

The *NORM* Report

Naturally Occurring Radioactive Material Contamination WINTER 1996

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The NORM Report
is published quarterly by
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Regulations for the Control of NORM - Update

The status of regulations for the control of NORM is summarized below for all 50 states. Since NORM contamination is not limited to the petroleum industry, some of the non-petroleum states are also drafting or preparing to draft NORM regulations to control NORM in other industries, e.g., mining and fertilizer. The status of NORM regulations in the federal government as well as in Canada is also summarized below. Each regulatory agency was contacted during the period from March 14-22, 1996.

The last states to enact NORM regulations were New Mexico and South Carolina. Their regulations were summarized in the Summer 1995 issue of **The NORM Report**. Louisiana, Mississippi, Arkansas, Texas and Georgia have previously enacted regulations for the control of NORM. It has come to my attention that Oregon also has regulations for the control of NORM. Although specifically written for the control of NORM in zircon sands, the regulations do apply to all NORM contamination in the state. The Oregon regulations became effective in January 1990. The Oregon regulations are summarized in the Oregon section of the state summaries.

New Jersey has prepared a draft of *Remediation Standards for Radioactive Materials*. The draft proposes an unique standard based on radiation doses and not only on concentrations of radionuclides in the soil. The proposed standards are summarized in the New Jersey section.

There currently are no Federal rules specifically for the control of NORM.

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

Summaries of the status of NORM regulations in all 50 states, the Federal government and Canada follow:

ALABAMA

Alabama is still redrafting their proposed NORM regulations. There is no timetable for the regulations to be adopted. There has been some interest in plugging wells, but there have been no requests for NORM regulations.

ALASKA

There are currently no regulations for the control of NORM in Alaska. They are waiting for the legislature to set the 1997 fiscal year budget. It will be May before the budget is set and it is not

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ALASKA (continued)
known if NORM funds will be available.

It is expected that once the funds are available, the writing of the regulations for the petroleum industry should go rather quickly, particularly since the Alaska Oil and Gas Commission has NORM guidelines in place.

ARIZONA

All radioactive materials, which would include NORM, are addressed in Arizona's general radiation regulations. At present, NORM is not specifically addressed, but consideration is being given to enacting NORM regulations at a later date, possibly in 1997.

ARKANSAS

It is being proposed that equipment, contaminated with NORM, be exempt from the regulations if the maximum radiation exposure dose does not exceed 50 microrem/hr including background at any accessible point.

Other changes which will be proposed include the requirement to make NORM surveys similar to those required in Louisiana.

The proposed changes may be submitted to the legislature in May with enactment in late 1996 or early 1997.

CALIFORNIA

The consensus report detailing the results from the survey of petroleum facilities for NORM contamination in California still has not been released to the general public. In addition to gamma surveys, water, brine, soil and other appropriate samples were taken for laboratory analysis. The survey was made as a preliminary to drafting NORM

regulations, if found necessary. There is one more hurdle before the report can be released to the public. It is hoped the report will be available soon.

COLORADO

Envirocare of Utah has sued the State of Colorado and others within Colorado over the disposal of some radioactive waste that had been sent to a solid waste landfill.

Envirocare argues that the radioactive waste should have been sent to a licensed disposal sites.

There was a pile of mining wastes near the city of Golden. A water main broke several years ago threatening to flood the tailings pond. EPA came in under its CERCLA authority and removed the tailings pond and its sediments and put it in a pile and ordered a number of parties, including the State of Colorado to remove it under CERCLA.

The state and the other parties studied the pile and concluded that it was not special nuclear wastes, and it was not low level waste. They did determine there was a very small component of by-product material (uranium tailings) and source material in the wastes. Because the vast majority of this material was other things, the state determined that it was a special solid waste which is a category of solid wastes recognized under state law, and therefore, could go to a solid waste landfill. The EPA agreed and issued an order to the State and the other parties to remove the wastes to a solid waste landfill which has been done.

Envirocare of Utah sued, arguing that the material cannot be called special solid waste and can only

be disposed of in a facility licensed for radioactive material. The State vigorously disagrees. The case is presently in procedural stages. The State filed a motion to dismiss on jurisdictional grounds. That motion has yet to be ruled on.

CONNECTICUT

In the Fall 95 issue of **The NORM Report** it was reported that the Connecticut Department of Environmental Protection (DEP) was reviewing a prepared draft of NORM regulations. However, at that time, the governor and his administration asked that the proposed draft be put on hold. But now the administration has reversed themselves regarding NORM regulations and asked the DEP to start over. The DEP is preparing a proposal to have a contractor prepare a draft of proposed regulations for the control of low level radioactive wastes, including NORM and NARM.

DELAWARE

There are no specific regulations for the control of 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. This revision tightened the compliance aspect of the regulations. There are no plans to propose specific NORM rules at present. NORM contamination appears to be minimal in the state; they are not aware of any NORM-contaminated facilities.

FLORIDA

The Office of Radiation Control in the Department of Health and Rehabilitative Services has

(Continued on page 3)

FLORIDA (continued) requested the Florida Institute of Phosphate Research to fund a study of the phosphate industry to characterize the scope of the NORM problem. The proposal goes before the Institute Board in April, and if approved, the 18-month study will begin in June. The proposed comprehensive study will include the complete phosphate industry in Florida, including everything from mining to chemical beneficiation through the service industry. The study will look at the risks of occupational and public radiation exposures.

The Office of Radiation Control has taken the NORM issue before the Florida Advisory Council on Radiation Protection. The Council does not have any regulatory authority but they advise the Office of Radiation Control and make recommendations on radiation protection. The Council has formed a committee to evaluate the NORM problem in Florida.

Florida is not ready to make any regulatory changes until the Advisory Council makes its recommendations and would like to wait until the Phosphate Institute completes its study. The delay is considered important so that any regulations proposed will be defensible.

Although the Advisory Council includes representatives from the oil and gas industry, the phosphate industry is considered to be the major NORM contaminated industry in Florida.

There is concern that some present operations in the state may exceed the 100 millirem annual dose limits for the public. If the study is done as proposed, it will be a

joint project conducted by the Polk County Public Health Department and a private consulting firm. The Florida governor has asked for a 50% reduction in the Florida administrative code of state regulations. The Office of Radiation Control said they would not be able to reduce their regulations by 50% because of federally mandated rules. They were able to reduce them by 20% to 30% by eliminating repetition.

Although Florida does not have specific NORM rules, the state does regulate some NORM. There are specific licenses for about a dozen chemical plants, but only for the chemical side of the phosphate industry where it is known that NORM contaminations may exceed radiation protection standards.

NORM in the oil and gas industry and in mineral sands may be characterized in the future and NORM regulations extended to those industries.

GEORGIA

Georgia's regulations for the control of NORM became effective in October, 1994. There have been no changes in the rules since that time. The rules and regulations will be reviewed and changes proposed for adoption by the Board in December 1996. The review process will begin in the next month or so.

HAWAII

Hawaii has no specific regulations for the control of NORM. The state has a set of proposed rules that are slated to replace the antiquated rules for the control of radiation. These rules are expected to cover NORM. The timetable for finalizing these rules is uncertain. The proposed rules have been in the administrative

review process for two years. The designated attorney is expected to "work" on the rules in the very near future. Hawaii is expecting to have the new rules for controlling radiation (and NORM) within two years.

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

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

IDAHO

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

ILLINOIS

Illinois's approach to NORM regulations is being reviewed to decide if general NORM regulations should be proposed, or whether rules should be written to address the NORM problems in certain sections of selected industries who have the potential for NORM contamination. No decision as to the approach to be proposed has been made yet. The Department of Nuclear Safety

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ILLINOIS (continued)

may go with the approach of identifying known NORM problems and writing specific rules for those problems. As new NORM problem areas are identified, new rules will be written to cover them. This approach may be preferable to generic rules which cover the whole world of NORM and results in too much unnecessary regulations without much benefit. This approach to NORM rule making is the result of reviewing the in-depth comment made on the latest (1994) CRCPD draft. There is no time schedule for the NORM rule making.

INDIANA

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

IOWA

Iowa is reviewing the Part N draft and comments from the CRCPD. At the present time Iowa has not done anything on NORM and has no timetable for action on rules and regulations.

KANSAS

Nothing has changed in Kansas in regard to NORM regulations. At one point there was some discussion that the gas community might try to introduce a NORM bill in the legislature, but since they didn't have any better idea than the Department of Health and Environment as to what the bill should contain, they chose not to do that. Therefore the current status is unchanged. NORM problems that arise are handled under the Kansas general rules for the control of radiation.

KENTUCKY

At present there is nothing new in promulgating NORM regulations in Kentucky.

The Central Midwest Interstate Commission was scheduled to hold a public hearing on March 28 in the Capital Annex Building in Frankfort on ways in which the Compact states, including Illinois and Kentucky, would like to have NORM regulated, i.e., whether there should be federal or state regulations or if it should be done by following federal general guidelines.

More tank battery sites submitted by Ashland Oil in the Martha Oil Field have been released for unrestricted use.

LOUISIANA

Louisiana's revised NORM regulations became effective January 20, 1995. A draft of an *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."

Because of the importance and interest in the exemption standards, the discussion in the Implementation Manual on this section of the regulations (§ 1404)

is given below.

(Numbers of paragraphs refer to the NORM regulation document).

