

# The NORM Report

Naturally Occurring Radioactive Material Contamination in the Petroleum Industry  
Summer 1993

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## Notice

The cost of producing The NORM Report has become very high. As a result there will be a subscription fee for the newsletter starting with the Winter 1994 issue. Details will be included in the Fall 1993 issue.

## P. Gray & Associates

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## Regulations for the Control of NORM - Update

Recent developments in the regulations for the control of NORM are summarized below. A complete status report of NORM regulations in the individual states, the federal government and Canada will be included in the Fall 1993 issue of The NORM Report.

### TEXAS

Regulations for the control of NORM became effective July 1, 1993. The Bureau of Radiation Control is now reviewing applications for decontamination services. The Bureau is still receiving many questions about the new rules.

Responsibility for the disposal of oil and gas NORM wastes lies with the Texas Railroad Commission. There has been no action on developing regulations for the disposal of oil and gas NORM.

The Texas Natural Resources Conservation Commission (TNRCC) was formed September 1, 1993 by combining the Texas Water Commission and the Air Control Board into a super environmental agency. The TNRCC has responsibility for non-oil and gas NORM disposal. It is unclear at this time as to what the delineation is between oil and gas NORM and non-oil and gas NORM. Oil and gas may mean production while non-oil and gas may include refining and petrochemical NORM. The TNRCC has no timetable for regulations for the disposal of non-oil and gas NORM, but expect to have them in place in 1994. The Railroad Commission has to have their regulations for the disposal of oil and gas NORM by January 1, 1995. The TNRCC expects to use the same exempt quantities as used

in the new Texas Regulations for the Control of NORM.

The Bureau of Radiation Control has two regulatory guides which may be useful: Regulatory Guide 5.10 Guidelines for Conducting Close Out Surveys of Open Lands and Requesting Release for Unrestricted Use and Regulatory Guide 2.15 Guide for the Preparation of License Applications for Decontamination of Equipment, Facilities and Land Contaminated with Naturally Occurring Radioactive Material (NORM).

### OKLAHOMA

A new agency, the Department of Environmental Quality (DEQ) became effective July 1, 1993. The DEQ will have responsibility for NORM regulations in Oklahoma. DEQ's Radiation Management Advisory Council won't have their first meeting for another two to three months. Six people have been appointed to the nine-member Council. It is expected that the Advisory Council will consider the NORM regulations drafted previously by the Department of Health at its first or second meeting. It will probably be the middle of 1994 before the Oklahoma regulations for the control of NORM become effective.

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**NEW MEXICO**

The last NORM Commission meeting was on August 31, 1993. The chairman of the Commission and other members hoped to resolve the few remaining issues during a conference call on September 20. The necessary changes will be made to the draft of the NORM regulations and the process started to have the regulations adopted. The Environmental Improvement Board and the Radiation Advisory Committee have to approve the proposed regulations before public hearings can be held, possibly later this fall.

**LOUISIANA**

There have been no recent changes in the NORM regulations. However, the DEQ is in the very early process of considering changes in some of the regulations; for example, pipe yards and salt water production pits and other areas that may be contaminated with NORM. The DEQ is also looking at other areas. DEQ's Hazardous Waste Division has begun surveying for NORM contamination in refineries and chemical plants.

The Campbell Wells disposal site has not yet received their final operating license. Although Campbell Wells was issued a license on June 3, 1993 by the DEQ, Kai Midboe, secretary of DEQ, set aside an administrative hearing request and allowed it to go to the Court of Appeals. The license will allow the company to treat oilfield wastes containing as much as 200 pCi/g of NORM. The site cannot be opened until all the legal hurdles have been satisfied.

**COLORADO**

The proposed draft of the NORM regulations have been sent to the Board of Health. The Board will hold hearings on the proposed regulations in November. The Colorado State Board of Health is

required to adopt NORM regulations prior to January 1, 1994.

The draft of the proposed regulations includes the following exemptions:

1. Any person is exempt from the requirements of the regulations to the extent that such person receives, possesses, uses, owns, transfers, or disposes of NORM in any material in which the concentration of any NORM radionuclide does not exceed 5 pCi/g and the total concentration of radium does not exceed 5 pCi/g.

