

# The NORM Report

Naturally Occurring Radioactive Material Control  
Volume VII, Number 3

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## Regulations for the Control of Naturally Occurring Radioactive Materials - An Update

The status of regulations for the control of NORM contamination is summarized for all 50 states, the Environmental Protection Agency (EPA) and the Nuclear Regulatory Commission (NRC), Canada, and the Conference of Radiation Control Program Directors (CRCPD). NORM contamination is not limited to the petroleum industry, and several non-petroleum states are drafting rules for the control of NORM in other industries. Each regulatory agency was contacted during July and August 2001.

Since the last issue of The NORM Report two more states have enacted regulations for the control of NORM. Maine adopted the CRCPD Part N regulations effective August 1, 2001 and West Virginia extensively revised their general regulations for the control of radiation and have included NORM regulations. The revised regulations became effective July 1.

Several other states have enacted regulations for some aspects of NORM control, e.g., remediation and cleanup of contaminated areas and the disposal of contaminated material.

The states, besides Maine and West Virginia, which have specific regulations for the control of NORM are Arkansas, Georgia, Louisiana, Mississippi, New Mexico, Ohio, Oregon, South Carolina, and Texas.

There currently are no federal regulations specifically for the control of NORM, although the Environmental Protection Agency appears to be moving in that direction (See page 15).

Canada now has published their *Guidelines for the Management of Naturally Occurring Radioactive Materials*. This issue of *The NORM Report* contains the Preface, Introduction, Purpose, Uniformity of Protection, Guideline Basis and Table of Contents for the Canadian Guidelines. Some of the features of the Guidelines will be further discussed in the next issue of the newsletter.

The enactment of regulations specifically for the control of NORM requires compliance by all 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.

The status of NORM regulations in all 50 states, the EPA, NRC, Canada and the CRCPD begins on page 2.

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## Summaries of State and Federal Regulations for the Control of NORM

### ALABAMA

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

### ALASKA

There is no NORM regulatory activity in Alaska at the present time. Although the price of oil has risen significantly, the budget is still very tight. Nothing will probably be done until the federal government (e.g. the EPA) mandates the Alaskan legislature to do something about NORM, similarly to what is currently happening about radium/radon in drinking water. There is some concern as to how radium removed from drinking water will be treated.

There have been no current problems with NORM contamination that have been referred to the State for action. The oil companies take care of their own NORM problems. Contaminated wastes are either being sent to Washington State for disposal or to the EPA-permitted injection well on the North Slope.

The Arctic Monitoring Assessment Program which is a consortium of all the Arctic countries, is starting to take an interest in NORM-type material. It is not known how this will translate into the U.S. Committee's action on the issue.

### ARIZONA

Although some consideration has been given to the need for specific NORM regulations in Arizona, there is no regulatory activity at

present. All radioactive materials, including NORM, are addressed in Arizona's general radiation regulations.

### ARKANSAS

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 Fall 96 issue of this newsletter. There are no plans to revise the NORM regulations.

### CALIFORNIA

In 1993, California underwent a peer review of its oil and gas exploration and production waste management regulatory programs. The review was conducted by the Interstate Oil and Gas Compact Commission (IOGCC), in cooperation with the U.S. Environmental Protection Agency and other interested 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 California Department of Conservation, Division of Oil, Gas and Geothermal Resources and the California Department of Health Services, Radiological Health Branch 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. Besides 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 the study indicate that NORM is not a serious problem in California oil and gas production facilities - confirming the findings found in an earlier survey (1987). In the 1987 survey, seventy-eight percent of the measurements were at background levels. A few sites had elevated levels of NORM. Further, studies of those sites should be considered. Routine protective measures may be all that is necessary to minimize exposure to radiation in these particular areas. The survey results and laboratory analyses 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.

(Continued on page 3)

**CALIFORNIA** (continued)

Copies of the report are available from:

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Telephone: (916) 322-4797

A summary of the report recommendations was in the Fall 96 issue of The NORM Report.

Promulgation of NORM regulations in California is a low priority at present. However, it is expected that California will enact NORM regulations sometime later.

**COLORADO**

There are no specific rules for the disposal of NORM in Colorado. NORM is treated like any other radioactive material. Part 18 of the Colorado Rules and Regulations Pertaining to Radiation Control (milling of uranium and thorium) are being updated to conform to Criteria 6(6) of 10 CFR 40, Appendix A (benchmark dose criteria). The Final adoption of the rule change is expected this summer.

Colorado does have a solid waste regulation that says sewage sludge must be below 40 pCi/gm gross alpha activity before it can be sent to a landfill or otherwise "free released."

There is no specific NORM regulatory activity in Colorado at this time.

**CONNECTICUT**

Using *Guidelines for Disposal of Drinking Water Wastes Containing Radioactivity* (U.S. Environmental Protection Agency draft, June 1994) and Nuclear Regulatory Commission limits for

the release of licensed material, the Connecticut Department of Environmental Protection put together its first guidelines for an actual water treatment facility. It will (for the present) continue developing guidelines for other facilities, giving case-by-case guidance. Simply put, the guidance will be to apply NRC discharge limits above background radioactivity. EPA Region 1 has given preliminary concurrence on this interpretation of EPA's Draft guidance. The thinking on this — "If it came from the ground and nothing was done to enhance it, it can go back into the ground."

Although an EPA Region 1 health physicist agreed with the proposed scenario that if "there is no radiological concern if it came from the ground, it could be returned to the ground if there had been no technical enhancement." However, an EPA expert on Underground Injection Controls (UIC) stated that the Clean Water Act amendments in its later revision, allows the injection of only water that meets federal drinking water standards. This would seem to exclude the return to the environment of any water treatment residue (salts from water softeners, filter backflush, etc.).

**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 1993. 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.

The Radiation Control Regulations are being considered for further revision, particularly Parts H and K. The revisions are at least six months to a year away.

NORM contamination appears to be minimal in the state. Occasionally a call is received from a salvage yard or steel mill reporting that their gate radiation monitors had detected gamma radiation above background on a load of scrap metal.

**FLORIDA**

The Florida Department of Health, Bureau of Radiation Control continues to devote staff resources to research the scope of the state's TENORM issues to support its evaluation of appropriate regulatory approaches. Its recent focus has been on the state's heavy mineral sands industry. Two facilities located in the northeast part of the state generate source material as a result of their separation of economic minerals from ancient beach sand deposits. The state is working with the industry to improve their radiation protection programs to address the radiological hazards associated with both the source material and the TENORM progeny present at the sites.

Florida does regulate gyp stacks requiring stacks to be lined with geomembrane liners and capped with a soil cover. The idea is to mitigate leachate release into the underlying Floridan Aquifer emanating from the stack.

**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 were

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**GEORGIA** (continued)

adopted by the Board. The revisions became effective May 6, 1997. However, there are no changes in the NORM rules in this latest revision.

**HAWAII**

Hawaii has revised their general radiation regulations but the CRCPD Part N was withdrawn for now. Part N will probably be incorporated in the regulations during the next revision, probably in 2002. NORM problems that do arise meanwhile can be handled on a case-by-case basis under the general regulations.

Hawaii does not now have any particular problems with NORM. 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 specific to the control of NORM. There are general statutory and regulatory provisions in the existing Idaho law giving the Department of Environmental Quality authority to address problems with NORM should they arise.

The commercial hazardous waste disposal facility in Idaho has been accepting NORM, and other radioactively contaminated wastes from the Army Corps' FUSRAP program. Public, legislative and regulatory awareness and concerns

about radioactive wastes have been heightened as a result. This scrutiny has led to the drafting of disposal regulations for radioactive wastes not presently regulated by federal regulations. It is hoped to have these disposal regulations ready before the end of the year, and to the state Department of Environmental Quality and the state legislature early in 2002.

**ILLINOIS**

In June 2001 a newly revised draft of the Illinois TENORM regulations was sent to the Illinois Department of Nuclear Safety (IDNS) staff for comment.

This draft incorporates most of the changes recently made to the Conference of Radiation Control Program Directors, Inc. (CRCPD) model rule (SSRCR Part N TENORM) by the CRCPD's SR-5 Working Group. The SR-5 submitted its revised draft Part N with its Rationale, Matters for Future Consideration, and revised Implementation Guidance to the CRCPD Board of Directors during June 2001 for evaluation and approval. The CRCPD Board's process may take 60 days. See the CRCPD Section for further details (page 19).

The TENORM regulations will be summarized in **The NORM Report** when available.

**INDIANA**

No new regulations for the control of NORM have been enacted or proposed in Indiana. There have been incidents involving NORM — contaminated materials in scrap yards, etc. It is expected there may be a need for NORM regulations sometime later.

**IOWA**

Iowa does not have specific regulations for the control of NORM. The

Iowa general regulations for radiation control are assumed to cover NORM and are used when NORM problems arise. Most of the NORM problems in Iowa involve NORM contaminated metal sent to scrap recyclers.

**KANSAS**

Regulations for the separate and specific control of NORM have not been proposed in Kansas. 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. Meanwhile, remediation activities in the Martha Oilfield are proceeding gradually and continually towards the final phases of cleanup of the field. Remediated materials are being stored in a temporary site pending the resolution of discussions on long term storage.

When the public clamor over the contamination of the Martha Oilfield dies down, consideration will be given to promulgating NORM regulations.

**LOUISIANA**

Following the adoption of the first state regulations for the control of NORM, Louisiana's revised NORM regulations became effective January 20, 1995. A draft of an

(Continued on page 5)

**LOUISIANA** (continued)

*Implementation Manual for Management of NORM in Louisiana* was released in September, 1995. The Table of Contents of this manual was given in the Fall 95 issue of *The NORM Report*.

The introduction to the Implementation Manual states "On January 20, 1995, the revised NORM regulations (LAC 33:XV. Chapter 14) became effective. This revised Implementation Manual reflects the changes and revisions which were made. It also includes the Radiation Protection Division's position on certain NORM issues that are not specifically addressed in the NORM regulations."

There have been no changes or revisions in the Louisiana NORM regulations since 1995 and none are planned.

Chem Waste has received approval for the disposal of NORM wastes containing up to 150 pCi/gm.

US Liquid sites in Louisiana can receive wastes containing less than 30 pCi/gm.

There is nothing new on the pending application for a new commercial NORM disposal well. The DEQ is waiting approval from the Office of Conservation who must approve it as a disposal well.

The number of P&A disposal wells has increased in Louisiana probably due to the high costs of NORM waste disposal.

There is one facility operated by Phillips Services. It is allowed to operate as a commercial facility because during the incineration process used the NORM is diluted. It is required that the incinerator wastes be disposed as incinerator

RCRA waste. As long as the NORM wastes contain less than 5 pCi/gm the Department is not concerned about it from a regulatory point.

Chevron has a NORM injection well for their own wastes from a specific cleaning area (that is, a non-commercial facility.) Chevron was refused permission to bring NORM wastes from Chevron facilities in Mississippi for disposal in their Louisiana injection well.

Meetings have been held with the Hazardous Waste Division to discuss the disposal of NORM contaminated mixed wastes in a hazardous waste landfill. One problem is that the hazardous waste disposal regulations in Louisiana prohibit the disposal of RCRA hazardous wastes containing NORM in a hazardous waste landfill.

The Louisiana regulations are based upon federal regulations. There has been some contact with the EPA in an attempt to determine the intent of the federal regulations. Knowing the intent of the federal regulations may suggest some options which can be used for the disposal of the hazardous wastes containing small concentrations of NORM. The federal regulations do allow some radioactivity, e.g., cesium-137, in the wastes to be disposed of in a hazardous waste landfill. Up to 100 picocuries cesium per gram can be disposed of this way.

**MAINE**

The CRCPD Part N (1999) Suggested State Regulations for the Control of NORM have been adopted with an effective date of August 1, 2001.

Maine does have NORM - contaminated water treatment wastes. Many water supplies in Maine con-

tain significant concentrations of radium, radon and uranium. Ion exchange resins used in water treatment can become "hot" with radium and uranium. Carbon filters used to remove radon from water become contaminated with the radon decay products, i.e., radioactive lead, bismuth and polonium.

The recent National Academy of Science report (*Risk Assessment of Exposure of Radon in Drinking Water, 1998*) and EPA's imminent adoption of radon in water MCL will mandate the state adopt water treatment wastes regulations.