II. EXEMPTION STANDARD
(§1404)

The revised NORM regulations categorize the NORM standards in three basic categories: A. Diffuse NORM Waste, B. Equipment, and C. Land. Each person or company/operator must determine whether their material, equipment, facilities, and /or land is either exempt or regulated under the standards that are outlined below. If the exemption standards cannot be applied, the person or company/operator is regulated under the general license (§1408) and are subject to the requirements therein.

A. Diffuse NORM Waste
(§1404.A)

- * all material that has no beneficial use or value (e.g., tank sludges, production sands, pipe scale, etc.) not specifically addressed in §1404.C
- * activity of the material measured to be 5 picocuries per gram of radium-226 or radium-228, above background; or
- * 150 picocuries per gram of any other NORM radionuclide
- * 100 square meter averaging not included in this category
- * activity to be determined by a radiological laboratory or estimated using an approved field method; not determined by using a microR survey meter

(Continued on page 5)

LOUISIANA (continued)

- * material(s), as stated in §1404.F - 1. are exempt from this category
- B. Equipment (§1404.B)
 - * all tanks, vessels, heater-treaters, pipe, tubular goods, filters, clean-out traps, etc.
 - * the maximum radiation exposure rate at any accessible point on the equipment does not exceed 50 microroentgens per hour.

Note: A piece of equipment at a site may exhibit an exposure rate below 50 microroentgens per hour and, therefore, be exempt from notification requirements and site registration requirements: however, material removed out of the equipment from cleaning operations may become non-exempt and regulated under §1404.A. Consideration should be given to sampling any material removed from equipment which exhibited readings greater than twice background levels.

- C. Land (§1404.C)
 - * oilfield & gas properties, pipeyards, real estate, pits
 - * concentrations averaged over any 100 square meters; and
 - * no single non-composited sample to exceed 60 picocuries per gram of radium-226 or radium-228

The land exemption is categorized into two standards:

- 1. * 5 picocuries per gram or less of radium-226 or radium-228, above background, averaged over the

first 15 centimeters depth; and

- * 15 picocuries per gram above background, averaged over each subsequent 15 centimeter thick layer of soil
- 2. * 30 picocuries per gram or less of radium-226 or radium-228, averaged over 15 cm depth increments; and
- * no member of the public (continually present) could receive a total effective dose equivalent (TEDE) exceeding 100 millirem a year. A person or company/operator must supply dose calculations for §1404.C2 to meet the exemption. The TEDE is the sum of the external dose (e.g., TLD badge) and the internal exposure from ingestion or inhalation.

MAINE

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

MARYLAND

Maryland has no specific regulations for the control of NORM. NORM is handled under the general radiation regulations.

These general regulations were recently revised to bring the rules into line with 10 CFR 20 as well as making other changes deemed advisable. The revisions became effective October 9, 1995.

MASSACHUSETTS

Massachusetts does not have specific regulations for the control of NORM. NORM is a part of NARM and NORM is considered to be regulated in the Massachusetts general radiation regulations. These general radiation rules were recently revised as part of the process of becoming an Agreement State. The revised rules became effective in February 1995. NORM is not a major problem in the state.

MICHIGAN

For the past 1 1/2 years Michigan's Division of Radiological Health in the Department of Public Health has been dealing with some large sites heavily contaminated with radium from luminous aircraft dials of World War II vintage.

In one instance a family had lived in a house for 30 years. During that time, the basement in the house was used in a business calibrating and refurbishing aircraft instruments for a large warehouse distributor. As a result of opening the gauges and refurbishing the surfaces, the deterioration of these old gauges over the years caused radium to be dispensed throughout the house and the backyard of the house and a neighbor's yard as well.

Because of the radium contamination, the site had to be cleaned on an emergency basis and the family relocated. The house, the neighbor's garage and other structures on the property

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MICHIGAN (continued) were dismantled, decontaminated as much as possible, and finally shipped to Envirocare for disposal.

Everything within the house was contaminated, including walls, carpets, furniture and clothing. A few items were successfully decontaminated (non-porous surfaces) and returned to the family. Two other large warehouses associated with the business have been secured pending further action. All three sites have been worked as a result of a request to the EPA for assistance. As a result of that request, all three sites were classified as superfund sites and superfund money is being used for the cleanup.

The family has been reluctant to be tested to determine radiation exposures. Whole body counting at Argonne National Laboratory was offered, but so far, the family has declined. It is estimated that the doses were appreciable because of the probability of ingesting and inhaling radium for many years. Although the radium was present as radium sulfate, the same chemical form of radium as found in tubular scale, radium paint is much more susceptible to deterioration and becoming airborne.

The radium was essentially insoluble in water and the contamination in the soil around the house stayed in the surface soils. This was fortunate, because the contaminated property was adjacent to a lake. The lake, ground waters, and wells in the vicinity tested negative for radium.

As part of the cleanup process for the contaminated sites, the Department of Public Health issued cleanup and disposal guide-

lines entitled *Cleanup and Disposal Guidelines for Sites Contaminated with Radium-226*. These guidelines were issued October 31, 1995. The guidelines discuss "how clean is clean" and "disposal alternatives". Copies are available by calling David Minaar, (517) 335-8200.

Some of the numbers in these new guidelines are similar to those in the previous draft guides for NORM in the oil and gas industry. The cleanup level for surfaces and equipment is the same. These levels are based on contamination limits that were previously adapted by the Nuclear Regulatory Commission in regulatory guide 1.826.

In regard to radium, however, on volumetric basis the new guidelines use 5 pCi/gram as a cleanup level for soil and debris and allow up to 50 pCi/g to go to a landfill.

The guidelines also address the allowance for oil and gas related NORM contamination in tubulars to be placed downhole regardless of the concentration as long as certain restrictions of the state in regards to plugging and abandonment are followed.

MINNESOTA

It had been hoped that there would have been some legislative action with regard to the disposal of radium and other NORM-type materials, but the end of the legislative session is near and there has been no action. Minnesota has no specific regulations for the control of NORM.

MISSISSIPPI

Responsibility for NORM in Mississippi is 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). Once the petroleum leaves the wellsite, the Mississippi Department of Health has continued authority for NORM contamination.

The Department of Health has no new development in its area of responsibility for NORM. The Department continues to be heavily involved in NORM.

On August 11, 1995, the Oil and Gas Board issued a proposed Rule 69: **Control of Oil Field NORM**. This rule provides the regulations for the control of oilfield 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 the State of Mississippi.

Rule 69, as issued August 11, 1995 was summarized in the Fall 95 issue of **The NORM Report**. A public hearing on Rule 69 was to have been held in January. This was postponed until March and at the request of attorneys on both sides of the issue, the hearing was again postponed until April 2-4, 1996.

There are essentially three sides on the proposed rule. One side arguing against any rule at all, one side wanting the original proposed draft issued in August, 1995, and the third side wanting the latest revised draft released on February 23, 1996. The changes made to the August draft are summarized below. The original draft contained some controversial features, such as allowing some land farming where the resulting NORM concentration could be

(Continued on page 7)

MISSISSIPPI (continued)

five times the natural background without requiring that the landowner be notified that such land farming had been done. In a cover letter accompanying the latest draft of Rule 69, it was stated that there are some extensive changes, many of which do nothing more than clarify or add additional support for sections of the Rule as previously written. There are some substantive changes, however; in particular, the references to land farming. One reason for removing land farming from the rule is that Rule 69 is for the control of NORM while land farming is a disposal method and does not properly belong in the rule.

A summary of Rule 69 is given below, particularly those sections in which significant changes have been made. Changes added to Rule 69 are underlined.

Rule 69: Control of Oilfield NORM

4. Surveys

- a. Operators shall perform surveys as necessary, to evaluate:
 - ii. The magnitude of exposure rates above ground surfaces. The ground surface surveys shall report the average and maximum readings for each 1 meter x 1 meter grid area.
- f. Routine surveys shall be performed every five years during exploration/production activities if the maximum exposure rate exceeds 50 microR per hour above background. Otherwise they shall be measured every ten years or when modifications or related work have the potential to alter the external

gamma levels.

5. Criteria for Site Operations

c. Site Maintenance

- i. Maintenance activities at sites with a maximum exposure rate of less than 50 microR/hr above background shall require no controls.
- ii. Maintenance activities of sites with a maximum exposure rate in excess of 50 microR/hr above background shall require the prudent use of dust masks and water sprays, water sprays or other dust control methods.
- iii. Land maintenance and equipment repair personnel that receive between 100 millirem and 500 millirem TEDE in a calendar year shall wear personal radiation monitoring badges that are replaced and analyzed every three months. The radiation exposure of all badged workers shall be reported annually to the Board.
- iv. Land maintenance and equipment maintenance and repair that may cause workers or contract personnel to exceed 500 millirem TEDE in a calendar year shall require control/licensing pursuant to Mississippi Department of Health regulations.

6. Release of Property

- a. Transfer to another producer:
 - i. Property may be transferred to another producer without regard for its radiological contaminants.
 - ii. Copies of the most recent radiation survey documents shall be

transmitted to the new producer prior to the property transfer.

