



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

OCT 10 1991

Mr. Gary Robertson, Head
Waste Management Section
Division of Radiation Protection
Washington State Department
of Health
Olympia, WA 90214

Dear Mr. Robertson:

We have reviewed US Ecology's August 6, 1991, submittal of proposed revisions to their Hanford site Facility Standards Manual (FSM). This submittal outlines, and provides the rationale for, proposed changes to the environmental monitoring action levels for the Hanford facility. The revisions have been made in response to Washington State Department of Health (DOH) proposed investigation and reporting levels.

The suggested revisions were reviewed against current action levels; DOH proposed investigation and reporting levels (per Washington State's January 9, 1990, letter from Gary Robertson to Steve Adams); and the Nuclear Regulatory Commission (NRC) suggested trigger and reporting levels (per September 15, 1989, memo from Paul Lohaus to Vandy Milier, enclosed). Additional documents used in the review were:

Environmental Pathways Analysis of the US Ecology Low-Level Waste Disposal Facility, 1988, M. Bergeron et al., for U.S. Ecology, Inc.;
Annual Environmental Monitoring Report, 1990, U.S. Ecology, Inc.;
EPA Proposed Rule on Drinking Water Standards, 1991; and
NUREG-1388 Branch Technical Position on Environmental Monitoring at a Low-Level Waste Disposal Facility, 1989.

The proposed revisions were also compared with the content of the current application for the renewal of the Washington State license. Our comments are as follows:

1. US Ecology has not provided sufficient support for items 3 and 5 of their facility standards manual change evaluations, for the increase of environmental monitoring levels. The evaluations should contain some comparison of impact for the new and old reporting and action levels respectively. This comparison may have been made previously in the development of the new reporting levels but should be included in the revision justification.
2. Section 6.1.5 describes the corrective actions that will be initiated in the event of an action level being exceeded. The corrective actions described in section 6.1.5 of the proposed revisions should describe the corrective actions appropriate for the new two tiered reporting system. Specific consideration should be made, in the FSM, for results that exceed each of the levels, i.e. investigation or reporting especially for the investigation levels that will be handled entirely internally. An example of such a consideration might be the procurement of isotopic analyses

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should a gross beta investigation level be exceeded in an air sample. This consideration may be addressed by reference to operating procedures.

- 3. From the comparison of the investigation and reporting levels with the 1990 Annual Environmental Monitoring Report, it appears that the smallest detection level of the isotopic plutonium analysis is of the same order of magnitude as the investigation level. This potentially leads to a problem as the error level appears to be of the same order of magnitude as the action level. The investigation levels themselves are adequate.
- 4. Finally, you have proposed a value of 200 pCi/l as a reporting level for Cs-137 in the groundwater monitoring program. The proposed EPA drinking water standards indicate that the compliance level for Cs-137 will be 119 pCi/l. NRC suggests that this (or slightly less eg. 100 pCi/l) be a minimum reporting level for the monitoring of Cs-137 in ground water.

If you have any questions concerning these comments please feel free to contact either myself at (301) 492-0553 or Mr. Robert Hogg, of my staff, at (301) 492-0579.

Sincerely,

ORIGINAL SIGNED BY

Paul H. Lohaus, Chief
Low-Level Waste Management Branch
Division of Low-Level Waste Management
and Decommissioning, NMSS

Enclosure: as stated

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SUBJECT ABSTRACT: REVIEW OF US ECOLOGY RICHLAND FACILITY STANDARDS MANUAL

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Mr. Gary Robertson

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3. From the comparison of the investigation and reporting levels with the 1990 Annual Environmental Monitoring Report, it appears that the smallest detection level of the Isotopic Plutonium analysis is of the same order of magnitude as the investigation level. This potentially leads to a problem as the error level appears to be of the same order of magnitude as the action level. The investigation levels themselves are adequate.
4. Finally, you have proposed a value of 200 pCi/l as a reporting level for Cs-137 in the groundwater monitoring program. The proposed EPA drinking water standards indicate that the compliance level for Cs-137 will be 119 pCi/l. NRC suggests that this (or slightly less eg. 100 pCi/l) be a minimum reporting level for the monitoring of Cs-137 in ground water.

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Division of Low-Level Waste Management
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SEP 15 1989

MEMORANDUM FOR: Vzndy L. Miller, Assistant Director
for State Agreements Program
State, Local and Indian Tribe
Programs, GPA

FROM: Paul H. Lohaus, Chief
Operations Branch
Division of Low-Level Waste Management
and Decommissioning, NMSS

SUBJECT: COMMENTS ON REVISED ACTION LEVELS FOR
US ECOLOGY'S HANFORD MONITORING PROGRAM

Enclosed are our comments on revised action levels that the State of Washington is proposing for the US Ecology's environmental radiation monitoring program at Hanford. Although we have commented on the proposed levels, we believe that it is US Ecology's responsibility to establish appropriate action levels. We have not commented on each action level, but have commented on specific examples that can be applied to the entire monitoring program.

We have given Gary Robertson, Chief of the Waste Management Section of the Washington State Office of Radiation Protection, a copy of our draft Technical Position Paper on "Environmental Monitoring of Low-Level Radioactive Waste Disposal Facilities." When the Position Paper is released in its final form we will send it to Washington and US Ecology. In the section on action levels we advise setting two types of action levels. One type is a triggering level. If the concentration of radioactivity or chemical indicators exceeds this level, the licensee investigates, but would not normally report to the State and NRC. The other action level is a reporting level. If the concentration of radioactivity or chemical indicators exceed this level, then the licensee would report to the State and NRC. Triggering levels should be set at a level equivalent to a fraction of applicable dose limits or equal to a multiple of background concentrations. Reporting levels should be set at a level close to or at regulatory standards. We suggest that US Ecology consider establishing both triggering levels and higher, reporting levels.