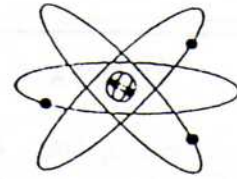
2. Any person is exempt from the requirements of the regulations to the extent that such person possesses, owns, or sells undisturbed soil in which the concentration of NORM averaged over any 100 square meters and averaged over the first 15 centimeters below the surface does not exceed 30 pCi/g total radium, 150 pCi/g of any other NORM radionuclide and the radon emanation rate is less than 20 pCi per square meter per second.

(It is interesting to note that the proposed regulations do not include a radiation exemption, e.g., 50 microrems per hour. I hope this is an oversight. Radiation readings with a survey meter are the best indication of the presence of NORM. Without radiation readings, excessive and expensive laboratory analyses will be necessary to determine the extent of NORM contamination.)

Section 19.5.1 states that no person may introduce NORM into other materials for the purpose of reducing NORM concentrations to levels exempted under this part, except in accordance with a general or specific license issued pursuant to this part.

**CALIFORNIA**

Two state agencies plan to team up for an independent study of NORM in California oil field despite



industry insistence that it is not a significant problem in the western United States. The Divisions of Oil and Gas and the California Department of Health Services will make the survey. A comprehensive study by University of Houston statistician Gordon Otto in 1989 identified California oil fields as largely free of over-background radiation. But Otto has admitted there is a need for new independent research using standardized equipment and uniform procedures. Another study may not be out of line.

California has made little progress yet on drafting regulations for the control of NORM.

**MICHIGAN**

Although there has been an increased interest in the media about NORM, the Michigan Department of Public Health has taken no action in drafting NORM regulations since the last issue of The NORM Report. They have no timetable for action at this time.

**OHIO**

The Blue Ribbon Commission on siting a Low Level Radioactive Waste location and the LLRW Advisory Committee have each completed their study. Their reports with recommendations have been filed with the state legislature. There has been no progress in developing regulations specifically for NORM.

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**MISSISSIPPI**

There have been no changes in the Mississippi regulations for the control of NORM.

**ENVIRONMENTAL PROTECTION AGENCY**

The EPA's Science Advisory Board (SAB) is still completing its review of the diffuse NORM report draft issued in April, 1993. After the SAB meets in October, their comments should be available to the public. The comments will be incorporated in a new draft of the report.

Another draft report, A Preliminary Risk Assessment of Management and Disposal Options for Oil Field Wastes and Piping Contaminated with NORM in the State of Louisiana, is still out for technical review.

The EPA has another draft report that is not ready to be released to the public. This Issues Paper on Radiation Site Cleanup Regulations was prepared to present issues, options, and preliminary analyses that are relevant to the development of radiation site cleanup regulations. The paper focuses solely on the development of cleanup regulations, which will establish criteria and procedures for cleaning up sites contaminated with radionuclides.

The development of waste management regulations for the disposal of radioactive waste generated during site remediation is not discussed in the Issues Paper and will be pursued under a separate effort.

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

The CRCPD committee responsible for drafting guidelines

for use by the states in their development of regulations for the control of NORM met at the CRCPD annual meeting in San Francisco in May, 1993. The Committee spent two days going over the last draft of the guidelines trying to decide what direction to take and determine what has to be done to get the guidelines finalized. The issues identified which might have some effect on the need for a revision to the guidelines included scrap metal recycling, phosphogypsum, source material and Zircon sand related issues. The Committee reviewed the 1991 Proposed Part N, item by item, and identified several provisions in need of further consideration prior to a revised proposal. The concept of provisions for "enhanced disposal" of NORM in landfills was discussed. The inclusion and applicability of the 100 millirem per year standard from the revised 10 CFR 20 was also considered. The intention at the May meeting was to meet again this fall and have a revised draft ready by the end of

the year. They now believe this may be too optimistic and it may be later in 1994 before the new draft is ready.

