The NORM Repor

Naturally Occurring Radioactive Material Contar

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Index

The NORM Report

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E-mail

pgray@normsreport.com

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

The status of regulations for the control of NORM contamination is summarized for all 50 states, the Environmental Protection Agency (EPA) and the Nuclear Regulatory Commission (NRC), Canada, and the Conference of Radiation Control Program Directors (CRCPD). NORM contamination is not limited to the petroleum industry and several non-petroleum states are drafting rules for the control of NORM in other industries in their states. Each regulatory agency was contacted during October 2000.

The last state to enact NORM regulations was Ohio. Ohio's regulations became effective June 9, 1997, and were summarized in the Spring 97 issue of **The NORM Report**. The New Mexico and South Carolina regulations were summarized in the Summer 1995 issue of **The NORM Report**. Louisiana, Mississippi, Arkansas, Texas and Georgia have previously enacted regulations for the control of NORM. Oregon enacted regulations in January 1990. Although the Oregon regulations were specifically written for control of NORM in zircon sands, the Oregon regulations do apply to all NORM contamination in the state. The Oregon regulations were summarized in the Winter 1996 issue of **The NORM Report**.

There currently are no federal regulations specifically for the control of NORM, although the Environmental Protection Agency appears to be moving in that direction (See page 17)..

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

The following are of particular significance in this issue:

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

Summaries of State and Federal Regulations for the Control of NORM

ALABAMA

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

ALASKA

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

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

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

ARIZONA

Although some consideration has been given to the need for specific NORM regulations in Arizona, there is no regulatory activity at present. All radioactive materials, including NORM, are addressed in Arizona's general radiation regulations.

ARKANSAS

The Arkansas NORM regulations constitute Section 7 of the *Arkansas Rules and Regulations for Control of Sources of Ionizing Radiation.* The revised regulations were summarized in the Fall 96 issue of this newsletter. There are no plans at present to further revise the NORM regulations.

CALIFORNIA

In 1993, California underwent a peer review of its oil and gas exploration and production waste management regulatory programs. The review was conducted by the Interstate Oil and Gas Compact Commission (IOGCC), in cooperation with the U.S. Environmental Protection Agency and other interested groups. One recommendation of the review team was for a thorough evaluation of the industry NORM survey data by the appropriate state agencies to verify the extent of oil and gas field NORM in California.

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

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

The results of the study indicate that NORM is not a serious problem in California oil and gas production facilities - confirming the findings found in an earlier survey (1987). In the 1987 survey, seventy-eight percent of the measurements were at background levels. A few sites had elevated levels of NORM. Further studies of those sites should be considered. Routine protective measures may be all that is necessary to minimize exposure to radiation in these particular areas. Survey results and laboratory analyses are reported in: *A Study of NORM Associated with Oil and Gas Production Operations in California*. The report was issued by:

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

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

(Continued on page 3)

CALIFORNIA (continued)
Copies of the report are available from:

Stephen Hsu
Department of Health Services
Radiological Health Branch
601 N 7th Street
P.O. Box 942732, MS 178
Sacramento, CA 94234-7320
E-mail:shsu@hwl:cahwnel.gov
Telephone: (916) 322-4797

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

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

COLORADO

Senate Bill 97-154, **Controlling Regulation of Radioactive Material**, did not get out of the Appropriations Committee and the Legislature adjourned without further action. (See the Winter 97 issue of **The NORM Report** for a summary of Bill 97-154.)

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

CONNECTICUT

Using ***Guidelines for Disposal of Drinking Water Wastes Containing Radioactivity*** (U.S. Environmental Protection Agency draft, June 1994) and Nuclear Regulatory Commission limits for release of licensed material, the Connecticut Department of Environmental Protection put together its first guidelines for an actual water treatment facility. It will (for the present) continue developing guidelines for other facilities, giving case-by-case guidance. Simply put, the guidance will be to apply NRC discharge limits above background radioactivity. EPA Region 1 has given preliminary concurrence on this interpretation of EPA's Draft guidance. The thinking on this — "If it came from the ground and nothing was done to enhance it, it can go back into the ground."