**MARYLAND**

Maryland has no specific regulations for the control of NORM. NORM is handled under the general radiation regulations. These general regulations were 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 considered to be a subset of NARM and NARM is considered to be regulated by the Massachusetts general radiation regulations.

The amended general radiation regulations became effective July 9, 1999.

**MICHIGAN**

There have been no significant changes in the Michigan guidance documents for the control of NORM and although none are planned for the immediate future, the CRCPD's Part N is being closely followed to determine if it should be the basis for future NORM regulations in Michigan.

(Continued on page 6)

**MICHIGAN** (continued)

The cleanup and disposal guidelines that are being used in Michigan have been updated with respect to references to applicable state laws and improved ties to federal MARSSIM guides. That is, some regulatory and technical updates have been made, but there have been no really substantial changes to the present guidelines.

There have been some successful remediations at several oil and gas facilities that had slightly contaminated soils. The contaminated soils were sent to solid waste landfills in Michigan. The Michigan guidelines for disposal in type 2 municipal solid waste landfill allow up to 50 pci/gm radium-226 to be disposed. This can be a large cost saving. Analysis has shown that this level shows an insignificant risk to the public.

Michigan is resurveying many sites for NORM contamination. The original surveys had been made in the early 90s. The resurveys show that, generally, oil and gas sites which showed NORM contamination in the earlier surveys showed even greater contamination in the present study. For example, radiation readings of 1,800 mR/hour were seen at a gas separator and radioactivity levels of radium-226 as high as 150,000 to 200,000 pCi/g are seen in oil and gas facilities.

NORM contamination in paper mills has been reported. It is expected that Michigan paper mills will be surveyed for NORM.

**MINNESOTA**

Minnesota has no regulations for the specific control of NORM; it has regulations for devices that use discrete NARM (e.g. radium-226)

as a source of radiation.

Within the next year Minnesota is planning to permit four landfills to take low-level NORM wastes. One of the landfills has been permitted. The level of NORM which will be accepted at the landfills has not been determined.

Concern about NORM is increasing as more people learn about NORM contamination. One problem that has arisen is the zircon sands left when foundries go out of business. Allowing these NORM wastes to be disposed in a landfill will make the disposal easier.

In 1998, the Minnesota Department of Health began the process to become an Agreement State with the U.S. Nuclear Regulatory Commission.

**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 wellsite (effective July 1, 1995). After the petroleum leaves the wellsite the Department of Health was to have 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. The Mississippi State Board of Health Regulations for Control of Radiation, Section 801.N is still in effect. The Division of Radiological Health continues to process licenses from contractors for NORM decontamination at industrial facilities. The attorney for the Department of Health believes that any commercial reme-

diation, etc. will still have to be licensed by the Department.

Although the jurisdictional conflict has not been completely resolved, it has been smoothed out to a degree. If the NORM wastes are generated by E & P activities, it is assumed to be under the jurisdiction of the Oil and Gas Board. If the dosage from the NORM reaches a certain level, the Department of Health assumes jurisdiction. The Department of Health does not appear to be disputing this. The Oil and Gas Board has assumed jurisdiction for about 99% of NORM associated with oil and gas.

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.

Revisions made to Rule 69 at the public hearing in August 1995 were summarized in the Winter 96 issue of **The NORM Report**.

Rule 69 is being implemented. Oil and gas operators have conducted NORM surveys on all their properties. Over 1,500 survey data have been entered in a computer. Once all the surveys submitted have been put in the data base, it will be determined which oil and gas sites have not submitted survey data.

The data will be analyzed to determine how many sites are over a selected concentration level of NORM contamination. In the absence of a resolution of the jurisdictional dispute between the

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**MISSISSIPPI** (continued)

Department of Health and the Oil and Gas Board, the latter is assuming responsibility for every oil and gas site in the state.

Rule 69 was appealed to the Mississippi State Supreme Court where it was decided in favor of the Oil and Gas Board. The time for asking for a re-hearing has expired.

The Oil and Gas Board received a petition to amend statewide Rule 68 to authorize the surface and subsurface landspreading of Naturally Occurring Radioactive Materials (NORM) associated with the exploration and production of oil and gas. The petition was received from the US Oil & Gas Association, Alabama/Mississippi Division. *Rule 68, Disposal of Naturally Occurring Radioactive Materials (NORM) Associated with the Exploration and Production of Oil and Gas* became effective in September 1994. The original Rule 68 did not authorize the landspreading as a method of NORM disposal.

Special hearings were held before the State Oil and Gas Board of Mississippi commencing on August 18, 1999. At a hearing held September 15, 1999 arguments and closing statements were heard.

(Editor's Note: Some of the Oil and Gas Board's thinking on the revisions to Rule 68 were discussed in the Volume VII, No. 2 issue of **The NORM Report**.)

The Board found that the maximum radiation levels in the proposed amendments which would authorize the surface and subsurface landspreading of NORM E&P oilfield wastes, are significantly more restrictive than the radiation levels contained in *Statewide Rule 69: Control of Oil Field NORM*

which was approved by the Mississippi State Oil and Gas Board and became effective June 1, 1996, and which has recently been upheld on appeal by the Chancery Court of the First Judicial District of Hinds County, Mississippi. The Board found that existing Statewide Rule 69, among other things, prescribes standards for the cleanup or remediation of property containing NORM E&P oilfield wastes. The Board noted that property for unrestricted use could have a maximum ambient exposure rate of 50 microR per hour which is equivalent to concentrations of thirty (30) picocuries per gram. The Board's own expert, Dr. Vern Rogers, previously testified during the hearing on Statewide Rule 69, that this maximum soil concentration would result in no demonstrable health and safety impact on the residents of the State of Mississippi. The Board found that the proposed amendments to Statewide Rule 68, which were before the Board will allow the surface and subsurface landspreading of NORM E&P oilfield wastes only where the maximum NORM concentrations do not exceed five (5) picocuries per gram. The Board found that the proposed landspreading amendments to Statewide Rule 68 contain maximum NORM concentrations which are six (6) times more conservative than the NORM concentrations prescribed in existing Statewide Rule 69. In addition, the Board found that the maximum radiation exposure rate of 40 millirem per year, as proposed is fully supported by the overwhelming weight of the credible scientific testimony as being safe and fully protective of both human health and the environment.

The Board stated that in developing the landspreading rules, it had been the objective of the Board to devel-

op rules which are sufficiently protective of oilfield workers, the general public and the environment, which do not conflict with existing state or federal regulations, which are technically sound, and which are implementable by those subject to their provisions. The Board was of the opinion and found that the landspreading rules being adopted fully meet all these objectives.

The Board found however, after careful evaluation, that a number of additional revisions should be incorporated into the proposed landspreading amendments to Statewide Rule 68 which differ significantly from the rule as originally proposed. These additional revisions were also summarized in the Volume VII, No.2 issue of **The NORM Report**.

The effective date of the amended Rule 68 was January 19, 2000.

Subsequently, an appeal of Rule 68 was filed in Lincoln County but was dismissed by the courts. There is an appeal of Rule 68 pending in Jefferson County. The Oil and Gas Board expects this latter filing will also be dismissed.

**MISSOURI**

There are no specific NORM regulations in Missouri and none are planned. 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

(Continued on page 8)



**MONTANA** (continued)

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 rules.

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 microrem/hr, to know when they can refuse or accept contaminated scrap.

**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 presently not 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 and their radioactive decay products.

Future regulatory activities may consider the need to adopt regulations similar to 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**

*Soil Remediation Standards for Radioactive Materials*, N.J.A.C. 7:28-12, was adopted on August 7, 2000. The response to the comment document, final rule, guidance manual on characterization and final status surveys, and the spreadsheet used to implement the standards are all available on the Radiation Protection Program's website

<http://www.state.nj.us/dep/rpp/index.html>

New Jersey has about 10 sites that are in some stage of cleanup. Most are using all or part of the rule for the cleanup levels and MARSSIM to implement final status surveys

**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**.

The guideline document draft for use with the NORM regulations (Appendix A of the regulations) is also available. The guide is entitled *Appendix A: Regulation Guidelines for the Management of NORM in the Oil and Gas*

*Industry in New Mexico.*

The purpose of the document is to provide guidance to persons involved with facilities or equipment associated with the production of oil and gas and how to conduct screening surveys with portable radiation detectors to identify NORM and to initiate determination of needed radiation protection controls. The guide is intended for individuals licensed by the New Mexico Environment Department and permitted by the New Mexico Oil Conservation Division. The document is intended to assist general and specific licensees in their proper use, transfer, transport, storage and disposal of regulated NORM.

The guide describes the type and extent of information needed by the New Mexico Radiation Licensing and Registration Section staff to evaluate an application for a specific license for authorization to perform commercial services involving NORM contamination.

The guide is for general guidance in preparation of the license application and should not be considered as all the information that may be required for a particular application. Nor is it a substitute for the applicant's safety evaluation of the proposed activity. The applicant must ensure that the application correctly and adequately describes the commercial services offered, and the radiation safety measures and procedures to be followed to provide adequate protection. For this guide, decontamination means deliberate operations to reduce or remove or remove residual NORM contamination from equipment, facilities or land.

Copies of the New Mexico NORM guide are available from:

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**NEW MEXICO** (continued)

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Copies of the State of New Mexico Radiation Protection Regulations (including the NORM rules), are available for \$37.50 from:

Santa Fe Printing  
 1424 Second Street  
 Santa Fe, New Mexico 87505  
 505-982-8111

**NEW YORK**

On July 31, 2000, the New York State Department of Environmental Conservation amended the Department's *Rules and Regulations for Prevention and Control of Environmental Pollution by Radioactive Materials* (6 NYCRR Part 380), which control the disposal of radioactive materials and radioactive wastes in this State. The amendment was promulgated as an emergency rule (effective July 31, 2000) and added a new category of radioactive waste to those radioactive wastes that are regulated under Part 380. These radioactive wastes may not be accepted for disposal at a facility regulated under the provisions of the State's solid waste management regulation, 6 NYCRR Part 360 (Part 360). The full text of the amended Part 380 is available on the Department's website at

[www.dec.state.ny.us/website/regs/380.htm](http://www.dec.state.ny.us/website/regs/380.htm).

**Type of Radioactive Wastes Affected**

This regulation affects radioactive wastes that were produced when ores were processed to extract uranium and thorium before November 11, 1978. (Similar wastes produced after that date are regulated by the US Nuclear Regulatory Commission.) Uranium and thorium are both naturally occurring radioactive materials, and the ores in which they are found contain other radioactive elements that are produced by the radioactive decay of the uranium and thorium. When the ores are processed to remove the uranium and thorium, the resulting waste products can contain high concentrations of these radioactive materials. These wastes have been considered by some to be NORM wastes that were heretofore unregulated. Often, the buildings and lands where the ores were processed became contaminated with these radioactive wastes.

**Typical Waste Forms Excluded from Landfills by this Amendment**

Cleanup of these sites usually involves removing contaminated soil. In addition, buildings and other structures often must be demolished. These result in waste soils and demolition debris. Some of these wastes are not contaminated with radioactive material and their disposal is regulated as solid waste under Part 360. However, some wastes will contain radioactive uranium, thorium, and their decay products at concentrations greater than what normally is found in those wastes due to naturally occurring radioactive materials. Under this amendment, those wastes are radioactive wastes and

cannot be accepted at landfills in New York State.

**Upcoming Rulemaking Process**

The Department is still under emergency rulemaking and is in the process of advancing the final rule. The Department has received some negative responses from several corporations but has also received positive responses from other groups.

New York continues to have problems with radiation alarms being set off at landfills.

**NORTH CAROLINA**

Nothing presently is being proposed for NORM regulations for North Carolina. The state recognizes that NORM is an issue that may need further attention, particularly in scrap metal yards. The state is also aware that there are North Carolina industries that generate NORM wastes, such as the phosphate industry, waste water treatment sludge, and metal mining and processing wastes. For the present, North Carolina remains committed to interacting with industry, Federal and state agencies and providing assistance in resolving disposition of NORM wastes.

North Carolina is considering ways to standardize or formalize its method of responding to incidents involving NORM/TENORM. Examples of such incidents include scrapyards/landfill portal monitor trips and mine refuse/industrial waste disposal. As part of this process, it was suggested that the state conduct a survey of other state radiation control programs to see

(Continued on page 10)

**NORTH CAROLINA** (continued) how other states handle NORM/TENORM incident response. For example, how do other states handle these incidents? It can take an excessive amount of time to investigate each portal monitor trip and similar incidents at landfills and scrapyards. The state cannot afford to send a health physicist or other technical staff to each facility requesting assistance. Should the agency be a free health physics consultant and guide them through every step in disposing of the NORM or do we just fax the facility a list of available qualified consultants and coordinate things from the "home office"?