In April 1993, copies of the most recent version (April 1991) of the Proposed Part N were mailed to the 50 state agencies for comment. Comments were requested by July 1, 1993. Responses were received from 11 states, the CRCPD, and one consultant. The Committee intends to prepare and publish responses to these comments within a formal responsiveness document. The Committee welcomes all input to the process. Comments and suggestions can be sent to the Committee Chairman, Edd Kray at:

Colorado Dept. of Health  
RCD-ESU-B1  
4300 Cherry Creek Drive S.  
Denver, CO 80222-1530  
(303) 966-2115

The Committee expects to move expeditiously to get the guidelines finalized. ■

**STANDARDS FOR PROTECTION AGAINST RADIATION: FINAL RULE -- 10 CFR 20**

The largest revision to 10 CFR 20 since it was originally published in 1957 becomes effective January 1, 1994. The new revision incorporates modern radiation protection philosophy for the establishment of new dose limits. Terminology is updated and new definitions introduced. The changes closely follow the recommendations of the International Commission on Radiological Protection (ICRP) and the National Council on Radiation Protection and Measurements (NCRP).

All states will be required to incorporate the new regulations in the applicable portions of the State's Radiation Protection Regulations. Although these regulations are not specific to NORM and several states have enacted specific NORM regulations and more states will have NORM rules in the next few years, the petroleum industry must also comply with the State's Radiation Protection Regulations.

Some of the major changes in 10 CFR 20 follow

**DOSE LIMITS**

Under the current 10 CFR 20, the dose allowed to radiation workers (workers in nuclear power plants,

industrial radiography, reactor fuel fabrication, etc.) is 5 R per year and the allowed dose to the public  
(continued on page 4)

**10 CFR 20 (Continued)**

is 0.5 R (500 milliR) per year. Under the revised 10 CFR 20, the allowable dose to radiation workers remains 5 R per year, but the allowable dose to the public is reduced to 100 mR/y, or a decrease of 80%. Of significance to the petroleum industry is that most petroleum personnel are classed as general public and the 100 mR dose limits applies to them. A radiation worker is anyone who is allowed into a radiation area (a restricted area). If so, they must be trained in radiation safety and wear a personal radiation monitoring device such as a film badge. No badge is necessary if the worker is not expected to receive more than 25% of their annual dose limit -- but they have to be able to prove it.

An increased responsibility is placed upon the Radiation Safety Officer to monitor for radioactive airborne contaminants such as radon and airborne NORM contaminated dust, etc. Any exposure to airborne contamination must be documented so that the dose an individual receives from the inhalation of such material can be added to his wholebody dose.

The annual occupational dose limits for minors are 10 percent of the annual dose limits specified for adult workers.

The dose to an embryo/fetus during the entire pregnancy due to occupational exposure of a declared pregnant woman, shall not exceed 500 mRem.

Appropriate surveys shall be made of radiation levels in unrestricted and controlled areas and radioactive materials in effluents released to unrestricted and controlled areas to demonstrate compliance with the dose limits for individual members of the public.

Each facility shall maintain records

sufficient to demonstrate compliance with the dose limit for individual members of the public.

**ALARA PROGRAM**

Each licensee shall develop, document, and implement a radiation protection program commensurate with the scope and extent of licensed activities and sufficient to ensure compliance with the provisions of 10 CFR 20.

The licensee shall use to the extent practicable, procedures and engineering controls based upon sound radiation principles to achieve occupational doses and doses to members of the public that are as low as reasonably achievable (ALARA).

The DOE defines ALARA as follows: "ALARA is not a dose limit, but rather a process which has the objective of attaining doses as far below the applicable limit as is reasonably achievable."

The licensee shall periodically (at least annually) review the radiation protection program content and implementation.

It is recommended that copies of 10 CFR 20 be available to safety and environmental management.

Bob Alexander, who while at NRC was much involved with the development of the revised 10 CFR 20 Standards for Protection from Radiation, now offers a correspondence course on these new standards. It consists of a book of the rules and guides and a book of comments and questions. If certification is required, an exam is given. For further information phone the Alexander Corporation, (703) 631-8878. ■

by a breached logging source. NORM contamination of the scale, however, was found to be the culprit. Although radioactive contamination of scale had been observed previously, it was this North Sea event that led to regulations for NORM control in the United Kingdom and later in the United States. ■

**A Health Physics Society Concern**

Members of the Health Physics Society have become increasingly concerned that many of our government's recent and proposed actions dealing with radiation protection are inconsistent, poorly coordinated between federal agencies, and inadequately communicated to the public.

