

# The NORM Report

Naturally Occurring Radioactive Material Contamination in the Petroleum Industry  
Winter 1992

## Index

Regulations Update	Page 1
Ra / Rn NORM	Page 1
Basic Radiation Text	Page 4
CRCPD	Page 4
Envirocare of Utah	Page 5
'10 CFR Part 20	Page 5
NORM Course	Page 6
NORM References	Page 6

## Radium / Radon NORM

Radium is the important NORM in the oil industry and radon and its long-lived decay products are the important NORM in the gas and gas liquid industry. Radium-contaminated scale can also be a problem in the gas industry -- whenever water is produced with the petroleum fluids, the potential for contaminated scale exists.

However, the presence of radon in the natural gas causes contamination throughout the gas system and particularly in natural gas liquids plants. The highest radiation from NORM I have seen in the petroleum industry was from a propane pump in an NGL plant. In many ways, the NORM contamination in the gas and gas liquids industry is more severe than it is in the oil industry. ■

*The NORM Report* is published quarterly by Peter Gray and Associates, Box 342, Bartlesville, OK 74005. Call 918-333-9274 for information.

## Regulations for the Control of NORM - Update

The status of regulations for the control of NORM is summarized below for 27 important petroleum producing states as well as the Nuclear Regulatory Commission, the EPA, MMS, two provinces in Canada and Health and Welfare Canada, and Radiation Authority in Canada. Each regulatory agency was contacted during the month of March, 1992.

Louisiana continues to be the only state with regulations in place for the control of NORM. However, Texas, Mississippi, Arkansas and North Dakota should have their regulations enacted this summer and several other states are actively preparing regulations. I believe every petroleum state will have NORM regulations within two to five years.

Although most states do not yet have specific NORM regulations, NORM contamination is nominally regulated by the separate state Control of Radiation regulations that require licensing for the possession, use, transfer, etc. of radioactive materials, including NORM. However, these general regulations are largely ignored for NORM in the petroleum industry. Enactment of regulations specifically for the control of NORM will require compliance by the industry.

A summary of the status of the individual NORM regulations follows:

### ALABAMA

Alabama is studying the proposed Mississippi regulations and will probably propose similar regulations for Alabama. There is no timetable yet.

### ALASKA

Alaska has a new director of their radiological health program -- Charles Tedford (from Arizona). There are no regulations at present in Alaska. The regulations being proposed in other states are being studied as models for Alaska. Tedford has stated that Alaska will have NORM regulations. There is no timetable yet.

### ARKANSAS

The proposed regulations for the control of NORM have gone to a legislative subcommittee for approval. The regulations will then go to the Board of Health for final approval before going to the

governor for his signature to become law. Arkansas will have NORM regulations this year. The regulations are expected to be similar to those from other states. Arkansas does not have specific regulations for produced water -- produced water is not a big issue in Arkansas.

### CALIFORNIA

California has not begun preparing NORM regulations. It is considered to be of lower priority than other radiation issues such as mammography regulations. There is no time table for NORM regulations.

### COLORADO

Colorado is waiting for the guidelines from the Conference of Radiation Control Program Directors (CRCPD) to be finalized

Continued on page 2

### COLORADO (continued)

before acting. There is no timetable for NORM regulations in Colorado.

### FLORIDA

Florida does not have specific regulations for the control of NORM. NORM contamination, etc. is now handled largely through licensing; e.g., contractors who decontaminate facilities must be licensed.

### ILLINOIS

Illinois is starting to incorporate the Draft 7 CRCPD guidelines into the proper format for Illinois. Other state agencies which may be affected by the regulations are being contacted for their input. The Louisiana and Texas regulations are being reviewed also, e.g., the regulations for the disposal of radium in soil, etc. There is no timetable for final enactment of the regulations. Illinois is not specifically looking at produced water -- they already have regulations for radium content of waters released to uncontrolled areas.

### INDIANA

Indiana does not have regulations for the control of NORM and no progress is being made in that area. They do not have a timetable for regulations. Any NORM contamination problems are being covered with existing regulations for the control of radiation, if possible.