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

DELAWARE

There are no specific regulations for NORM in Delaware. NORM, NARM and other radioactive materials are considered to be covered in the general regulations for the control of radiation enacted in 1993. A revision of the general regulations became effective September 1, 1995. The revision tightened the compliance aspect of the regulations. NORM is considered to be covered in Sections C and D, Radioactive Materials, in the regulations.

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

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

FLORIDA

The Florida Department of Health, Bureau of Radiation Control (BRC) continues to devote staff resources to research TENORM contamination and exposure issues to support its evaluation of appropriate regulatory approaches to the issue. Its recent focus has been on the pulp and paper (P&P) industry, due to a Florida mill's discovery of TENORM-contaminated piping in a load of their scrap metal. The BRC is working with the company to investigate the extent of contamination at their facility. BRC staff recently conducted a TENORM survey of another (closed) pulp and paper mill, which has been cleared for decommissioning. Based on preliminary results, TENORM in Florida's P&P industry appears to be a site-specific, rather than an industry-wide problem.

GEORGIA

Georgia's regulations for the control of NORM became effective in October 1994. There have been no changes in the rules since. Revisions to the general rules and regulations for the control of radiation have been drafted and were adopted by the Board. The revisions became effective May 6, 1997. However, there are no changes in the NORM rules in this revision.

HAWAII

Hawaii has revised their general radiation regulations but the CRCPD Part N was withdrawn for

(Continued on page 4)

HAWAII (continued)
now. Part N will probably be incorporated in the regulations during the next revision, probably in 2002. NORM problems that do arise in the meantime can be handled on a case-by-case basis under the general regulations.

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

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

IDAHO

Idaho has no regulations specific to the control of NORM. There are general statutory and regulatory provisions in the existing Idaho law giving the Department of Environmental Quality authority to address problems with NORM should they arise.

The commercial hazardous waste disposal facility in Idaho has been accepting NORM and other radioactively contaminated wastes from the Army Corps' FUSRAP program. Public, legislative and regulatory awareness and concerns have been heightened as a result. This scrutiny could eventually lead to changes in Idaho law to deal with the disposal of NORM waste. No changes are anticipated in the 2001 legislative session.

ILLINOIS

Illinois has drafted regulations for the control of TENORM based on the November 97 draft of CRCPD Part N. The draft has been circulated in-house. It is planned to have stakeholder meetings during this coming winter to get their input before publishing it in the Illinois Register.

Some of the delay was caused by the rewrite of licensing requirements in the general radiation regulations. Since the NORM draft rules refers to these licensing regulations, the NORM rules had to be revised as well.

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

INDIANA

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

IOWA

Iowa does not have specific regulations for the control of NORM. The Iowa general regulations for radiation control are assumed to cover NORM and are used when NORM problems arise. Most of the NORM problems in Iowa involve NORM contaminated metal sent to scrap recyclers. Most of this contaminated metal comes from out-of-state sources.

KANSAS

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

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

KENTUCKY

The Kentucky Department of Environmental Protection continues to work on a satisfactory long term disposal site for NORM. In the meantime, remediation activities in the Martha Oilfield are proceeding gradually and continually towards the final phases of the cleanup of the field. Remediated materials are being stored in a temporary site pending the resolution of discussions on long term storage.

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

LOUISIANA

There have been no changes or revisions in the Louisiana NORM regulations and none are planned at the present time.

Chem Waste has received approval for the disposal of NORM wastes containing up to 150 pCi/gm. Chem Waste was hoping for a permit to dispose of mixed wastes, but the permit by the Department of Natural Resources was to create a NOW disposal facility within, but separate from, the RCRA facility. There is a cell specifically for NOW material.

(Continued on page 5)

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

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

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

There is one facility operated by Phillips Services. It is allowed to operate as a commercial facility because during the incineration process used the NORM is diluted. It is required that the incinerator wastes be disposed as incinerator RCRA waste. As long as the NORM wastes contain less than 5 pCi/gm the Department is not concerned about it from a regulatory point.

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

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

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

MAINE
Maine has general regulations for the control of radiation, but does not currently have specific regulations for NORM. The CRCPD Draft Part N (TENORM) is being reviewed for possible adoption early in 2001.