Examples of problem areas include 1) 100- to 1000-fold discrepancies in permissible exposure levels between various regulations, all allegedly based on the same scientific risk assessment data; 2) proposed expenditures of billions of federal and private dollars to clean up radioactively contaminated federal and commercial sites to environmentally pristine states without careful consideration of the actual societal benefits to be achieved; 3) some excessively restrictive government regulations that impose radiation exposure limits that are substantially lower than normal variations in natural radiation levels; and 4) the enormous difficulties that politicians and the public appear to be having in dealing with radioactive waste disposal thus threatening the future of a variety of industries, including the use of radionuclides in medicine and research.

(From the HPS Newsletter, August 1993.) ■

**Discovery of NORM Contaminated Scale**

In 1981, radiation alarms on a production platform in the North Sea sounded while pipe was being pulled. Personnel on the platform assumed the alarms were triggered

## ENVIROCARE OF UTAH, INCORPORATED

There have been several misconceptions recently concerning the Envirocare disposal facility near Salt Lake City, Utah. The NORM Report interviewed Al Rafati, Envirocare's Business Development Manager, to help inform the industry of the facts concerning Envirocare.

**The NORM Report:** Where is the Envirocare facility located?

**Al Rafati:** The Envirocare facility is located about 75 miles west of Salt Lake City in the Utah Western Desert. This site is ideal for the disposal of radioactive waste due to its remote location and hydrogeological characteristics. In fact, this site was chosen by the State of Utah and the DOE for the disposal of radioactive waste from a large Salt Lake City cleanup project in the mid 1980's.

**TNR:** Is Envirocare a "storage facility"?

**AR:** No. Envirocare is a permanent disposal facility. Occasionally, wastes are stored temporarily on storage pads before they are disposed.

**TNR:** What types of NORM waste does Envirocare accept?

**AR:** Envirocare accepts numerous types of NORM - these include pipe scale, contaminated soil and other wastes generated by the petroleum/petrochemical industry. The NORM waste is acceptable here if it falls within our license requirements.

**TNR:** Does Envirocare accept mixed waste such as NORM-contaminated organic sludge?

**AR:** Yes, Envirocare accepts mixed waste for disposal and, to the best of my knowledge, we are the only mixed waste disposal facility in the United States. We can dispose of mixed wastes that display hazardous characteristics and those that are "listed" as long as the wastes meet our treatment standards. One requirement specific to sludges is that they must pass the "paint filter test" to be disposed of at Envirocare. I urge generators to contact us with their questions regarding specific waste streams.

**TNR:** Does Envirocare accept contaminated equipment, e.g. pumps, vessels, tanks, valves, piping, tubular goods?

**AR:** Yes, as long as we can crush or cut those larger pieces so that they are compactable and can be placed in the disposal cells.

**TNR:** How are the NORM wastes disposed of at Envirocare?

**AR:** Incoming material is visually inspected and samples are then taken for analytical determinations to verify the contamination in the waste. The waste is then emptied from its container and spread out in the NORM disposal cell. This material is compacted and more of the same waste is placed on top of it following the same procedure. When the maximum height is achieved, a compacted radon barrier and erosion barrier are put in place.

**TNR:** Is each generator's NORM waste separated from other wastes? Is this a permanent segregation?

**AR:** Envirocare's operations are unique in that each generator's waste is permanently segregated from all other's material. Generators can choose a simple clay liner or a multiple clay/synthetic liner for this segregation. This segregation process ensures that there will be no future contamination of different generator's waste.

**TNR:** What determines the costs of NORM disposal at Envirocare?

**AR:** The volume of waste being disposed is the single largest determinant of cost for disposal. The other factors that determine the cost have to do with the handling that is involved on our end. These include the type of packaging and transportation, duration of project, time of year

shipped, etc.

The costs of disposal at Envirocare are lower than most people think, and the generators that call us for disposal information are pleasantly surprised with the disposal costs here.

**TNR:** Are the disposal costs dependent upon the level of contamination?

**AR:** The levels of contamination with NORM waste generally have little impact on the disposal cost.

**TNR:** Is there any limit to the level of radioactivity that Envirocare will accept? Is there a limit to the quantity of wastes that are acceptable?

**AR:** Our license specifically states the levels of radioactivity that we can accept. As far as quantities are concerned, we will take as much material as we can up to our present capacity of about 18 million cubic yards. Since our facility is set up to handle large volumes of material, we are more than happy to take the large quantity projects.