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We have met with Gary Robertson of Washington State and discussed these issues briefly. We are arranging to meet with both the State and US Ecology to discuss these action level concepts further.

ORIGINAL SIGNED BY

Paul H. Lohaus, Chief
Operations Branch
Division of Low-Level Waste Management
and Decommissioning, NMSS

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SUBJECT ABSTRACT: COMMENTS ON REVISED ACTION LEVELS FOR US ECOLOGY'S HANFORD MONITORING PROGRAM

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Enclosure

COMMENTS ON REVISED ACTION LEVELS

GENERAL COMMENTS

If Washington sets its final action levels too low, unnecessary effort may be needed to review data to ensure that no remedial action is necessary. Washington has based its proposed action levels on past monitoring data, setting action levels at the mean activity plus three sigma. This level represents a conservative upper bound on the variation in background values. Setting action levels at this low level will likely result in frequent alarms of no demonstratable safety benefit.

The NRC staff recommends that action levels be set following the guidance on NRC's draft Technical Position Paper on "Environmental Monitoring of Low-Level Radioactive Waste Disposal Facilities," which will be issued in final form in a few months. The position paper recommends two types of action levels.

One type of action level is the triggering level. The triggering level is set at the concentration of radioactivity or chemical indicators above which an investigation is required. The investigation includes verifying laboratory procedures for contamination, resampling, analyzing for specific radionuclides, increasing sampling frequency, and expanding the monitoring program. The triggering level should be related to a fraction of applicable dose limits or to small multiples of background concentrations if the environmental sampling media cannot be directly or conveniently related to a dose limit. For example, if the applicable dose limit is the 25 mrem/yr specified in 10 CFR Part 61.41, the triggering level can be related to 20-25% of the dose limit. The licensee does not report to the NRC or the State when triggering levels are exceeded but investigates and records the results for review by the inspector.

The other type of action level is the reporting level. The reporting level is set at a concentration of radioactivity or chemical indicators that exceed or are about to exceed regulatory standards. When the reporting level is exceeded, the licensee should report to NRC or the state the monitoring results, the licensee's investigation and findings, and mitigating measures taken to correct the problem.

SPECIFIC COMMENTS

These comments on specific proposed action levels illustrate how to set more useful action levels. Washington State or US Ecology can apply these approaches to set appropriate triggering and reporting action levels for other radionuclides or chemical indicators.

1. Soil Action Levels:

Total Uranium	1	pci/g
Pu-238	0.001	pCi/g
Pu-239/240	0.005	pCi/g

These action levels are set too low; in fact, uranium is set at background. For decommissioning of fuel cycle facilities, the NRC has established soil criteria for uranium and plutonium in soil (see attachment, Policy and Guidance Directive FC 83-3). The criteria for natural uranium (separated from its daughter) is set at 35 pCi/g, for enriched uranium at 30 pCi/g, and for plutonium at 25 pCi/g. These soil limits are derived based on a dose limit of 20 mrem/yr to the lung or 60 mrem/yr to the bone. An appropriate triggering level for uranium is 5 pCi/g which is 2 to 3 times above background; an appropriate reporting level is 30 pCi/g. An appropriate triggering level for plutonium is 1 or 2 pCi/g; an appropriate reporting level is 25 pCi/g.

2. Ground Water Action Levels:

Gross Alpha	12	pCi/l
Gross Beta	12	pCi/l

These can be used as a triggering levels which, if exceeded, are followed by isotopic analysis to determine whether EPA's drinking water standards for Ra 226/228 (5 pCi/l); or for Sr-90 (8 pCi/l) are exceeded. If the isotopic analysis shows that these standards are not exceeded, no report needs to be made to the NRC or to the State.

Reporting levels for other radionuclides should set at the stringent EPA drinking water standards with triggering levels set at 25-50% of the standards.

3. Air Action Level:

Gross Alpha	1×10^{-14}	uCi/cc
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If this level is applied at the facility fenceline, then the level is too low to be a triggering level because it is too close to the minimum detection level for gross alpha in air samples. However, if this level is for an offsite location, beyond the fenceline, the level is too high to be a reporting level. For instance, if all the gross alpha activity is from insoluble uranium (Y compound), then the concentration will exceed the 25 mrem/yr lung dose limit as shown in the following calculation:

$$\begin{aligned}
 \text{Lung dose} &= \text{concentration} \times \text{inhalation rate} \times \text{dose conversion factor} \\
 &= 1 \times 10^{-14} \frac{\mu\text{Ci}}{\text{cc}} \times \frac{7300 \times 10^6 \text{ cc}}{\text{yr}} \times \frac{420 \times 10^3 \text{ mrem}}{\mu\text{Ci}} \\
 &= 31 \text{ mrem/yr}
 \end{aligned}$$

The proposed action level could be used as a triggering level if used for air sampling at the facility fence line, but cannot be used to demonstrate the 25 mrem/yr dose limit in offsite sampling. If this level is exceeded at the fence line, isotopic analysis is needed. Gross alpha measurement in air samples has limited applicability; for more accurate isotopic measurement composited air samples are normally required to demonstrate compliance with the 25 mrem/yr dose limit.

4. Vegetation Action Levels:

Total Uranium	0.25	pCi/g
Pu-238	0.0004	pCi/g
Pu-239/240	0.004	pCi/g

We do not know if these numbers are for dry or wet weight basis; however, they appear to be low. We suggest that the triggering level be set at several multiples of background to ensure the level is not set too low. The reporting level should be derived based on the hypothetical food ingestion pathway such that the 25 mrem/yr dose limit is not exceeded.