Maine does have NORM - contaminated water treatment wastes. Many water supplies in Maine contain significant concentrations of radium, radon and uranium. Ion exchange resins used in water treatment can become "hot" with radium and uranium. Carbon filters used to remove radon from water become contaminated with the radon decay products, i.e. radioactive lead, bismuth and polonium.

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

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

MASSACHUSETTS
Massachusetts does not have specific regulations for the control of NORM. NORM is considered to be a subset of NARM and NARM is considered to be regulated by the Massachusetts general radiation regulations.

These general radiation regulations were amended earlier this year and became effective July 9, 1999.

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

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

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

(Continued on page 6)

MICHIGAN (continued)
public.

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

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

MINNESOTA

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

Within the next year Minnesota will have permitted four landfills to take low-level NORM wastes. One of the landfills was to have been permitted by November 1, 1999 and the other three before the end of 2000. The level of NORM which will be accepted at the landfills has not been determined yet.

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

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

MISSISSIPPI

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

However, the Mississippi legislature has enacted legislation that gives the Oil and Gas Board jurisdiction over all oil and gas wastes. The Oil and Gas Board's NORM rules which became effective July 1, 1995 assumes jurisdiction only over NORM at the well. The Mississippi State Board of Health Regulations for Control of Radiation, Section 801.N is still in effect. The Division of Radiological Health continues to process licenses from contractors for NORM decontamination at industrial facilities. The attorney for the Department of Health believes that any commercial remediation, etc. will still have to be licensed by the Department.

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

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

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

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

The data will be analyzed to determine how many sites are over a selected concentration level of NORM contamination. In the absence of a resolution of the jurisdictional dispute between the Department of Health and the Oil and Gas Board, the latter is assuming responsibility for every oil and gas site in the state.

The Oil and Gas Board received a petition to amend statewide Rule 68 to authorize the surface and subsurface landspreading of Naturally Occurring Radioactive Materials (NORM) associated with the exploration and production of oil and gas. The petition was received from the US Oil & Gas Association, Alabama/Mississippi Division. ***Rule 68, Disposal of Naturally Occurring Radioactive***

(Continued on page 7)

MISSISSIPPI (continued)
Materials (NORM) Associated with the Exploration and Production of Oil and Gas became effective in September 1994. The original Rule 68 did not authorize the landspreading as a method of NORM disposal.

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

(Editor's Note: Because of the widespread interest by industry on landspreading disposal of NORM wastes, some of the Oil and Gas Board's thinking on the revisions to Rule 68 are discussed below.)

The Board was particularly impressed with the testimony of Ms. Carol D. Berger, a Certified Health Physicist. Ms. Berger testified on behalf of the Petitioners in support of the proposed amendment to authorize the surface and subsurface landspreading of NORM E & P oilfield wastes. Ms. Berger participated in the drafting of the proposed landspreading provisions to Rule 68, as well as in the preparation of the accompanying Background Document and Technical Basis for Revision of Rule 68.

Ms. Berger testified that it is the position of the Health Physics Society, of which she is a member, that doses of radiation of less than 10,000 millirem, in addition to natural background radiation, pose no detectable increase in health risks to humans. In addition, Ms. Berger testified that the highest possible dose rate of 40 millirem per year through all applicable pathways, as contemplated by the proposed landspreading amendments to Statewide Rule 68, is orders of magnitude lower than the 10,000 millirem radiation level recognized by the Health Physics Society as being free of any demonstrable radiological risks.

