SEC Petition Evaluation Report
Petition SEC-00051

Report Rev # Addendum-2 Report Submittal Date 6-04-2007

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Petition Administrative Summary

Petition Under Evaluation

Petition #	Petition Type	Petition B Qualification Date	DOE/AWE Facility Name
SEC-00051	83.13	August 7, 2006	Los Alamos National Laboratory (LANL)

Petitioner Class Definition

All workers of LANL working in all Tech Areas from 1943 - 1975.

Proposed Class Definition

All employees of the Department of Energy (DOE), its predecessor agencies, DOE contractors, and subcontractors, who were monitored, or should have been monitored, for radiological exposures while working in operational Technical Areas with a history of radioactive material use at the Los Alamos National Laboratory for an aggregate of at least 250 work days during the period from March 15, 1943 through December 31, 1975, or in combination with work days within the parameters established for one or more other classes of employees in the SEC.

Related Petition Summary Information

SEC Petition Tracking #(s)	Petition Type	DOE/AWE Facility Name	Petition Status
None			

Related Evaluation Report Information

Report Title	DOE/AWE Facility Name
SEC Petition Evaluation Report, SEC-00061	LANL

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Peer Review Completed By:	[Signature on file] *Gregory V. Macievic*	6/5/2007 *Date*
SEC Petition Evaluation Reviewed By:	[Signature on file] *Jim Neton*	6/5/2007 *Date*
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Addendum to Los Alamos National Laboratory (SEC-00051) Special Exposure Cohort Evaluation Report

Prior to the May 3, 2007, Advisory Board on Radiation and Worker Health meeting and NIOSH's presentation of the evaluation report for SEC-00051, NIOSH issued an addendum (SEC-00051 Addendum-1) to the evaluation report which modified the class definition to read as follows:

All employees of the Department of Energy (DOE), its predecessor agencies, DOE contractors, and subcontractors, who were monitored, or should have been monitored, for radiological exposures while working in operational Technical Areas with a history of radioactive material use at the Los Alamos National Laboratory for an aggregate of at least 250 work days during the period from March 15, 1943 through December 31, 1975, or in combination with work days within the parameters established for one or more other classes of employees in the SEC.

After NIOSH's presentation and a brief presentation by the petitioners, the President of the guards' union at LANL, presented the union's justification for concluding that additional technical areas, for which NIOSH had previously determined did not involve the use of radioactive material during the class period, actually may have used or involved use of radioactive material. He also stated that Technical Area designations changed over time, which further complicates the determination of which Technical Areas used radioactive material. He provided NIOSH a copy of his presentation and supporting documents for its review.

NIOSH has reviewed the documentation provided by the President of the LANL Guards Union and concluded that the documentation supports a conclusion that operational technical areas TA-1-Z and TA-19 should be added to the table of Operational Technical Areas that potentially used radioactive material. NIOSH concluded TA-1-Z should be included because a number of documents (see Attachment 1) provided contain maps of the early arrangement of TA-1 and they show that TA-1-Z was in the center of the TA-1, and thus in close proximity to some of the other buildings, where radioactivity was present. In addition, documents show that the accelerator housed in TA-1-Z was a source of exposure to fission products. NIOSH determined TA-19 should be added because a document (see Attachment 1) indicates that radioactive sources material was stored at the East Gate Lab, including a 300 Ci source of ^{60}Co. Activities conducted at this location included spontaneous fission experiments and experimental irradiation of monkeys.

The revised table, Table Addendum-2, follows:

Table Addendum-2

List of TAs NIOSH has Concluded Used Radioactive Material During the Covered Period

TA-0
TA-1 (Inclusive of all TA-1 locations listed in Table 5-1: LANL Technical Areas, Operational Dates, and Radionuclides)
TA-2 (Inclusive of all TA-2 locations listed in Table 5-1: LANL Technical Areas, Operational Dates, and Radionuclides)
TA-3 (Inclusive of all TA-3 locations listed in Table 5-1: LANL Technical Areas, Operational Dates, and Radionuclides)
TA-4

TA-5
TA-6
TA-7
TA-8
TA-9
TA-10-CMR-10
TA-11
TA-12
TA-13
TA-14
TA-15
TA-16
TA-18
TA-19
TA-20
TA-21 (Inclusive of all TA-21 locations listed in Table 5-1: LANL Technical Areas, Operational Dates, and Radionuclides)
TA-22
TA-23
TA-24
TA-25
TA-26
TA-27
TA-29
TA-30
TA-31
TA-32
TA-35 (Inclusive of all TA-35 locations listed in Table 5-1: LANL Technical Areas, Operational Dates, and Radionuclides)
TA-36
TA-37
TA-39
TA-40
TA-41 (Inclusive of all TA-41 locations listed in Table 5-1: LANL Technical Areas, Operational Dates, and Radionuclides)
TA-42
TA-43
TA-45
TA-46 (Inclusive of all TA-46 locations listed in Table 5-1: LANL Technical Areas, Operational Dates, and Radionuclides)
TA-48 (Inclusive of all TA-48 locations listed in Table 5-1: LANL Technical Areas, Operational Dates, and Radionuclides)
TA-49
TA-50
TA-51
TA-52
TA-53
TA-55

TA-56
TA-58
TA-59
TA-60
TA-61
TA-62
TA-63
TA-66
TA-67
TA-68
TA-71
TA-72
TA-73

In addition, it is important to note that (as indicated by the President of the LANL Guards Union) technical area designations changed over time; the table above is based on the information available to NIOSH at the time of this report's publication. NIOSH will update this list and notify DOL of any changes to the list as new information becomes available which would warrant additions to the list.