### KANSAS

No regulations for the control of NORM have been proposed. Kansas is still "struggling" with the issue and following what other states are doing. The NORM problems in Kansas are being assessed to determine what should be done. One area of concern is the disposal of contaminated pipe and equipment that has been rejected by a scrap yard because of radioactivity contamination.

### KENTUCKY

Kentucky has a draft prepared for the control of NORM, but nothing has been done with it recently. They hope to look at it again during the next six months.

### LOUISIANA

The proposed revisions to the Louisiana NORM regulations were signed off on March 6, 1992 and went out for public comment on March 10. Several seminars were held during March and early April in Louisiana at which the regulations were and will be discussed. (Peter Gray as well as Richard Brackin and Kai Midboe from the Louisiana Department of Environmental Quality will be speaking at a seminar in Baton Rouge on April 8.) Under the proposed revisions, companies are limited to 90 days storage of NORM wastes on the company's property, i.e., plans for the disposal of the wastes must be submitted to the DEQ within 90 days.

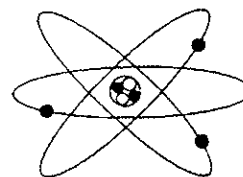
### MICHIGAN

The Michigan Department of Public Health low-level radioactive waste regulatory advisory committee meets April 9, 1992 to consider recommendations made by its NORM subcommittee. These recommendations entail standards for exemptions and unrestricted release of NORM and NORM contaminated equipment and materials. The committee will also be considering guidance on NORM screening surveys to determine what controls will be necessary. The 5 pCi radium per gram rather than 30 pCi per gram for soil contamination limits will be recommended. Set gamma radiation exposure levels will not be used. Recommendations will also be considered for disposal alternatives. They are looking at down-hole disposal options on a case-by-case basis.

### MISSISSIPPI

Mississippi has revised its Section

C (Licensing of Radioactive Material) to agree with the addition of Section N (Regulation and Licensing of NORM). The



revisions were made also to comply with recent revisions made by the Nuclear Regulatory Commission in their regulations that are considered a matter of compatibility for the Agreement States. Section C and N were sent out for public comment with comments due back by March 13, 1992. The proposed regulations will be reviewed first with the Radiation Advisory Council and then submitted to the Mississippi Board of Health for approval. The regulations will probably become law this summer. Appendix A in the proposed regulations, **ACCEPTABLE SURFACE CONTAMINATION LEVELS FOR NORM**, specifically shows where lead-210 and polonium-210 are to be regulated. This has not been clear in other states' regulations. These two NORM decay products of radon-222 are especially important in the gas and gas liquids industry.

### MONTANA

The regulations for the control of radiation have not been revised since 1980. There are no specific regulations for NORM and NORM is not considered to be covered 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 at present.

### NEBRASKA

Nebraska believes that NORM is

Continued on page 3

**NEBRASKA** (continued) included in the current regulations for the control of radiation. There are no plans for specific NORM regulations.

**NEVADA** NORM is handled under Nevada's regulations for the control of radiation. They are following the development of the CRCPD guidelines and reviewing the Louisiana and Texas regulations. Regulations for the control of NORM will be proposed in the future if it is determined they are necessary.

**NEW MEXICO** The New Mexico Secretary of the Environment has formed a NORM committee. This committee, which has held two meetings so far, is compiling a bibliography and making a literature review. They are reviewing what other states are doing and trying to determine if there is a problem with NORM in New Mexico. If it is determined that there is a problem, the Secretary wants to have regulations by the end of 1992. New Mexico has no specific regulations for the control of NORM contaminated produced water.

**NORTH DAKOTA** New regulations for the control of NORM were sent to the Health Council for a meeting on March 19, 1992. The next steps will be getting an opinion from the Attorney General and a formal review by the legislative council. Assuming the new regulations make it through these reviews, the regulations will be ready by May, 1992.

**OHIO** Ohio is reviewing the petroleum facilities (producers) in the state to determine the extent of NORM contamination. Regulations for the control of NORM will be drafted following the CRCPD guidelines and the regulations from other states. Ohio is revising the

regulations for the control of radiation (not just NORM). These new regulations should be in effect late in 1993.

