

The NORM Report

Naturally Occurring Radioactive Material Contamination
WINTER 1995

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Regulations for the Control of NORM - Update

The status of regulations for the control of NORM is summarized below for 49 states (Hawaii is not included), including 27 of the important petroleum-producing states. Since NORM contamination is not limited to the petroleum industry, some of the non-petroleum states are also drafting or preparing to draft NORM regulations. The status of NORM regulations in the federal government as well as in Canada is also summarized below. Each regulatory agency was contacted during the first three weeks of January, 1995.

The last state to enact NORM regulations was Georgia. The Georgia regulations became effective March 16, 1994. Louisiana, Mississippi, Arkansas and Texas also have specific regulations for the control of NORM. Several states, e.g. New Mexico, Oklahoma, Illinois, South Carolina, Kentucky, Connecticut and others may have NORM regulations by the end of 1995. Other states are in various stages of drafting NORM regulations.

Louisiana has a major revision of that state's regulations which became effective January 20, 1995. The Texas NORM disposal regulations became effective February 1, 1995. The CRCPD draft of suggested guidelines for the control of NORM continues to be reviewed after receiving voluminous comments on its latest draft.

Several states are continuing to revise their general regulations for the control of radiation to include the revised 10 CFR 20 regulations that became effective January 1, 1994. The revised 10 CFR 20 incorporates modern radiation protection philosophy for the establishment of new dose limits and ALARA programs. The changes closely follow the recommendations of the International Commission of Radiological Protection (ICRP) and the National Council on Radiation Protection and Measurements (NCRP).

Although there currently are no federal regulations specifically for the control of NORM, it is probable that there will be federal NORM regulations -- possibly beginning in 1995.

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

A summary of the status of NORM regulations in the individual states, the federal government and Canada follows:

ALABAMA

Alabama is still redrafting their proposed NORM regulations. There is no
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ALABAMA (continued)

timetable for the regulations to be adopted. There has been some recent interest in plugging wells, but there have been no requests for NORM regulations.

ALASKA

Charles Tedford recently retired as Chief, Radiological Health Program in the Department of Health and Social Services and has not been replaced as yet.

Recruiting for the open position continues. Information can be obtained from:

Dr. Gregory Hayes
State Public Health Laboratory
Section of Laboratories
3256 Hospital Drive
Juneau, AK 99801
907-586-3586

Alaska has no specific NORM regulations and nothing is planned -- at least until Tedford is replaced.

ARKANSAS

There have been no changes in the Arkansas NORM rules and regulations. However, the state is making an extensive update in the licensing of NORM users on a case-by-case basis. Inquiries can be directed to Jared Thompson at 501-661-2301. There are some remediation sites in Arkansas that are receiving a lot of attention from potential licensees. The Arkansas Department of Health is almost to the point of accepting the application from a remediation company from out-of-state and one from in-state is close to being licensed also.

ARIZONA

All radioactive materials, including NORM, are addressed in Arizona's general regulations for the control of radiation. At present, NORM is not specifically addressed, but consideration is being given to enacting NORM regulations in about a year.

CALIFORNIA

As a preliminary to drafting NORM regulations, California has made surveys of petroleum facilities for NORM contamination and collected samples for laboratory analyses. Water, brine, soil and other appropriate samples have been collected. A draft report of the surveys has been prepared but has not as yet been approved for release. Some areas in California were found to be contaminated, but in general the contamination was not as great as generally found in Texas and Louisiana. There is no timetable for the report to be released. A meeting will be scheduled with oil and gas industry representatives and other interested parties before making a decision on the next step to NORM regulations.

COLORADO

There has been no progress in the enactment of the proposed NORM regulations in Colorado.

CONNECTICUT

The Department of Environmental Protection is currently doing in-house editing on a prepared draft of NORM regulations. After the DEP has approved the draft, the proposed regulations will be sent to Legal and then to the State Legislature for enactment. There is no timetable -- enactment is dependent on the new state administration.

DELAWARE

There are no specific regulations for the control of NORM in Delaware. NORM, NARM and other radioactive materials are considered to be covered in the general regulations for the control of radiation enacted in 1983. There could be some revisions in these general radiation regulations in 1995, particularly in tightening compliance requirements.

FLORIDA

Florida's Office of Radiation Control in the Department of Health and Rehabilitation Services has recently hired a new staff member who is in the process of researching NORM prior to preparing a draft of NORM regulations.

GEORGIA

Georgia has completed their "cleanup" of the NORM regulations to correct typos, etc. Only very minor changes were made in the regulations. The revised regulations became effective in October, 1994. No further revisions in the regulations are planned for the near future.

IDAHO

Idaho is not doing anything at present with NORM other than reviewing the latest CRCPD NORM draft guidelines. There is no program for the development of specific NORM regulations. There are provisions in the general regulations for the control of radiation that can be used for NORM problems if the need arises.

ILLINOIS

The Division of Radioactive Materials in the Illinois Department of Nuclear Safety is again working on a draft of proposed NORM regulations. The goal is to have a proposal ready by March or April with enactment of the regulations by the end of 1995. Comments from the API and others on the latest draft of the CRCPD NORM guidelines are being reviewed to determine if changes should be made in the Illinois draft. Meetings with interested parties will be held and written comments will be invited prior to submitting the proposed draft of the regulations for enactment.

INDIANA

No new regulations for the control
(Continued on page 3)

INDIANA (continued)

of NORM have been enacted or proposed in Indiana. There have been a few incidents involving NORM contaminated materials in scrap yards, etc.

IOWA

Iowa has no specific regulations for the control of NORM. Problems are handled on a situation-specific basis using the state's general regulations for the control of radiation. There are no plans for specific NORM regulations unless the state legislature requests them.

KANSAS

There has been little or no action in the last few months in Kansas leading to the promulgation of regulations for the control of NORM. The Kansas Department of Health and the Environment will be having a meeting with the Kansas Corporation Commission to discuss NORM issues. The Corporation Commission regulates the oil and gas industry in Kansas. It has not been determined who will have the regulatory jurisdiction for NORM in the oil and gas industry. The Kansas Petroleum Council NORM Study Group remains active and there are indications that the Kansas petroleum industry is becoming interested in tackling the NORM problem.

Kansas continues to handle NORM problems on a case-by-case basis. People with NORM problems are being advised to store NORM wastes on-site or dispose of the wastes through one of the commercial facilities, e.g. Envirocare, US Ecology, Campbell Wells, or Newpark.

KENTUCKY

In the last issue of *The NORM Report* it was erroneously reported that Kentucky had distributed a draft of NORM regulations. This

was in error -- Dr. Rice Leach, Commissioner of the Cabinet of Human Resources distributed a document which was to be used as a point of departure for discussing what information should be contained in NORM regulations.

Nothing has been done at this time to promulgate NORM regulations in Kentucky. A resolution of the negotiations with oil companies concerning the Martha Oil Field situation in the absence of applicable state and federal NORM regulations is awaited before taking any steps to formally promulgate regulations. Once an agreement is reached, Kentucky will very quickly work on their NORM regulations.

LOUISIANA

The Louisiana revisions to their NORM regulations became effective January 20, 1995 when they were published in the Louisiana Register. Details of the revisions were given in the SPRING, 1994 issue of *The NORM Report* in a release prepared by Karen Fisher-Brasher of the Louisiana DEQ. Karen has since moved to DEQ's enforcement area and Jason Talbert now heads up the NORM activities.

In the identification of regulated equipment and material, several revisions have been made. The exemption level for NORM is 5 pCi/g or less of radium-226 or -228. The use of the 30 pCi/g of technologically enhanced radium-226 or -228 averaged over any 100 square meters has been removed. The use of radon emanation has also been removed.

Revisions have been made for the exemption of land if it contains concentrations of 5 pCi/g or less of radium-226 or -228, above background, averaged over the first 15 cm and 15 pCi/g, above background, averaged over each

subsequent 15 cm thick layer of soil, or 30 pCi/g or less of radium-226 or -228, averaged over 15 cm depth increments, provided the total effective dose equivalent from the contaminated land does not exceed 0.1 rem (100 mrem) in year. Both of the above may be applied to samples averaged over 100 square meters with no single non-composite sample exceeding 60 pCi/g of soil.

The maximum radiation exposure level for the regulation of equipment has been changed from 25 microrem/hr over background to 50 microrem/hr including background at any accessible point. This change makes the Louisiana regulations consistent with those of Texas and Arkansas. It will also remove the need to correct for background.

A provision has been included to allow pipe yards, storage yards, and production equipment yards to apply for a one time authorization to conduct property cleanup. The revision in LAC 33:1410 will require the submission to the Division of a plan for the removal of NORM contaminated soil in excess of 200 pCi/g of radium-226 or -228 or 50 microrem/hr at one meter from the soil. The plan must include a schedule for cleanup and be approved by the Division.

