scheduled 2-day training courses in NORM for 1996 and 1997. The course *NORM Contamination in the Petroleum Industry* covers all aspects of NORM contamination and its control, including:

- Fundamentals of Radiation
- Fundamentals of NORM
- Radium Contamination
- Radon Contamination
- State & Federal Regulations
- NORM Surveys including Hands-on Training
- Maintenance Procedures
- Disposal of NORM Wastes
- Decontaminations
- Release of Facilities
- Recommended Programs
- Liability and Litigation

This course builds a rigorous and complete foundation for the control of NORM contamination.

This in-depth course is taught by Peter Gray who has a background in nuclear and radiochemistry and 25 years experience in the petroleum industry. Dr. Gray has a Ph.D. in Nuclear Chemistry from the University of California at Berkeley. He took early retirement from Phillips Petroleum Company in 1985 after 25 years with the company. Since 1985, Dr. Gray has been a consultant in NORM. During his tenure with Phillips, Dr. Gray was in charge of the company's NORM control program from the discovery of NORM contamination in natural gas and natural gas liquids in 1971 until his early retirement in 1985. This background uniquely qualifies Dr. Gray as the instructor for the course-- an instructor who understands the origin of NORM and why it contaminates nearly all petroleum facilities, where the contamination is, how to set up programs that protect employees, company facilities, the environment and the public, how to survey for NORM contamination, the available options for the disposal of NORM wastes, and the Federal and state regulations for the control of NORM.

Peter Gray is the editor/publisher of **The NORM Report**, a newsletter reporting on developments in NORM, including summaries of regulatory activities on the state and Federal level as well as in Canada.

The 1996/97 schedule for the course **NORM Contamination in the Petroleum Industry** is:

March 18-19, 1997 Tulsa, OK

For further information about the course, contact Joseph Goetz, OGCI. 1-800-821-5933, or contact Peter Gray, 918-492-5250, for information about the course content. ■

Comparison of NORM Rules by State (Continued)

Exemption for Contaminated Equipment

AR	Concentration limit only (5 pCi/g)	OK	50 µR/hr including background
		OR	5 pCi/g
CO (Proposed)	Concentration limit only (5pCi/g)	SC	50 µR.hr including background
GA	50 µR/hr including background	TX	50 µR/hr including background
LA	50 µR/hr including background	CRCPD (Proposed)	Concentration in dpm
MS	25 µR/hr above background 100 cpm above background		
NM	50 µR/hr including background		

NOTES

Before release for unrestricted use, facilities or equipment contaminated with NORM should not exceed specified contamination limits in dpm/100 sq. centimeters. ■