- b. Release for unrestricted use.
 - i. A production site may be released for unrestricted use after:
 - (1) All equipment contaminated to levels above the release criteria in 7.b and 7.c has been removed from the property.
 - (2) A release survey of the site surface demonstrates that the property does not exhibit an exposure rate at any discrete point in excess of 40 microR per hour above background has been completed, documented and furnished to the site owner.
 - (3) A release survey of exposure rates in at least five boreholes per site, showing a maximum exposure rate less than 200 microR per hour including background. At least one borehole shall be drilled at the location of the maximum surface exposure rate measurement. All boreholes shall be at least one meter deep, and shall be measured at 0.15 meter intervals.
 - ii. Land area remediation may be performed by the following methodologies in order to achieve the release criteria listed in 6. b. i.
 - (1) No action
 - (2) Excavating and transferring discrete

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MISSISSIPPI (continued)
areas of soil to a radioactive material storage area for disposal under Rule 68.

- (3) Other remedial actions as approved, in advance, by the Board.

Note: All references to land farming have been deleted.

7. Criteria for Release of Equipment

- a. Equipment may be transferred to another producer without regard for its radiological constituents.
- b. Equipment that is released for unrestricted use shall:
- i. Exhibit a surface count rate on accessible internal and external surfaces of no greater than an equivalent of 100 cpm above background on a pancake probe geiger counter.
- ii. Exhibit an exposure rate at a distance of 2.5 centimeters (1 inch) from the equipment surface of no greater than 25 microR per hour above background.

MISSOURI

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

MONTANA

There have been no new developments applicable to NORM regulations in Montana. The regulations for the control of radiation have not been revised since 1980. NORM is not considered to be included in the

radiation regulations. The Montana Department of Health and Environmental Sciences does have the statutory authority for NORM regulations, but there is no funded program for their development.

NEBRASKA

There has been no change in the status of NORM regulations in Nebraska. Nebraska believes that NORM is included in their general regulations for the control of radiation. There are no plans for specific NORM regulations.

NEVADA

No specific NORM regulations have been proposed. Comprehensive statutes for the general control of radiation address NORM and NARM similarly.

NEW HAMPSHIRE

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

NEW JERSEY

The New Jersey Commission on Radiation Protection is considering proposing remediation standards for radioactive materials. The Commission was directed to establish generic soil cleanup criteria for the remediation of contaminated sites. The criteria for soil standards were to be based on either: (1) an incremental

lifetime risk of cancer of one in a million persons exposed, or (2) naturally occurring background levels that are consistently encountered.

The scope of the proposed rule extends to:

- (1) Any naturally occurring radionuclide whose concentration has been enhanced by man-made physical or chemical processes.
- (2) Accelerator produced radionuclides.
- (3) As applicable, relevant, and appropriate, to any remediation involving radioactive materials pursued under authority of the Federal Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), and
- (4) Remediation involving any radioactive materials within or outside the boundary of a federally owned, operated or licensed site when the federal government has not assumed responsibility for said remediation.

(Consequently the scope of the rule extends to the remediation of sites contaminated with NORM).

General Approach to Standard Setting

The Department was directed to promulgate generic remediation standards that could be consistently applied across the state. The intent was to move the Department away from establishing cleanup standards on a case by case basis, while allowing the use of alternative standards for

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NEW JERSEY (continued) significantly different site circumstances.

Since NORM causes lifetime risks substantially greater than 1 in one million, it is not possible to use that as a cleanup criteria.

Therefore, the Department has used natural background as the remediation criteria for NORM. In doing so, it has recognized that background radiation varies with time and from place to place, and has utilized the naturally occurring variability in radiation that people encounter in their day to day lives as the radiation dose increment to be achieved by a remediation.

Further, the enabling legislation directed that regional natural backgrounds should be defined as the levels "consistently" found in the region of the site. The Department has utilized a one standard deviation, or approximation thereof, as the measure of the variation that is "consistently" encountered.

Consequently, the approach taken in this rule is to define the one - standard deviation in naturally occurring background radiation doses for each of the three major sources of radiation; external gamma radiation, intakes of radionuclides, and inhalation of radon. To translate the radiation dose criteria into generic soil standards, the Department has made extensive calculations of radiation doses to individuals, for both unrestricted (residential) and restricted (non-residential) uses, as a function of both the vertical extent of the contaminated material remaining after remediation (V) and the residual radionuclide in soil concentration in that material (C). For diffuse materials and soils these dose relationships are first expressed as the ratio of the dose received per year divided by the activity in the

material in picocuries per gram (pCi/g) and termed the dose factor. These dose factors are then divided into the allowed background dose criteria to determine what contamination extents and residual concentrations are acceptable.

The allowed soil concentration (C) is the background allowance divided by the dose factor.

Where the dose factor is calculated as a function of V. For a given value of V, the vertical extent of contamination remaining, the value of C that does not cause any of the background variation allowances to be exceeded is then selected as the standard.

For the purpose of this rule, "radiation" is considered the contaminant which must be controlled, and not each individual radionuclide. This position is based on the fact that it is the collective radiation and not the individual radionuclides that causes the harmful health effect.

The proposed New Jersey cleanup standards establish an incremental annual total effective dose equivalent (TEDE) of 15 mrem per year from external radiation and intake from both unrestricted and restricted sites. The allowed generic soil radionuclide concentrations derived herein from the dose limits are different for each radionuclide because of their differing properties.

The primary cleanup criteria of 15 mrem per year is consistent with developing federal regulations. Approaching the problem by looking at allowed concentrations of contaminant radionuclide and also at the volume of contaminated materials that remain after a remediation program means that the calculated radiation dose

exposures depend on both concentration and volume - both dimensions are needed. This approach means that the allowable remaining radionuclide concentrations will vary depending upon the volumes of contaminated materials remaining. It gives options for disposal - it may not be necessary to remove all the contaminated soil/material. Depending on the volumes and concentrations, some contaminated material wouldn't have to be remediated, some material could be dispersed on-site and some material may be able to be sent to a landfill. It may not be necessary to send hundreds of thousands of cubic yards to a commercial disposal site.

One of the objectives of this rule making was an attempt to be reasonable, so that it may not be too expensive to remediate contaminated sites.

The proposed rule is:

Subchapter 12. Remediation Standards for Radioactive Materials.

Copies of the proposed rule or other information can be obtained from:

New Jersey Department of
Environmental Protection
Bureau of Environmental
Radiation
Bob Stern or Jenny Moon
(609)984-5400

Written comments should be submitted by May 10, 1996 to
Bob Stern, Chief
Bureau of Environmental
Radiation
CN415
Trenton, NJ 08625-0415

Two public hearings on the proposed rule will be held in

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NEW JERSEY (continued)
April. Call Bob Stern (609)984-5400 for details.

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.

A task force from the Oil Conservation Commission has come up with some proposed rule changes to allow for the disposal options that are addressed in Part 14 NORM regulations. There will be a public hearing before the Oil Conservation Commission on April 11 to consider the proposed changes. If they are adopted, they will be filed at the State Records Center and become effective 30 day later.

New Mexico is preparing guidelines for implementing the NORM regulations. They have had input from the New Mexico Oil and Gas Association and they are still receiving input from different sources. They will try to get the guidelines finalized in the next 4 to 6 weeks. The draft of the guidelines is largely based on the Louisiana guidelines.

NEW YORK

New York will be starting a more formal review than has been done in the past in checking for radium buildup in their oil and gas industry. A review of the radium contamination in the industry was made several years ago, but not with the details that will be used now. The expected reason that New York doesn't appear to have a big NORM problem in this area is because New York doesn't have high pressured deep wells as in Louisiana, Texas and Oklahoma; New York wells are much more

shallow. Paraffin buildup is a bigger problem than is radium scale.

Some brine waters were checked a couple of years ago, but it is planned to do a more comprehensive study in the near future - near future being defined as the next year or two.

Some older mines in the Adirondacks have radon problems, especially in buildings built on top of tailings, etc. But on a comparative basis, New York appears to be in better shape in regards to NORM contamination than most other states.

NORTH CAROLINA

Nothing presently is being proposed on NORM regulations for North Carolina. The state recognizes that NORM is an issue that may need attention, but there are many other priority things going on, not the least of which is the low level waste disposal facility. North Carolina is the host state for the Southeast Compact. The state is aware of NORM contamination within the state, particularly in scrap metal yards. For the present, North Carolina is on the sidelines and is advocating a constructive relationship between the regulated community and the would-be regulations.

NORTH DAKOTA

There are no new developments affecting NORM in North Dakota. Contrary to what has been presented in **The NORM Report** in recent issues. North Dakota does have some regulations affecting NORM. These are part of the North Dakota Radiological Health Rules. There is a cleanup standard of 5 pCi/gram for radium and criteria are given for the disposal of radioactive wastes, including NORM.

OHIO

Ohio's revised general regulations for the control of radiation are presently in committee being reviewed by the Radiation Advisory Council. NORM is included in the revised regulations as part of the preparation for Agreement State status. It is hoped that the revised rules will be finalized by fall.

The proposed rules are not available for distribution yet. By the time they are ready for comment, the Bureau of Radiological Health hopes to have a Web page that people will be able to access by e-mail. The final rules document is expected to be several hundred pages in length.

Although Ohio does have NORM contamination problems in their oil and gas industry, the problems are small when compared with such oil producing states as Louisiana, Mississippi and Texas.

OKLAHOMA

The Oklahoma Radiation Management Advisory Council last met March 7, 1996. A discussion draft of proposed NORM rules prepared by Dr. David Gooden was distributed and some preliminary discussions were held. A meeting with industry representatives and interested citizens to discuss NORM rules will be scheduled before the Council next meets June 6 in Tulsa.