MAINE

Maine has general regulations for the control of radiation, but does not have specific NORM regulations. There may be an apparent need for NORM regulations, however, especially for the control of water treatment wastes. Many water supplies in Maine contain significant concentrations of radium and radon. Chemicals, e.g. ion exchange resins used in water treatment, can become quite "high" in radium and carbon filters used to remove radon from water are

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MAINE (Continued)

giving waste filters "hot" with radon daughter products, lead-210, bismuth-210, and polonium-210.

MARYLAND

Maryland has no specific regulations for the control of NORM. NORM is handled under the general radiation regulations. Scrap dealers sometimes report a problem with radium-226, but NORM is not considered to be a large problem in the state.

MASSACHUSETTS

Massachusetts has no specific regulations for the control of NORM. There are no plans at present for NORM regulations.

MICHIGAN

The status quo is being maintained in Michigan as regards NORM regulations. Michigan has issued a draft of standards and guides for the control of NORM and are presently awaiting a decision as to whether to proceed with regulations.

MINNESOTA

Minnesota has no specific regulations for the control of NORM. The Pollution Control Agency has adopted by reference a statute in the Environmental Quality Board which says that natural materials may be buried. The statute does not give any concentration information and the Health Department is trying to work with these other agencies to define the concentrations of these natural materials which may be disposed of by burying. There have been no other statutes or regulations enacted in Minnesota recently relating to NORM.

MISSISSIPPI

There have been no revisions in the Mississippi NORM regulations and no revisions are planned or anticipated at the present time.

Mississippi has promulgated Rule 68 - Disposal of NORM Associated with the exploration and production of oil and gas. This rule was accepted August 17, 1994 and became effective September 9, 1994. Rule 68 states that any dry, abandoned or plugged back oil and/or gas well may be considered as a potential disposal site for NORM. Each owner, operator and/or producer of a well shall be responsible for the proper disposal of NORM in that well in accordance with all applicable rules and regulations of all appropriate state or federal authorities.

Provisions of Rule 68 include:

In order to qualify for disposal pursuant to this Rule, the NORM must have been derived from the exploration and production of oil and gas within the State of Mississippi.

Acceptable methods of disposal of NORM shall be limited to the following:

- A. NORM material can be placed between cement plugs; or
- B. encapsulated in pipe then placed between cement plugs; or
- C. NORM slurry can be mixed with gel or mud and placed between cement plugs; or
- D. NORM slurry can be placed into a formation; or
- E. NORM material can be disposed of offsite at a licensed low level radioactive waste or NORM disposal facility.

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. Some NORM regulations may be required in the future.

MONTANA

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

NEBRASKA

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

NEVADA

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

NEW HAMPSHIRE

New Hampshire considers NORM to be a subset of NARM and the state has always regulated NARM in the same manner as byproduct, source, and special nuclear materials are regulated as an agreement state. One area that may not presently be regulated and may have to be are water treatment systems. There are significant quantities of radon in New Hampshire water supplies together with NORM materials from the granite sources in the state. Some water treatment facilities become quite "hot". Regulations similar to those adopted in Texas may be adopted in the future.

NEW JERSEY

New Jersey's general regulations for the control of radiation have
(Continued on page 5)

NEW JERSEY (Continued)
just been repropoed without change (a requirement of the New Jersey sunset laws), except for eliminating Subchapter 12 which was the transportation regulation. The reason was, as advised by the attorney general, state transportation regulations were preempted by the federal Hazardous Materials Transportation Uniform Safety Act.

New Jersey is trying to move in concert with the chemical industry in setting cleanup standards for radiation and chemical contamination at the same time.

NEW MEXICO

A New Mexico Environmental Improvement Board hearing was held December 8, 1994 in Albuquerque to consider Subpart 14: Naturally Occurring Radioactive Materials (NORM) in the Oil and Gas Industry. Subpart 14 establishes radiation protection standards for the possession, use, transfer, transport, storage and disposal of NORM associated with the oil and gas industry, and which are not subject to regulation under the Atomic Energy Act of 1954, as amended.

The exemptions listed in Section 1403 of the proposed Subpart 14 include:

A. For release for unrestricted use. Persons who receive, etc. NORM are exempt from the requirements of these regulations if the NORM present is at concentrations of 30 pCi/g or less of radium-226, above background, or 150 pCi/g or less of any other NORM radionuclide, above background, in soil, in 15 cm layers, averaged over 100 square meters. Samples should be taken if gamma radiation readings are equal to or exceed twice background readings when surveyed at a distance of 1 cm from

the surface of the soil, in accordance with Department guidelines.

B. The possession and use of natural gas and natural gas products and crude oil and crude oil products as fuels are exempt from the requirements of these regulations.

C. NORM not otherwise exempted and equipment from oil, gas, and water production containing NORM are exempt from the requirements of these regulations if the maximum radiation exposure reading at any accessible point does not exceed 50 microrentgens per hour, including background radiation levels. Sludges and scales contained in oil, gas and water production equipment are exempt from the requirements of these regulations if the maximum radiation exposure reading within 1 cm of the surface of the sludge or scale does not exceed 50 microrentgens per hour, including background radiation levels. If the radiation readings exceed 50 microrentgens per hour, removable sludges and scale are exempt from the requirements of these regulations if the concentration of radium-226, in a representative sample, does not exceed 30 pCi/g.

D. NORM not otherwise exempted and equipment from gas processing, fractionation, and dry gas distribution containing NORM are exempt from the requirements of these regulations if the removable surface NORM contamination does not exceed 1000 dpm per 100 square cm and otherwise conforms with the requirements of Section 1403 A. Removable scale from gas processing, fractionating, and dry gas distribution is exempt from the requirements of these regulations if the concentration of lead-210, in a representative sample, does not

exceed 150 pCi/g.

E. Produced water is exempt from the requirements of these regulations if it is reinjected into Class I or Class II Underground Injection Control well permitted the Division and/or stored or disposed in a double synthetically lined surface impoundment permitted by the Division.

In Section 1405 is the requirement that licensees shall incorporate hazard identification and training into their hazard communication programs as required by OSHA and as required under Part 10 of these regulations for personnel working on or around equipment and materials that contain Regulated NORM. Regulated NORM material that has been removed from equipment and containerized shall be labeled as per the requirement of Part 4-220

In Section 1407, Disposal and Transfer of Regulated NORM for Disposal, the following are specified:

A. Disposal of Regulated NORM on or near the surface of the ground shall be done pursuant to a specific license issued under Section 1410 and Subpart 13 of these regulations and pursuant to NMOCD Rule 711, except that a general license may blend or disc Regulated NORM contaminated soils in place provided that:

1. the soils were contaminated at that site and prior to promulgation of these regulations, and
2. the limits established in Part 1403 A are met.

B. Disposal of Regulated NORM in nonretrieved flowlines and pipelines, in plugged and abandoned wells or by deep-well injection shall be done pursuant to

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NEW MEXICO (Continued)
a general license issued under section 1409 and pursuant to applicable Division rules and regulations.

C. All licensees shall store, transfer and/or dispose of Regulated NORM in accordance with the Worker Protection Plan required under Section 1405. All requirements of this Worker Protection Plan shall be available for inspection by the Department.

D. Regulated NORM shall only be disposed by the methods enumerated below, except that the Department will consider and approve alternative methods of disposal if the applicant demonstrates that such alternative methods will protect the environment, public health and fresh waters, and otherwise is consistent with these regulations, with other provisions of the NMRPR and with applicable Division rules and regulations.

1. Disposal in Nonretrieved Flowlines and Pipelines.
2. Disposal at Commercial and Centralized Facilities.
3. Disposal in Plugged and Abandoned Wells.
4. Disposal by Injection.
5. Other Disposal Methods.

Persons subject to the general license established in these proposed regulations shall conduct radiation surveys of equipment and facilities in their control or possession and maintain that information on file. Surveys would be conducted for all of the following events.

1. Prior to working on facilities or equipment where potential release of regulated NORM could occur or

where workers could be exposed to regulated NORM.

2. Prior to any transfer of equipment to another operator, the general public, or a salvage firm.
 3. Prior to the movement or removal of equipment from any facility or facility reclamation.
 4. At facilities where pipe has been cleaned.
 5. At facilities where materials are known to have been spread, spilled or stockpiled.
- B. Surveys required by this subpart shall be conducted using instruments that meet the requirements of section 1404.

C. Surveys required by this subpart shall be performed pursuant to guidelines issued by the Department and by persons who possess the knowledge and/or training to perform such surveys pursuant to Department and Division Guidelines.

