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UNITED STATES
NUCLEAR REGULATORY COMMISSION
OFFICE OF INSPECTION AND ENFORCEMENT
WASHINGTON, D. C. 20555

March 28, 1986

IE INFORMATION NOTICE NO. 86-20: LOW-LEVEL RADIOACTIVE WASTE SCALING FACTORS, 10 CFR PART 61

Addressees:

All nuclear power plant facilities and fuel facilities holding an operating license (OL) or a construction permit (CP).

Purpose:

This notice is provided to alert licensees to a problem in the methodologies used to determine facility scaling factors for low-level radioactive waste classification. This notice is intended to assist licensees in properly determining waste classification scaling factors.

It is expected that recipients will review the information provided for applicability, if appropriate, to their waste classification programs. However, suggestions contained in this notice do not constitute NRC requirements; therefore, no specific action or written response is required.

Description of Circumstances:

Recent NRC inspections have identified poor correlation between generic radionuclide concentration data used to classify waste and actual radionuclide sample data at some nuclear power plants. Similarly, these inspections determined that some plants with multiple waste streams have been using one set of scaling factors to classify waste from all their waste streams despite significant differences (greater than a factor of 10) in radionuclide concentrations. Such practices may lead to significant underestimation of certain radionuclides with direct health and safety consequences. The practices may also lead to significant over estimates which limit disposal capacity and increase costs.

Discussion:

Any licensee who transfers radioactive waste to a land disposal facility or to a licensed waste collector or processor is required by 10 CFR 20.311(d)(1) to classify the waste according to 10 CFR 61.55. The three low-level waste classes (A, B, and C) as defined in 10 CFR 61.55(a)(2)-(a)(7) describe the manner in which the classification is to be computed, based on concentrations of certain radionuclides within the waste. Recognizing that some of these radionuclides may be difficult to routinely measure using counting equipment normally found at power reactor facilities, 10 CFR 61.55(a)(8) permits use of

indirect methods, such as scaling factors. Such methods can be used to determine concentrations of difficult-to-measure radionuclides provided there is reasonable assurance that the indirect methods can be correlated with actual measurements.

On May 11, 1983, the NRC Division of Waste Management forwarded to all licensees a technical position (TP) paper on waste classification describing procedures acceptable to the regulatory staff which may be used by licensees to determine the presence and concentration of radionuclides listed in 10 CFR 61.55. That position paper is affirmed to represent the current regulatory staff position on this matter.

Since 10 CFR 61 became effective in January 1984, licensees have had varying experiences in attempting to develop scaling factors specific to their facility and waste streams. Initially, the staff exercised flexibility in determining compliance with 10 CFR 61 and permitted licensees to use generic scaling factors to determine waste classification, provided that the licensee was actively developing specific scaling factors for its facility and waste streams.

The attachment describes problems which have been observed by the NRC relative to inappropriate methodologies sometimes used by licensees on the application of waste stream scaling factors and provides guidance to avoid those problems.

No specific action or written response is required by this information notice. If you have any questions about this matter, please contact the Regional Administrator of the appropriate regional office or this office.

Edward L. Jordan, Director
Division of Emergency Preparedness
and Engineering Response
Office of Inspection and Enforcement

Technical Contact: A. Grella, IE
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Attachments:
1. Discussion of Scaling Factor Methodology Problem
2. List of Recently Issued IE Information Notices

DISCUSSION OF SCALING FACTOR METHODOLOGY PROBLEM

The TP paper states that scaling factors should be developed on a facility and waste stream specific basis. The staff also considers that in determining measured or inferred radionuclide concentrations, the concentrations are to be accurate to within a factor of 10. Scaling factors based on a single set of detailed sample analysis results are acceptable, provided that there is reasonable assurance as to the representativeness of the samples.