Ms. Berger testified that the basis of her calculations of the highest possible dose rate of 40 millirem per year, through all applicable pathways, as contemplated by the proposed landspreading amendments is to a hypothetical farm family. This assumes that the hypothetical farm family, including children, lives on a specific piece of property which contains radiation levels equivalent to five (5) picocuries per gram of soil evenly distributed throughout the entire property area. This calculation, which utilizes the RESRAD computer program, assumes that the hypothetical farm family spends twelve (12) hours per day standing outside the family residence on the property, where they receive no shielding from their residence. This calculation further assumes that the hypothetical farm family drinks only percolated water, that is, rain water which has gone through the area of radioactivity, and that radium dissolves in the water. Furthermore, this calculation assumes that the hypothetical farm family eats only vegetables grown on the property where the radiation is located and that they drink milk and eat meat only from cows which have grazed on the property where the radiation is located. In addition, this calculation assumes that the children of the hypothetical farm family eat approximately 200 milligrams of dirt a day which contains a radiation level of five (5) picocuries per gram. Ms. Berger testified that utilizing these calculations, and taking all of these factors and assumptions into account, the hypothetical farm family would only be exposed to a maximum possible radiation dose of 40 millirem per year. Ms. Berger testified that these radiation levels are orders of magnitude below the radiation levels of 10,000 millirem or less which the Health Physics Society has concluded pose no detectable health risk to humans. The Board found the testimony of Ms. Berger with respect to the maximum radiation levels which may result from the approval of the proposed landspreading amendments to be particularly credible and convincing.

Ms. Berger further testified that no studies have ever demonstrated any adverse health effects on humans at acute radiation doses of less than 10,000 millirem. Ms. Berger testified that, according to the BIER IV Report, which was prepared by the National Research Council, 10 to 20 rem (i.e., 10,000 to 20,000 millirem) of radiation is the lowest level of radiation exposure at which any human health risks can be demonstrated.

Ms. Berger further testified that humans are constantly exposed to radiation merely by virtue of being alive. Radioactive materials are ubiquitous. That is, they exist all around us. Radiation exists in the soil and rocks around us, in every human body, in building materials, in a large number of consumer products, in the food we eat, the air we breathe and in, on and around virtually everything with which humans come in contact. Ms. Berger testified that each citizen of the United States receives on average approximately 360 millirem of radiation each year from all natural and medical sources. She testified that there is no credible scientific evidence which would demonstrate that radiation doses of 360 millirem per year have ever caused any radiation-related health effects. Ms. Berger further testified that in areas of higher altitudes and different

(Continued on page 8)

MISSISSIPPI (continued)
geologies, people are exposed to significantly higher levels of naturally occurring radiation. For example, she testified that people living in Leadville, Colorado, are exposed to more than twice the national average levels of radiation. Ms. Berger testified that there is no evidence of any radiation-related health effects occurring in that portion of the national population which receives twice the annual average radiation dose.

Ms. Berger further testified that certain phosphate fertilizers with broad commercial applicability (i.e., for use in golf courses, home use and commercial applications) contain radium at levels exceeding 20 picocuries per gram. This concentration is four (4) times higher than the five (5) picocuries per gram in soil contemplated in the proposed landspreading amendments to Rule 68. Ms. Berger further testified that the United States Environmental Protection Agency (EPA) has authorized the use of phosphogypsum tailings as a soil conditioner containing radiation levels up to 10 picocuries per gram. She testified that these phosphogypsum tailings contain radium of a type similar to that found in NORM E&P oilfield wastes. Ms.Berger also testified that phosphogypsum tailings are more transportable in the environment than are petroleum NORM.

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

It was noted by the Board that New Mexico allows landspreading at levels up to 30 picocuries per gram, a concentration six times greater than the five picocuries per gram in the proposed amendment and is equivalent or more restrictive than the five picocuries per gram specified in Texas regulations.

The Board also found the testimony of Dr. Tate Thigpen, another expert witness for the Petitioners, particularly persuasive and convincing. Dr. Thigpen testified that no scientific studies have ever demonstrated any observable health effects from radiation doses below 50,000 millirem. Dr. Thigpen testified that a very conservative level of radiation exposure below which adverse health effects are medically insignificant would be in the range of 10,000 to 20,000 millirem. Dr. Thigpen testified that, in his professional opinion, the radiation levels contemplated in the proposed landspreading amendments to the Rule were medically insignificant and posed absolutely no threat and would cause no harm to the health of the citizens of the State of Mississippi.

The Board stated that it had carefully listened to and evaluated the testimony of all of the Contestants' witnesses and found the testimony of Ms. Berger, Dr. Thigpen and Mr. Edwards, all of whom testified in support of the proposed landspreading amendments to Statewide Rule 68, to be far more credible and persuasive.