Other sections of Subpart 14 establish standards for radiation survey instruments, protection of workers during operations, protection of the general population from releases of radioactivity, requirements for storage of regulated NORM, and requirements for general and specific licenses.

The New Mexico Oil and Gas Association worked closely with the State of New Mexico Environment Department in the development of the proposed NORM regulations.

NEW YORK

Any licensed NORM in New York comes under their Part 380 regulations for disposal. New York also has a soil decommissioning and cleanup

standard that was adopted in September, 1994. This standard was sent to the EPA for their consideration for use as a federal standard.

NORTH CAROLINA

Nothing presently is being proposed on NORM regulations. The state would like to be doing more on NORM, but there are too many other "alligators" biting at them right now.

NORTH DAKOTA

The Oil and Gas Division of the Industrial Commission has put on NORM training. About 20 people attended the course in November, 1994, including industry and regulatory people.

North Dakota recently started looking at ash from coal-fired power plants. Initial indications are that there may be some NORM problems. Concentrations about 6.5 pCi/g combined radium-226 and -228 were reported. If the radium concentrations are greater than 5 pCi/g, the material is subject to the North Dakota Radiological Health rules. It would as a minimum have restricted use criteria placed on it. The coal ash issue may force North Dakota to look harder at the whole NORM contamination area. Contact will be made with other states to determine what these states are doing about coal ash.

OHIO

Ohio is going through a massive revision of their radiation regulations as part of the process of becoming an Agreement State. NORM will be added to the regulations during this revision. It will be one to two years before the revision is complete.

OKLAHOMA

Oklahoma's Radiation

(Continued on page 7)

OKLAHOMA (Continued)

Management Advisory Council continues to revise the May 7, 1993 draft of proposed regulations Subchapter 19, Licensing of Naturally Occurring Radioactive Materials (NORM). Some of the features included in the proposed draft or in the revisions under consideration include the following:

(1) NORM are exempt from the requirements of these rules if the materials contain, or are contaminated at, concentrations of

(A) 30 pCi/g or less of technologically enhanced radium-226 or -228 in soil, averaged over 100 square meters and averaged over the first 15 cm of soil below the surface,

(B) 30 pCi/g or less of technologically enhanced radium-226 or -228 in media other than soil,

(C) 0.05% by dry weight or less of uranium or thorium, or

(D) 150 pCi/g or less of other NORM radionuclides, provided that these concentrations are not exceeded; or

(2) Materials in the recycling process, including scale or residue not otherwise exempted, and other equipment containing NORM are exempt from the requirements of these rules if the maximum radiation exposure level does not exceed 50 microrentgens per hour including the background radiation level at any accessible point.

The following products/materials are under consideration to be non-exempt from the requirements of the proposed regulations:

Potassium and its compounds
Byproducts from fossil fuel combustion (bottom ash, fly ash,

and flue-gas emission control byproducts

Materials used for building construction, industrial processes, sand blasting, and metal casings
Phosphate and potash fertilizer
Phosphogypsum for agricultural uses.

Possession of produced waters from crude oil and natural gas production are exempt from the requirements of these rules if the produced waters are re-injected in a well approved by the authorized regulatory agency or if the produced waters are discharged under authority of the authorized agency.

Each person subject to the general license shall manage and dispose of wastes containing NORM:

(1) by transfer of the wastes for disposal to a land disposal facility licensed by the U.S. NRC, an Agreement State, or a Licensing State;

(2) in accordance with alternate methods authorized by the Department of Environmental Quality which may include for solid residues:

1. Landspreading
2. Landspreading with dilution
3. Non-retrieval of surface pipe
4. Burial with unrestricted site use
5. Disposal at a commercial oil field waste site
6. Disposal at a licensed NORM waste disposal site
7. Disposal at a licensed low-level radioactive waste disposal site
8. Burial in surface mines
9. Plugged and abandoned wells
10. Well injection
11. Hydraulic fracturing
12. Injection into salt domes

Or for equipment containing

NORM:

1. Release for general use, if appropriate release criteria
2. Release for re-use within the petroleum industry
3. Storage in an oil-field equipment yard
4. Release to a smelter, and
5. Burial with NORM sludges/scales.

The transfer of NORM, not exempt from these rules, from one general licensee to another general licensee authorized by the Department if:

- (1) the equipment and facilities contaminated with NORM are to be used by the recipient for the same purpose or at the same site;
- (2) The materials being transferred are ores or raw materials for processing or refinement; or
- (3) The materials being transferred are in the recycling process.

Facilities and equipment contaminated with NORM in excess of the level set forth in the proposed regulations shall not be released for unrestricted use.

Land contaminated with technologically enhanced radium-226 or -228, averaged over 100 square meters, in which the concentrations of technologically enhanced radium-226 or -228 are in excess of 30 pCi/g, over a maximum depth of 15 cm of soil below the surface, shall not be transferred for unrestricted use.

It must be emphasized that many of the items tabulated and discussed above in the proposed draft of Oklahoma NORM rules are not included for consideration and discussion by the Radiation

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OKLAHOMA (Continued)
Management Advisory Council
and may not be in the final draft.

Mike Broderick, formerly with Air Quality Services, has replaced Lloyd Kirk as the Section Manager of the Oklahoma Radiation Management Section.

OREGON

Oregon is still looking at revising their radiation rules, but this has been on hold waiting for the CRCPD Part N guidelines to be finalized. One of the NORM issues in Oregon is in the zircon sand industry.

PENNSYLVANIA

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

RHODE ISLAND

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

SOUTH CAROLINA

The proposed NORM regulations continue to work through the administrative/legislative process in South Carolina. Enactment of the regulations by June, 1995 is expected.

SOUTH DAKOTA

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

TENNESSEE

NORM contamination in Tennessee is handled basically like any other radioactive material. If it

is enhanced above background levels, an assessment is made as to whether it constitutes a problem or not. If it does, it is dealt with similarly to any other radioactive material, i.e. by using the general radiation regulations. There are no specific regulations for the control of NORM and none are planned. It appears that as more people learn about NORM, more instances of NORM contamination are being reported.

TEXAS

The Texas Department of Health is not proposing any revisions to their NORM regulations at present. Some revisions may be proposed, however, later in 1995.

Statewide Rule 94 - Disposal of Oil and Gas NORM Waste was adopted by the Texas Railroad Commission on December 12, 1994 and took effect February 1, 1995. The new rule sets forth requirements for the safe disposal of NORM that constitutes, is contained in, or has contaminated oil and gas waste. The rule was developed in consultation with the Texas Department of Health and the Texas Natural Resource Conservation Commission regarding protection of public health and the environment.

Rule 94 applies to activities involving the disposal of NORM that constitutes, is contained in, or has contaminated oil and gas wastes and that exceeds exemption criteria for NORM established by the Texas Department of Health. Rule 94 prohibits disposal of oil and gas NORM waste, except in accordance with its provisions. Roadspreading of oil and gas NORM waste and surface discharges of oil and gas NORM waste other than produced water are expressly prohibited.

Rule 94 specifically authorizes certain disposal methods without a

permit. These methods include disposal of oil and gas NORM waste in a well that is being plugged and abandoned, provided that all specified requirements are met.

The rule also authorizes, in limited circumstances, on-site disposal of oil and gas NORM waste by burial or by applying it to and mixing it with the land surface. Specifically, rule-authorized on-site burial or land application is limited to instances where, after disposal, the total radioactivity concentration of radium-226 and -228 does not exceed the background concentration by more than 5 pCi/g. This 5 pCi/g limitation on post-disposal radioactivity concentration is intended only as an interim measure pending further study of the relationship between the Texas Department of Health NORM exemption criteria and exposure levels associated with surface disposal. The Railroad Commission anticipates amending the rule in the future to provide a broader range of surface/near-surface disposal options.

The rule allows the disposal of oil and gas NORM waste at a facility licensed by the U.S. NRC, the State of Texas, or another state if such facility is authorized under its license to receive such waste.

The rule also allows injection of oil and gas NORM waste that meets the Texas Department of Health exemption criteria due to processing or treatment at a facility licensed by the Department of Health, provided that the operator notifies the commission that it plans to inject such material and verifies that the material meets exemption criteria by obtaining documentation from the treatment/processing facility regarding the post-treatment and processing NORM levels.

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TEXAS (Continued)

Rule 94 was adopted pending further study of three specific issues. First, the commission is studying whether NORM survey devices and/or methods that are suitable for use in the field can be used in lieu of laboratory analyses to measure NORM in oil and gas waste. At present Department of Health exemption criteria for soil and other contaminated media are tied to radioactivity concentrations (pCi/g) which can be directly measured only through laboratory analyses. Indirect measurement devices and/or methods may be more appropriate for use in the field. Additional NORM identification requirements may be adopted in the event such survey devices and/or methods can be identified.