The following is a statement of philosophy by Dennis Senkowski, a member of the Oklahoma Radiation Management Advisory Council. It is an individual statement; and does not necessarily reflect the opinions of the entire Council.

(Continued on page 11)

OKLAHOMA (continued)**SUGGESTION FOR NORM MANAGEMENT IN OKLAHOMA**

The State of Oklahoma should be as self-sufficient as possible in all areas of waste treatment, storage, and disposal. This capability provides the State with economic advantages in the form of jobs for our citizens and lower costs for our industries. It also provides for protection of human health and the environment and an incentive for new industries to locate facilities within the State. Self-sufficiency also helps the State avoid potentially-adversarial relationships with surrounding states due to lack of waste disposal capacity and the associated interstate waste transfer issues.

In these regards, Oklahoma currently appears capable of managing Naturally Occurring Radioactive Material (NORM) waste and should maintain the capability in the future. The Oklahoma Department of Environmental Quality (ODEQ) should ensure, through implementing regulations, that all available and appropriate waste management options be utilized in the management of NORM. Existing facilities within the State, especially sited and designed for waste management, appear adequate to provide for sound NORM management. New facilities or technologies to address the growing NORM concern may not be needed, but they should also not be prohibited.

The relatively lower hazard presented by NORM, as compared to other types of wastes, should allow the ODEQ to implement rules which incorporate the permits, plans, and procedures of existing facilities into an

approval process. Such rules will avoid the burdensome, costly, and often lengthy process of permitting facilities for waste management. Oklahoma industry and the State will benefit from an expedited process and the prompt availability of disposal capacity. Approval of disposal capacity will reduce the current practices of on-site storage, out-of-state shipment, potential improper disposal, or other inappropriate management methods that NORM generators may have employed.

OREGON

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

Oregon does have NORM regulations, entitled *Regulation and Licensing of Naturally Occurring Radioactive Materials (NORM)*. The rules are found in the Oregon Administrative Rules, Chapter 333, Division 117 - Health Division. The NORM rules in Division 117 are summarized below.

Purpose

This Division establishes radiation protection standards for the possession, use, transfer and disposal of NORM not subject to regulations under the Atomic Energy Act of 1954, as amended.

Scope

(1) These rules apply to any person who engages in the extraction, mining, beneficiating, processing, use, transfer or disposal of NORM in such a

manner as to technologically alter the natural sources of radiation on their potential exposure pathways to humans.

(2) (Deals with introduction of NORM into products.)

(3) This Division also addresses waste management and disposal standards which apply to both inactive and active sites and facilities.

Exemptions

(1) Persons who receive, possess, use, process, transfer, distribute and dispose of NORM are exempt from the requirements of these Rules if: the materials contain or are contaminated at concentrations less than five picocuries per gram of radium, 0.05 percent by weight of uranium or thorium or 150 picocuries per gram of any other NORM radionuclide, provided that these concentrations are not exceeded at any time.

(2) Persons who receive products or materials containing NORM distributed in accordance with a specific license issued by the Agency pursuant to OAR 133-117-220 (2) or an equivalent license issued by another Licensing State are exempt from these Rules.

(3) Discusses exemptions for various materials, e.g., fertilizers, natural gas and natural gas products, etc.

Effective Date

The rule became effective in January, 1990.

General and Specific Licenses

The issuing of general licenses and the requirements of specific licenses are discussed.

Standards for the protection of workers during operations and protection of the general population from releases of radioactivity are included. In this latter category, the annual limit for

(Continued on page 12)

OREGON (continued)
radiation exposure to the general population is limited to 25 millirem to the whole body. Doses from radon are excluded from this limit.

Disposal and Transfer of Waste for Disposal

Each person subject to a general license shall manage and dispose of waste containing NORM in accordance with the applicable requirements of the EPA for disposal of such wastes or in a manner equivalent to the requirements for uranium and thorium by-product materials in 40 CFR 192 or shall transfer wastes for disposal to a land disposal facility licensed by the NRC or an Agreement State or a Licensing State.

The Oregon NORM regulations were written primarily for the zircon sands industry, but the rules as written apply to all NORM contamination in the state.

PENNSYLVANIA

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

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

RHODE ISLAND

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

SOUTH CAROLINA

Part IX- *Licensing of Naturally*

Occurring Radioactive Material (NORM) became effective June 30, 1995 in South Carolina. There have been no changes in the regulation and none are proposed at the present time.

Part IX was summarized in the Summer 1995 issue of **The NORM Report**.

SOUTH DAKOTA

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

TENNESSEE

NORM contamination in Tennessee is handled basically like any other radioactive material. If it is enhanced above background levels, an assessment is made as to whether it constitutes a problem or not. 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 is still planning to make some modifications to their NORM rules. The Department of Health has jurisdiction for NORM except for the disposal of NORM. The Railroad Commission has jurisdiction for the disposal of oil and gas industry NORM wastes, while the Texas Natural Resources Conservation Commission has responsibility for the disposal of non-petroleum industry NORM wastes.

The revisions to the Department of Health NORM rules have been

delayed because other rules have taken precedent over NORM. The NORM revisions should be completed during the next year. The changes will primarily be classifications of NORM and adding some requirements for processing of NORM from other persons. These revisions will be coordinated with the Railroad Commission, particularly where they concern jurisdictional issues or where processing and desizing are being done at the same time.

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

The Texas Natural Resources Conservation Commission has not started drafting NORM disposal rules yet. When the general radiation rules from the Department of Health have been revised where necessary, it may be possible to start drafting the NORM disposal rules for the non-petroleum industries.

UTAH

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

VERMONT

There are no developments in the NORM area in Vermont. It is hoped that the trend for low radium exempt concentrations doesn't lead to such low radium concentrations that they will affect

(Continued on page 13)

VERMONT (continued)

granite mining in Vermont and probably in other mineral industries as well. There is a proposal at the present time to revise the allowable radon concentration in water. At present it is 300 picocuries per liter and the EPA is being encouraged to increase it by a factor of ten. If this is approved, it will make it easier for many states, particularly in the Northeast, where radon in water is a problem. The proposed legislation is in the Senate Committee on the Environment and Public Works. EPA's Science Advisory Board is asking the EPA to consider reducing the cancer risk from radon. Under the proposed legislation Congress will provide funds to identify drinking water contaminants that pose the most serious health problems. In the proposed legislation, if the EPA wants to make the 3000 pCi per liter lower, the Science Advisory Board and the National Academy of Science have to agree that the revision is needed to address the particular risk.

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 latter regulations are in the process of being revised.

WASHINGTON

The Washington rule for the disposal of NORM wastes in the state became effective July 22, 1995. This rule WAC 246-249-080 *Naturally occurring and accelerator produced radioactive material (NARM), excluding source material* was summarized in the Summer 95 issue of **The NORM Report**. This controversial rule limits the disposal of NARM in the state to

8,600 cubic feet per calendar year and individual generators are limited to an annual volume of 1,000 cubic feet.

U.S. Ecology has filed a lawsuit attempting to overturn the rule. The attorneys are still working through the lawsuit. In the interim, the 8600 cubic feet per year limit remains in affect.

WEST VIRGINIA

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

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, etc. The state has general regulations for the control of radiation. These regulations don't include some of the NORM-specific issues, e.g., contaminated scrap. The regulations may or may not cover NORM problems. Wisconsin is working on a revision to its maximum radioactivity standards in community water treatment facilities, primarily radium-226.

WYOMING

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

materials.

FEDERAL ACTIONS**U.S. ENVIRONMENTAL PROTECTION AGENCY**

A Science Advisory Board Report: *Review of Radionuclide Cleanup Levels for Soil* is a review of technical aspects of ORIA's technical support document for the development of cleanup levels for soil by the Radiation Advisory Committee. The report was sent to the Administrator of the EPA on September 29, 1995.

The abstract of the report follows:

Abstract

The EPA Science Advisory Board's (SAB) Radiation Advisory Committee (RAC)/Radionuclide Cleanup Standards Subcommittee (RCSS) reviewed the Office of Radiation and Indoor Air's (ORIA) *Technical Support Document (TSD) for the Development of Radionuclide Cleanup Levels for Soil* (9/94). The RCSS supports ORIA's approach of defining a generic site to compare environmental pathway models; perform sensitivity/uncertainty analysis; and generate generic tables of cleanup soil concentrations for different land-use scenarios. ORIA defined reference facilities to represent sites and derived site-specific risk factors to estimate soil remediation volumes and health effects averted under each of the scenarios, for a range of cancer incidence and radiation dose cleanup goals. The RCSS was concerned that source term information appeared weak and the radionuclide selections were not sufficiently inclusive. The RCSS emphasized the need to estimate uncertainties for contaminated soil volumes. The

(Continued on page 14)

EPA (continued)

RCSS evaluated neither the default values in RESRAD, nor the parameter set used for each reference site, and therefore was unable to assess whether the model results are bounding estimates of the risks for each level of cleanup. The RCSS recommended that EPA improve its definitions of the dominant pathways. The RCSS commended the EPA's sensitivity and uncertainty analysis, but felt that the TSD did not adequately convey the magnitude of the uncertainties in soil volumes requiring remediation and cancers averted by remediation.