**OKLAHOMA** Oklahoma is still in the process of discussing NORM with their Radiation Advisory Committee which is composed of governmental, industrial, and medical representatives. Regulations from other states are being reviewed. Oklahoma will probably adopt similar regulations in 1993 after the "bugs" have been worked out.

**PENNSYLVANIA** There currently are no specific regulations for the control of NORM. Draft 7 of the CRCPD and the Louisiana and Texas regulations are being used for guidance when necessary. When CRCPD has finalized its guidelines, Pennsylvania will enact appropriate legislation for the control of NORM.

**SOUTH DAKOTA** South Dakota has regulations for the control of radiation but nothing specific to NORM. Although there are no current plans for NORM regulations, they are following what other states are doing.

**TENNESSEE** NORM is handled basically as any other radioactive material. If it is enhanced above background levels, they try to make an assessment as to whether it constitutes a problem or not. If it does, it is dealt with as they would with any other radioactive material, i.e., by their regulations for the control of radiation. There are no specific regulations for the control of NORM and none are planned at present.

**TEXAS** The Texas Board of Health has approved Draft 3 (with minor changes) of the proposed regulations for the control of

NORM. The most significant change made was the replacement of the 25 microR above background radiation exempt level with 50 microR including background. The proposed regulations have been published in the Texas Register and following a 60-day public comment period, final adoption of the regulations are expected this summer.

**UTAH** NORM regulations are considered to be included in Utah's comprehensive radiation control regulations. A state license is required for anyone with material containing more than 15 pCi radium per gram of material.

**WEST VIRGINIA** There are no specific regulations for the control of NORM in West Virginia. NORM is thought to be adequately covered by other regulations that require registration of facilities that own, possess, transfer, etc. NORM. There are no plans now for the specific regulation of NORM.

**WYOMING** Wyoming has no regulations for the control of NORM and no regulations have been proposed at this time. There are no limits on NORM concentrations in water for reinjection. Produced water is limited to 40 pCi radium in water for surface discharge. Wyoming has enacted a bill to allow commercial radioactive waste disposal, including land waste disposal. The solid waste management regulations are being amended to allow incineration of household and industrial wastes. This area is rapidly changing and bears watching.

**ENVIRONMENTAL PROTECTION AGENCY** The draft report "*Diffuse NORM Wastes - Waste Characterization and Preliminary Risk Assessment*" is out for public

**EPA** (continued)

comment. This summer it will be updated to a final draft and finalized late in 1992. There is a separate report in preparation on disposal options for NORM. Under a cooperative agreement with Louisiana, a contractor's report evaluating disposal options for Louisiana is being prepared -- nothing is available yet, however. There currently are no federal regulations for the control of NORM. The EPA is in the very early planning stage for a national conference on NORM. The EPA has the authority to regulate NORM if it chooses to do so.

**MINERAL MANAGEMENT SERVICE**

MMS has the authority to regulate all disposals on the OCS. Overboard sand disposal is the only area presently controlled, but data are being collected on the disposal of radium-226 and radium-228. Quarterly analysis reports have to be sent to MMS. These and other data will be the basis for additional regulations for the disposal of NORM on the OCS.

**NUCLEAR REGULATORY COMMISSION**

The NRC has no regulations for the control of NORM and none are proposed. It will require a change in the Atomic Energy Act of 1954 for the NRC to become involved in NORM regulations.

**ALBERTA**

Alberta has no NORM regulations yet. A committee of government and industrial representatives from Alberta, Saskatchewan, and British Columbia are attempting to set consistent guidelines for the western provinces. Radiation standards and various affiliated documents are being reviewed. Guidelines will be available for industry to develop their radiation safety plans.

**BRITISH COLUMBIA**

British Columbia is participating

with Alberta and Saskatchewan on a joint NORM committee to set up consistent guidelines across western Canada. There is still some disagreement as to whether the provincial or federal governments have jurisdiction. Optimistically, British Columbia hopes to have NORM regulations within six months to a year. Some sections may be available as early as May, 1992.