Second, the commission finds that further study of the relationship between Department of Health exemption criteria and exposures associated with surface and near-surface disposal methods is necessary before a broader range of surface/near-surface disposal options can be authorized.

Department of Health exemption criteria for radium-226 and -228 (the principal radionuclides found in oil and gas NORM waste) in soil were developed using specific modeling parameters to evaluate doses to persons exposed to those radionuclides in soil. The Department of Health model is very sensitive to changes in the depth or surface area of affected soils to which persons are exposed. Increases in the surface area or depth of the affected soils may result in increased modeled doses.

Finally, the commission intends to further examine the issue of what, if any, regulatory restrictions should be imposed on disposal of NORM-contaminated buried pipes (such as flowlines). In the case of

buried pipes, the commission interprets Department of Health exemption criteria as applying at the ground surface -- the closest accessible point. Therefore, if the measurement of radioactivity from a buried pipe did not exceed 50 microrentgens per hour above the pipe, the pipe would be exempt from regulation under this rule. If the surface measurement above a buried pipe exceeded 50 microrentgens per hour, however, the pipe would not fall within exemption criteria.

Retrieving and disposing of buried pipes that do not meet NORM exemption criteria might result in greater exposures than simply leaving the pipes in place. The issue of whether, and how, to regulate buried pipes, including the need for institutional controls to limit the potential for future exposure to buried pipes left in place, should be the subject of further evaluation.

The Texas Natural Resource Conservation Commission has not as yet drafted regulations for the disposal of non-oil and gas NORM wastes. A draft is not expected in the near future.

UTAH

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

VERMONT

Vermont has concerns as to the exempt levels which will be used for radium and other radionuclides in the uranium and thorium decay chains. Vermont has thousands of tons of granite wastes which contain significant concentrations of these NORM materials. If the NORM is controlled at significantly "low" levels, these massive quantities of granite

wastes will have to be handled as controlled NORM wastes.

Wood chip generating plants in the state have also been of concern as to the radioactivity content of the wood ash. The focus has been primarily on the cesium-137 content while ignoring the NORM material potassium-40.

Recently, inquiries were made about shipping hundreds of thousands of picocuries of radioactive NORM wastes from rutile ore processing in Quebec to Vermont for disposal.

VIRGINIA

Virginia has no specific regulations for the control of NORM. NORM is considered covered in the general regulations for the control of radiation. These latter regulations are in the process of being revised.

WASHINGTON

Washington's Department of Health is awaiting instructions from the governor as to the next step in regulations for the control of NORM. New regulations have been proposed which will put a ceiling on how much NORM can be brought into Washington for disposal. It has been proposed that an annual limit of NORM wastes be 8,600 cubic feet with 1,000 cubic feet as an annual limit from any one generator. When the annual limit is reached, according to the proposed regulation, no additional NORM waste could come in, either in-region or out-of-region. The site would be closed for any more NORM disposal that year. This proposed NORM limit regulation is open for public comment. The proposal is not final. Public hearings will be on March 7/8, 1995. Written comments can be submitted before March 8.

WEST VIRGINIA

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

WISCONSIN

Wisconsin has no specific regulations for the control of NORM except those imposed by the Department of Natural Resources for the disposal of materials containing radium-226, etc. The state has general regulations for the control of radiation. These regulations don't include some of the NORM-specific issues, e.g., contaminated scrap. The regulations may or may not cover NORM problems.

Wisconsin is working on a revision to its maximum radioactivity standards in community water treatment facilities, primarily radium-226.

WYOMING

Wyoming has no regulations for the control of NORM and none have been proposed at this time.

There is a restriction on produced water. Produced water cannot be discharged if it contains more than 60 pCi radium per liter. Wyoming no longer has legislation that requires the registration of radioactive materials.

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

EPA's Science Advisory Board issued its review of the Office of Radiation and Indoor Air Draft Document on Diffuse Naturally Occurring Radioactive Material (NORM): Waste Characterization and Preliminary Risk Assessment

in May 1994 as EPA-SAB-RAC-94-013. The SAB in its conclusion of its review believes that the issue of NORM as a potential environmental problem deserves substantial attention within EPA, and is concerned that the issue may not be resolved in a timely manner without increased resources being devoted to it. According to Eugene Durman, Deputy Office Director of the Office of Radiation and Indoor Air, nothing is active on the report presently.

The EPA is proceeding on one NORM issue; specifically, cleanup standards for contaminated facilities. These standards are primarily for cleanup of DOE, DOD and NRC-licensed facilities. If these sites contain NORM, the standards will be applicable to the NORM as well. Basically, the standards are such that the public is assured of not receiving a dose of radiation. Industry is concerned that the rules will set an important precedent for the cleanup of NORM. According to duPont, one billion tons of NORM are generated annually, and 60 billion tons are in inventory, with costs of cleaning up all the material ranging from \$50 to \$100 trillion over a number of years.

The EPA is not presently explicitly looking at oilfield contamination.

EPA recently announced that under the authority of the Atomic Energy Act, standards for land disposal of low-level radioactive waste will be proposed in spring 1995, with a final rule to follow a year later. The rule will apply to nuclear waste generated by both U.S. defense plants and commercial activities. The standards, however, will not cover NORM or NARM.

The EPA is proposing to make recommendations to the President

for new guidance to Federal agencies on radiation protection which would have two effects: it would cause a five-fold reduction in the maximum allowable risk of cancer from any Federally regulated activity involving nuclear materials or other sources of radiation; and it would decrease the cost of Federal regulation of radiation by promoting uniform treatment of radiation by all Federal agencies, and reducing costly duplicative and conflicting requirements. (Federal Register / Vol. 59, No. 246 / Friday, December 23, 1994, pages 66414 - 66428)

According to the EPA, the largest single source of exposure of the general public is radon. Radon, a naturally-occurring radioactive gas, can accumulate in any structure that limits the free exchange of indoor and outdoor air. There are two general categories of sources that can generate significant amounts of radon within a building: radium-bearing soil or rocks naturally situated beneath or near the building and radium-bearing materials used in construction or as fill beneath or near the building. Although exposure to radon from sources of the first kind may be enhanced or reduced by building location, design, or construction, these factors usually are not subject to direct Federal or State control. Exposure to the second category of sources (radium-bearing materials placed in or near a building) may be subject to direct regulatory control or alleviation through Federal or State programs. Since NORM in scale, sludges, etc. in the oil industry usually contain radium-226, these wastes can contribute radon to structures in the vicinity, if not remediated, stored and disposed of properly. Therefore, the recommendations being proposed by the EPA for

(Continued on page 11)

U.S. EPA (Continued)

radiation protection guidance could have a direct impact on future Federal and State regulations for the control of NORM.

A recent draft report by the Radiation Environment Futures Subcommittee of the Science Advisory Board's (SAB) Radiation Advisory Committee has stated that the majority of radiation issues to be taken up by the EPA over the next 30 years will be closely linked to energy production and distribution, particularly the nuclear energy fuel cycle. The report also examines radioactive waste management, nonionizing radiation, radon, medical activities and naturally occurring and accelerator-produced radioactive materials (NORM and NARM). The report recommends that EPA issue final standards for high-level and low-level waste and that EPA state a clear policy for dealing with NORM, mixed waste and radioactive waste.

The report was drafted as part of EPA's futures project, an effort to identify the future developments that will dominate environmental decision making. The radiation report is one of several that will be submitted to the Environmental Future Project, which will use the reports to draft a final overall project document. One SAB member who contributed to the report says that EPA currently does not have the institutional expertise or initiative to develop radioactive waste rules in a timely manner.

EPA is considering drafting a cleanup standard that makes a distinction between different kinds of NORM to ease the concerns of industry, which has attacked a blanket standard as being too stringent. NORM formed inadvertently through industrial processes, such as oil drilling, may not be covered under the standard.

Instead, the proposal would apply only to those sites that were explicitly engaged in an activity that used a radioactive material for a specific purpose. For example, the rule envisioned by EPA would apply to a NORM-afflicted site that used an x-ray scanning machine containing radioactive isotopes.

Margo T. Oge, director of EPA's Office of Radiation and Indoor Air for the past three years, has become director of the Office of Mobile Sources, which is also within the Agency's Office of Air and Radiation. Succeeding her is E. Ramona Trovota, who was director of the Water Enforcement Division in EPA's Office of Enforcement and Compliance Assurance.

The Illinois Department of Nuclear Safety continues to discuss various issues regarding the cleanup of radium-contaminated soil at 14 locations in and around Ottawa, Illinois. The material is the legacy of the Luminous Processes, Inc. facilities that operated in Ottawa from the 1920s to the mid-1970s. The U.S. EPA has not yet officially proposed cleanup criteria of the Ottawa project, but unofficially, EPA staff are seeking a criteria of 4.5 pCi/g of soil. The Illinois Department of Nuclear Safety staff are concerned because EPA has established a cleanup criteria of 5 pCi/g for the cleanup of the residential properties in West Chicago.