### **NORTH DAKOTA**

North Dakota does not have specific regulations for the control of NORM. The state is currently revising their Radiation Control Regulations, but no changes are expected with respect to NORM.

### **OHIO**

The revised Ohio regulations for the control of radiation, including NORM and NARM, were summarized in the Spring 97 issue of The NORM Report. The regulations were revised to agree with the federal regulations as an initial step in Ohio's application to become an Agreement State. The Agreement State status became effective August 31, 1999.

It is probable that more specific NORM regulations will be necessary within the next 12 to 18 months.

### **OKLAHOMA**

Oklahoma has no specific regulations for the control of NORM con-

tamination. The draft of NORM regulations prepared by the Department of Environmental Quality's Radiation Management Advisory Council was tabled indefinitely at the request of the state legislature.

Oklahoma became an Agreement State effective September 29, 2000.

### **OREGON**

There are no new developments regarding NORM regulations in Oregon.

Oregon has NORM regulations entitled *Regulation and Licensing of Naturally Occurring Radioactive Materials (NORM)*. The rules that 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**

All radioactive materials including NORM are addressed in Pennsylvania's general radiation regulations. At present there are no specific NORM regulations.

A draft of solid waste regulations has been prepared by the Bureau of Radiation Protection and the Bureau of Land Recycling and Waste Management. This started as guidance about five years ago and has evolved to codify the essential elements so that now all the 300 landfills, transfer stations and resource recovery facilities (e.g. incinerators) will be required to monitor for radiation.

Maximum performance standards (alarm set points, etc.) and best management practices were set out in the regulations and guidance. That is, what can and what can't be accepted in a solid waste facility.

Some 95% of the radioactive materials being disposed of in the landfills are short-lived nuclides, e.g. from nuclear medicine facilities. But, occasionally the landfills do receive some NORM waste, and it is expected that when the northwest counties of the state where there is an oil and gas industry start installing monitors many more instances of NORM will be seen.

Particularly noteworthy in these regulations and guidance is that if an alarm goes off because of cover materials taken from an undisturbed environment are being taken to a landfill, the materials are exempt from the regulations. That is, if there is no enhancement of the radioactivity, the materials are exempt.

If there is TENORM, i.e., technically enhanced NORM, a small quantity can be accepted by the landfills if certain conditions are met. One cubic meter of material can be accepted without further approvals if the material contains less than 5 picocuries radium per gram, and the dose rate is less than 50  $\mu$ R/hour. Approval to accept other materials in the landfills will be handled on a case-by-case basis.

The set point for the gate radiation monitors is 10  $\mu$ R/hour above background.

The title of Document Number:250-3100-001 is: *Final Guidance Document on Radioactivity Monitoring at Solid Waste Processing and Disposal Facilities* Effective Date: Sept. 16, 2000.

Now over the next two years, the 300 landfills must submit action plans, install radiation monitoring equipment, developing procedures, training staffs, etc.

(Continued on page 11)

**PENNSYLVANIA** (continued)

Nine out of ten radioactive wastes sent to landfills in Pennsylvania are short-lived radioactivities from medical wastes. The landfills will either need multichannel analyzers and the expertise to interpret the results or hire a consultant to separate the TENORM from the medical wastes. The medical wastes will be allowed to be disposed of in the landfill while the TENORM must meet the requirements above to be accepted by the landfill.

Pennsylvania is a major state for the disposal of solid wastes from most of the states bordering Pennsylvania.

The Comment/Response Document entitled *Report to the Environmental Quality Board on the Proposed Guidance Document on Radioactivity Monitoring at Municipal and Residual Waste Processing and Disposal Facilities* can be downloaded from: [http://www.dep.state.pa.us/dep/subject/Rec\\_Final\\_Technical\\_guidance/Rec\\_Final\\_Technical\\_guidance.htm](http://www.dep.state.pa.us/dep/subject/Rec_Final_Technical_guidance/Rec_Final_Technical_guidance.htm) (The document is at the bottom of the table.).

A copy of the document may also be available from:

David J. Allard, CHP  
PA DEP, Bureau of Radiation  
Control  
P.O. Box 8469  
Harrisburg, PA 17105-8469  
Tel: 717-787-2480  
E-mail:  
allard.David@dep.state.pa.us

**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 regulations and none are proposed. 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.

**TENNESSEE**

NORM contamination in Tennessee is handled 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 contaminated wastes. 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.

In April, 1999, the Texas Department of Health (TDH) finalized revisions to 25 Texas Administrative Code, §289.259, *Licensing of Naturally Occurring Radioactive Material (NORM)*.

The revisions include new definitions that support the changes in the rule. Exemptions for oil and gas NORM waste are redefined and exemptions for pipe (tubulars) and other downhole or surface equipment contaminated with NORM are clarified. Specific licensing requirements for spinning pipe gauge operations that perform NORM decontamination and for persons receiving NORM waste from other persons for processing or storage are added. Other minor grammatical changes are made to the section for clarification.

Over the last several years, industry has indicated that they consider "routine maintenance" to be the repair and maintenance of equipment for restoring it to its intended use or efficiency, despite the presence of oil and gas NORM. Decontamination of equipment contaminated with NORM above the exempt limits may occur incidental to the routine maintenance. The TDH acknowledges that not all routine maintenance activities result in a significant increase in radiation exposure risk. Simple routine maintenance tasks such as replacing or repairing a valve, changing filters, or "pigging" a pipe are such activities.

The wording in the revised rule, "Maintenance that provides a different pathway for exposure than is found in daily operations and that increases the potential for additional exposure is not considered routine," was proposed to define the risk the department is concerned about. In discussions with the industry, the TDH determined that the activity that presents the most concern is vessel entry. The industry considers this to be routine maintenance. However, this is the type of operation that the TDH believes presents a significantly

(Continued on page 12)

**TEXAS** (continued)

increased risk from an enclosed environment where an inhalation risk (a different pathway for exposure than is found in daily operations) from NORM can be present.

The TDH acknowledges that unlike the employees of a company specifically licensed to perform decontamination, the employees or contractors of a general licensee would be performing vessel entry on an infrequent basis and thus, the radiation exposure risk is lowered due to the time factor.

The TDH drafted language that will outline radiation safety precautions that must be followed when vessel entry is conducted during routine maintenance, but wishes to seek further input from the industry on that draft language. However, in order for several of the other revisions of this section supported by comments to become effective and for the section to be reformatted in **Texas Register** format, no change to the wording about routine maintenance was made prior to the rule revisions being finalized.

In July, 1999, the TDH held a workshop to explain the revisions to the rule and to get stakeholder input on the draft language about routine maintenance. Over 75 people attended the workshop and the TDH received a good amount of input on the draft language. The staff will be reviewing the input received during the workshop and will develop new draft revisions to 25 TAC §289.259. TDH hoped to have the revisions before the end of 2000, but legislative priorities for other regulatory actions will push this back to at least the spring of 2002.

The three agencies are considering some additional changes to the NORM rules, particularly concern-

ing exemptions.

The Texas Railroad Commission's Statewide **Rule 94: Disposal of Oil and Gas NORM Wastes** took effect February 11, 1995. This rule sets forth requirements for the safe disposal of NORM that constitutes, is in, or has contaminated oil and gas wastes. Rule 94 was summarized in the Winter 95 issue of **The NORM Report**.

In 2000 the Railroad Commission conducted a survey of 612 randomly selected oil and gas sites throughout the State to determine the radioactivity level of various types of oil and gas equipment, including tanks, flow lines, valves, pumps, and well tubulars relative to background levels. NORM radioactivity above the regulatory level of 50  $\mu$ R/hr was detected at 59 sites. Of a total of 5,916 readings of oil and gas equipment, 203 were higher than 50 mR/hr. To augment the study, the Texas Department of Health surveyed 24 pipe yards around the State. Pipe at four yards had levels of NORM radioactivity above 50  $\mu$ R/hr. The survey results and other pertinent data were used to evaluate the effectiveness of the current regulations for the detection, control, and disposal of oil and gas NORM. The study was completed by December, 2000.

Legislation signed into law on May 22, 2001 authorizes the Railroad Commission to require the owner/operator of oil and gas equipment used in exploration, production, or disposal to determine whether the equipment is contaminated or contains oil and gas NORM waste, and identify any equipment so determined.

There has been no change to the Texas Natural Resource Conservation Commission

(TNRCC) non-oil and gas NORM requirements. However, since the issuance of the 40 CFR 141, **National Primary Drinking Water Regulations for Radionuclides**, the TNRCC decided it will investigate the need for NORM disposal rules to address drinking water treatment wastes containing Radium-226, Radium-228, and Natural Uranium. The TNRCC has requested a drinking water advisory group be established and that several "Shareholder" meetings be held with the advisory group to obtain feedback to determine the need for NORM rules. It is expected that if TNRCC NORM rules are required, they will not be completed until late 2003.

The TNRCC has prepared a White Paper which was issued March 29, 2001. The paper entitled **Implementing the National Primary Drinking Water Regulations for Radionuclides** (40 CFR 141) was written to inform the Legislature of recent revisions to the EPA's National Drinking Water Standard for radionuclides and how they may affect constituents. These federal regulations concern Naturally Occurring Radioactive Material (NORM) in drinking water. The TNRCC staff requests guidance on whether to develop rules needed to address disposal of NORM waste from treatment of drinking water.

Public drinking water systems are now faced with final regulations for radionuclides and must address health concerns for many citizens of Texas. Options for achieving compliance are limited to either finding an alternate source or to treat the water to lower the radionuclide concentration to acceptable levels. Alternate water supplies are not available at a reasonable cost in some parts of the state. Even where

(Continued on page 13)

**TEXAS** (continued)

available, developing alternate sources or purchasing water from other systems may be more expensive than applying available treatment technologies. Treatment, however, is not an option if there are no rules to allow disposal of the treated waste

The staffs of Public Drinking Water, Underground Injection Control and Radioactive Waste, Toxicology & Risk Assessment, and Legal have reviewed this issue. They have determined that there is a human health concern associated with radionuclides in some drinking water systems in Texas. The preferred option for some violators will be implementation of treatment technologies. However, this would result in producing NORM waste which must be disposed of in a proper manner.

There is a need to develop rules for the safe, economical disposal of NORM waste to protect human health and the environment. A rules revision is needed to address standards for licensing and permitting requirements for facilities which dispose of non-oil & gas NORM.

**UTAH**

NORM is considered to be in Utah's comprehensive radiation control regulations. No specific NORM regulations have been proposed in Utah.

A license application was received on November 1, 1999 from Envirocare of Utah to receive and dispose of containerized Class A, B, and C waste. Envirocare is now going through a five-step process that requires a siting and technical review by the Division of Radiation Control and a public process that requires the facility to be approved by the host county, the legislature, and the governor.

Envirocare has completed the siting process and received county approval to date. The public comment period has concluded. Comments have been reviewed, and a final decision is now under consideration.

On January 26, 2001, the Division received a major amendment request from Envirocare to receive and dispose of containerized Class A waste in the existing Class A cell. Public comment on the request has concluded on the request and comments are being evaluated prior to a final decision.

**VERMONT**

Vermont has no direct regulations for the specific control of NORM and none are planned. Concern has been expressed as to the radiation received by some workers in granite plants due to radioactive materials (NORM) 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 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.

Another interesting situation involves the monitoring of wells from waste treatment facilities. Some facilities are unprepared to take into account the natural radioactivity in the water. There is no mechanism for consideration of ground water naturally containing radionuclides above EPA standards, other than a restriction on the use of such waters as potable

water. Much of these waters are used for irrigation and for watering livestock. Some facilities are inappropriately applying the U.S. EPA standards for drinking water, neglecting the natural radioactivity in the water. Without allowing for the natural activity in the water, some of the monitoring wells exceed the EPA standard, leading to the conclusion that the treatment facility is contaminating the ground water.

Another issue in Vermont and increasingly in other jurisdictions involves medical radioactive waste shipped from Canada to the United States for treatment and disposal. The regulations in Canada and Vermont are different creating a snag which the state is presently trying to resolve.