There have been no developments on the EPA draft NORM report *Diffuse Naturally Occurring Radioactive Materials (NORM): Waste Characterization and Preliminary Risk Assessment* issued in 1993.

The EPA states there is nothing new on NORM to be reported at this time.

NUCLEAR REGULATORY COMMISSION

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

The NRC and the Agreement States met recently (March 5/6) in Vancouver, Washington. Among the topics discussed were sealed radioactive sources that inadvertently get to scrap dealers in loads of scrap iron and steel. Most of the scrap dealers send the scrap back to its origin.

U.S. MINERAL MANAGEMENT SERVICE

In 1995, MMS issued only two permits for off-shore disposal of NORM. Most NORM wastes continue to be brought on-shore.

DEPARTMENT OF TRANSPORTATION

The DOT has made changes in their regulations for the transportation of radioactive materials. The new regulations are in the September 28, 1995 Federal Register, pages 50292 - 50336. A summary of the new rules is given below.

Department of Transportation
49CFR Parts 171 - 178

Hazardous Materials Transportation Regulations, Compatibility with Regulations of the International Atomic Energy Agency.

Action: Final Rule

Summary

This final rule amends the Hazardous Materials Regulations pertaining to the transportation of radioactive materials to harmonize them with those of the International Atomic Energy Agency (IAEA) and, thus, most major nuclear nations of the world. Several substantive changes are made to provide a more uniform degree of safety for various types of shipments, such as requiring offerors and carriers to maintain written radiation protection programs, revisions to the definition and packaging for low specific activity radioactive materials, and requiring use of the International System of Units for the measurement of activity in a package of radioactive materials. However, the basic standards for packaging radioactive materials remain unchanged. The intended effect of this rule making is to

increase the level of safety and facilitate international commerce concerning the transportation of radioactive materials. Elsewhere in the September 29, 1995 **Federal Register**, the Nuclear Regulatory Commission (NRC) has published a corresponding final rule to its transportation regulations found in 10 CFR Part 71.

Dates: Effective date. The effective date of these amendments is April 1, 1996.

Compliance date. Voluntary compliance with these regulations, as of November 1, 1995.

For further information contact:

A. Wendell Carrier
Office of Hazardous Materials
Technology
(202) 366-4545
or
John A. Gale
Office of Hazardous Materials
Standards
(202) 366-8553

U.S. Department of Transportation
400 Seventh Street SW
Washington, DC 20590.

CANADA

The Guidelines for the Handling of Naturally Occurring Radioactive Materials (NORM) in Western Canada was released in August 1995. There are no plans to make the guidelines into regulations at the present time. It is expected that the oil and gas and the fertilizer industries will use the NORM guidelines to develop their own code of operating practices in order to give the front-line workers specific guidelines to enable them to work with NORM safely. There are some questions on the report, particularly on the *de minimis* values used for bulk materials in Tables 3 and 5. I have asked the Chairman of the Western

(Continued on Page 15)

CANADA (continued)

Canada NORM Committee responsible for the report for clarification. I will summarize the report in the next issue of **The NORM Report**.

One of the concerns when the guidelines were finished was that there were other industries that should have similar guidelines. As yet there has been no feedback and the Western Canada NORM Committee has not pursued it further.

CONFERENCE OF RADIATION CONTROL PROGRAM DIRECTORS (CRCPD)

The NORM Commission sent out letters with questions to their Advisory Committee and the answers are coming in slowly. The answers will be reviewed and it is anticipated that a meeting of the Commission will be held in early fall to prepare a draft of proposed NORM regulations for distribution for comments.

The CRCPD has issued a list of *Radioassay and Toxic Chemical Leach Test Services*. This list is reproduced on page 22 of this issue of **The NORM Report**. ■

New Subscription Rates

The cost of subscriptions to **The NORM Report** will increase July 1, 1996. The new one-year rates will be \$115 (\$59 for government and non-profit organizations). This is the first increase since I have charged for the newsletter and is necessary due to the sharply increased costs of publishing **The NORM Report**.

Solving the Mixed Waste Dilemma

William P. Dornsife, Joel T. Case and Dade W. Moeller

Discussions of the problems faced in the disposal of low-level radioactive wastes inevitably lead to the conclusion that one of the most important current challenges is the disposal of mixed wastes.

Although this is partially a technical problem, it also has important scientific implications and political ramifications. The scientific implications involve the fact that certain academic and industrial institutions have announced cutbacks in important scientific research in order to avoid the production of mixed wastes; the political ramifications arise through the fact that mixed wastes are currently subject to regulation by both the U.S. Nuclear Regulatory Commission (NRC) and the Environmental Protection Agency.

Several possible solutions to this problem have been proposed. One suggested by the Advisory Committee on Nuclear Waste was to encourage the NRC to develop guidelines for declaring the radioactive content of certain wastes as "below regulatory concern (BRC)." Adoption of such guidelines would have permitted many wastes, now classified as mixed, to be reclassified as hazardous and thereby subject to regulation only by the EPA. Unfortunately, as every health physicist knows, efforts by the NRC to promulgate a BRC policy were met with widespread opposition and this approach has now been abandoned.

Concurrently, if EPA could be encouraged to develop and implement *de minimis* criteria for various toxic chemicals, many of the wastes now classified as mixed could be reclassified as low-level

radioactive wastes and thereby subject to regulation only by the NRC or the Agreement States. Again, this particular approach has not met with success.

Another approach that has been suggested is to assign to the U.S. Department of Energy (which is the major producer of mixed wastes in this country) the responsibility for the disposal of all mixed waste in the U.S. This, however, is not a "solution" to the problem: it is primarily a method of "passing the buck."

In spite of these setbacks, there remains a viable step that could be taken to solve a major portion of the mixed waste problem. That would be for EPA to develop readily applicable methods for "delisting" certain toxic chemicals, commonly present in hazardous wastes. Under the existing system, EPA has designated (listed) certain chemicals as "hazardous," and any waste that contains these chemicals must likewise be categorized as hazardous. Once a waste has been so designated, it remains "hazardous," even if the waste has subsequently been treated and the listed chemicals have either been removed or converted into a nonhazardous form. This is called the "derived from" rule.

Recent Federal court action (Shell Oil vs. EPA, 1992) has prompted EPA to re-evaluate this rule. As part of this effort, EPA has undertaken rulemaking to permit the automatic declassification (delisting) of wastes in which listed chemicals have been reduced to very low concentrations

(Continued on page 16)

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Solving the Mixed Waste Dilemma (Continued)

through the application of treatment processes. In certain respects, this approach is another form of the application of to *de minimis* concept. To support the rulemaking, EPA is applying multi-pathway risk assessment techniques to develop background information on each of the 512 chemicals now designated as "hazardous." The result of this effort, which will be called the Hazardous Waste Identification Rule (HWIR), deserves the strong support of members of the Health Physics Society. The proposed rule would permit waste generators to reclassify as "radioactive" many wastes that now must be categorized as

"mixed." In fact, estimates are that the availability of the resulting guidance would permit upwards of 90 percent of the existing wastes to be reclassified as radioactive. It would also save hundreds of millions of dollars in regulatory and disposal costs. It is time that the problem of mixed wastes be resolved. Let's hope that EPA is able to move ahead to complete the proposed rulemaking and to provide the necessary guidance.

This article first appeared in the HPS Newsletter (February 1996) as a guest editorial and is reprinted with the permission of Bill Dornsife. ■

Interesting Reading

100 Years of Radiological Science, World Health, The Magazine of the World Health Organization (WHO), 48th Year, No. 3, May-June 1995, WHO, CH-1211, Geneva, Switzerland. This special issue of *World Health* reviews the progress made in radiology over the past century and continues with a summary of WHO's activities in radiation medicine and its response to public apprehension about radiation hazards. There are summaries of diagnostic and therapeutic procedures in current use. Radiology in the next hundred years is presented. Ethics of new technologies and radiation protection are also subjects explored. In an editorial, M. Tubiana and G. Hansen express the hope that by the year 2000 "vast segments of the population will have access to radiation medicine". ■

Some ideas are good, and some ideas are worthless. Don't let anyone convince you they can always tell the difference.

About Results of Cleaning the Pipe Specimen Contaminated with NORM Scale According to TatNIPIneft Technology

Rasim N. Diyashev, Valery I. Zaitsev and Gennady P. Antonov

The problem of radioactive scaling on oil-field equipment has a global character. This phenomenon in one extent or another accompanies the technological processes of oil production and treatment in many oil-producing regions of the world.

Radioactivity of scales is associated with presence in them of radium isotopes (radium-226 and radium-228) and their decay products. Radium isotopes are always present in deposits in practically insoluble form - in the form of radiobarite $Ba(Ra)SO_4$. Specific activity of scales by radium in some cases makes dozens and more microcurie/kg. According to their physical characteristics the scales can be divided into two groups.

The first group includes scales created on technological equipment of wells - electric centrifugal pumps, tubing in different pipelines of oil and gas gathering system. They are deposited in the form of a strong film with thickness ranging from fractions of mm to complete covering of pipes flow section.

The second group includes scales created in technological equipment of oil treatment system - different tanks, bullets, etc. They have much more complex physical-chemical characteristics. Hydrocarbons (heavy fractions of oil, asphalt-resinous substances, paraffins) make 50-80% of total mass. Main mineral component is presented by ferric, silicon, aluminum oxides, calcium carbonate and other compounds.