The EPA has become interested in the problem encountered by metal manufacturing operations when radiation sources are mixed with incoming feed material and inadvertently smelted. Representatives of CRCPD's E-23 Committee on Resource Recovery and Radioactivity participated in a planning workshop held by EPA in Washington, D.C. on September 23, 1994. Metal manufacturing operations and other metal

recyclers, e.g. scrap yards, have encountered NORM on some of the scrap feed, and EPA has been called upon to develop a national standard for NORM. The need for consistent standards, applicable to any entity which generates NORM wastes, and their international applicability was also stressed, as the discoverer of the NORM contamination is often left wondering, "now that I've got it, what do I do with it?"

NUCLEAR REGULATORY COMMISSION

The NRC has deferred to the EPA for the control of NORM.

U.S. MINERALS MANAGEMENT SERVICE

MMS continues to prepare a letter to lessees and operators redefining and clarifying MMS policies, including NORM. The letter should be distributed in the next few months.

CANADA**ALBERTA, BRITISH COLUMBIA, AND SASKATCHEWAN**

These three western provinces of Canada have jointly formed a committee of government and industrial representatives to develop guidelines for the control of NORM. The first two parts of the three-part proposed guideline are generic and Part 3 will be industry specific. The draft of the guidelines are undergoing final revision and will be finalized in 1995. The guidelines will be guidelines in the true sense and will not have the power of regulation. It is not known if or whether the guidelines will evolve into regulation, or which governmental agency or agencies will have jurisdiction. ■

CONFERENCE OF RADIATION CONTROL PROGRAM DIRECTORS (CRCPD)

Since releasing the latest draft of Suggested State Regulations for Control of Radiation (SSRCR) Part N (Registration and Licensing of NORM) for comments in June 1994, the Part N Committee has received hundreds of pages of good comments from industry and other interested parties. Comments were received by the Committee through November 1994.

Comments were received from the American Petroleum Institute, the American Waterworks Association, the American Mining Congress, U.S. EPA, the National Coal Association, E. I. du Pont de Nemours and Company (Inc.)

Minerals Products Business, the EOP Group, Envirocare, the Department of Energy, The Fertilizer Institute, the Department of Environmental Resources of the Commonwealth of Pennsylvania, the Division of Mineral Resources of the New York State Department of Environmental Conservation, the Zirconium Environmental Committee, the American Coal Ash Association and the Utility Solid Waste Activities Group, the Texas Utilities Services, Inc., the Interstate Oil and Gas Compact Commission, the Idaho elemental phosphorus processing industry, and the Railroad Commission of Texas - Oil and Gas Division.

Many comments appear to be very good and suggest improvements in the Part N draft. It will require a lot of work by the Committee to analyze the comments and incorporate the better ones in the Part N draft. It was hoped that the draft would be finalized by May, 1995, but that now appears unrealistic because of the volume of comments received.

I can supply copies of the comments to interested parties for the cost of copying. If you desire copies please contact Peter Gray at 918/492-5250 or FAX at 918/492-4959. ■

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- Biological Effects
- Likely Sources of NORM
- Radiation Protection
- Applicable Regulations
- One-hour course
- Testing services available

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Disposal of NORM Wastes

The following is an interview with Susan King Hereford, Manager Oilfield NORM Services, US Ecology in New Orleans, Louisiana. In this interview, Susan describes the services for NORM disposal offered by US Ecology at the Richland, Washington disposal site.

The NORM Report: What services does US Ecology (USE) provide for NORM disposal?

US Ecology: Our forte is providing hands on, turn-key, on-site management support. We assist the generator from the paperwork preparation to the actual waste transportation and disposal at our permanent disposal facility in Richland, Washington. We try to make our services as user friendly as possible by providing round-the-clock customer support, both from Richland and New Orleans and detailed step-by-step instructions for preparing each shipment properly.

TNR: How do your services compare with NORM disposal services offered by Envirocare of Utah?

USE: Envirocare specializes in railcar quantities of NORM and based on the specific operating requirements, cannot economically handle volumes less than 1,000 cubic feet. USE specializes in small quantities shipped by truck. However, for large quantities, we can arrange for intermodal rail transportation for most of the distance between the generator's site and the disposal facility in Washington.

TNR: How does US Ecology compare to Newpark's downhole disposal?

USE: Conceptually, we are 180 degrees apart. Newpark blends and dilutes a generator's NORM waste down to a RCRA exempted NOW material and fracs the generator's material into a commercial well. USE, on the other hand, places the generator's NORM material, without blending or dilution, into a disposal trench for burial. A generator's waste is never commingled with another's waste and our regulations strictly prohibit the dilution of a generator's NORM material to meet a waste classification. Like US Ecology, Newpark offers the E & P NORM generators a viable alternative for NORM disposal.

Two years ago industry had essentially two options for disposal, either downhole in a P & A well or Envirocare. Although USE accepted NORM for disposal we did not have a department that specifically catered to E & P operations. Industry now has a variety of available options and each has its own risk management and cost effectiveness assets and detractors.

TNR: What do you feel are US Ecology's strongest assets?

USE: USE believes there are benefits to ensuring that NORM waste materials are disposed of only at licensed facilities located on federal or state owned land. Our facility is located on land owned by the federal government, surrounded by federal property and therefore benefits from the associated security and well protected from inadvertent intrusion. We currently have in excess of \$41.5 million in cash on deposit in state-managed funds for closure and perpetual care and maintenance, assuring that the closure plan, when implemented, will meet or exceed all applicable regulatory requirements for safe permanent disposal. No other NORM disposal option currently maintains that level of financial assurity.

Our site is strictly regulated by the Washington State Department of Health and the U.S. Nuclear Regulatory Commission in accordance with Title 10

CFR Part 61, Land Disposal of Radioactive Waste. Federal and state regulations provide for a comprehensive monitoring program and we have an outstanding environmental and regulatory compliance history.

Accordingly, our site is in a remote desert location. The climate is dry and arid. We receive approximately 4-6 inches of annual rainfall with 85-110 inches in evapotranspiration. The nearest aquifer is 320 feet from the surface. There is no surface to ground recharge.

TNR: Does US Ecology take title to the NORM materials?

USE: Yes. US Ecology takes title and ownership of the NORM materials sent to its Richland, Washington site for disposal. USE indemnifies the generator and provides perpetual care, maintenance and closure funds in managing the site.

TNR: What are your upper limits on radioactive concentrations?

USE: USE may dispose of NORM material up to 100,000 pCi/gm; however, concentrations greater than 10,000 pCi/gm require additional stabilization.

TNR: How long has US Ecology been in the NORM business?

USE: The Richland facility has been in operation since 1963 as a commercial low-level waste disposal site. The facility has disposed of NORM since the mid 1980s. The site is operated by USE under a 99 year lease which will expire in the year 2061. At the end of the lease the land will revert to state and eventually federal

(Continued on page 14)

US Ecology (Continued)
ownership and control.

TNR: Can US Ecology dispose of mixed waste NORM?

USE: No. The State of Washington does not recognize the oil and gas industry's E & P exemption contained in RCRA. Therefore, all shipments must be certified to be free of hazardous characteristic and listed hazardous wastes. Additionally, the material must contain no water or freestanding liquids.

TNR: Are oily wastes acceptable when present in the NORM solids?

USE: Only if the waste will pass a paint filter test for freestanding liquids and does not exhibit the hazardous characteristics as defined by the Washington State Dangerous Waste Regulations. Some oily residue can be present as long as it is entrained in the NORM solids. Waste liquids and sludges can be processed for disposal by using approved sorbents and

procedures in accordance with our Radioactive Materials License.

TNR: How must NORM waste be packaged for transportation and disposal at Richland?

USE: Minimum requirements for all shipments are a strong tight container. Typically these include drums and metal boxes. Super sacks may be used with state case-by-case approval. Tanks, vessels, and pipes have also been utilized for disposal when properly prepared. DOT specification containers may be required for certain shipping classifications.

TNR: What type of approvals are necessary to get NORM accepted at Richland?

USE: The process requires submission of appropriate NORM analytical data to support a determination of the waste as NORM. Once the Washington State Department of Health issues a "NORM Determination Letter" a permit application is submitted to

the Washington State Department of Ecology along with the appropriate permit fee. After the Site Use Permit is issued transportation of the material can be arranged.

TNR: What other services does US Ecology provide?

USE: USE provides site characterization and remediation services. We also provide waste processing at our facility in Oak Ridge, Tennessee. In addition, we offer hazardous waste transportation and disposal services through our parent company American Ecology.