Vermont is becoming concerned about what effect small concentrations of radium-224, lead-210 and polonium-210 (all of which have been detected in Vermont waters) will have on regulations to safeguard the health of residents of the state. Concerns have been expressed that no standard method has yet been developed for the determination of radium-224 in water, although this nuclide has been under discussion for more than two years. It appears regulators generally would like to ignore the problem of radium-224 much like was done earlier regarding radon.

None of these issues discussed here have yet been approached for final solution.

**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 regula

(Continued on page 14)

**VIRGINIA** (continued)  
tions are being revised.

### **WASHINGTON**

In August 2000 the draft Environmental Impact Statement (EIS) for the Commercial Low-Level Radioactive Waste Disposal Site was jointly issued by the Washington State Department of Health and Washington State Department of Ecology. The draft EIS evaluated alternatives for renewal of the US Ecology, Inc. license to operate the site, limits for disposal of diffuse Naturally Occurring or Accelerator Produced Radioactive Material (NARM), and closure of the site. Public comments were received on the draft EIS through November 2000.

The agencies original intent was to publish a final EIS in March 2001. Based on the volume and substance of the comments received, it became apparent that there was a lot more work to do before a final EIS can be completed. The new schedule is to issue a final EIS no later than December 2002.

There are many tasks the agencies will continue to work on over the next 18 months in preparation of the final EIS. Some of these tasks are:

1. Individually answering all comments received during the comment period,
2. Integrating the data from the site investigation into the Chemical Risk Assessment, Ground Water Modeling, and Radioactive Risk Assessment,
3. Evaluating an alternative of zero volume for NARM disposal,
4. Evaluating impacts for air transportation of waste,
5. Evaluating transportation

impacts for construction of the closure cover,

6. Researching and evaluating more operational enhancements including the use of trench liners,

7. Clarifying the role of the Model Toxics Control Act in closing the commercial site,

8. Planning Phase III of the site investigation, including hiring a consultant to facilitate public participation in the Data Quality Objective (DQO) Process.

The agencies appreciate all the comments received on the draft EIS. Many of the tasks listed above reflect recommendations made during the comment period. Although the time and effort required to respond to the comments requires an extended schedule, the agencies believe this additional effort will result in a Final EIS that better answers the public's questions and concerns.

For more information, please contact Nancy Darling, Washington Department of Health, (360) 236-3244, Nancy.Darling@doh.wa.gov or Larry Goldstein, Washington Department of Ecology, (360) 407-6573, lgol461@ecy.wa.gov.

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**

The general regulations for the control of radiation have been extensively revised and have been approved by the state legislature. The revised regulations which now include NORM rules became effective July 1, 2001.

In addition to the inclusion of NORM rules, the revisions to the radiation regulations were very extensive, going from a 75 page document to a 450 page document. The NORM rules are largely based on the CRCPD Part N Suggested State Regulations for the Control of Naturally Occurring Radioactive Materials.

### **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's general radiation regulations are being revised as part of becoming an Agreement State. A draft of the revised general regulations is almost ready to hand in and start the promulgation process. This will undoubtedly be a lengthy process because the revised regulations are significantly longer than the previous rules. Specific NORM regulations are not in the revision. NORM rules will be addressed later -- NORM is an issue onto itself. The current revision focuses on the Atomic Energy Act and NARM.

### **WYOMING**

Wyoming has no regulations for the control of NORM and none have been proposed. But, the issue has been discussed at a SERC meeting and the committee has inquired what surrounding states are doing and what regulations are in place. Wyoming is currently reviewing options using Wyoming's neighbors information as a basis for the next action.

At the current time, there is no plan to initiate any NORM regulations

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**WYOMING** (continued)

besides those currently in place (environmental rules/regulations).

Wyoming relies on voluntary cooperation for the control of NORM. For example, scrap yards and other recyclers have installed gate radiation monitors, etc.

Considerable scale is found in the Wyoming oil and gas industry but there appears to be no support for NORM regulations. The problem with that scenario is that there are no controls on NORM/TENORM within the state for the most part -- only some restrictions on produced water and ground water. For example, 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)**

In July 2000, EPA sent a report to Congress stating the Agency's views on the need to revise its guidelines for TENORM because of the 1999 National Academy of Sciences evaluation (see **The NORM Report** - Fall 1999/Winter 2000 issue). EPA explained the technical and policy basis for its views and submitted the NAS report along with the EPA report. The EPA report is available to be read or downloaded electronically on EPA's TENORM Internet web site at: [http://www.epa.gov/radiation/tenorm/docs/nas\\_resp.pdf](http://www.epa.gov/radiation/tenorm/docs/nas_resp.pdf)

The Agency's current approach to TENORM is to :

- Study and issue individual technical reports on TENORM-producing

industries to determine what's in the wastes and products from each industry and how much risk they pose. The Agency will focus on TENORM materials from specific sources in a series of separate reports.

- Identify and study existing TENORM sites to assemble a nation-wide view of the problem. This consists of a variety of field projects that will give EPA more information on the sources, characteristics and risks of TENORM.
- EPA will seek to partner with other organizations to enhance data sharing and avoid duplication of efforts. Meetings and partnerships with stakeholders will help to review technical reports plus identify appropriate courses of study and action for each TENORM product or waste.
- Ultimately develop and provide education and guidance for radiation protection, and for safely and economically handling, cleaning up and disposing of TENORM.

Accordingly, with this approach, EPA will not be developing a revision of the draft report **Diffuse NORM Wastes: Waste Characterization and Preliminary Risk Assessment** originally issued in April 1993. Instead, it plans to use some materials in that report plus new information and revised risk analyses in each of its technical reports. The first of those reports will be on TENORM from uranium mining and is currently in preparation.

**Contacting EPA about TENORM**

If you have questions or comments about EPA's TENORM Program or TENORM in general, or if you would like to request more information, the EPA can be contacted at:

TENORM Program  
U.S. Environmental Protection Agency  
Office of Radiation and Indoor Air  
(6608J)  
Washington, DC 20460  
Tel: 202-564-9445  
Fax: 202-565-2065  
e-mail: [webmaster.oria@epa.gov](mailto:webmaster.oria@epa.gov)

**NUCLEAR REGULATORY COMMISSION (NRC)**

The Commission has instructed the NRC staff to look into better and more efficient ways to regulate low-activity materials (unimportant quantities of source materials, i.e., less than 0.05% thorium and uranium which are basically similar to NORM and TENORM). The staff was instructed to form a working group with other federal agencies.

The agencies on this working group are the Nuclear Regulatory Commission, the Environmental Protection Agency, the Department of Energy, OSHA and the Army Corps of Engineers. The Group is looking at ways to better regulate low-end materials, which include TENORM. They are exploring options where one option might be for the Commission to defer regulations of unimportant quantities of source materials. The Group, which has now met three times, is still exploring options and has nothing firm to offer yet.

Another committee, the Interagency Steering Committee on Radiation Standards (ISCORS), is charged with harmonizing radiation standards and risk manage

(Continued on page 16)



**NRC** (continued)

ment practices among the various federal agencies. The agencies on the Steering Committee include the Nuclear Regulatory Commission, the Environmental Protection Agency, the Department of Energy, Health and Human Services, Department of Transportation, Department of Defense, Department of Labor/OSHA, and the Department of State.

The Steering Committee has several subcommittees, including a NORM Subcommittee. The members of this subcommittee include all the members of the parent committee except the Department of State. Representatives from various states attend meetings as observers.

The mission of the ISCORS NORM Subcommittee is to ensure effective communication and coordination among member agencies involved with regulatory, oversight, and disposal issues for NORM wastes, and products containing NORM. At the direction of the full ISCORS Committee, the Subcommittee may take on responsibility for issues on other types of radioactive waste and materials.

At the most recent Subcommittee meeting reported on the ISCORS Web page, i.e., the March 20, 2001 meeting, Chairman Loren Setlow (EPA), reported that during the session the Air Force member said that they are examining their previous AEC licenses to check on waste material that may be buried at their installations across the country.

The DOT member mentioned that their draft notice of proposed rulemaking on amending transport requirements for radioactive materials to bring them into compliance with IAEA/ICRP standards had received sixty comments. Setlow mentioned that he had worked on a

joint NEA/IAEA report on "Restoration of World Uranium Recovery Facilities" that would be issued this year and cover remediation of contaminated facilities, long term stewardship and monitoring. He also described EPA's development of a Geographic Information System to illustrate the locations of abandoned uranium mines and their relationship to population, infrastructure, ecosystems, etc. with the objective of assessing risk. A presentation had been made at the Subcommittee meeting by NRC staff on the status of their Jurisdictional Working Group which was evaluating federal agency rulemaking plans for source material <500 ppm. Another presentation also had been made on the status of the revised CRCPD "Part N" suggested state regulations for TENORM. Lastly, the Subcommittee discussed development of a White Paper on the NORM/TENORM authorities of member agencies.

Information on ISCORS, including the NORM Subcommittee can be found on the ISCORS Web page at <http://www.iscors.org>

It is my understanding that the ISCORS Annual Report for 2000 has been released, but it is not yet available on their Web page.

According to the Atomic Energy Act of 1954 the NRC cannot regulate NORM, but is very interested in the subject since NORM is very similar to what the NRC does regulate.

### **MINERALS MANAGEMENT SERVICE (MMS)**

The Minerals Management Service Gulf of Mexico OCS Region has released a **NOTICE TO LESSEES AND OPERATORS OF FEDERAL OIL, GAS, AND SULFUR LEASES AND PIPELINE RIGHT-OF-WAY HOLDERS IN**

**THE OUTER CONTINENTAL SHELF, GULF OF MEXICO OCS REGION: Guidelines for the Sub-Seabed Disposal and Offshore Disposal Storage of Solid Wastes.** This Notice to Lessees and Operators (NTL) supercedes NTL No. 96-03, dated May 8, 1996, on this subject.

It updates regulatory citations, makes minor technical amendments, and includes a statement on the Paperwork Reduction Act of 1995. The Guidelines became effective September 24, 1999. The background section of the Guidelines is reproduced below.

### **NTL No. 99-G22 BACKGROUND**

This Notice to Lessees (NTL) provides standardized guidelines and instructions for the sub-seabed disposal and offshore storage of solid wastes generated from oil and gas development on the Outer Continental Shelf (OCS) in the Gulf of Mexico OCS Region (GOMR). This NTL applies only to such solid wastes that are classified as exempt exploration and production (E&P) wastes under the Resource and Conservation and Recovery Act (RCRA) (see 40 CFR 261.4(b)(5)). These exempt E&P wastes include drilling fluids, produced waters, and other wastes associated with the exploration, development, or production of oil, gas, or sulfur on the OCS. According to 30 CFR 250.300(b)(2), you must obtain approval from the Minerals Management Service (MMS) of the methods you will use to dispose of drill cuttings, sand, and other well solids. Under this authority, the MMS GOMR requires that you must obtain approval for the sub-seabed disposal of all wastes, and for the offshore storage of E&P wastes that contain naturally occur-

(Continued on page 17)

**MMS** (continued)

ring radioactive materials (NORM) above background levels. You must obtain these approvals before you may proceed with such disposal or storage operations.

This NTL provides guidance and instructions on the disposal of these E&P wastes, worker safety when handling these wastes, and the contents of application to dispose of or store these wastes. The procedures regarding waste disposal outlined in this NTL do not supercede, but are supplemental to, those procedures for abandonment of wells as specified in Subpart G of 30 CFR 250.

This Notice to Lessees (NTL No. 99-G22 is available on the Internet at the following URL:

[http://www.gomr.mms.gov/homepg/regulate/regs/ntls/ntl\\_1st.html](http://www.gomr.mms.gov/homepg/regulate/regs/ntls/ntl_1st.html)

**CANADA**

**CANADIAN GUIDELINES  
FOR THE MANAGEMENT  
OF NATURALLY OCCUR-  
RING RADIOACTIVE  
MATERIALS (NORM)**

June 2000

Prepared by the Canadian  
NORM Working Group of the  
Federal Provincial Territorial  
Radiation Protection  
Committee

**Editor's note:** The Canadian NORM Guidelines are now published. They can be downloaded from the web by accessing the Saskatchewan Labour website:

<http://www.labour.gov.sk.ca/safety/publications/publications.htm>  
and selecting, under brochures, the Canadian Guidelines for NORM.