Radioactive scaling in technological equipment during production and treatment of oil and gas gives rise to a number of serious problems requiring immediate solution. The main problem is cleaning of equipment from radioactive salts (scales).

TatNIPIneft Institute of JSC "Tatneft" (Tatarstan, Russia) has developed two technologies for cleaning pipes from radioactive scales. This report gives results of testing these technologies on a pipe specimen presented by Dr. Gray (USA).

The received specimen was a pipe cut of length 752 mm, outer diameter 73.6 mm, inside diameter - 62.5 mm, total mass was 6.4 kg. There was a scale of thickness 0.3-0.4 mm on the inside surface of the

pipe.

Power of gamma radiation from pipe has been measured. In this case scintillation radiometer with crystal NaI of size 25x25 mm and energy threshold of 50 Kev was used.

Dose rate on pipe ends was 20-30 microrentgen/hour, on the outer surface in centre-52 microrentgen/hour, inside the pipe in centre - 140 microrentgen/hour.

Total 7 specimens of length 75 mm each have been cut from the pipe. Mechanical separation of scales from specimens No 1 and No 7 has been performed for determining chemical and isotope composition of scales. The results of analysis are shown in table on page 18.

The scale consists mainly of barium and strontium sulfates, calcium carbonate. Total specific activity accounted for 1 microcurie/kg.

As for chemical composition it radically differs from scales being created on the equipment of wells of Tatarstan oil fields, where barium sulfate content makes 90-96%.

There were taken spectra of gamma radiation from specimens 2-6 and gamma radiation dose inside each specimen was measured.

Results of measurements show that radioactivity of scale is caused mostly by isotope radium-226. Characteristic lines of thorium series (in particular - 2.62 Mev) on spectrum are not practically distinguished (Figure on page 19) which proves the absence (or minor amount) of isotope radium-228 in scale.

Power of gamma radiation dose inside some specimens of pipe was about 72 microrentgen/hour with background value being about 14 microrentgen/hour.

Specimens 2 and 3 were subjected to thermochemical treatment. In so doing, technology 1 was tested on specimen 2, while specimen 3 was tested by technology 2, which were differing by composition of

(Continued on page 18)

About Results of Cleaning Pipe (continued)

Table - Main Mineral Composition of Scale

Component	Content in Specimen, %	
	Specimen No. 1	Specimen Mo. 7
BaSO4	23.1	20.7
SrSO4	13.8	15.1
CaCO3	48.0	48.5

reagents and temperature conditions.

The efficiency of treatment was determined by measurement of scale total activity decay with time on pipe specimen. Besides, gamma radiation spectra were taken periodically.

Results of measurements showed that duration of specimens complete cleaning from radioactive scales according to technology 1 made 4-5 hours, and according to technology 2 - about 14 hours. Dose rate herewith inside cleaned pipes did not exceed 12 microrentgen/hour, which complies with background value. Gamma spectra of cleaned specimens do not practically differ from those, measured on specimens after mechanical cleaning.

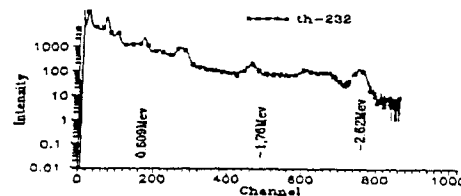
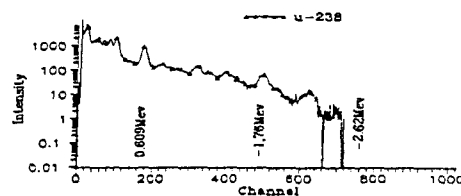
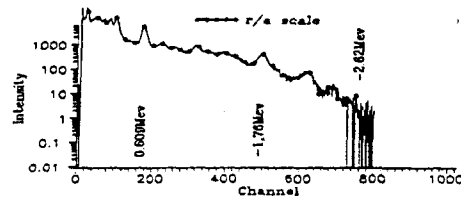
The developed technologies are characterized by simplicity, do not require costly, hard-to-get reagents.

If there are any questions, please address to Dr. R.N. Diyashev by Fax: 7(095)2398009 or 7(84312)22567, and also by E-mail: diyashev@tatnii.kazan.su.

Authors express their gratitude to Dr. Gray for submitting pipe specimen for testing and publication of results in **The NORM Report**.

Editor's note: The sample of pipe was kindly supplied by Mike McClure of Selective Tools, Inc. in Houston.

Energy Spectra of Natural Radiative Scale Uranium, and Thorium



News from the CRCPD

The 1996 edition of the CRCPD directory of personnel in radiation control programs throughout North America and of LLRW officials in the U.S. may be obtained by requesting the *Directory of RCPs* and sending prepayment of \$30 to CRCPD, 205 Capitol Avenue, Frankfort, KY 40601.

A concise list of contact persons for assistance with radiological incidents is available from state radiation control programs. (The objective is to encourage the development of acquaintance and information exchange with the radiation control authorities, who may well have additional information to distribute.)

MEETING CALENDAR

The following is a listing of meetings that may be of interest. These meetings either contain sessions or papers dealing with NORM, or they are of a related subject matter. It is intended to make the Meeting Calendar a regular feature of **The NORM Report**. I would very much appreciate receiving notices of upcoming meetings.

**1996 National Conference on Radiation Control
Albuquerque, New Mexico
May 5-9, 1996**

This is the annual meeting of the CRCPD.

**American Industrial Hygiene Conference
Washington, D.C.
May 18-24, 1996**

The conference program contains papers on hazardous wastes, radiation, regulatory affairs, risk assessments, and other topics.

**The 3rd International Conference on Health,
Safety & Environment in Oil and Gas Exploration
and Production** Sponsored by the Society of
Petroleum Engineers
**New Orleans, Louisiana
JUNE 9-12, 1996**

The conference theme is "Sustaining Global Progress" and the aims of the conference are:

1. to promote progress in occupational health, safety and environmental concerns in exploration and production of oil and gas;
2. to exchange experiences and to stimulate discussion on these topics between experts and line managers responsible for these key aspects of exploration and production; and
3. to encourage active participation and cooperation of all stakeholders in the upstream industry.

(Continued on page 20)



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MEETING CALENDAR (continued)

Air & Waste Management Association's 89th Annual Meeting and Exhibition Location: Nashville, Tennessee JUNE 23-28, 1996

Original papers for presentations are invited on a wide range of environmental topics, including the theme of the Annual Meeting: Technologies for Sustainable Environment. The program includes at least one session on NORM.

Additional information can be obtained from:
Wayne Davis @ (412) 232-3444; Fax (412) 232-3450

International Conference on Deep Disposal of Radioactive Wastes Winnipeg, Manitoba, Canada September 15-18, 1996

For information: M.M. Ohio, Conf. Chair
Waste Management and Environmental Affairs Div.
Canadian Nuclear Society c/o AECL
Pinawa, Manitoba, Canada..ROE 1L0

Second International Symposium on Extraction and Minimization of Waste Scottsdale, Arizona, USA October 27-30, 1996

Eighteen different societies throughout the world, including the Health Physics Society, are sponsoring this four-day symposium. The international symposium will focus on issues and processing as applied to the treatment and minimization of wastes. The symposium is expected to bring together a diverse group of researchers, policy makers, regulators, manufacturers, and other interested groups to address common interest in waste treatment and minimization.

The following technical topics will be discussed.

- * Mining wastes
- * Iron and steel industry wastes
- * Titanium industry wastes

(Continued on page 21)

MEETING CALENDAR (continued)**Expert Witnessing**

- * Radioactive wastes
- * Aqueous processing
- * Thermal processing
- * Biotreatment
- * Treatment of soils
- * Smelter and refinery wastes
- * Arsenic, selenium, & mercury wastes

For information:
 V. Ramachandran
 ASARCO, Inc.
 (891)263-5224
 or
 Carl C. Nesbitt
 Michigan Technological University
 Tel: (906)487-2796
 Fax: (906)487-2934
 E-mail: cnesbitt@mtu.edu

To determine the reliability and acceptability of expert testimony, a district court used the Daubert v. Merrell Dow Pharmaceuticals, Inc. Supreme Court case from 1993 as a guideline. The old rules said that for expert testimony to be admissible, the scientific basis had to be generally accepted in the relevant scientific community. In the Daubert decision the Supreme Court said the trial court should admit even novel scientific evidence if it has sufficient hallmarks of scientific knowledge. Some of the factors that are used in deciding that question include: 1) whether the opinion resulted from a testable and tested hypothesis, 2) what was the known or potential rate of error with respect to the method in question, 3) whether it has been peer reviewed, and 4) whether it has been generally accepted. Testimony could still be admissible even if it is not generally accepted in the scientific community and is a minority view, if it fits the other criteria.

Selective Tools, Inc. (STI)

STI was incorporated under the laws of Texas in 1986. The primary activities of the company are oil-field related and over 100 oil and gas firms have been serviced during the past eight years. On August 20, 1993, STI received the first Specific License granted by the Bureau of Radiation Control, Texas Department of Health for the decontamination of NORM-contaminated equipment, facilities and land including the contamination of NORM wastes. Under their license, STI is authorized to handle NORM as defined in the Texas Regulations for the Control of Radiation, both liquids and solids of unlimited maximum activity. In addition to the petroleum industry, STI has serviced the phosphoric acid industry as well as tanker loading and offloading facilities. Relative to their Specific License, STI services include.