Inspections have indicated that several licensees have continued to use generic data, (i.e., data from similar waste streams from several other facilities), combined with actual plant sample data to derive facility scaling factors. This approach was taken because of a limited number of facility waste stream samples. The difficulty arises when scaling factors derived from the mix of generic and facility-specific data are under-conservative and differ from the actual facility samples by generally greater than a factor of 10. Some differences as high as a factor of 10,000 have been observed, yet some licensees have continued to use the scaling factors containing generic sample data. Continued use of scaling factors which produce estimates of radionuclide concentrations that differ from the most recent actual measurement of that radionuclide concentration by generally more than a factor of 10 may constitute noncompliance with 10 CFR 61.55(a)(8) since the reasonable assurance of correlation standard cannot be met. When discrepancies are observed, either the scaling factors need to be adjusted to agree with the most recent analysis of that waste stream or the waste stream needs to be resampled, if there is some question as to the validity of the sample analysis result causing the disagreement. Questions also may arise as to the correct classification of the waste, if classification based on the most recent sample analysis would result in a higher classification from that calculated by using the generic scaling factors.

As a sample analysis history of facility waste streams is compiled, licensees may choose to determine new scaling factors based on the most recent sample analysis results or may combine the latest analysis with those previously obtained to refine the scaling factors currently in use. Because large differences may have been caused by changes in plant operating conditions (e.g., increased fuel leakage, crud burst, etc.), the previous sample analysis results may not be representative of the waste stream and new scaling factors may need to be considered.

Inspections also have disclosed questions in licensee identification and determination of scaling factors for each facility waste stream. Several licensees have used only one set of scaling factors to determine the classifications of wastes from all of their waste streams. For some licensees this has resulted in underestimates of selected radionuclide concentrations. However, the majority of licensees that use only a single set of scaling factors overestimate some of the radionuclide concentrations in the wastes, because the most conservative ratio for a radionuclide from the various waste stream samples is chosen as the scaling factor for that radionuclide.

While using scaling factors which underestimate the radionuclide concentrations is clearly a problem, gross overestimation of the concentrations also is of concern. To ensure that 10 CFR 61 performance objectives are met, inventory restrictions may be established at a disposal facility for specific radionuclides such as Tc-99 or C-14. Because an overestimate in radionuclide inventory results in a corresponding overestimate in potential environmental releases, systematic gross overestimates in waste radionuclide concentrations may result in underutilization of the disposal facility. This could result in limited disposal capacity and higher disposal costs. Therefore, licensees may benefit from identifying individual facility waste streams and determine unique scaling factors for each. Facilities that have more than one operating unit will probably need separate scaling factors for each waste stream that is unique to each operating unit. One set of scaling factors would be appropriate for waste produced by systems shared by two or more units.

The following are examples of waste streams that may warrant establishment of unique scaling factors to classify wastes from those sources:

Pressurized Water Reactor

Primary Purification Filters
Primary Purification Resins
CVCS Evaporator Bottoms
Radwaste Polishing Resins
Secondary System Wastes (filters and resins)
Dry Active Waste

Boiling Water Reactor

Cleanup Filters/Resins
Condensate Polishing Resins
Evaporator Bottoms
Radwaste Ion Exchange Resins
Dry Active Waste

LIST OF RECENTLY ISSUED IE INFORMATION NOTICES

Information Notice No.	Subject	Date of Issue	Issued to
86-19	Reactor Coolant Pump Shaft Failure At Crystal River	3/21/86	All power reactor facilities holding an OL or CP
86-18	NRC On-Scene Response During A Major Emergency	3/26/86	All power reactor facilities holding an OL or CP
86-17	Update Of Failure Of Automatic Sprinkler System Valves To Operate	3/24/86	All power reactor facilities holding an OL or CP
86-16	Failures To Identify Containment Leakage Due To Inadequate Local Testing Of BWR Vacuum Relief System Valves	3/11/86	All power reactor facilities holding an OL or CP
86-15	Loss Of Offsite Power Caused By Problems In Fiber Optics Systems	3/10/86	All power reactor facilities holding an OL or CP
86-14	PWR Auxiliary Feedwater Pump Turbine Control Problems	3/10/86	All power reactor facilities holding an OL or CP
86-13	Standby Liquid Control System Squib Valves Failure To Fire	2/21/86	All BWR facilities holding an OL or CP
86-12	Target Rock Two-Stage SRV Setpoint Drift	2/25/86	All power reactor facilities holding an OL or CP
86-11	Inadequate Service Water Protection Against Core Melt Frequency	2/25/86	All power reactor facilities holding an OL or CP
84-69 Sup. 1	Operation Of Emergency Diesel Generators	2/24/86	All power reactor facilities holding an OL or CP

OL = Operating License
CP = Construction Permit