Or they can be directly accessed from the Health Canada Website:

[http://www.hesc.gc.ca/chp/ehd/catalogue/rpb\\_pubs/00ehd245.pdf](http://www.hesc.gc.ca/chp/ehd/catalogue/rpb_pubs/00ehd245.pdf)

**PREFACE**

The NORM Working Group, a working group of the Federal Provincial Territorial Radiation Protection Committee, represents the interests of provincial and territorial regulators and includes affected industries in the petroleum production, fertilizer manufacturing and metal recycling industry sectors. With the support and encouragement of Health Canada, and the Canadian Nuclear Safety Commission, these Guidelines are the result of their efforts.

**INTRODUCTION**

The Canadian Nuclear Safety Commission (CNSC), formerly the Atomic Energy Control Board (AECB), has legislative control of nuclear fuel cycle materials and man-made radionuclides. However, naturally occurring radioactive material (NORM) is exempt from CNSC jurisdiction except for the import, export and transport of the material. Therefore, jurisdiction over use and radiation exposure to NORM rests with each Canadian province and territory.

It has been the practice for companies that encounter challenges associated with NORM to seek advice on safety procedures from provincial and territorial regulatory agencies. Such advice has been given on an ad hoc basis, leading to inconsistencies in the interpretation and application of radiation safety standards across Canada.

The Federal Provincial Territorial Radiation Protection Committee (FPTRPC), a Canadian intergovernmental committee established to support federal, provincial and territorial radiation protection agencies in carrying out their mandates,

recognizes that the potential radiation hazards from NORM are the same as those from radioactive materials controlled by the CNSC. The basic principle of these Guidelines is that where workers or the public are exposed to additional sources or modes of radiation exposure because of activities involving NORM, the same radiation protection standards should be applied as for CNSC regulated activities. This applies to situations where NORM is in its natural state and to cases in which the concentration of NORM material has been increased by processing.

However, in practice there may also be situations where existing natural background radiation is significant quite apart from any activities involving the use of NORM. The issue of whether human intervention is required to reduce such natural radiation levels is quite separate from the issues discussed in these Guidelines and the reader is referred to ICRP 65 for a discussion of when such intervention might be warranted.

To that end, the Canadian NORM Working Group has, on behalf of the Federal Provincial Territorial Radiation Protection Committee, produced the *Canadian Guidelines for the Management of Naturally Occurring Radioactive Materials (NORM)*. The Guidelines are an extension of the work by the Western Canadian Committee on Naturally Occurring Radioactive Materials (NORM) published in August 1995 as the *Guidelines for the Handling of Naturally Occurring Radioactive Materials (NORM) in Western Canada*. The differences between the Canadian Guidelines and the Western Canadian Guidelines reflects changes in national and international radiation protection practices

(Continued on page 18)

**CANADA** (continued)

and consensus standards for NORM classification and management since 1995.

The Canadian Guidelines set out principles and procedures for the detection, classification, handling and material management of NORM in Canada, and include guidance for compliance with federal transportation regulations. These Guidelines provide the framework for the development of more detailed NORM management practices and Guidelines by regulatory authorities, affected industries and specific workplaces. A separate section outlines the basic science of radioactivity and explains the technical terms and concepts that are used throughout the Guidelines.

There is also a glossary at the end of the document for quick reference and definitions.

**Purpose of The Canadian NORM Guidelines**

As NORM is not part of the nuclear fuel cycle, it does not come under the control of the Canadian Nuclear Safety Commission (CNSC), which licenses and controls radioactive materials associated with the nuclear fuel cycle and artificially produced radionuclides. NORM-related activities therefore fall under the jurisdiction of the provinces and territories. This has led to inconsistent application of radiation protection standards with numerous agencies involved as materials cross jurisdictional boundaries. For example, transportation of a NORM material for disposal involves:

- Provincial/Territorial Health, Labour and Radiation Regulatory Agencies for worker and public exposure;
- Provincial Environmental

Regulatory Agencies for disposal options;

- The Canadian Nuclear Safety Commission for transport of radioactive material.

Note: In its legislation, the CNSC uses the term Naturally Occurring Nuclear Substances instead of NORM.

Accordingly the Guidelines were developed to:

- ensure adequate control of NORM encountered by affected industries,
- harmonize standards,
- reduce jurisdictional gaps or overlap.

The basic principle of the Guidelines is that persons exposed to NORM should be subject to the same radiation exposure standards that apply to persons exposed to CNSC-regulated radioactive materials. No distinction is made regarding the origin of the radiation, whether it is NORM in its natural state or NORM whose concentration of radioactive material has been increased by processing (Technologically Enhanced NORM or TENORM). However, because of the ubiquitous nature of NORM, in dealing with situations where natural radiation is significant the cost of any intervention must be taken into account.

A major principle in radiation dose control is that if doses can be reduced by reasonable actions, those actions should be taken. As even low doses of radiation exposure may produce harmful effects, reducing low doses of radiation may be beneficial. The goal is that doses should be As Low As Reasonably Achievable, economic

and social factors being taken into consideration. This principle is usually referred to by the acronym ALARA.

**Uniformity of Protection**

The basic principle of these Guidelines is that the same radiation exposure criteria should be applied where workers or the public are exposed to new sources or modes of radiation from activities involving NORM, as for radiation exposure from CNSC regulated activities. This applies to cases where NORM is in its natural state and to cases in which, the concentration of NORM material has been increased by processing.

**Guideline Basis**

The Guidelines are based on the most recent international standards recommended by the International Commission on Radiological Protection (ICRP) and CNSC regulations. The recommendations of the ICRP represent an international consensus on radiation protection standards and provide the basis for regulatory control of radioactive materials in virtually all countries of the world. As these regulations and standards are subject to periodic amendment, the Guidelines may also be updated to reflect amendments to accepted national and international radiation protection practices. The ICRP and International Atomic Energy Agency (IAEA) radiation protection philosophy and recommendations of significance for NORM in Canada are contained in ICRP reports 60, 65, 68, 72 and 77 and IAEA Safety Series 115.

**Editor's Note:** As a means to show what is included in the Canadian Guidelines, the Table of Contents is reproduced below. It is recommended that those interested obtain a copy of the Guidelines.

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**CANADA** (continued)

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**CONFERENCE OF RADIATION CONTROL PROGRAM DIRECTORS (CRCPD)**

CRCPD's SR-5 Working Group submitted its revised draft Part N with its Rationale, Matters for Future Consideration, and revised Implementation Guidance to the CRCPD Board of Directors in June 2001 for evaluation and approval. The CRCPD Board's process may take 60 days.

Information regarding the SR-5 Working Group and its revisions to Part N is given below. This information was provided by Steve Collins (IL), Chair of SR-5.

**SUGGESTED REGULATIONS GROUP 5 (PART N)**

The WHO, WHEN, WHAT and WHY for the Suggested Regulations -- Group 5 (Part N)

(Continued on page 20)

**CRCPD** (continued)

The CRCPD Board of Directors established SR-5 at its May 1999 meeting. The charge was assigned at the Board's November 1999 meeting.

**Charge**

- a. To review comments and suggestions from all interested parties that may provide comments and make the necessary revisions as deemed appropriate.
- b. Revise the TENORM Guidance Document once published concurrent with revisions to Part N.
- c. To complete a revision of Part N and the TENORM Guidance Document and present the revised documents at the 2001 annual meeting.

**A Short Version of Why, What and Who for SR-5 Actions**

Comments on Part N indicated that it sometimes did not communicate

what the supporting documents indicated it was designed to state. Many changes were made throughout Part N so it communicates more clearly what the Commission on NORM papers, the Rationale and the Guidance Document indicated Part N was intended to authorize and require. The regulatory scheme established by the Commission on NORM was not significantly changed although the way it is described in Part N was revised extensively. The Guidance Document was revised to match changes to Part N and to clarify application of rule provisions.

WHO is the Suggested Regulations -- Group 5 (Part N) or SR-5. The members of SR-5 are:

- Thomas Cardwell (TX), member -- Chair of E-36 and Commission on NORM member
- Steve Collins (IL), Chair of SR-5

- Robert Goff (MS), member
  - Thomas Hill (GA), member -- former Chair of SR-5
  - Jared Thompson (AR), member
  - Dave Bernhardt, advisor -- Commission on NORM member, NORM Advisory Committee member and E-36 member
  - Walter Cofer (FL), advisor -- Commission on NORM member
  - Sam Finklea (SC), JD, advisor -- Commission on NORM member and E-36 member
  - Paul Merges (NY), advisor -- Chair-Elect of CRCPD
  - Ray Paris (OR), advisor -- Chairman of Commission on NORM and former member of SR-5
  - Charles Simmons, JD, advisor -- the Commission on NORM advisor and E-36 advisor
  - Bruce Hirschler, OED Technical
- (Continued on page 21)

**NORM Manuals Available**

The manual which I use in teaching my 2-day course *NORM Contamination - An Emerging Environmental Problem* is available. The manual contains over 650 copies of the slides used in the course. Although designed originally for the oil and gas industry, the manual is updated regularly and contains material about NORM contamination in other industries.

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 Oil & Gas & Other Industries
- 9. Fundamentals of Radiation Detection
- 10. NORM Surveys

- 11. Disposal of NORM Wastes
- 12. Federal Regulations
- 13. State Regulations
- 14. Canadian Guidelines
- 15. Recommended Industrial Hygiene
- 16. Program Suggestions for NORM Control
- 17. Radiation Litigation & Minimization
- 18. Conclusions
- 19. Glossary

For further information contact:

**Peter Gray**  
**P.O. Box 11451**  
**Fort Smith, AR 72917**  
**TEL (501)646-5142**  
**FAX (501)646-5359**  
**E-mail: pgray@normreport.com**

In addition to the manual for the 2-day NORM course the manual from my 1-day course is also available. The two manuals are similar in content—but the 2-day course manual is more detailed. The 1-day course manual contains about 400 slides.

The cost of the 2-day course manual is \$195 (US) and the cost of the 1-day course manual is \$125. ■

**CRCPD** (continued)

Staff

**Summary of Revisions to Part N**Definitions added:

Conditional release added to clarify the application of the screening criteria and release other than for unrestricted use.

Consumer and also Consumer or retail product added to clarify who must obtain a specific license and who is exempt from licensing.

Critical group -- added to clarify the setting of appropriate criteria for license termination.

Exemptions

Added zircon and zirconia to the exemption provision that included fertilizers, but the exemption does not state that manufacturing is exempt.

Specified the dose-based criteria the Agency uses to determine whether certain TENORM may be exempt.

Standards for RadiationProtection for Members of the Public

Changed the wording to limit the TEDE to members of the public to 100 mrem from all sources, not just from TENORM atonal ational or licensed activities and regulated sources of radiation.

Introduced authorization for the Agency to require doses from inhalation of indoor radon and its short half-life (less than 1 hour) progeny to be included in calculations of TEDE if directed by the Agency. The Agency will provide its basis if it requires such. The Agency may require inclusion if the licensed

operation is releasing radon in such a manner that the released radon would have a significant impact in its own indoor areas or nearby indoor radon levels occupied by one or more members of the public. This provision does not apply to TENORM released for unrestricted use.

Unrestricted Use and Conditional Release

The application of the 50 microR/hour screening criterion was clarified to be only for metals recycle. The criterion is the gross level that includes background.

Disposal of Waste

Alternate methods are approved when the disposal facility has necessary authorization from the appropriate regulatory authority. This should increase options and minimize cost, especially for diffuse low activity TENORM waste that would meet criteria of the USEPA's new proposed options.

Purposeful dilution to remove waste from the regulatory waste management scheme is prohibited unless specifically approved by the Agency.

Prohibition

Purposeful dilution to remove TENORM from the regulatory scheme is prohibited unless specifically approved by the Agency.

General License

The newly defined terms "consumer" or "consumer or retail product" were introduced to clarify which manufacturers and distributors will have a general license and which will be required to obtain a specific license. The criteria and record keeping

requirements for obtaining approval to transfer contaminated real property or equipment between general licensees were added.

Specific License

The newly defined term "consumer" and "consumer or retail product" were introduced to clarify which manufacturers and distributors will have a general license and which will be required to obtain a specific license.

Requirements for the Issuance of Specific Licenses

Provisions were added to ensure that an applicant for a license either owns or notifies the owner of the property that could become contaminated of the intended use or storage of radioactive material at the property.

Conditions of Specific Licenses Issued under N.22

Provisions were added for notification and timeliness of decommissioning.