- | | |
|--|---|
| ● Soil remediation | ● NORM slurrification and disposal operations |
| ● Pipe and equipment decontamination | ● NORM surveys |
| ● Automated tank/enclosed vessel decontamination | ● Worker training and certification |
| ● Pipeline descaling | ● Project and implementation relating to unique NORM problems |
| | ● NORM surveys and core analysis |

For additional information on these services, please contact our office:

Mike McClure
Selective Tools, Inc.
 2401 Fountainview, Suite 600
 Houston, TX 77057
 (713) 780-1944 or Fax (713) 780-1964

RADIOASSAY and TOXIC CHEMICAL LEACH TEST SERVICES

CRCPD Notes of January 1996

EPA³ DOE³ MAPEP³ TCLP⁴ Pkg.&⁵ Resp.⁶

Firm ¹	Location	Contact Person	Telephone	Water	Drink	Milk	Soil	Air	Filter	Biota	NORM ²	Q.C.	O.A.	DOE ³	MAPEP ³	TCLP ⁴	Test	Instr.	Pkg.& ⁵	Resp. ⁶
Accu-Labs Research Inc.	Golden CO	Bud Summers	303/277-9514	Yes ⁷	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Some	Yes	Yes	Yes	<6 Wks.
Analytical Technology Lab.	Fort Collins CO	Jodie Barr	800/443-1511	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	<4 Wks.
CH ₂ M Hill Environmental Lab.	Redding CA	Wayne Scott	916/244-5227	Yes	No	No	Yes	No	No	No	No	Yes	No	No	No	Yes	Yes	Yes	Yes	2 Wks.
Compuchem Labs	Res. Triangle NC	Rick Giglio	800/833-5097	No	No	No	Yes	Yes	Some	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	4 Wks.
Controls for Envir. Pollution Inc.	Santa Fe NM	Elsie Razzino	800/545-2188	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	3 Wks.
Core Laboratories	Casper WY	Ronni Mull	307/235-5741	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	3 Wks.
Data Chem	Salt Lake City UT	(Customer Serv.)	801/266-7700	Yes	Yes	Yes	Yes	Yes	Some	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	4 Wks.
Delaware Nat. Res. & Env. Control	Dover DE	Kathy Knowles	302/739-4771	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	No	No	No	No	1 Day
Environ. Science & Engineering Inc.	Gainesville FL	Barbara Ritter	904/332-3318	Yes	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	3 Wks.
Lockheed Analytical Services	Las Vegas NV	Mary Ford	702/361-0220	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	4 Wks.
Univ. of Iowa, State Hygienic Lab	Iowa City IA	Marinea Mehnhoff	319/335-4500	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	Yes	Yes	Yes	Yes	4 Wks.
Quanterra; TN, MO, WA; main office->	Richland WA	Van Peltley	509/375-3131	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	4 Wks.
Kentucky Radiation Control Branch	Frankfort KY	Mary Todd	502/564-8390	Yes	Yes	No	Yes	Yes	Yes	Yes	Some	Yes	No	No	No	No	Yes	Yes	Yes	-2 Wks.
Nuclear Technical Service	Alpharetta GA	Herman Rao	770/663-0711	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	3 Wks.
NUS Corp.	Pittsburgh PA	(Customer Serv.)	412/747-2500	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	<4 Wks.
Orlando Laboratories Inc.	Orlando FL	Korky Vault	407/896-6645-	Yes	Yes	No	Yes	No	No	No	No	Yes	No	No	No	No	Yes	Yes	Yes	10 Days
Pembroke Laboratory	Fl. Meade FL	Debra Scott	813/285-8145	Yes	Yes	No	Yes	No	No	No	Yes	Yes	Yes	No	No	No	Yes	Yes	Yes	2 Wks.
Post, Buckley, Schuh & Jernigan Inc.	Orlando FL	Tom French	407/277-4443	Yes	Yes	No	Yes	No	No	No	Some	Yes	No	No	No	No	Yes	Yes	Yes	2 Wks.
Radiation Safety Associates	Hebron CT	John Ratchford	203/228-0721	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	Yes	<2 Wks.
RSO Inc.,	Laurel MD	Mike Beard	301/953-2482	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	No	No	No	No	1 Wk.
Rhode Is. Nuclear Science Center	Narragansett RI	Ninni Jacob	401/789-9391	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	No	No	No	No	No	Yes	<3 Wks.
Teledyne Isotopes	Westwood NJ	Dr. Martin	201/664-7070	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	4 Wks.
Teledyne Isotopes	Northbrook IL	Leo Huebner	708/564-0700	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	2-8 Wks.
Thiokol Corp.	Brigham City UT	Dennis File	801/863-2437	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	Yes	Yes	Yes	2 Wks.
Thornton Laboratories Inc.	Tampa FL	Marsha Harvey	813/223-9702	Yes	Yes	No	Yes	Yes	Yes	Yes	No	Yes	Yes	No	No	No	Yes	Yes	Yes	<2 Wks.
Thermo NUtech	Richmond CA	Rod Mergard	510/235-2633	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	8 Wks.
Thermo NUtech	Oak Ridge TN	Mike McDougal	423/481-0683	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	Yes	No	Yes	2 Wks.
Thermo NUtech	Albuquerque NM	Ernie Sanchez	505/345-3461	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Yes	4 Wks.
Yankee Atomic Electric Co.	Bolton MA	Mark Krilian	508/779-6711	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	3 Wks.
Wisconsin State Laboratory of Hygiene	Madison WI	Lynn West	608/263-4766	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	No	No	Yes	-3 Wks.

1 A firm is listed here if it provides radioassay of diverse low specific activity materials, has Q.A. & Q.C. programs and will accept work from government radiation control programs or private firms.
 2 Naturally Occurring Radioactive Material is evaluated under Q.A./Q.C. not just byproduct radioisotopes.
 3 Quality control/assurance programs: the EPA Las Vegas Lab for water; DOE EML Q.A. for water, soil, vegetation and air filter cross-check; DOE RESL Mixed Analyte Performance Evaluation Pgm.
 4 The firm also performs the toxic characteristic leaching procedure required by EPA for wastes to be disposed of, e.g. at Envirocare or Richland.
 5 The firm will provide packaging for samples and instructions on packaging.
 6 Response time is the typical value from receipt of sample to report of analysis by the firm; most firms will expedite sample analysis for an additional fee.
 7 As with other CRCPD Notes, the No's are definite, Yes means maybe, and both the availability of a service and the prices change continually.
 This information is not to be construed as an endorsement by the CRCPD of the services listed here.
 Please provide additions or corrections to Terry Devine, 502/227-4543, fax -7862

NRC Considers Revising Regulations on Release of Radioactive Materials from Nuclear Facilities

The Nuclear Regulatory Commission (NRC) is considering amending its regulations that govern release of radioactive materials from NRC-licensed facilities other than nuclear power plants.

These changes are expected to provide a basis for the Environmental Protection Agency to rescind its regulations for NRC non-reactor licensees and thus eliminate dual regulations.

The revisions would require affected NRC licensees to constrain air emissions of radioactive materials from their facilities so that the highest likely radiation dose they could cause to an individual member of the public would be 10 millirem per year.

NRC currently requires licensees to ensure that the

dose to an individual member of the public does not exceed 100 millirem per year from all pathways (including air emissions). The Commission believes these current regulations provide adequate protection of the public health and safety. But the proposed revisions would ensure that the emissions are maintained at a very low level for little or no extra cost (and, considering the elimination of dual regulations, probably at a net saving).

Exceeding the 10-millirem constraint level would not be a violation of the regulations, but failing to report a dose in excess of the constraint level or failing to take appropriate steps to ensure against recurrence would be. However, exceeding NRC's 100 millirem limit does constitute a violation of NRC regulations -- under both current and proposed rules. ■

"It is a miracle that curiosity survives formal education." -- Albert Einstein

Campbell Wells Corporation

Campbell Wells Corporation, a wholly owned subsidiary of Sanifill Inc. began receiving NORM wastes for treatment and disposal in May 1994 at its facility located near Lacassine, Louisiana. The Lacassine facility is designed to treat non-hazardous oilfield waste (NOW) contaminated with naturally occurring radioactive material (NORM). This commercial facility, the first of its kind in the United States, is permitted to receive NOW-NORM generated throughout Louisiana, other states, and the Outer Continental Shelf.

The permits issued to the Lacassine facility by the Louisiana Department of Natural Resources and the Louisiana Department of Environmental Quality (LADEQ) specify that the facility may receive NOW-NORM that contains not more than 200 picocuries of radium per gram (pCi/gm). The waste material will be treated at the Lacassine facility to (i) bring the NOW element of the wastes to the "reusable material" standards as specified in Order 29-B and monitored by the LADEQ, and (ii) reduce the radium content of the NORM wastes to levels that do not exceed 5 pCi/gm above radium background concentrations in the vicinity. This will qualify the treated waste materials for "unrestricted transfer" as defined in the LADEQ's regulations for the control of NORM.

NOW-NORM waste materials containing radium in excess of 200 pCi/gm, other NORM-contaminated oilfield wastes, and NORM-contaminated materials not associated with oilfield wastes may be managed through **Campbell Well's** Sunrise Supply Limited facility. Sunrise Supply is the only LADEQ licensed commercial storage facility in Louisiana. Through the combination of the new Lacassine NORM facility and the Sunrise Supply storage facility, **Campbell Wells** provides the oil and gas industry with a comprehensive program for compliance with NORM regulations.