**HEALTH AND WELFARE CANADA**

Health and Welfare Canada has no regulations for the control of NORM and has no plans at present for developing such regulations.

**RADIATION AUTHORITY IN CANADA**

The Radiation Authority in Canada does not regulate NORM. This federal agency is similar to the U.S. Nuclear Regulatory Commission in its jurisdiction for NORM regulations.

**Basic Radiation Textbook**

An excellent reference book as well as a student textbook in radiation protection is *Basic Radiation Protection Technology*, 2nd Edition. This book by Daniel A. Gollnick is available from:

Pacific Radiation Corp.  
2945 Stonehill Drive  
Altadena, CA 91001  
(818) 798-8100

The cost of the book is \$55 (softcover) plus \$3 S&H. The book's 636 pages include fundamentals of radiation, instrumentation, operational aspects, and supplements and appendices. I highly recommend this book for anyone wanting a better understanding of radiation, its detection and practical aspects of its control. ■

**“If you can't convince them, confuse them.” H. S. Truman**

**Conference of Radiation Control Program Directors**

Draft 7 of *Part N: Regulation and Licensing of Naturally Occurring Radioactive Materials (NORM)* is still being internally reviewed by CRCPD and is not generally available for public comment. It is hoped these guidelines for use by the separate states in writing their NORM regulations will be available soon. The longer CRCPD delays in releasing the Part N guidelines, the less useful they will be. While many states are awaiting the guidelines, others are proceeding using draft 7 and earlier drafts as well as the proposed regulations from other states. In addition to the Part N guidelines, CRCPD is preparing several other reports on NORM - some of which will address smaller problems of importance to the petroleum industry. For example, one committee is looking at scrap recycling concerns, including contaminated scale in production piping.

A meeting was held January 3 & 4 in Columbus, Ohio to discuss a number of issues facing the Ohio radiation control program. Ohio wished to know how other states had dealt with similar issues. The issues discussed included pipe scale, ancillary NORM and existing contaminated sites as well as other issues outside the petroleum industry. After discussion of these issues, the group turned its attention to consideration of criteria which could be implemented by a state faced with the problem of approving disposal of NORM waste. Notwithstanding the political ramifications, good technical criteria are needed for judging the health and safety issues. Guidelines were endorsed for:

- Radon emanation from land contaminated with radium.
- Concentrations of radium in ground and surface water.

(continued on page 5)

CRCPD (continued)

- Total exposure to the general public.
- Dose to an intruder, e.g., construction activities.

The group identified several tools currently available for addressing NORM problems. The group then considered what additional tools are needed to make proper responsible decisions.

- The group considered Part N as a reasonable starting point for development of state regulations, but with the 5 pCi/gram exemption changed to 30 pCi/gram.
- Generate volume and mass contamination limits to complement the existing surface contamination limits.
- Evaluate whether a new class of NORM disposal facility is needed to provide adequate radon control.
- Develop site decontamination limits.
- Generate a list of NORM sites and generators.
- Evaluate the suitability of vitrification for control of NORM wastes by determining the long-term characteristics and stability of vitrification products.
- Define and characterize a Standard Reference Intruder for purpose of projecting risks from disposal activities.

There were 14 attendees at the meeting. They came from Ohio, Oregon, Illinois, Colorado, Nebraska, Florida, and Louisiana as well as from the CRCPD. Such meetings can be very valuable, especially as a tool for getting industry concerns on the table.

The Conference of Radiation Control Program Directors is willing to organize similar regional meetings around the country. It is suggested that the one-to-two day meetings be kept small in order that good discussions of the issues can be held. Attendees should be from industry and the state regulatory agencies responsible for NORM regulation. The petroleum industry is going to have to comply with the regulations when they are enacted and these meetings will give them a voice into the regulations.

Although the CRCPD is willing to organize these meetings, they do not have any funding for this purpose. The cost of the meeting is estimated at less than \$10,000 and probably less than \$7,500 -- a relatively small cost for the benefits that would be derived. The costs that would be covered by the \$10,000 include travel expenses for the governmental attendees and the costs associated with organizing and holding the meeting. Attendees from industry would be expected to pay their own expenses.