Temporary jobsite provisions (granting of reciprocal recognition of licenses) were added because NRC does not have jurisdiction over TENORM and the provisions of Part C have not been revised to adequately cover such for TENORM.

Expiration and Termination of Specific Licenses

Language was changed to state more clearly the distinction between expiration of a license and termination and the process for each.

Information that must be submitted to the Agency to obtain termination of a license was added.

A provision was added stating that a decontamination and disposal (decommissioning) plan may be required

(Continued on page 22)

**CRCPD** (continued)

by the Agency.

Agency Action to Remove an Authorized User or a Radiation Safety Officer

Provisions were added describing the causes and procedures for the Agency to remove authorized users or the appointed Radiation Safety Officer.

Record Keeping Requirements for Site Decommissioning

Requirements equivalent to those of NRC for decommissioning records were added.

Regulatory Scheme

Exemptions

General License

Those not required to demonstrate compliance with Standards for Protection Against Radiation and Worker Instruction, but who may be required to identify name, location, type of operation, and material involved.

Those who must document compliance with Standards for Protection Against

Radiation and Worker Instruction (industrial processing operations and suppliers of materials to other processing operations).

Specific License

Manufacture and Distribution of Consumer Products (private consumers receive only products evaluated and proven low or negligible risk).

Decontamination Operations (persons who decontaminate equipment, facilities, or land for others).

Disposal of Wastes from Others (wastes treatment, storage and disposal facility operators, except N.8a.iii and N.8c and N.20c for very low activity waste).

Standards for Protection

Members of the public Workers

Transfers

Who is authorized to transfer consumer and retail products, materials to industrial users, contaminated real property and equipment to persons with a general license?

Disposal

Flexibility to use any properly permitted or licensed facility.

Screening Criteria

Limited to recycle but not for unrestricted use.

Summary of Revisions to Guidance Document

Editing conformed the Guidance to revisions of Part N. Because there were no major conceptual changes to Part N, only three substantive changes were needed --

1. Explanation of the application of dose criteria
2. Explanation of the exclusion of radon and its progeny from certain dose estimates
3. Explanation of the application of screening criteria

A new Section 1.2 clarifies that the exclusion is for inhalation of short half-life radon decay products (less than 1 day half-life). Also, the radiation dose for workers includes inhalation of radon in the workplace, the gamma dose pathway for the public is included, and the food pathway dose is included. ■

## Soil Screening Guidance for Radionuclides

The EPA's Office of Emergency and Remedial Response has just released two radionuclide soil screening documents titled *Soil Screening Guidance for Radionuclides: User's Guide*, October 2000, OSWER No. 9355.4-16A, NTIS Order Number (PB2000 963307), and *Soil Screening Guidance for Radionuclides: Technical Background Document*, October 2000, OSWER No. 9355.4-16, NTIS Order Number (PB2000 963306). These documents can be downloaded from EPA's Web site at <http://www.epa.gov/superfund/resources/radiation/radrisk.htm>.

These guidance documents provide information on soil

screening for radionuclides when setting remediation goals at Comprehensive Environmental Response, Compensation and Liability Act sites with radioactive contamination. The *Soil Screening Guidance for Radionuclides: User's Guide* presents standardized exposure parameters and equations that should be used for calculating radionuclide preliminary remediation goals (PRGs) for residential land use exposures. These equations update those used in Chapter 4 of *Risk Assessment Guidance for Superfund (RAGS), Human Health Evaluation Manual-Part B*, for setting Preliminary Remediation Goals (PRGs). ■



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## **The Radsafe Email List Has Moved!**

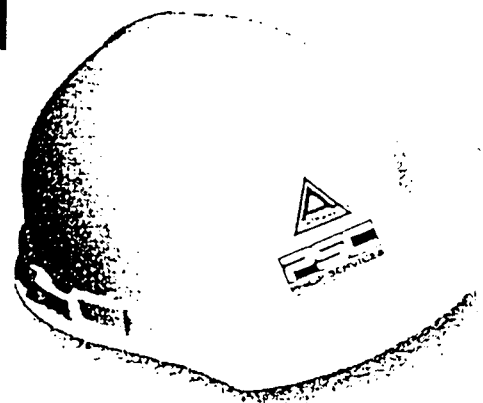
The Radsafe email-based user list was moved in March 2001 due to the need to shut down certain servers at the University of Illinois at Urbana-Champaign (UIUC) campus. The list was started there in 1993 and has served the health physics community since then, with the cooperation of the UIUC staff, in particular due to the tireless efforts of Melissa Woo, the listowner from 1994-2001. The list was moved to the Vanderbilt University campus in Nashville, Tennessee, and is being maintained currently by Michael Stabin. The list sends out a variable number of email messages every day (typically 10-30), including news, job announcements, opinions, and other information from any of the list's nearly 2,000 members worldwide. Many consider it to be a very important resource in researching questions related to radiation

safety and in keeping touch with ongoing changes in the health physics community.

The list offers a "digest" subscription option, in which many individual messages are combined periodically in one larger email, to limit daily emails that users need to deal with. There are also on-line archives (<http://www.vanderbilt.edu/radsafe/>), which can be browsed to see past exchanges by list members; list subscription information also may be found at this Web address. Subscription is free, and subscribing and unsubscribing are easy, executed by the user simply by sending a short two- to three-word email. The mailing list is closed so that only subscribed members can post, thus limiting intrusions from spammers, trolls, or other undesirable sources. ■

## Defining Oilfield Services

oil·field ser·vic·es – see “Allwaste”,  
 a Philip Services Company,  
 defining oilfield services for 16 years.  
 all·waste – synonymous  
 with pride, quality and safety.



- State-of-the-art NORM facility
- Highly trained professionals
- Turnkey capabilities
- Disposal Management
- Regulatory interface
- Direct access to rail spur
- Wet & dry method of pipe decon available
- Trained in DOT shipping requirements
- Pb210 Po210 decon via chelation

- Licensed in LA & TX with reciprocal agreements in other states
- 6 Onsite Radiation Safety Officers
- Direct access to navigable waterway
- Isolated work bays
- Waste minimization and consolidation
- Offer pipe-in-trade options
- Offsite remediation & surveying
- Pipe & equipment decontamination

**MORGAN CITY OFFICE**  
 9743 Highway 90 East  
 Morgan City, Louisiana  
 70380  
 Phone: (504) 631-3325  
 Fax: (504) 631-2817

**MORGAN CITY NORM FACILITY**  
 138 Tiger Court  
 Morgan City, Louisiana 70380  
 Phone: (504) 631-3973  
 Fax: (504) 631-0209

**GOLDEN MEADOW OFFICE**  
 21148 Highway 1  
 Golden Meadow, Louisiana 70357  
 Phone: (504) 475-7770  
 Fax: (504) 475-5916

**VENICE OFFICE**  
 40360 Hwy 23 South  
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### Disposal Facilities -- Barnwell and Envirocare

Barnwell is phasing out as a national disposal facility and will soon be restricted to South Carolina, New Jersey, and Connecticut (the Atlantic Compact). The good news is that Envirocare of Utah is making progress toward a full license for Classes A, B, and C

low-level waste. The bad news is that if and when Envirocare is successful, with the phase-down of Barnwell, the Utah facility will be the only disposal facility serving the needs of radioactive materials users in 36 states!

## RADIATION LITIGATION

In the September 2001 Health Physics Journal are several interesting and informative articles on radiation litigation and related topics. As the population of exposed workers ages and as members of the public are exposed or believe they have been exposed, radiation litigation is likely to continue. Radiation safety officers, health physicists and other safety personnel have a unique opportunity to read and understand the thoughts and experiences of those professionals involved from both the legal and scientific points of view.

The articles include important information on fundamentals of radiation litigation and an overview of the current state of radiation litigation. The nature of the process of litigation and fairness to both litigants is presented as well. Documentation and records keeping are important responsibilities of SROs and health physicists and they are provided with information to ensure that their work does what is intended. Finally, some unique insights into the updates of the role of the expert witness are presented.

Some SROs and health physicists may become involved in radiation litigation; some may not. The articles in this issue and several others that will later follow in issues of the Health Physics Journal address important technical and legal issues regarding radiation litigation. Hopefully, these articles and those to follow will be interesting and informative to the readership.

The radiation litigation articles in the September 2001 issue of *Health Physics* follow:

### A LITIGATION PRIMER FOR THE HEALTH PHYSICIST

*Abstract* -- This paper presents a basic overview of legal terminology and theories that may be encountered by the health physicist relative to radiation-related litigation. Legal terms are defined, and the progression of a sample radiation injury claim is explained from the filing of a claim through the appeal process. The objective of the paper is to establish a basic foundation of legal concepts on which to build further

understanding. The legal system is an arena with which most health physicists have essentially no familiarity, or at best, limited knowledge. The chances are increasing that health physics professionals may be involved in radiation injury litigation in some way, requiring a basic understanding of these concepts. *Health Phys.* 81(3):246-252: 2001

### AN OVERVIEW OF THE CURRENT STATE OF RADIATION LITIGATION

*Abstract*-- Over the last three decades, radiation litigation has become a unique field of toxic tort litigation, with many new precedent setting decisions providing guidelines establishing how cases will be litigated in the future. This article will provide a summary of the status of the issues that are being litigated in radiation cases and suggest recommendations on how pending issues should be resolved in the future.

*Health Phys.* 81(3):253-259: 2001

### A RADIATION LITIGATION CAUSATION ANALYSIS WHICH ACHIEVES FAIRNESS TO BOTH LITIGANTS

*Abstract*-- Very few, if any, radiation induced cancers should appear among nuclear workers in the United States. The existing safety standards and lifetime doses received under the operation of those safety standards are such that less than 1% of the cancers that appear in nuclear workers should be related to their occupational radiation exposure. This small number of valid claims is a tribute to the effectiveness of the federal safety standards and to the ALARA professional philosophy of achieving excellence in radiation protection which has marked the field of health physics since its inception.

*Health Phys.* 81(3):260-264: 2001

### DOCUMENTATION AND LOG KEEPING: ENSURING YOUR WORK DOES WHAT YOU INTEND IT TO DO

*Abstract*-- Maintaining regular documentation, such as a log-book, can be an organization's most important asset when dealing with radiation protection issues,

(Continued on page 26)

## RADIATION LITIGATION (continued)

both normal and abnormal. When an organization is faced with litigation, proper documentation of events can ensure that a record is acceptable and, by extension, that the data itself is acceptable. A record of events will not preclude litigation nor will it guarantee that an organization will prevail in a court of law, but it will provide evidence and credibility that could favorably affect the outcome of litigation. An organization can ensure that the documents it creates and maintains are as effective as possible by being aware of the legal consequences of documenting events and taking appropriate steps to conform to standards for admission of documentation. Misconceptions about log keeping such as recording only events that are likely to result in litigation, rather than recording all events, can prevent a record from being admissible as evidence. Because of the amount of effort and time put into documentation, and the reliance placed on its contents, it is important for an organization to ensure that a record will do what it is intended to do, namely, to accurately record activities. Issues discussed in this article include the legal basis of documentary evidence, what and what not to record, when and how to record it, and how to strengthen the records kept.

Health Phys. 81(3):265-268; 2001

### THE ROLE OF THE EXPERT WITNESS: AN UPDATE

*Abstract*-- As in the past, the principle role of the scientist in the courtroom is to assist attorneys, judges, and jurors in understanding the complex scientific and technical issues before them. In the last decade, however, changes in the law and the increasing technical complexity of many disputes have introduced new factors that influence the preparation and presentation of expert testimony. The most significant change in the law regarding expert testimony is arguably the 1993 Supreme Court ruling in *Daubert vs. Merrell Dow Pharmaceuticals*. Under Daubert, scientific evidence may be submitted to the jury if the judge finds that it rests on a reliable foundation and is relevant to the task at hand. Reliability and relevance replace the older requirement of "general acceptance by the scientific community," although "general acceptance" remains a factor in the consideration of reliability. The tests of reliability and relevance and their impact on the preparation of expert opinions are discussed in the context of increasingly complex radiation cases, with emphasis on cases involving teams of experts.

Health Phys. 81(3):269-271; 2001

## Story Problems Portray Gains in Teaching Math

● In 1960: A logger sells a truckload of lumber for \$100. His cost of production is four-fifths of this price. What is his profit?

● In 1970: A logger sells a truckload of lumber for \$100. His cost of production is four-fifths of this price, or \$80. What is his profit?

