

# The *NORM* Report

## Naturally Occurring Radioactive Material Contamination WINTER 1996

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### Regulations for the Control of NORM - Update

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

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

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

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

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

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

#### ALABAMA

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

#### ALASKA

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

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

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

### **ARIZONA**

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

### **ARKANSAS**

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

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

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

### **CALIFORNIA**

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

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

### **COLORADO**

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

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

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

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

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

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

### **CONNECTICUT**

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

### **DELAWARE**

There are no specific regulations for the control of NORM in Delaware. NORM, NARM and other radioactive materials are considered to be covered in the general regulations for the control of radiation enacted in 1993. A revision of the general regulations became effective September 1, 1995. This revision tightened the compliance aspect of the regulations. There are no plans to propose specific NORM rules at present. NORM contamination appears to be minimal in the state; they are not aware of any NORM-contaminated facilities.

### **FLORIDA**

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

(Continued on page 3)

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

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

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

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

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

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

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

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

### **GEORGIA**

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

### **HAWAII**

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

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

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

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

### **IDAHO**

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

### **ILLINOIS**

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

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**ILLINOIS** (continued)

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

**INDIANA**

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

**IOWA**

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

**KANSAS**

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

**KENTUCKY**

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

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

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

**LOUISIANA**

Louisiana's revised NORM regulations became effective January 20, 1995. A draft of an *Implementation Manual for Management of NORM in Louisiana* was released in September, 1995. The Table of Contents of this manual was given in the Fall 95 issue of **The NORM Report**.

The introduction to the Implementation Manual states "On January 20, 1995, the revised NORM regulations (LAC 33:XV, Chapter 14) became effective. This revised Implementation Manual reflects the changes and revisions which were made. It also includes the Radiation Protection Division's position on certain NORM issues that are not specifically addressed in the NORM regulations."

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

is given below.

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

**II. EXEMPTION STANDARD**  
(§1404)

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

**A. Diffuse NORM Waste**  
(§1404.A)

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

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**LOUISIANA** (continued)

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

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

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

The land exemption is categorized into two standards:

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

first 15 centimeters depth; and

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

**MAINE**

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

**MARYLAND**

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

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

**MASSACHUSETTS**

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

**MICHIGAN**

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

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

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

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

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

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

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

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

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

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

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

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

### **MINNESOTA**

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

### **MISSISSIPPI**

Responsibility for NORM in Mississippi is divided between the Department of Health and the Oil and Gas Board. The Oil and Gas

Board has authority for NORM at the wellsite (effective July 1, 1995). Once the petroleum leaves the wellsite, the Mississippi Department of Health has continued authority for NORM contamination.

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

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

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

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

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**MISSISSIPPI** (continued)

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

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

**Rule 69: Control of Oilfield NORM**

## 4. Surveys

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

gamma levels.

## 5. Criteria for Site Operations

## c. Site Maintenance

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

## 6. Release of Property

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

transmitted to the new producer prior to the property transfer.

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

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

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

**Note: All references to land farming have been deleted.**

**7. Criteria for Release of Equipment**

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

**MISSOURI**

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

**MONTANA**

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

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

**NEBRASKA**

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

**NEVADA**

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

**NEW HAMPSHIRE**

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

**NEW JERSEY**

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

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

The scope of the proposed rule extends to:

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

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

General Approach to Standard Setting

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

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