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

(Continued on page 9)

MISSISSIPPI (continued)

The Board found however, after careful evaluation, that a number of additional revisions should be incorporated into the proposed landspreading amendments to Statewide Rule 68 which differ significantly from the rule as originally proposed. These additional revisions are summarized below.

The Board revised the Rule to provide that no person may dispose oil and gas NORM waste without first obtaining a permit from the Mississippi State Oil and Gas Board

The Board also found that it is necessary to limit the areas in which landspreading may occur. First, on-site landspreading will be limited to the "site of origin" which is defined as that portion of the surface of land reasonably necessary (excluding lease roads) used for the conduct of producing operations of a well. Secondly, off-site landspreading will be limited to surface property in which the Operator owns fee title to the entirety of the surface.

The Board also made the revision to limit subsurface landspreading to six inch layers not to exceed three feet of total blended volume thickness.

Other features of the amended Rule 68 include that landspreading shall not be performed with materials that exhibit ambient exposure rates in excess of 600 microR per hour above background. Also landspreading shall not be performed where the general area exposure rate is significantly elevated above background due to the presence of equipment.

Pre- and post-landspreading radiation surveys are required. The survey of the impacted land area shall be performed to demonstrate that the ambient exposure rate at any given point in the impacted area does not exceed eight microR per hour above background.

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

Subsequently, an appeal of Rule 68 was filed, but was denied by the courts. Hence, landspreading is allowed in Mississippi.

MISSOURI

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

MONTANA

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

NEBRASKA

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

Like many other states, Nebraska receives comments and questions from recyclers. Some of these recyclers have "requested" NORM rules so they can use NORM limits, e.g., 50 microrem/hr, to know whe they can refuse or accept contam nated scrap.

NEVADA

Nevada has no specific NORM regulations and none have bee proposed. Comprehensive statute for the control of radiation addres NORM and NARM similarly

NEW HAMPSHIRE

New Hampshire considers NORM to be a subset of NARM and th state has always regulated NARM in the same manner as by-product source, and special nuclear materi als are regulated as an Agreemen State.

One area presently not regulated and may have to be is water treat ment systems. There are significan quantities of radon in New Hampshire water supplies. Some water treatment facilities actually become quite "hot". Another potential NORM problem area is the inadvertent exposure to the radiation hazards associated with construction involving granite containing uranium and thorium and their radioactive decay products.

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

NEW JERSEY

Soil Remediation Standards for Radioactive Materials, N.J.A.C. 7:28-12, was adopted on August 7, 2000. The response to the comment document, final rule, guidance manual on characterization and

(Continued on page 10)

NEW JERSEY (continued)
final status surveys, and the spreadsheet used to implement the standards are all available on the Radiation Protection Program's website at http://www.state.nj.us/dep/rop/index. html

NEW MEXICO

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

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

The New Mexico NORM regulations allow for down-hole injection of NORM waste in a company's own wells. However, the Rocky Mountain Board, one of the Low-Level Radioactive Waste regional compacts, considered NORM to be a low-level radioactive waste and subject to their regulations and the Compact refused to give approval for the injection of NORM wastes in private wells in New Mexico.

On June 1, 1998, the Rocky Mountain Low-Level Radioactive Waste Board adopted an amendment to the Board's rules. The change clarifies that NORM waste from oil and gas production within the Rocky Mountain Compact region may be placed in oil and gas wells without the Board's designating such wells as regional facilities. The Board's action followed a public hearing on the matter.

No one has actually requested permission to dispose of NORM down-hole. A few companies in the state who have accumulated NORM wastes under a general license have requested a one year extension for storing the wastes. Most of these NORM wastes will probably eventually be disposed of down-hole.

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

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

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

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

Copies of the New Mexico NORM guide are available from:

William M. Floyd
Program Manager
Radiation Licensing &
Registration Program
2044 Galisteo
P.O. Box 28110
Santa Fe, NM 87502
Telephone: (505) 827-1862
FAX: (505) 827-1544

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

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

NEW YORK

On July 31, 2000, the New York State Department of Environmental Conservation amended the Department's ***Rules and Regulations for Prevention and Control of Environmental Pollution by Radioactive Materials*** (6 NYCRR Part 380), which control the disposal of radioactive materials and radioactive wastes in this State. The

(Continued on page 11)