Order Comments Permit

Mr. Donivan R. Porterfield
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December 30, 2002

James P. Bearzi, Chief
Hazardous Waste Bureau
New Mexico Environment Department
2905 Rodeo Park Drive East, Building 1
Santa Fe, NM 87505-6303
Ref: Los Alamos National Laboratory Facility Order

Dear Mr. Bearzi:

The attached comments are in response to the issued (November 26, 2002) final Corrective Action Order (CAO) for Los Alamos National Laboratory. I continue to be concerned about some of the requirements of the CAO and make these comments in case there may still be some hope of alleviating these concerns through future modifications.

Sincerely yours,

Mr. Donivan R. Porterfield

Cc: Northern New Mexico Citizens Advisory Board
1660 Old Pecos Trail, Ste B
Santa Fe, NM 87505

Environmental Restoration Project
Los Alamos National Laboratory
PO Box 1663
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Comment 1, Section III & Comment R4
In the response to R4 the Department makes mention of "Section III.R in the Order". Such a section is not evident in either the draft or final order.

Comment 2, Section II.A.4(14) & Comment R139
I must disagree with the conclusion of "depending on the activity when released, it is possible that Po-210 can still be detected, even considering its 138-day half-life" in this case. The specific activity of Po-210 is approximately 4500 Ci/g, this being the maximum activity of 1 gram of pure Po-210. Given the relatively short half-life of Po-210 this maximum activity would over the course of 60 half-lifes (22.7 years) decay to approximately 0.004 pCi/g – a level that would be barely detectable in most situations. This level of Po-210 would easily be lost amidst the Po-210 continually being produced as part of the uranium decay series. In addition Po-210 decays directly to stable Pb-206 so there is no radioactive daughter. However, this doesn't rule out the possibility of a parent or by-product radionuclide that may still be present.

If excessive quantities of Po-210 had been present the two indirect manners of determining such would be to look at the level of stable lead and the abundance of Pb-206 relative to the other stable lead isotopes.

Comment 3, Section IV.A.e.f (Springs) and Comment R210
The Department response that "*any isotope of*" americium, uranium, plutonium are expected to be analyzed for implies the isotopes in the tables below are included (source: WWW Table of Radioactive Isotopes, http://ie.lbl.gov/education/isotopes.htm). Those isotopes with values listed in the HEAST tables are also noted. I would suggest that the Department re-consider its response.

americium isotopes

Isotope	half-life	HEAST
Am-231	unknown	
Am-232	79 sec	
Am-233	unknown	
Am-234	2.3 min	
Am-235	15 min	
Am-236	unknown	
Am-237	73 min	yes
Am-238	98 min	yes
Am-239	11.9 hr	yes
Am-240	50.8 hr	yes

isotope	half-life	HEAST
Am-241	432 yr	yes
Am-242	16.0 hr	yes
Am-243	7370 yr	yes
Am-244	10.1 hr	yes
Am-245	2.05 hr	yes
Am-246	39 min	yes
Am-247	23.0 min	
Am-248	unknown	
Am-249	unknown	

uranium isotopes

isotope	half-life	HEAST
U-218	1.5 msec	
U-219	42 μsec	
U-220	unknown	
U-221	unknown	
U-222	1 μsec	
U-223	18 μsec	
U-224	0.9 msec	
U-225	95 msec	
U-226	0.36 sec	
U-227	1.1 min	
U-228	9.1 min	
U-229	58 min	
U-230	20.8 day	yes

isotope	half-life	HEAST
U-231	4.2 day	yes
U-232	68.9 yr	yes
U-233	1.6E+5 yr	yes
U-234	2.5E+5 yr	yes
U-235	7.0E+8 yr	yes
U-236	2.3E+7 yr	yes
U-237	6.75 day	yes
U-238	4.5E+9 yr	yes
U-239	23.5 min	yes
U-240	14.1 hr	yes
U-241	unknown	
U-242	16.8 min	

plutonium isotopes

isotope	half-life	HEAST
Pu-228	unknown	
Pu-229	unknown	
Pu-230	unknown	
Pu-231	unknown	
Pu-232	34.1 min	
Pu-233	20.9 min	
Pu-234	8.8 hr	yes
Pu-235	25.3 min	yes
Pu-236	2.86 yr	yes
Pu-237	45.2 day	yes

isotope	half-life	HEAST
Pu-238	87.7 yr	yes
Pu-239	24110 yr	yes
Pu-240	6563 yr	yes
Pu-241	14.4 yr	yes
Pu-242	3.7E+5 yr	yes
Pu-243	4.96 hr	yes
Pu-244	8.1E+7 yr	yes
Pu-245	10.5 hr	yes
Pu-246	10.8 day	yes
Pu-247	2.27 day	

Comment 4, Section IV.A.3.f (Springs) & Comment R211
If the Department "*is more concerned with total gamma emissions*" then gross gamma should be the indicated analysis and not gamma spectroscopy.