The addition of the technical areas to the table above does not affect the current class definition. This addendum will be provided to DOL to assist it in implementing the current class definition.

ATTACHMENT 1
Content of the Data CD Provided by the President of the LANL Guards Union

The data compact disc contains six folders with altogether 38 files, which cover a broad spectrum of LANL documents. This is a summary of the information provided and NIOSH's view (if appropriate) of the relevance to the SEC class addressed by this Evaluation Report.

1) PowerPoint presentation: LANL and surrounding areas

One slide contains a map of the TA-1 area, which was the main area, and it shows that TA-1-Z is connected to areas T and U and is overall located in the center of the TA-1 area between all other buildings in TA-1.

2) Folder: "Cross section reports and info"(9 pdf files)

00326019: History of accelerators at LANL, by Richard Richelt, 1993, 14 pages
- Shows that TA-1-Z is a shack in the middle of TA-1
- The Cockcroft Walton accelerator which was located in TA-1-Z was used to investigate the efficacy of tamper materials for the implosion-type bomb, which included gold and platinum as well as uranium.
- The Cockcroft Walton accelerator produced 2.5 MeV neutrons.

Conclusion: NIOSH has added TA-1-Z to the list of Technical Areas where radioactive material was used.

00419743: Cockcroft Walton accelerator neutron cross sections, by
- "The Z-building Cockcroft Walton accelerator was used to produce 2.55 and 14.1 MeV neutrons by means of the $D(D, n)^3He$ and $T(D,n)^4He$ reactions…

Cross sections of 14 MeV neutrons, by Meyer and Nyer, 1951
- Determined neutron cross-sections of various materials using the Cockcroft Walton accelerator, such as $^{63}Cu(n, 2n)^{62}Cu$, $^{65}Cu(n,\gamma)^{64}Cu$
- Other elements bombarded with 14 MeV neutrons were C, H, O, D, N, Cu

Fission cross sections of 238U accelerator LAMS, by Everhart et al., Sep. 1948
- 'neutrons from the $T(D,n)^4He$ reaction (tritons) were accelerated into a heavy ice target by means of the 125 keV Cockcroft Walton accelerator.'

LA-1279: Same as "Cross sections of 14 MeV neutrons"

LA-1480, by Arnold et al., Oct 1952:
- Reports on cross-section measurements

LA-1483, by Coon et al., Oct 1952:
- "for the experiments with the Cockcroft Walton accelerator, the number of neutrons was monitored by counting alpha particles from the T(D,n) reaction."

LA-1681, by Davis and Wahl, June 1954:

- Cross-section measurements

Nuclear Data: Diven et al., 1983
- Accelerators = sources of fast neutrons

3) Folder: Environment Contamination Reports (3 pdf files)

Discharge report, by Concerned Citizens for Nuclear Safety, Sep. 2006
- Contains a summary and history of environmental discharges from LANL into the local environment
- Page 28: mentions that perchlorate was detected in a well in Otowi-1, which is in area TA-74; however, perchlorate is not a radioactive contaminant.

Conclusion: NIOSH has determined that the information does not support adding TA-74 to the list of Technical Areas where radioactive material was used.

LA-6887, Radiological survey and decontamination of the former main technical area (TA-1) at LANL, by Ahlquist et al., 1977
- Describes rad survey and decon efforts between 1974-1976, after TA-1 had already been cleaned up and turned over to public use; now the site contains a hotel and gas stations, etc.
- Table 1: lists buildings at TA-1 that housed operations involving radioactive contamination potential. TA-1-Z is not included in the list
- According to this report TA-Z-1 was removed in 02/59

Conclusion: All of TA-1 is included in the list of Technical Areas where radioactive material was used.