● In 1970 (new math): A logger exchanges a set L of lumber for a set M of money. The cardinality of set M is 100, and each element is worth \$1.00. Make 100 dots representing the elements of the set M. The set C of the costs of production contains 20

fewer points than set M. Represent the set C as a subset of M and answer the following question: What is the cardinality of the set P of profits?

● In 1980: A logger sells a truckload of wood for \$100. His cost is \$80, and his profit is \$20. Your assignment: underline the number 20.

● In 1990: (outcome-based education): By cutting down beautiful forest trees, a logger makes \$20. What do you think of this way of making a living? (Topic for class participation: How did the forest birds and squirrels feel?)

## NORM LAWSUITS PROLIFERATING

As the NORM issue made its way to the forefront of the oil and gas industry's environmental and regulatory concerns during the late 1980s and early 1990s, more and more lawsuits have made their way to court. Legal problems for the oil and gas industry began in 1991, when a suit was brought against Chevron because of NORM found at the site of one of its service companies. The suit alleged that the buildup of NORM at the site had caused not only personal health problems but contamination of soil and loss of land values.

Without ever presenting its case or admitting guilt in the case, Chevron settled out of court in 1992. Since then, the number of cases has skyrocketed, presenting a problem of considerable proportions for diverse elements of the oil and gas industry.

A number of suits continue to be filed against Chevron and other operators. Much of the NORM litigation centers on older oil fields in South Mississippi, most of which were developed by large companies and subsequently sold to smaller operators who were later brought into the suits. For instance, in at least two NORM law suits, plaintiffs joined service companies to the litigation in addition to the operators, but so far there have been no judgments against service companies.

Still, only one NORM case, known as Fannie Bell

James vs. Chevron, has been tried to conclusion. A jury awarded approximately \$56,000 in actual damages and \$50,000 in punitive damages. Largely viewed as a victory for Chevron, it was the first case for plaintiff's attorneys which offered no expert testimony to counter Chevron's expert testimony, which had vowed that it would cost as much as \$56,000 to clean the area. It is estimated there are more than 40 NORM lawsuits ongoing.

Oil & gas industry officials have continually maintained that plaintiff's lawyers were overplaying the actual health risks posed by NORM, and that because of litigation surrounding the issue, producers were having a harder time than usual gathering the capital needed to drill a new well. The lawsuit threat and overkill regulations, the officials claimed, all but froze land transfers and forced companies to spend more time, effort and money surveying their sites for compliance and arranging for proper NORM disposal.

### FAMILY AWARDED BILLION DOLLARS FROM EXXON MOBIL FOR POLLUTION

A jury in New Orleans found May 22, 2001 that Exxon Mobil had polluted the 1.5-hectare tract in the state of Louisiana during a three-decade operation to clean used oil-field pipe. It awarded former judge Joseph Grefer and his family, who filed their lawsuit in 1997, 56 million dollars to clean up their land, \$145,000 dollars in lost property value and 1 billion dollars in punitive damages.

The plaintiffs, former Jefferson Parish state District Judge Joseph Grefer and his siblings, contended Exxon knew the danger of the radioactive waste long before it notified its contractor, and that it failed to clean the site as required by law. Exxon disputed the charges and the amount of contamination on the land. The company's attorneys said it will appeal.

It was the largest award ever made to an individual for property damage and the sixth largest jury verdict in history, according to Lawyers Weekly USA, a national legal newspaper that tracks jury verdicts.

(Continued on page 28)

### The NORM REPORT A NORM Contamination Newsletter

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Editor: Peter Gray, Ph.D.

**NORM LAWSUITS PROLIFERATING (continued)**

**EX-PIPE CLEANERS SUING EXXON**

One day after a record \$1.06 billion judgment was made against Exxon Mobil Corp. for contaminating land in Harvey, LA with radioactive scale from oil field pipes, 11 men who cleaned pipe for Exxon and other companies have sued, claiming they were exposed to hazardous radiation. The suit was filed by former employees of the now defunct Intracoastal Tubular Services.

The suit alleges some of the hardened mineral scale contained naturally occurring radioactive material, or NORM, that workers and others were exposed to without their knowledge.

The workers are seeking damages and compensation for the fear of developing cancer or leukemia, as well as medical monitoring for potential illnesses and medical expenses. Their lawyer said the workers don't know whether they've been made sick by radiation. They know they've been exposed to it. It's caused them great concern about themselves and their family members.

Defendants in the suit are Alpha Technical, Chevron USA Inc., Conoco Inc., Exxon Mobil Corp., Homeco Inc., Mobil Exploration and Producing US Inc., Phillips Oil Co., Sexton Oil Co., System Fuels Inc., Shell Western E&P Inc., Texaco Inc. and Tubular Corp., a forerunner to Intracoastal Tubular Services.

The companies are the same ones initially named in a lawsuit by the owners of the Harvey land. Some settled with the owners and others were dropped from the suit. The recent billion dollar verdict was against Exxon, Intracoastal's major client.

According to the worker's suit, the companies created a hazardous condition, violated safety standards and disregarded public safety in the storage and handling of the material, causing radioactive material to spread through the air and water into the surrounding com-

munity.

The worker's lawyer has indicated he is asking the court to certify the suit as a class action.

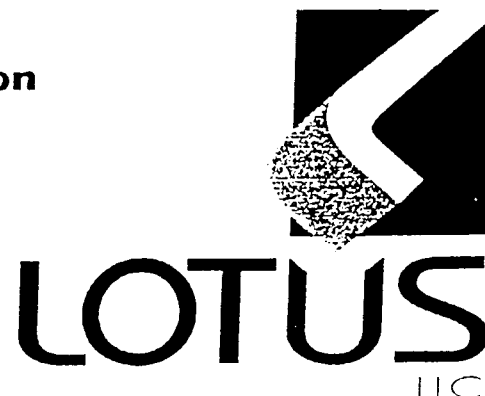
**WOMAN ALLEGES EXXON CONTAMINATED LAND**

The recent \$1 billion verdict against Exxon Mobil Corp. for contaminating land in Harvey, LA with radioactive material has prompted a Harvey resident to file yet another lawsuit against Exxon. The woman whose family has called the neighborhood home since the 1950s, accuses Exxon and 13 other oil companies of poisoning her property's soil and decreasing its value. She lives near the property that the jury deemed was contaminated by Exxon Mobil. Her attorney, filed a proposed class-action lawsuit in Orleans Parish Civil District Court days after 11 men who once cleaned oil pipes in Harvey sued for damages. "An invisible villain is a concern of everyone in that community," the lawyer said. The woman used to grow vegetables and raised chickens on the land, her lawyer said. "They ate off the land right there," he said. "Their children played on the pipes when they were very young." He said his law firm will dispatch experts to the area to test for radioactivity. The lawsuit comes on the heels of a giant jury verdict for a Jefferson Parish family that leased its land for about 30 years to a company that cleaned used oilfield pipe for Exxon. On May 1, a New Orleans jury ordered Exxon to pay \$56 million to clean up the 33 acres and \$145,000 for the property's value. The verdict included \$1 billion in punitive damages to former Jefferson Parish state District Judge Joseph Grefer and his family. When the woman learned of the award, she feared for the safety and future of her family; her lawyer said. "There can be little doubt that the valuation of their property has significantly diminished in a very short period of time," he said. Exxon, which disputed the amount of contamination on the site, said it will appeal the huge award. ■

**The more you know, the more you know you don't know.**

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### EPA News

The U.S. Environmental Protection Agency (EPA) published in August 2000 a compact disc (CD) Supplement, EPA 402-C-99-001, to Federal Guidance Report No. 13, *Cancer Risk Coefficients for Environmental Exposure to Radionuclides*. The CD supplement includes an interactive viewer for displaying the FGR 13 radionuclide risk coefficients in a choice of units. Site-specific as well as total cancer risk values are displayed. Committed doses calculated with the same dose models used for calculating the risk coefficients can also be viewed. Data archives of files used in calculating the risk coefficients for the more-than-800 radionuclides in FGR 13 are provided. These files include age- and organ-specific dose rates for each pathway considered, as well as age-specific radionuclide risk coefficients. United States age- and gender-specific cancer force of mortality and life table files are provided, along with usage and other detailed

data used in the calculations. Fortran procedures that can be used to access the risk and committed dose coefficients are included. For convenience, PDF files of Federal Guidance Reports 11, 12, and 13 and related documents are also provided.

The U.S. Environmental Protection Agency (EPA) has also recently published a report titled *Radiation Protection at EPA-The First Thirty Years*. The report describes the radiation protection responsibilities transferred to EPA when it was established in 1970 and the statutes that have been enacted over the past 30 years that provide the Agency additional radiation protection responsibilities. The second part of the report provides information on key EPA implementation activities and highlights the significant radiation protection precedents established by these activities. ■



## Meetings Calendar

### Third International Symposium on Naturally Occurring Radioactive Materials -- NORM III

Brussels 17-21 September 2001

#### Scope and Objectives

It is well-known that individual and collective doses from natural sources are generally higher than those from artificial sources. For historical reasons different standards and approaches have evolved for the exposures from naturally occurring and artificially produced sources of radiation. Many persons find this reasonable from a practical perspective whilst others argue that this is inappropriate since there is no difference in dose received. Therefore, the implementation of Title VII of the new European Basic Safety Standards is a challenge for regulators, radiation protection practitioners and industries.

The symposium will focus on work activities involving operations with and storage of materials, not usually regarded as radioactive, but which contain naturally occurring radionuclides, causing a significant increase in the exposure of workers and, where appropriate, members of the public. Particular attention will be given to problems related to the harmonization of the regulatory approach in the different EU-countries. For the processing industries involved the point of view will be presented of radiation scientists, radiation protection agencies as well as of the operators.

In view of the extension of the EU, special attention will be given to the specific situation and problems in the NORM industries of the candidate EU-countries. In discussion panels matters associated with the symposium items will be debated from different perspectives.

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**2002 Joint Topical Meeting  
Health Physics Society  
Canadian Radiation Protection  
Association  
North American Technical Center  
Information System on Occupational**

### Exposure OECD/IAEA

### American Academy of Health Physics National Registry of Radiation Protection Technologists Nuclear Suppliers Association

Orlando, Florida  
February 17-20, 2002

The topic of the joint meeting (35th HPS midyear) is **Decommissioning and Environmental Restoration**. The technical programs for the joint meeting will start with a joint Plenary Session and then split into two concurrent programs open to all attendees. One program will be the HPS technical session, and the other will be International ALARA Symposium related. The format will include both oral and poster sessions. Authors of poster sessions will have the opportunity to introduce their work during oral sessions. Each session will include both invited and contributed papers.

Topics to be included in the meeting include:

- Regulatory Agencies
- Liability and the Legal Aspects
- Public Relations
- Technical Issues and MARSSIM
- Dose Modeling

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### Radiation and Radioactivity

How can we call ourselves scientists if we are not willing to "question"? Knowledge and understanding are not stagnant. I wish to break with historical traditions of health physics and radiation safety. They no longer serve us well as a society or as scientists who wish to serve humankind. They cause agencies to argue about whether cleanup standards should be 0.15 or 0.25 mSv per year. They cause exposure scenarios to be projected thousands or tens of thousands of years into the future. They compromise beneficial use with no known reduction in risk. Our relationship to the radiation industries should be that of "partners in safe use" not that of "policemen". Health physics should support and expand the safe beneficial use of our wonderful tools -- radiation and radioactive materials. ■

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## NORM in the Literature

### **An Assessment of the Disposal of Petroleum Industry NORM in Nonhazardous Landfills**

DOE/BC/W-31-109-ENG-38-8

Karen P. Smith, et al

Argonne National Laboratory

Environmental Assessment Division

Lakewood, Colorado

September 1999

A couple of years ago, Argonne National Laboratory conducted a study assessing the potential radiological health risks associated with the disposal of petroleum industry NORM wastes in a municipal solid waste (MSW) landfill (i.e., one permitted only to receive nonhazardous or Subtitle D wastes). Specifically, the study evaluated the disposal of bulk radium-bearing wastes and containerized Pb-210 bearing wastes. The case study considered a landfill located in the state of Michigan. This setting was chosen primarily because the state of Michigan has issued a policy allowing the disposal of some bulk wastes containing Ra-226 in MSW landfills (specifically Type II landfills).