Comment 5, Section IX.B.2.d (Soil, Rock and Sediment Sample Field Screening) & Comments R512 and R514
Given that these radionuclide screening measurements are not suggested to be NIST traceable the need for use of a NIST traceable source to insure "*proper operation and calibration*" is unclear and would only seem to build a false sense of precision and accuracy in the reported results. The use of a stable source would be all that is necessary to insure proper operation. If the intent is to establish a true comparability between field and contract analytical labs results then much more needs to be specified regarding the manner in which these screening methods are performed and calibrated.

To clarify the nature of the repeated counts suggest the following: "*Field screening of the sample shall be repeated if there is greater than a 20 percent variance between field screening measurements ~~for any~~ of duplicate samples ~~sample~~ when the measured values are greater than the background noise established before the field screening.*"

Comment 6, Section IX.B.2.g (Subsurface Vapor-phase Monitoring and Sampling) & Comment R519
I'm concerned with the mention of "gross beta" in association with "Tritium" in this section. This since most methods for gross beta eliminate tritium in the form of HTO as part of the sample prep. However, I understand that instrumentation for measurement of radionuclides in a vapor would have difficulty in resolving tritium from other beta emitters. So I take the implication to be that in essence the Respondent will be measuring gross beta and not just tritium in the needed instrumentation.

For the respondent's benefit I'm including references to the sources of instrumentation for measurement of radionuclides, especially tritium, in vapor:

- Overhoff Technology Corporation Portable Tritium Monitors
- Thermo Eberline FHT 63 D Tritium Noble Gas Monitor
- Technical Associates PTG-7 Tritium Monitor

Comment 7, Section IX.B.2.j (Sample Handling) & Comment 523
Requiring that the respondents use "sample containers supplied by the project analytical laboratory" does seem excessive. Given the likelihood the Respondent will use multiple contract analytical laboratories it would seem more appropriate for the Respondent to procure sample containers from a single vendor.

The use of temperature blanks should be dependent on the storage method appropriate to the samples being shipped.

Comment 8, Section IX.C (Chemical Analyses) & Comment R532
There are a number of accreditations that a contract analytical laboratory may obtain. Examples of laboratory accreditation programs are that several states have their own laboratory accreditation programs, the National Environmental Laboratory Accreditation

Conference (NELAC) [www.epa.gov/ttn/nelac], or that provided by the American Association for Laboratory Accreditation (A2LA) [www.a2la.com]. So the simple requirement to use "accredited contract laboratories" seems overlay vague without specific reference to one or more accreditation programs.

Comment 9, Section IX.C (Chemical Analyses) & Comment R528
Implicit in the response to this comment the Department seems to be leaving it to the Respondent and/or the contract analytical laboratories to choose the method of calculating detection limits as they seem fit. Unfortunately, the Department's response doesn't leave me assured that they understand the potential variability with which such detection limits may be calculated. I'm hopeful the Respondent will have this information reported in a uniform manner by the contract analytical laboratory.

Comment 10, Section IX.C (Chemical Analyses)
The most likely source of censored data is the contract analytical laboratory and not the Respondent. However, such data censoring is most typically addressed by prohibitions in the statement of work.

Comment 11, Section IX.C (Chemical Analyses) & Comment R527
While the Department doesn't seem to have any interest in reporting of the uncertainty associated with the radionuclide results I'm hopeful the Respondent will have this information reported in a uniform manner by the contract analytical laboratory.

Comment 12, Section IC.C (Chemical Analyses)
Correct "detedts" in second paragraph.

Comment 13, Section IX.C.1.b (Equipment Calibration Procedures and Frequency) & Comment R538
I would agree with the commenter (R538) that requiring "all instruments and equipment used by the laboratory shall be operated, calibrated, and maintained according to manufacturers' guidelines and recommendations" may create an undue burden on the contract analytical laboratory. In many cases these instruments and equipment may have many analytical applications beyond only environmental sample analysis. As a result the manufacturers' guidelines and recommendations may be written broadly and thus not necessarily just applicable to environmental sample analysis. Thus the contract analytical laboratory may well be justified in not adhering to every manufacturer's guideline and recommendation.

Comment 14, Section IX.C.1.c & Comment R539
I don't share the objection of the commenter (R539) on this requirement but feel their objection is likely due to the unclear language of the requirement. It is a well-established principle that all analytical results should be traceable to NIST. In practice this is accomplished through the use of NIST traceable standards. As a practical manner such traceable standards may also be procured from New Brunswick Laboratory, the International Atomic Energy Agency, and other national standards laboratories, e.g. Canada and the United Kingdom. In the United States a number of private vendors offer NIST traceable standards through their partnership with NIST to establish a trail of traceabilty.