**TNR:** How should the NORM wastes be packaged?

**AR:** Wastes can be packaged in a variety of forms - boxes, bags, drums, bulk, etc. Really, the only criteria from our end is that the packages have to meet DOT's "strong tight" requirements. Because we empty the contents, the choice of packaging is the generator's.

**TNR:** What about the generator's exposure for future liabilities for the NORM wastes sent to Envirocare?

**AR:** Future liability exposure for the generator is minimal as a result of the waste acceptance process

(Continued on page 6)

**ENVIROCARE** (Continued)  
 id daily operations at Envirocare.  
 /waste sampling, pre-shipment  
 ceptance criteria, waste  
 gregation, incoming analyses  
 id the removal of waste from its  
 ontainer all contribute to  
 creasing future liability.

In addition to these precautions,  
 Envirocare has also been  
 intensively audited and the results  
 ve all been positive. We have  
 en audited by the DOE, the EPA,  
 e Utah State Legislature and  
 merous private generators - and  
 findings have been a positive  
 flection on our concern for any  
 uture liabilities. Additionally, the  
 ate of Utah has regulators at our  
 e 4- days a week to ensure that  
 r operations are compliant with  
 regulations.

**Q:** What will happen to the  
 disposal facility if Envirocare  
 ould "go out of business"?  
**A:** We don't plan on that  
 opening unexpectedly, but if it  
 es, Envirocare has a trust  
 eement with the State of Utah  
 t is based on the volume of  
 ste at our facility. In the  
 ikely event of our going out of  
 iness, closure and post-closure  
 ds will be available for the  
 per management of the site.

**Q:** Does Envirocare conduct  
 entation seminars on the  
 virocare acceptance process?  
**A:** Does Envirocare give tours of the  
 disposal facility?  
**A:** Yes to both. Interested  
 erators can contact us in  
 iness Development for  
 ormation.

**Q:** How should a company with  
 RM wastes contact Envirocare?  
 at information should be  
 ible about the wastes?  
**A:** We can be reached at  
 1)532-1330 to discuss specific  
 disposal projects.

will need any process

knowledge as well as general  
 information such as volumes,  
 location, types of contamination,  
 etc. Any analytical information  
 about the waste would also be  
 helpful.

**TNR:** How can someone find out  
 more about Envirocare's services?  
**AR:** They can call anyone in my  
 Business Development group at  
 (801)532-1330. ■

### NORM in the Petroleum Industry

A recent report *An Overview of NORM in the Petroleum Industry* by Karen Smith of Argonne National Laboratory is an excellent assessment of NORM in the industry. The report ANL/ESIS-7 is available from:

NTIS  
 U. S. Dept. of Commerce  
 5285 Port Royal Road  
 Springfield, VA 22161 ■

## INDUSTRIAL NORM CONTAMINATION

The petroleum industry is not the only industry plagued with NORM contamination. Several industries have NORM contaminations of similar magnitude to the petroleum industry. All this radioactive contamination is primarily due to radium-226 and the other radionuclides found in petroleum NORM. One estimate of NORM "production" in these industries is shown below:

<u>Industry</u>	<u>Annual NORM Production in tons/yr</u>	<u>Average Ra-226 in pCi per gram</u>
Uranium Mining	41. X 10 <sup>6</sup>	24.
Phosphogypsum	44. X 10 <sup>6</sup>	33.
Fly Ash	82. X 10 <sup>6</sup>	4.
Mineral Processing	1. X 10 <sup>9</sup>	35.
Drinking Water		
Sludges	280. X 10 <sup>3</sup>	16.
Ra Selective Resins	46. X 10 <sup>3</sup>	35,000.
Geothermal Wastes	77. X 10 <sup>3</sup>	160.
Petroleum Production		
Scale and Sludge	456. X 10 <sup>3</sup>	155.

It has been estimated that there are 750,000,000 tons of NORM-contaminated phosphogypsum wastes being stored in the United States with an estimated 44,000,000 tons being generated each year. Florida, for instance, believes phosphogypsum NORM wastes are a greater problem in the state than are the petroleum industry NORM wastes. It has been reported that a single phosphogypsum company in Texas has an estimated 25,000,000 tons of NORM wastes. The disposal of these wastes presents a tremendous problem! ■