The study evaluated the fate and transport of the radionuclides within the landfill and within a shallow subsurface aquifer, assuming the radionuclides could migrate beyond the landfill containment. Radiological doses and health risks were evaluated for a variety of potential receptors, including individuals who could be exposed because of waste placement activities, future use of the property after closure of the landfill, or future consumption of contaminated groundwater. In very general terms, the study results indicated that the Michigan policy was adequately protective of public health provided certain conditions relating to integrity of the landfill cap and depth of the wastes are met.

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### **Effect of Leachability on Environmental Risk Assessment for NORM in Petroleum Oil Fields**

by

Gerald Raiaretnam and Henry B. Spitz

*Abstract*--Elevated concentrations of NORM, including U-238 Th-232, and their progeny found in under-

ground geologic deposits, are often encountered during crude oil recovery. Radium, the predominant radionuclide brought to the surface with the crude oil and produced water, co-precipitates with barium as complex compounds of sulfates, carbonates, and silicates found in sludge and scale. These NORM deposits are highly stable and very insoluble under ambient conditions at the earth's surface. However, the co-precipitated radium matrix is not thermodynamically stable at reducing conditions which may enable a fraction of the radium to eventually be released to the environment. Although the fate of radium in uranium mill tailings has been studied extensively, the leachability of radium from crude oil NORM deposits exposed to acid-rain and other aging processes is generally unknown. The leachability of radium from NORM contaminated soil collected at a contaminated oilfield in eastern Kentucky was determined using extraction fluids having a wide range of pH reflecting different extreme environmental conditions. The average Ra-226 concentration in the samples of soil subjected to leachability testing was 32.56 Bq/gm. The average leaching potential of Ra-226 observed in these NORM contaminated soil samples was 1.3% and was independent of the extraction fluid. Risk assessment calculations using the family farm scenario show that the annual dose to a person living and working on this NORM contaminated soil is mainly due to external gamma exposure and radon inhalation. However, waterborne pathways make a non-negligible contribution to the dose for the actual resident families living on farmland with the type of residual NORM contamination due to crude oil recovery operations.

Health Phys. 7S (2):191-198: 2000

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### **THE MEASUREMENT OF RADIATION LEVELS IN AUSTRALIAN ZIRCON MILLING PLANTS**

by

B. M. Hartley

*Abstract*--The processing of zircon often involves grinding it to a fine powder known as zircon flour. As the resulting particles are small they may be

(Continued on page 32)

**NORM in the Literature** (continued)

inhaled if they become airborne and, since they contain some uranium and thorium, deliver radiation doses to workers. Theoretical estimates and measured radiation exposure in Australian zircon milling plants are reported in this paper. Theoretical doses, calculated in this work, indicate a potential maximum dose to workers of 5.5 mSv/y. Measured doses, based on normal work practices, vary in different plants from 0.66 mSv to 1.03 mSv/y and suggest that in the dustiest Australian zircon milling plants the maximum dose would be of the order of 1 mSv/y. Measurements, which focused on the dustiest operations, indicate an upper limit of dose of about 3 mSv/y. Based on the theoretical and measured doses not exceeding 6 mSv/y, workers would not be designated as Category A workers, and probably would not be designated Category B workers, exceeding 1 mSv/y, under the guidelines of a EURATOM Directive.

Health Phys. 80(1):16-23; 2001

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**A DOSIMETRIC MODEL FOR DETERMINING THE EFFECTIVENESS OF SOIL COVERS FOR PHOSPHOGYPSUM WASTE PILES**

by

J. L. Mas et al

*Abstract*-Phosphogypsum (PG) is a by-product of the phosphoric acid production process that contains high concentrations of U-series radionuclides. PG piles formed during the last 30 years cover about 1,200 hectares and are located close to the town of Huelva (Spain) on a salt-marsh. The regional government of Andalusia restored the area beginning in 1990 by covering it with a 25-cm-thick layer of natural soil. With this restoration, the external gamma-dose rate in the zone has decreased drastically, approaching near environmental background values. This conclusion is based on results obtained through in-situ monitoring measurements and through a dosimetric model developed for that particular radiation source. As the model uses average parameters of the studied site, its output does not show a corre-

lation point by point with the in-situ monitoring measurements. However, a good agreement is observed in average values over the covered piles. The model gives an average dose rate of 0.41 mGy/y and the in situ monitoring 0.40 mGy/y. Based on this model, it is possible to calculate the necessary thickness of soil to reduce the dosimetric contribution from a similar extension of PG until the desired level is reached. In our conditions, in a 25-cm-thick soil, about 0.19 mGy/y is the increase produced by the PG layer in relation to an infinitum soil layer. Consequently, no radiological concern exists in the restored zones with respect to the external gamma radiation.

Health Phys. 80(1):34-40; 2001

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**An Excerpt from the Federal Register**

66 FR 27218, 16 May 2001, Final rule: The U.S. Environmental Protection Agency finalized its proposal to provide increased flexibility to facilities that manage low-level mixed waste (LLMW) and technologically enhanced naturally occurring and/or accelerator-produced radioactive material (NARM) containing hazardous waste. The rule reduces dual regulation and conditionally exempts from Resource Conservation and Recovery Act (RCRA) hazardous waste management low-level mixed wastes during storage and treatment. The rule also exempts LLMW and NARM from RCRA manifest, transportation, and disposal requirements when specified conditions are met. The final rule is effective 13 November 2001. The complete Federal Register text may be found at [http://www.epa.gov/radiation/mixed-waste/mw\\_rule.htm](http://www.epa.gov/radiation/mixed-waste/mw_rule.htm).

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**ANSI/HPS N13.53 TENORM STANDARD**

Naturally occurring radioactive materials (NORM) are ubiquitous in the environment and present in materials extracted from natural resources. The radioactivity is associated with uranium and thorium and their decay products. Ores and beneficiated materials may contain technologically-enhanced radioactivity at elevated concentrations, depending on the material; hence, the "TENORM" designation. These processes may

(Continued on page 33)

## NORM in the Literature (cont'd)

enhance the environmental mobility of contaminants present in some wastes. The radioactivity may present a public health hazard and result in environmental contamination if such materials were improperly disposed of or recycled. The Health Physics Society decided to address this issue and develop an ANSI/HPS TENORM standard. The standard proposes allowable dose and concentration limits and provide technical guidance in managing products and waste containing TENORM. The primary dose criterion is consistent with the recommendations of the International Atomic Energy Agency and was selected for consistency with international commerce. The standard identifies regulatory issues and outlines considerations in evaluating impacts on the public and environment. The standard recommends the use of good radiological work practices and upgraded industry processes. The final standard was included with the January 2000 issue of the Health Physics Newsletter. The HPS N13 Committee will develop a second standard to clarify implementation issues such as instrument selection, statistical sampling, and records.

The Elsevier Science Journal of Environmental Radioactivity published a Special Issue entitled *Natural Radioactivity: Technological Enhancement, Detection and Migration* (Guest Editors William C. Burnett and Horst Monken Fernandes), vol 54/1, 2001.

Papers in the issue include:

Nuclide Migration and the Environmental Radiochemistry of Florida Phosphogypsum (W.C. Burnett)

Radium Contamination of the Banks of the River Laak -- a Consequence of the Phosphate Industry in Belgium (J. Paridaens)

Radionuclide Fluxes at a Plant Manufacturing Dicalcium Phosphate for Domestic Animals (T. Gafvert)

Radiological Impact from Atmospheric Releases of <sup>238</sup>U and <sup>226</sup>Ra from Phosphate Rock Processing Plants (C. Papastefanou) ■

**The more you complain, the longer  
God lets you live**

## DOE and the Disposition of Scrap Metal

The US Department of Energy has announced a "Notice of Intent To Prepare a Programmatic Environmental Impact Statement on the Disposition of Scrap Metals" in the 12 July 2001 Federal Register. Information can also be obtained at the DOE National Environmental Policy Act (NEPA) web site (<http://tis.eh.doe.gov/nepa/>).

The Department of Energy (DOE) intends to prepare a Programmatic Environmental Impact Statement (PEIS), under the National Environmental Policy Act, on the policy alternatives for the disposition of DOE scrap metals that may have residual surface radioactivity. The primary metals to be considered in the analysis are carbon steel and stainless steel. Other metals (e.g., copper, aluminum, lead, and precious metals (silver, gold, platinum), which exists in smaller quantities, will also be addressed in the PEIS. The disposition alternatives to be analyzed include: continuation of the suspension on unrestricted release of scrap metals from DOE radiological areas for recycling; unrestricted release of scrap metals for recycling under existing DOE requirements; unrestricted release of scrap metals for recycling under alternative requirements; and no unrestricted release for recycling of scrap metals with any potential for residual surface radioactivity. The following link is to the Federal Register announcement:

<http://tis.eh.doe.gov/nepa/bbs/ftpup/fedreg/36562.pdf>

Comments on the scope of the PEIS may be mailed to the address below or sent by facsimile or electronic mail. Written comments may be mailed to the following address:

Kenneth G. Picha, Jr.

Office of Technical Program Integration, EM-22

Attn: Metals Disposition PEIS

Office of Environmental Management

U.S. Department of Energy

1000 Independence Avenue, SW.,

Washington, DC 20585-0113.

Otherwise, send comments via facsimile to Metals Disposition PEIS at 301-903-9770, or send electronic mail to: [Metals.Disposition.PEIS@em.doe.gov](mailto:Metals.Disposition.PEIS@em.doe.gov). ■

## Regulatory References

Title 10 CFR Part 20 ---- Standards for Protection Against Radiation	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 61 ---- National Emission Standards for Radionuclide		
Title 29 CFR Part 1910.96 ---- Ionizing Radiation	ARKANSAS	Rules and Regulations for Control of Sources of Ionizing Radiation. Section 7 NORM
Title 33 U.S.C. 466, et seq. ---- Federal Water Pollution Control Act as amended		
Title 40 CFR Part 141 ---- National Primary Drinking Control Program; Criteria and Standards	GEORGIA	Rules and Regulations for Radioactive Materials, Chapter 391-3-17, Section 08-Regulation and Licensing of NORM
Title 40 CFR Part 190 ---- Environmental Radiation Protection Standards for Protection Power Operations	LOUISIANA	Title 33: Environmental Quality Part XV: Protection. Chapter 14: Regulation and Licensing of NORM
Title 40 CFR Part 192 ---- Health and Environmental Protection Standards for Uranium and Thorium Mill Tailings	MISSISSIPPI	Part 801 Section N Licensing of NORM Oil and Gas Board, Rule 69, Control of Oil field NORM
Title 40 CFR Part 440 ---- Ore Mining and Dressing Point Source Category	NEW MEXICO	Subject 14: NORM in the Oil and Gas Industry
Title 42 U.S.C. 300, et seq. ---- Safe Drinking Water Act, as amended	OREGON	Regulations and Licensing of NORM Oregon Administrative Rules, Chapter 333, Division 117 -- Health Division
Title 42 U.S.C 2011, et seq. ---- Atomic Energy Act of 1954, as amended		
Title 42 U.S.C 4321, et seq. ---- Toxic Substances Control Act (TSCA)	SOUTH CAROLINA	Part IX, Licensing of NORM
Title 42 U.S.C. 4341, et seq. ---- Conservation and Recovery Act of 1976 (RCRA)	TEXAS	Texas Department of Health-- Texas Regulations for Control of Radiation (TRCR) Part 46, Licensing of NORM Railroad Commission of Texas-- Rule 94, Disposal of Oil and Gas NORM Wastes
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 <sup>(3)</sup>
CO (proposed)	5 pCi/g	CO (proposed)	5 pCi/g
GA	5 pCi/g with high radon factor <sup>(1)</sup> 30 pCi/g with low radon factor <sup>(2)</sup>	GA	5/15 pCi/g with high radon factor 30/15 pCi/g <sup>(4)</sup> 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 36)

## NORM Training Course Offered by Peter Gray

The course *NORM - An Emerging Environmental Problem* covers all aspects of NORM contamination and its control, including:

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

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 and other industrial 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.

The course can be either one day or two days in length. Both courses cover the same material, but the two-day course contains more detail. The cost of the two-day course is \$600 and the one-day course \$400. Discounts are available for multiple attendees from the same company. Travel expenses are additional.

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

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

Contact Peter Gray at 501-646-5142 or email him at [pgray@normreport.com](mailto:pgray@normreport.com) for more information

### Comparison of NORM Rules by State (Continued)

#### Exemption for Contaminated Equipment

AR	Concentration limit only (5 pCi/g)	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		
OK	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.