TNR: Who can a generator contact for more information about making NORM shipments to Richland for disposal?

USE: Anyone interested can contact Susan King Hereford at the US Ecology New Orleans office at 504/866-2300 or Darwin Westlund in our Richland office at 509/377-2411. ■

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In addition to removal, collection and disposal of radioactive scales, Lionhead Engineering and Consulting Ltd. specializes in the design of well bore abandonment programs including regulatory clearance for sub-surface disposal.

For more information or to discuss your needs, call or write:

Lionhead Engineering and Consulting Ltd.
203, 622-5th Avenue S.W.
Calgary, Alberta T2P 0M6
Tel: (403) 262-2694; FAX: (403) 237-7111

Selective Tools, Inc. (STI)

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

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

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

Mike McClure
Selective Tools, Inc.
11 Greenway Plaza, Suite 1712
Houston, TX 77046
(713) 626-0091 or FAX (713) 960-0832

Aerojet Tennessee Environmental Services

Jonesborough, TN. Aerojet Tennessee Environmental Services (ATES) has been issued a specific license for NORM remediation and decontamination by the Louisiana DEQ. Aerojet has a twenty year record of experience in processing, decontamination, and disposal of low level radioactive wastes. ATES has developed the ARMS system, a new remedial technology which has proven effective in descaling and decontamination of oil & gas processing equipment. The ARMS system uses a variety of patented urethane-based blast media which can remove and segregate NORM scale for responsible disposal. Information on ATES and the ARMS system can be obtained from Mike Smith at ATES 313/454-4566 or FAX Mike at 313/453-1413. ■

DRY HOLE/GRAVITY FEED NORM DOWNHOLE DISPOSAL METHOD

By Guy A Miro, Account Manager
 NORMCO - a Division of Growth Energy Services, Inc.

All current Downhole Disposal methods of NORM (Naturally-Occurring Radioactive Material) requires the volume of NORM waste to be increased by forming a slurry in order to convey it downhole into the casing or formation. The creation of this slurry requires the use of more equipment materials and manpower resulting in higher costs. Volume of radioactive material increases of 2 to 3 times its original volume and the associated potential health risks causes more generator cradle to grave accountability for downhole disposal. This results in a higher NORM management cost and more potential liability to its generator. Why, with all the emphasis on volume reduction, do we still increase its volume? It appears logical that in order to manage and maximize your NORM waste disposal volume, the NORM waste volume must be kept to a minimum since the greatest opportunity cost for downhole disposal could be the lack of available applicable P & A wells.

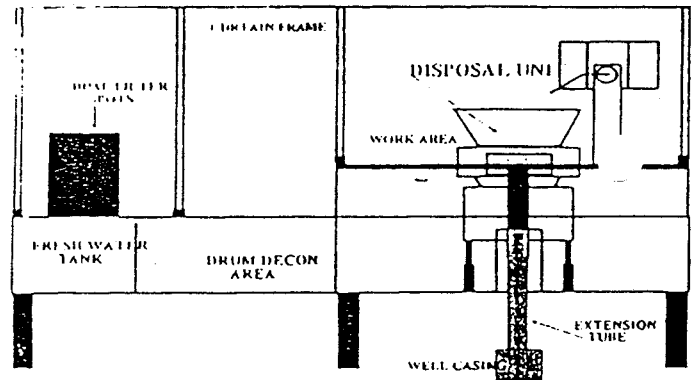
NORMCO has designed a self contained transportable system (Figure 1 on page 16) to expedite and maximize a downhole disposal operation of NORM waste without increasing the volume of radioactive material. It is simply called the NORMCO Dry Hole Gravity Feed Method. After a
 (Continued on page 16)

DRY HOLE/GRAVITY FEED NORM DOWNHOLE DISPOSAL METHOD (Continued)

wellbore is prepared to receive NORM waste. i.e. bottom plug set, cement in place and casing integrity pressure successfully tested, fluid will be removed either wholly or partially by the displacement through tubing with nitrogen or other medium. Tubing is subsequently removed from the wellbore. NORMCO's Downhole Disposal Unit (DDU) may be set up over the top of the wellhead with a rig in place or rigless and operate autonomously. The DDU consists of a modified shaker where NORM waste is moved from storage with a crane and emptied directly onto a surface grating which enables the sorting of contaminated large pieces requiring special handling. The NORM leaves the shaker in a controlled fashion by being gravity fed directly down into the wellbore. The control rate is variable and a function of casing size, condition and type of waste. This operation is assisted by pneumatic vibrators attached to the casing. Empty drums are immediately processed for decontamination while onsite. This requires minimal clean fluid that is consistently being run through a closed-looped water filtration system.

NORMCO recently completed a DDU commercial project for a major oil company at a site in south Louisiana. This was a successful example of maximizing a P & A wellbore volume for the disposal of NORM waste. This wellbore accepted 205, 55-gallon drums of various types of NORM waste in seven (7) inch casing with only 5300 feet of wellbore space. This placement of waste was followed by 30 barrels of wash water before setting an upper plug below the groundwater depth. All this was accomplished in an operation that lasted approximately 51 hours or had an efficiency rate of 4 to 6 drums/hr. These efficiencies resulted in substantial cost savings

NORMCO
DOWNHOLE DISPOSAL UNIT (DDU)



TOP VIEW

FIGURE 1

for the generator while at the wellsite and with the utilization of less P & A wellbores experienced by the generator.

This disposal method is an approved licensed activity by the States of Louisiana and Texas regulatory authorities and oil and gas agencies.

FEDERAL RADIATION SAFETY STANDARDS

NORM PIPE SCALE

On October 27, 1994, Senator Glenn called on the federal government to establish rational and coherent radiation standards to protect the public's health and safety. A recent GAO study has found that the federal government has, at best, an inconsistent and fragmented program for regulating public exposure to radiation. The report "Nuclear Health and Safety: Consensus on Acceptable Radiation Risk to the Public Is Lacking," discusses the widely varying risk levels allowed under current regulations and finds that in recent years, federal agencies have coordinated radiation policies ineffectively.

Many do with opportunities as children do at the seashore; they fill their little hands with sand and let the grains fall through, one by one, till all are gone.
Tom Jones

I am looking for a small piece of production pipe containing NORM contaminated scale. The piece of pipe, from 6-inches to a foot in length and any diameter, is needed to send to a contact in Russia for use in studying the dissolution of the scale with a new chemical system developed in that country. If you have a piece of pipe available, please call Peter Gray at: (918) 492-5250 or Fax me at (918) 492-4959.

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CLOSING OF THE BARNWELL LLRW DISPOSAL SITE

The July 1, 1994 closing of the Barnwell low-level radioactive waste disposal facility in South Carolina to states not in the Southeast Compact has generated concern about the future of radioactive waste disposal in the United States.

For more than 30 years there were three low-level disposal facilities in the U.S. -- in South Carolina, Nevada and Washington. In 1980 these states appealed to the federal government to provide them relief; they wanted waste disposal divided more evenly so each state would be responsible for its own. Congress passed the Low-Level Waste Policy Act which requires each state to dispose of its own waste or join in a compact with other states to develop regional disposal facilities. The three facilities were allowed by law to close at the end of 1992 if they chose. The Nevada facility closed in 1993 and only a few Northwest and Rocky Mountain states may use the Washington facility. The Barnwell site in South Carolina is already closed except to the eight states in the Southeast Compact and is facing permanent closure in December 1995.

The Barnwell site, run by Chem-Nuclear Systems, Inc, was opened in 1971 and accepted waste from all over the U.S. If the Low-Level Waste

Policy Act is fully implemented there will be 12 waste disposal sites under development. Where three sites were effectively handling waste -- now there will be 15. Three sites are more environmentally correct than 15. Having so many sites for disposal will most likely increase the cost of disposal because each site will have to be built, staffed and maintained. The fixed costs will be high and there will be too little waste for too many facilities. If reason prevails two or three sites will be built and others will be built later as needed. There is no low-level waste problem technically and scientifically -- just political

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EDITORIAL & APOLOGY

I profusely apologize for the messiness of this issue of *The NORM Report*. I let myself get over committed and the newsletter suffered. This will not happen again. The newsletter is now my top priority and there will be four issues a year. Needless to say, each annual subscriber will receive four issues before being asked to renew.

Articles written for *The NORM Report* are solicited. Please send them to:

Peter Gray Editor/Publisher
P.O. Box 470932
Tulsa, OK 74147

Call (918) 492-5250 or
Fax at (918) 492-4959

(Phone and Fax nos. are new) ■

RADON THREAT DOWNPLAYED

The following is an article that appeared in *The Tulsa World*, Sunday, September 11, 1994.