If interested in such a meeting contact:

Dr. Terry Devine  
Conference of Radiation Control Program Directors, Inc.  
205 Capital Avenue  
Frankfort, KY 40601

## Envirocare of Utah, Inc.

Envirocare of Utah is probably the only commercial operation that currently accepts NORM wastes from the petroleum industry. Envirocare accepts all types of NORM waste, including 55-gallon drums of scale, sludges, etc. as well as contaminated tubular goods, equipment, valves, etc. Geothermal wastes are also accepted by Envirocare.

If the radioactive waste material has been properly identified as to the radionuclides present as well as the quantities of each nuclide, and if these quantities of NORM are covered in Envirocare's license, Envirocare assumes the liability for the material. If the NORM has not been correctly defined, either by mistake or on purpose, the liability reverts back to the NORM originator.

Costs of disposal are currently about \$220/55 gallon drum (negotiable for larger amounts). Last summer Envirocare had a \$182/drum special. Disposal costs for contaminated tubular goods, equipment, valves, etc. is on a case-by-case basis.

Envirocare is a permanent disposal site and is regulated by CERCLA.

The address of Envirocare is:

Envirocare of Utah, Inc.  
Khosrow B. Semnani, President  
175 So. West Temple, Suite 500  
Salt Lake City, Utah 84104  
801-532-1330

### 10 CFR Part 20

The Nuclear Regulatory Commission has revised 10 CFR Part 20 et. al. *Standards for Protection Against Radiation*. The final rule was issued May 21, 1991. These rules and regulations are not specific to NORM, but are the basis for the regulations for the control of radiation adopted by most states. Companies with NORM contamination have to comply with these regulations also.

## NORM Training Course Offered by OGIC

OGIC (Oil & Gas Consultants International, Inc.), a world leader in petroleum training, has scheduled training courses in NORM control for 1992. The course *NORM Contamination in the Petroleum Industry* will cover all aspects of NORM contamination and its control, including:

- Fundamentals of Radiation
- Fundamentals of NORM
- NORM (Radium) Contamination
- NORM (Radon) Contamination
- State and Federal Regulations
- NORM Surveys including hands-on practice
- Maintenance Procedures
- Disposal of NORM Wastes
- Decontaminations
- Release of Facilities
- Recommended Programs

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 contamination in the petroleum industry. 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 retirement in 1985. This background uniquely qualifies Dr. Gray as an instructor of the course -- an instructor who understands the origins of NORM, why it contaminates nearly every oil and gas facility, where the contamination occurs, how to set up programs which protect employees, company facilities, the environment and the public, how to survey for NORM contamination, the available options for the disposal of NORM contaminated wastes, and the federal and state regulations for the control of NORM.

The 1992 schedule for the course *NORM Contamination in the Petroleum Industry* is:

April 27 - May 1	Dallas
May 18 - 22	Aberdeen
Nov 2 - 6	Dallas
Nov 16 - 20	Calgary

In-house courses can be arranged by contacting Chuck Conaway at OGIC.

For information about the course, contact Chuck Conaway, Executive Vice President, OGIC, 4554 South Harvard Avenue, Tulsa, OK 74135, 800-821-5933. Or contact Peter Gray at 918-333-9274 for information about the course content.

**“It is easier to ask forgiveness than permission”**

### NORM References

The following are additional references on NORM:

1. NORM: The New Hot Wastes by Janet Raloff, Science News, Vol. 140, No. 17, pages 264-267, 1991

The following papers were presented at the 36th Annual Meeting of the Health Physics Society, July 21-26, 1991 in Washington D.C.:

1. NORM Contamination of Oil and Natural Gas: An Emerging Regulatory Problem
2. NORM from the Regulatory Perspective
3. Radioactive Metal Scrap - Are We Solving the Problem?
4. Disposal Alternatives for Oil and Gas NORM
5. Information and Knowledge Gained from Conducting Radiation Surveys Around Crude Petroleum Production Operations
6. Health and Environmental Risks Associated with Radium Discharged in Produced Water