For additional information on the NORM services provided by **Campbell Wells**, contact:

Sammy Cooper or Jerry Brazzel at (318) 266-7979

Excerpts from the *Federal Register*

60 Fn 63984, December 13, 1995, Proposed Rule: The NRC proposed to establish a constraint of 10 millirem per year total effective dose equivalent for dose to members of the general public from air emissions of radionuclides from NRC-licensed facilities other than power reactors. The proposed rule is necessary to provide assurance to the EPA that future emissions from the NRC licensees will not exceed levels that will provide an ample margin of safety. This should provide the EPA the basis upon which to rescind its Clean Air Act regulations for NRC-licensed facilities other than power reactors and Agreement State licensees, thus providing relief from unnecessary dual regulations. Comments were due by March 12, 1996.

60 FR 66344, December 21, 1995, Proposed Rule: The EPA proposed changes to its hazardous waste

regulations commonly known as the Hazardous Waste Identification Rule (HWIR). This rule would establish a risk-based floor to hazardous waste listings that will encourage pollution prevention, waste minimization, and the development of innovative waste treatment technologies. Those involved in the generation or disposal of mixed wastes should be interested in this proposal. Comments were due to the EPA by February 29, 1996.

61 FR 633, January 9, 1996, Petition for Rulemaking: The NRC received a petition for rulemaking from Heartland Operation to Protect the Environment. The petition requests that the Commission amend its regulations to adopt a rule regarding government ownership of a low-level radioactive waste disposal site that is consistent with Federal statutes. Comments were due by March 11, 1996.

The Single Source Advantage

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Radioactive Matter Exclusion Endorsement

The Insurance Industry's Protective Response for Total Radioactive Liability Avoidance

(The following is the Introduction from a paper by Peter McDowell, St. Helen's Trading, Ltd., and presented at the 29th Midyear Topical Meeting of the Health Physics Society, Scottsdale, Arizona, January 7-10, 1996.)

Introduction

It has been a standard insurance industry practice for many decades now to include a "Nuclear Exclusion Endorsement" in insurance policies. This endorsement excludes coverage for very specific nuclear materials such as spent fuel or waste associated with operations at nuclear reactors and military (DOD, DOE, etc.) facilities. This exclusion resulted from the acceptance of all such liability by the United States Federal government under the Price-Anderson Act and the subsequent Atomic Energy Act of 1954. The definitive isotopic specificity of nuclear material, waste, etc. mentioned in the endorsement left open the insurance industry's liability for exposure to the balance of the 4,500+ radionuclides noted in the above referenced introductory quotation, including NORM. Note the well-worn trial attorney's adage regarding insurance exclusions - "If it's not excluded then it's included". Thus, in many forthcoming instances, the insurance industry would still have a place set at future settlement tables especially where NORM is concerned, unless they could find a vehicle for assuring the avoidance of all such future liability.

In 1993-94 they did just that through the adoption of a significant international liability avoidance doctrine. In order to usurp any potential for scientific indecisiveness, regulatory waffling and ambiguous court decisions on Radiation Protection Guidelines (RPG), the insurance industry began to include the "Radioactive Matter Exclusion Endorsement" (RMEE) to Comprehensive General Liability Policies (CG). The text of the exclusion reads - "*This policy does not apply to: "Bodily Injury" or "Property Damage" arising out of the actual, alleged or threatened exposure of person(s) or property to any radioactive matter*" (emphasis added).

(Continued on page 27)

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NREP AND EIA ANNOUNCE JOINT TRAINING AND CREDENTIALLING PROGRAMS IN RADIATION SAFETY AND NORM MANAGEMENT

NREP - The National Registry of Environmental Professionals and the Environmental Industry Associations (EIA) announce new programs to train and credential environmental and safety professionals for positions as Radiation Safety Compliance Officers (RSCOs) and as NORM Surveyors and Supervisors.

NREP is the largest US environmental credentialling organizations with over 17,000 active registrants in all environmental disciplines. NREP's credentialling programs promote legal and professional recognition of individuals possessing a defined combination of education, training, and experience as environmental managers, technologists, and scientists - and consolidate this recognition in one centralized source.

NREP has initiated the Registered Radiation Safety Compliance Officer (RRSCO) examination which credentials individuals with education and experience in the management of a radiation safety program. This examination program responds the growing need for credentialed professionals in both manufacturing and refining firms with compliance responsibility for radioactive materials. Philip Underhill, REP, RRPT, President of P.R. Underhill and Associates of Baton Rouge, LA, chairs the NREP RRSCO examination committee.

EIA has coordinately developed university-level professional education programs with the Southeast New Mexico Technology and Training Center (SEMTTC) to train environmental and radiation safety professionals preparing for NREP examination. EIA is the largest environmental trade association in the US representing over 2400 companies in the hazardous waste, solid waste, and consulting industries. These 3- and 5-day EIA course programs provide practical training in radiation safety management and the use, handling, monitoring, storage, and disposal of radioactive materials. Professionals with management, training, or operations responsibilities in

industries using radioactive materials will find these courses an up-to-date source of key information needed by radiation safety officers (RSOs). These courses comply with NRC recommendations for training for professionals serving as RSOs in industry, academia, and government.

NREP and EIA also announce training and credentialling programs for environmental and safety professionals in the oil and gas industry. The NORM Surveyor and NORM Supervisor course/credentialling programs prepare industry professionals with practical training and information needed to manage NORM-contaminated wastes as well as to assess and manage NORM-contaminated sites. Each course complies with industry, state and federal training guidelines for NORM surveyors and supervisors.

Upcoming NREP/EIA Radiation Safety and NORM courses:

Radiation/NORM Surveyor - 1 day (10 hours), \$295.00.

Carlsbad, NM	May 9
Albuquerque, NM	May 14
Las Vegas, NV	May 17
Albuquerque, NM	May 7
Dallas, TX	May 9

Radiation Safety Compliance Officer Review - 3 days (25 hours), \$695.00

Las Vegas, NV	May 20-22
Albuquerque, NM	June 3-5
Dallas, TX	July 10-12

All of these courses can be scheduled on -site with discounted pricing. Tuition includes NREP examination, all course texts and CEUs awarded by New Mexico State University.

To register for these NREP examinations and EIA courses, contact Stan Power at SEMTTC [800-748-3131]. ■

Computers can figure out all kinds of problems, except the things in the world that just don't add up. ----- James Magary (The toughest decision a purchasing agent faces is when he is about to buy the machine designed to replace him.)

Radioactive Matter Exclusion Endorsement (continued)

It is apparent that the industry felt that where radioactive matter was concerned, the underwriters were in line to relive their enormously expensive liability exposure experienced over the past two decades with hazardous materials liability issues of CERCLA, RCRA, asbestos, etc. From a strick risk management prospective, the adoption of this endorsement must be viewed as an absolute stroke of genius. Unfortunately from the prospective of impacted parties - consultants, contractors, transportation companies and the public at large, who now are faced with the lack of access to a financially viable safety net for past and future "radioactive matter" indiscretions, the loss of such available surety poses a serious predicament.

"The [NORM] story is so basic that it begins at the birth of the universe. It was the combination of nuclear reactions and radioactivity that created all matter. It was nuclear stability which determined

which elements are abundant and which are rare in the universe. Of the more than 5,000 known kinds of atoms (nuclides), about 95% are radioactive. It is the norm." (see note below)

Note: Excerpted from the IAEA Bulletin, 2/1993, **Environmental Radioactivity: A Perspective on Industrial Contributions**, Professor Murdoch S. Baxter, Director, International Atomic Energy Agency - Marine Environmental laboratory, Monaco. ■

Polluted Property

Selling polluted property "as is" does not release the seller from the legal obligation to remove the contamination. The only time a sale relieves the previous owner of cleanup liability is when the agreement contains a clear transfer of that liability to the purchaser. ■

SAFE NORM DISPOSAL

Envirocare



Of Utah, Inc.

- ◆ The Nation's First and Largest NORM Disposal Facility
- ◆ Selected by US EPA with Over 15 Million Cubic Feet of NORM Disposed to Date
- ◆ The Most Cost-Effective NORM Disposal Alternative Available
- ◆ Over 40 miles from Nearest Town in an Arid Desert Environment
- ◆ Accepted and Supported by Regulators and Local Public

Envirocare of Utah, Inc. operates the nation's first and largest diffuse NORM disposal facility. We have safely disposed of over 15 million cubic feet of NORM for EPA and DOD as well as major exploration and production companies. As EPA prepares to finalize federal NORM regulations, Envirocare presents the least liability concern of any licensed NORM facility in the country. For more information, please contact the Business Development Group at (801) 532-1330.

Comparison of NORM Rules by State

Radium Exemption Concentration

Radium Cleanup Standard

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

NOTES

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

- (4) 30/15 pCi/g is 30 pCi/g of radium in soil, averaged over any 100 square meters and

(Continued on page 29)

Comparison of NORM Rules by State (Continued)

Exemption for Contaminated Equipment

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

NORM Training Course Offered by OGCI & Peter Gray

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

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

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

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

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

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

Apr. 25-26, 1996 Calgary
Oct. 3-4, 1996 Houston

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