Several new studies of radon, the radioactive gas known to cause cancer and found to be seeping into millions of homes across the country, have uncovered little evidence linking household exposure to disease, raising questions about how much risk radon poses to humans at very low levels. Researchers say these studies have in most cases failed to show an association between lung cancer and household radon levels at or even slightly higher than the levels at which the Environmental Protection Agency recommends taking corrective measures. The continued lack of evidence of a significant risk from radon at these levels raises questions about how aggressively the nation should try to lower radon levels in homes and buildings. The ultimate cost to meet the EPA standard is estimated at \$50 billion or more, critics say.

But the EPA and other scientists contend there is enough indirect evidence that radon is a major cause of cancer at levels found in many homes to take action. The design and limited number of participants in some of the new studies fail to give them sufficient data to assess the true risks, they say. ■

Growth Environmental, Inc. is pleased to announce the formation of

GROWTH ENERGY SERVICES, INC.

GROWTH ENERGY SERVICES, INC. is a consolidation of Growth Environment, Inc.'s radiological environmental services to its oil, gas, utility and industrial clients.

Effective December 1, 1994 GROWTH has acquired all of the business and operations of NORM Environmental Services, Inc. (NORMCO) with offices in Houston, Texas and a licensed decontamination and processing facility in Amelia, Louisiana. The business combination of NORMCO with the existing operating units of GROWTH establishes an integrated environmental service company focused upon providing effective solutions to its clients concerned with Naturally Occurring Radioactive Materials (NORM) and related hazards.

Consulting, laboratory and training services historically provided from the Baton Rouge, Louisiana location, formerly through Radiation Technical Services, will now be provided through the Technical Services Division Growth Energy. Field Services currently furnished primarily from the Lafayette, Louisiana location through Praxis Environmental Services, Inc. will now be provided by the Field Services Division. The licensed permanent facilities located in Amelia, Louisiana and Bayou Black, Louisiana are staffed and equipped to complete decontamination and processing activities, and will be provided by the NORMCO Division.

Our clients will have the benefit of continuity of service and expanded capability through this integration. You have our pledge of the combined talents of all the employees of Growth Energy Services to quality and safety every project.

Please continue to contact us at one of our several Gulf Coast locations:

Robert Mouton
Lafayette, Louisiana
(800) 293-8787

Dennis Yancey
Baton Rouge, Louisiana
(504) 769-9972

Guy Mirro
Houston, Texas
(713) 9786580

Bayou Black, Louisiana
(800) 293-8809

Amelia, Louisiana
(504) 631-9002

Radiation and Smoking

Thirty years ago scientists at the Harvard School of Public Health discovered that tobacco contained relatively high concentrations of the naturally occurring radionuclide, polonium-210. When a cigarette is lighted, the polonium is volatilized, inhaled and deposited in the lungs. Because polonium-210 is an alpha emitter, the dose equivalent to certain parts of the lungs is relatively high, estimates being that small areas of the bronchial epithelium in a 1.5 pack per day smoker receive an annual dose of about 16 rem (16,000,000 microrem). Using an appropriate tissue weighting factor, this translates into an annual effective dose greater than 1 rem (1,000,000 microrem) which is over ten times the long term limit for members of the public.

Although government regulations require tobacco companies to place warning labels on cigarette packages, there is no requirement that these warnings alert consumers about the high radiation doses being received by smokers.

Possibly the following should be added to the list of warnings that are

required to be placed on cigarette packages and in cigarette advertising:

Surgeon General's Warning
Cigarettes are a major source of radiation exposure.

Although tobacco companies can always challenge epidemiologic studies that show a correlation between cigarette smoking and lung cancer, there is no way that they can refute the fact that cigarettes contain polonium-210 and that the lungs of smokers are heavily exposed to alpha radiation.

Stan A. Huber Consultants, Inc. (SAHCI)

Stan A. Huber Consultants, Inc. (SAHCI) has specialized for 25 years in providing full health physics support services to industrial facilities that use or may be contaminated with radioactive materials or NORM. We offer a full range of professional services including, but not limited to:

1. Providing professionally recognized radiological surveys of materials, equipment and facilities to define the true scope of any NORM contamination that may exist.
2. Preparing or assisting with licensing, permits, and regulatory compliance needs and documentation.
3. Providing health physics services, such as:
 - a. Decontamination/decommissioning projects. Termination of licensed facilities require that a close-out radiation survey be made to ensure that the facility is free of NORM contamination and can be released for unrestricted use.
 - b. Certified calibration of NORM survey meters (required by regulations to be done every 6 or 12 months).
 - c. Soil and water analyses.
 - d. Routine radiation surveys.
 - e. Radiation safety programs.
4. Drum or container packaging and transport arrangements (including manifesting, labeling, load preparation, etc.) can be done for each shipment of NORM wastes.
5. Providing on-the-job training for your personnel to assume the radiation survey requirements and the shipping functions for continuing NORM disposal projects.
6. Coordinating decontamination projects and acting as liaison between waste removal personnel, facility management, and regulatory agencies.

We can provide references of previous projects.

If any of these services are of interest, or if you would like a no-obligation discussion or additional information, please contact our office by phone (815/485-6161), FAX (815/485-4433), or by letter to:

Stan A. Huber Consultants, Inc.
200 North Cedar Road
New Lenox, IL 60451-1751

AVAILABLE NEW DISPOSAL OPTION --- NEWPARK

As of September 16, 1994, a new commercial NORM processing facility is on line for the disposal of NORM. SOLOCO, Inc. along with its sister company, Newpark Environmental Services, Inc. (a subsidiary of Newpark Resources, Inc.) has constructed this facility in association with its Port Arthur, Texas Nonhazardous Oilfield Waste (NOW) processing plant,

NORM waste will be received into a specifically licensed NORM treatment facility (licensed by the Texas Department of Health) where it will be hydrated and viscosifiers added to properly suspend the solids for injection. During the processing of the material, it is diluted to below 30 pCi/g and becomes regulated as NOW for injection at low pressures.

No waste is left in the well bore. It is injected into

receiving geological formations that are below and isolated from underground sources of drinking water. The facility will be allowed to receive NORM up to a 2000 pCi/g limit, and possibly higher on a case-by-case basis. The unique feature of this facility is that the waste, at the act of disposal, will not be manifested as NORM, but as NOW.

For more information, call:

Michael Sparks
Project Sales Manager
SOLOCO, INC.
713/240-6700 or 800/204-9200

Campbell Wells Corporation

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

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

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

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

Sammy Cooper or Jerry Brazzel at (318) 981-4004

AVAILABLE NEW DISPOSAL OPTION --- ST. HELEN'S TRADING, LTD.

St. Helen's Trading, Ltd. recently finalized an exclusive 20 year representation agreement for the exportation and recycling of NORM infused Non-Hazardous Oilfield Waste (NOW) and Phosphogypsum Waste (PW) with Biosphere, a member-company of the Ukrainian Waste Management Group. The NOW-NORM which is referred to as Product, will be recycled into building material (bricks) for exclusive use within the 30 km Chernobyl Zone. The recycling site, Naralka, is located 15 km south of the Zone. The agreement has been fully sanctioned by both the Ukrainian Institute of Science and Ukrainian governmental agencies.

Domestically, St. Helen's will provide marketing, inspection and confirmation of material shipment and facilitate the exportation of the Product. In the Ukraine, St. Helen's, in conjunction with the Ukrainian Institute of Science, is required to provide health physics consulting, transportation, material handling and operational oversight services to Biosphere. All material handling, personnel health and safety and

Product recycling is required to meet all international health and safety standards including those of the U.S. Environmental Protection Agency and the Nuclear Regulatory Commission.

The Product will be recycled at Naralka, a secure restricted site which has a higher level of radioactive contamination than is conceivable for NORM and/or PW. Because of the shorter decay life of radium-226 and 228 than plutonium and other radionuclides at Chernobyl --- 1620 years vs. 24,000 years --- the NORM bricks will actually serve as a form of shielding for the much more intense, dangerous and long-lived contamination inherent in the area since the Chernobyl accident. The cost of this NORM disposal option for exportation to Russia is reported to be less than any other disposal option available at present in the United States. For more information call:

Peter MacDowell
(818) 969-0911 or FAX (818) 969-4971

A NEW RADIATION SURVEY PROBE FOR THE DETECTION OF LEAD-210

A new radiation probe, the RAP47 scintillation probe, was recently introduced at the American Energy Week Conference and Exhibition in Houston at the end of January by S.E. International, Inc., a leading supplier of radiation survey meters. The RAP47 was announced as the alternative to the GM pancake probe for surveying for lead-210 contamination in the natural gas, gas processing and petrochemical industries.