I think it would have been much clearer if what I believe is the intended principle had been a separate section, e.g.:

> To insure fundamental comparability of all reported analytical results all standards used in the instrument calibration and quality control of utilized analytical methods shall be traceable to the National Institute of Standards and Technology (NIST). Certified Reference Materials from the DOE New Brunswick Laboratory, the International Atomic Energy Agency, and the national standards laboratories of Canada and the United Kingdom may also be used in the same manner as NIST standards. Laboratories should be cognizant of the NIST definition of traceabilty when obtaining NIST traceable standards from commercial vendors: The property of the result of a measurement or the value of a standard whereby it can be related to stated references, usually national or international standards, through an unbroken chain of comparisons all having stated uncertainties (ISO VIM 2nd ed., 1993, definition 6.10).

Comment 15, Section IX.C.1.d(1) & Comment R543
While I would agree with the Department that the indicated transmittal letter is customarily included by the contract analytical laboratory there may be great variability of the content of such letters. I've seen cases where the contract analytical laboratory merely directed attention to quality control results that were included in the associated data package. I'm more concerned with the Department's response to R543 which suggests that the transmittal letter should include an "*interpretation of the QA/QC procedures*". While such a letter should communicate any quality failures in the associate results the interpretation of such should be left to the data user.

Comment 16, Section IC.C.1.d(4) (Laboratory Deliverables)
The item "Surrogate recovery results and corresponding control limit for samples and method blanks (organic analyses only)" would seem more appropriate as a bullet in item 18 of this same section.

Comment 17, Section IX.C.1.d.(7) (Laboratory Deliverables)
The item "*radiogenic NIST traceable source standard calibration references*" would seem to more appropriately appear as a bullet in item 20 of this same section.

Comment 18, Section IX.C.1.d(19) (Laboratory Deliverables)
The content of the last bullet, "Recovery assessments …", has an un-matched parenthesis.

Comment 19, Section IX.C.3.b (Field Duplicates) & Comment R550 and R551
"A precision of no more than 20 percent for [field] *duplicates shall be considered acceptable for soil, rock, and sediment sampling conducted at the Facility."*
I'm concerned that there is the presumption in this requirement that if the specified precision is not met that the field sampling and/or contract analytical laboratory has failed in some manner. For some media/analytes it is not unexpected to encounter a non-homogenous distribution and therefore quite easily fail a 20 percent RPD (relative percent difference) requirement. Such instances can be reduced but not always eliminated by thorough homogenization of the field sample. Unfortunately the CAO doesn't clearly address the allowability of sample homogenization in the field or by the contract analytical laboratory. When a duplicate RPD requirement is failed it is customary for the contract analytical laboratory to re-run the duplicate analysis and provide both sets of data to the client. The client/data user can then attempt to make a decision on data usability as part of the validation process.

In addition RPD requirements are not always appropriate in the analysis or radionuclide results. At low levels the inherent uncertainty of the reported field duplicate results may make it quite unlikely for field duplicate results to agree within a 20 percent RPD criterion. For such cases it is more customary to look at the statistical overlap of the two results and their associated uncertainties, e.g. do they agree within 2-sigma. Such a test is referred to by some contract analytical laboratories as a "duplicate error ratio". I would note that duplicate uncertainty ratio" being a much more appropriate description of this test.

Comment 20, Section IX.C.3.e (Method Reporting Limits) & Comment R553
In responding to questions on this topic the Department emphasizes the second part of the requirement "*and shall not exceed soil, groundwater, surface water, or vapor emissions background levels, cleanup standards, and screening levels*". My concern is more with the first part, "*method reporting limits for sample analyses for each medium shall be established at the lowest level practicable for the method and analyte concentrations*", and how low is low enough. For some radiochemical methods the method with slight modification may be capable of a much lower method reporting limit than is customary for environmental analysis. As an example the same radiochemical method for strontium-90 in water that is typically used for a 1-liter water sample may also be able to accommodate a 100-liter water sample with slight modification. The method reporting

limit for a 100-liter sample being obviously lower. Alternatively the contract analytical laboratory may typically count a sample for 60-minutes but a 600-minute count can be reasonably done and would allow for a lower method reporting limit. Is such an effort envisioned by the phrase "*the lowest level practicable for the method and analyte concentrations*"? In still other cases there may be more advanced analytical methods that allow much lower method reporting limits well below health effect considerations and at dramatically higher costs. So the basic question is how low is low enough?