Lead-210 is difficult to detect when present as a NORM contaminant in the natural gas / natural gas liquids industries. Lead-210 decays by beta emission with 46.5 keV gamma radiation in 4% of the decays. Bismuth-210 and polonium-210, the decay products of lead-210, decay by beta and alpha emission, respectively, with no gamma radiation in their decay. Although the GM pancake probe can detect alpha, beta, and low energy gamma radiation, it does so with poor efficiency. Moreover, the alpha and beta particles, particularly, are easily absorbed by any films, sludges, scales or by the GM pancake probe window itself.

S.E. International, Inc. has made a sensitivity comparison between the new RAP47 scintillation probe and a standard GM pancake probe to illustrate the improved efficiency of the RAP47 for the detection of the lead-210 46.5 keV gamma radiation. Using a new 10 nanocurie lead-210 check source placed 1 mm from the detector surfaces, the RAP47 probe was shown to produce 135 counts for every one produced by the pancake probe.

Lead-210 is a serious NORM contaminant in the natural gas / natural gas liquids industries. The contamination is the result of radon-222 produced with natural gas. When sufficiently concentrated, e.g. in liquid propane and ethane separated from the natural gas, radon itself is relatively easily detected with a standard 1x1 inch sodium iodide scintillation probe. However, when a gas processing plant or petrochemical facility processing

light hydrocarbon liquids has been shut down for 3 hours or longer, the NORM contamination due to the radioactive decay products of the radon cannot be detected by the standard scintillation probe. A GM pancake probe has historically been used to survey for the lead-210 NORM contamination on the inside surfaces of systems and facilities exposed to radon contamination in the natural gas.

Now, lead-210 contamination can be detected with much increased efficiency with the new RAP47 scintillation probe, thereby increasing significantly the probability that NORM contamination subject to radiation and NORM control regulations will be detected and measured.

For further information on the RAP47 radiation survey probe contact:

Susan Skinner
S.E. International
 (615) 964-3561; FAX (615)964-3564

ENVIRONMENTAL NUCLEAR COUNCIL

Several initiatives begun under the aegis of the Environmental Nuclear Council (Jill Lipoti, Council Chairperson), are being continued by committees and staff of the CRCPD.

A letter was sent to the U.S. Department of State regarding shipping NORM waste to third world nations. Their assistance was requested in proposing solutions for the short- and long-term. A charge was given to the Committee on International Radiation Protection asking that they propose standard language for all developing nations. A charge was given to the Committee on Natural Radioactivity Contamination to develop a consensus limit below which NORM could be released for unrestricted use by any nation, and above which adequate controls would have to be demonstrated by the receiving nation.

NCRP PUBLICATION

A NCRP publication which may be of interest is Report No. 118, *Radiation Protection in the Mineral Extraction Industry*. It is available for \$20 from:

NCRP Publications
 7910 Woodmont Avenue, Suite 800
 Bethesda, Maryland 20814
 1-800-229-2652

“When government goes into business it can always shift its losses to the taxpayer. The government never really goes into business, for it never makes ends meet, and that is the first requisite of business.”

Thomas Alva Edison

And then the people said NOT

The following was taken from a "Message from Roland G. Fletcher", Chairperson of the Conference of Radiation Control Program Directors.

Low-level radioactive waste (LLRW) disposal is rapidly becoming a nonevent. Generators have developed elaborate plans, states have joined together for their mutual interest, radiation disposal companies have presented concepts and proposals about the elaborate, practical, safe and convenient facilities they can construct.

And then the people said, "NOT!.... "

NOT over my roads ---

NOT near my drinking water ---

NOT in my air ---

NOT in my backyard ---

NOT in my country ---

NOT on planet Earth ---

And NOT IN MY LIFETIME.

Every one of us has heard one or all of these sentiments, if we interface at all with the public and the media. ■

ICRP Publication 65

ICRP Publication 65, "*Protection Against Radon-222 at Home and at Work*," Annals of the ICRP, Volume 23, No. 2, 1993 contains some interesting data concerning safe levels of radon in dwellings.

On page 24, Table 7 and Table 8, radon concentration action levels are listed. The range given is 5.4 to 16.2 pCi per liter. The U.S. Environmental Protection Agency recommends an action concentration level of 4 pCi per liter and Canada recommends 22 pCi per liter.

ICRP publications are available from:

ICRP Publications
Elsevier Science Inc.
660 White Plains Road
Tarrytown, New York 10591-5133
(914) 524-9200 ■



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(800) 293-8787	(504) 769-9972

Guy Mirro
Houston, TX
(713) 978-6580

The NORM Report

The NORM Report is published four times a year by Peter Gray & Associates. It is available by subscription for \$95 a year or \$49 a year for government and non-profit organizations. Single copies are available for \$35 an issue.

Peter Gray & Associates

P.O. Box 470932

Tulsa, OK 74147

(918) 492-5250 or FAX (918) 492-4959

Comparison of NORM Rules by State

Radium Exemption Concentration

Radium Cleanup Standard

AR	5 pCi/g
GA	5 pCi/g with high radon factor ⁽¹⁾ 30 pCi/g with low radon factor ⁽²⁾
LA	5 pCi/g above background
MS	5 pCi/g with high radon factor 30 pCi/g with low radon factor
TX	5 pCi/g with high radon factor 30 pCi/g with low radon factor
CO (proposed)	5 pCi/g
MI (proposed)	5 pCi/g
NM (proposed)	30 pCi/g
OK (proposed)	30 pCi/g
SC (proposed)	5 pCi/g with high radon factor 30 pCi/g with low radon factor
CRCPD (proposed)	5 pCi/g

AR	5/15 pCi/g ⁽³⁾
GA	5/15 pCi/g with high radon factor 30/15 pCi/g ⁽⁴⁾ with low radon factor
LA	5/15 pCi/g, or 30 pCi/g if the effective dose equivalent to members of the public does not exceed 100 millirem per year
MS	5/15 pCi/g with high radon factor 30/15 pCi/g with low radon factor
TX	5/15 pCi/g with high radon factor 30/15 pCi/g with low radon factor
CO (proposed)	5 pCi/g
MI (proposed)	5/15 pCi/g
NM (proposed)	30/15 pCi/g
OK (proposed)	30/15 pCi/g
SC (proposed)	5/15 pCi/g with high radon factor 30/15 pCi/g with low radon factor
CRCPD (Proposed)	5/15 pCi/g

(1) High radon factor is a radon emanation rate greater than 20 pCi per square meter per second.

(2) Low radon factor is a radon emanation rate less than 20 pCi per square meter per second.

(3) 5/15 pCi/g is 5 pCi/g of radium in soil, averaged over any 100 square meters and averaged over the first 15 centimeters of soil below the surface.

(4) 30/15 pCi/g is 30 pCi/g of radium in soil, averaged over any 100 square meters and averaged over the first 15 centimeters of soil below the surface.

(Continued on page 25)

Historical Perspectives

“The energy produced by the breaking down of the atom is a very poor kind of thing. Anyone who expects a source of power from the retransformation of these atoms is talking nonsense.”

---Ernest Rutherford, Nobel Laureate, 1908

“While theoretically and technically television may be possible, commercially and financially I consider it an impossibility, a development of which we need waste little time dreaming.”

---Lee de Forest, American radio pioneer, 1926

“Much outcry, little outcome” -- Aesop

NORM Training Course Offered by OGCI & Peter Gray

OGCI (Oil & Gas Consultants International, Inc.), a world leader in petroleum training, has scheduled training courses in NORM control for 1995. 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 course builds a rigorous and complete foundation for the control of NORM contamination. The 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 course meets all requirements for Radiation Safety Officer training as outlined by Louisiana's DEQ.

Peter Gray is the editor/publisher of *The NORM Report*.

The 1995 schedule for the course *NORM Contamination in the Petroleum Industry* is:

June 20-23	Houston
Oct. 17-20	Calgary
Nov. 7-10	Houston

For further information about the course, contact Joseph Goetz, Vice President, OGCI, 1-800-821-5931. Or contact Peter Gray at 918-250-6042 for additional information about the course content. ■

Comparison of NORM Rules by State (Continued)

Exemption for Contaminated Equipment

AR	Concentration limit only (5 pCi/g)		disintegrations per minute ⁽⁵⁾
GA	50 µR/hr including background	NM (proposed)	50 µR/hr including background
LA	50 µR/hr including background	OK (Proposed)	50 µR/hr including background
MS	25 µR/hr above background	SC (Proposed)	50 µR/hr including background
TX	50 µR/hr including background	CRCPD (Proposed)	Concentration in dpm
CO (Proposed)	Concentration limit only (5 pCi/g)		(5) Before release for unrestricted use, facilities or equipment contaminated with NORM should not exceed specified contamination limits in dpm/100 sq. centimeters.
MI (Proposed)	Concentration limit only in		