LA-UR-92-810, REI work plan for operable unit 1071, environmental restorations program, May 1992, DOE cleanup program, by Aldrich et al.; 496 p.
- Discusses only post-RCRA situations (RCRA was enacted in 1976).
- Contains some information regarding TA-19, which is one of the SEC excluded sites. TA-19 contains the Solid Waste Management Unit (SWMU) aggregates and "areas of concern (AOC)." TA-19 is located east of the LANL airport and was initially constructed by Emilio Segre, "who needed an isolated spot for exacting experimental work on small sources". The lab on TA-19 had a drainline into the Pueblo canyon.
- TA-19 area was transferred to the ZIA company in 1962.
- Page 91: "Documented uses of TA-19 included spontaneous fission experiments and storage of radioactive source material"; the use of a 300 Ci ^{60}Co source was documented in 1961.
- Also irradiation experiments with La sources were conducted on monkeys.
- An area survey in 1974 found no contamination.
- TA-74: was a Buffer Zone, located in the northeast corner of the current (1992) lab site. According to this report, the area has no SWMUs, has not been used for lab operations, and remains strictly a buffer zone.
- TA-74 (parcels C and D) was contaminated from effluent from the liquid waste treatment in TA-45, which discharged liquids into Pueblo Canyon. Also operations at former TA-10 could have impacted TA-74.
- Detectable amounts of Pu were found in TA-74

- Report also contains information on TA-0, which however seems to be a term for a large variety of smaller facilities. I am not sure to what extent the described facilities coincide with TA-60
- This document has 496 pages; page 491 has a summary sheet, which is helpful

Conclusion: NIOSH has added TA-19 to the list of Technical Areas where radioactive material was used. NIOSH has determined that the information does not support adding TA-74 to the list of Technical Areas where radioactive material was used.

4) Folder: LHADRA (10 pdf files)

Appendix%20A%20sfs: Key operational area, Pu processing

- Shows a map of TA-1
- Contains general description of early Pu processing methods, mainly in the D building.
- No direct reference to any of the excluded areas, except to show that TA-1-Z was in the center of TA-1 and thus close to other operations in TA-1

Conclusion: All of TA-1 is included in the list of Technical Areas where radioactive material was used.

Appendix%20E%20sfs: Key operational areas – Beryllium, 18 p.

- Describes Be processing in center of TA-1 (V-shop). Be processing was moved to TA-3 in 1959.
- No direct reference to any of the excluded areas, no relevance to this SEC Evaluation.

Appendix%20M%20sfs: Summaries of public meetings held by the LAHDRA project team, 187 pg

- No direct relevance to this SEC Evaluation.

Chapter%202%20sfs: Overview of historical operations at LANL

- Lists all the TAs in table with descriptions of the processes used and types of radionuclides present. Matches the information in the table that is listed in the ER report regarding the presence of radioactive material; some is labeled as "unknown".

Chapter%203%20sfs: Methods used to gather information at Los Alamos, 50 pg.

- No relevant information for this SEC Evaluation.

Chapter%204%...: Prioritization for radionuclide releases, 50 pg.
Chapter%205%...: Prioritization of chemical releases, 18 pg.
Chapter%206%...: Development of residential areas of Los Alamos, 24 pg.
Front%20%and%20Chapter%...: 32 pages, contains the "front matter" of interim report
Other…: 80 pages, contains Appendices

- None of the above reports contain any information that would be relevant to deciding whether or not to include/exclude the listed TAs in an SEC class.

5) Folder: LANL Geography, Geology and History (6 pdf files)

00412557 LA-13379MS: Survey of Pu and U atom ratios and activity levels in Mortandad Canyon by Gallaher et al., 27 p

- Study on isotope ratios compared with "natural" levels.
- Interesting from environmental perspective, but not relevant to areas or period of SEC

Doe-LANL-apprvl_and_tables: 9 pages
- Approval letter to remove 7 SWMUs from the DOE-LANL-RCRA permit "with no further action" required. Contains a table that lists all TAs that contain SWMUs, including TA19, which contains three of them.

LAMS-2532: Los Alamos Project Vol. 1, by Hawkins, D., 87 pages
- Contains very detailed information on the operations at LANL, more from a practical operational perspective of the total infrastructure, not so much the technical aspects; part 1 is from 1943-Aug 1945.

LAMS-2532: Los Alamos Project Vol. 2, by Trustow and Smith, 249 pages
- Same as part one, but from August 1945 to Dec. 1946. Contains a section on the Cockcroft-Walton accelerator

- Both of the above reports are very interesting from a historical perspective, but do not contain any information relevant to this SEC ER.

LANL SWEIS Chapter 4: 160 pages, "affected environment", no author or title of overall report is given.
- Abstract is on page 3: chapter deals with the state of the environment at LANL since the last environmental impact statement in 1999. *i.e.*, the report covers the period from 1999 to 2004
- Describes area, geology, wildlife and much other environmental information.
- Contains a section on worker health (pg 104), but only exposures for 1999-2004.
- No relevant information to this SEC ER

LA-UR-05-6234: 120 pages, Aug 2005, Report to Mr. James Bearzi, "Aggregate areas list and maps of technical areas, SWMUs and areas of concern"
- No relevant information regarding this SEC Evaluation.

6) Folder: Plutonium uptake studies (2 pdf files)

27-year study: Hempelmann et al., "A 27-year study of selected Los Alamos Pu-workers", 39 pages, January 1973
- 25 male Pu workers (the UPPU club) have been followed medically for 27 years
- Interesting report, not really relevant for this SEC Evaluation, since the areas relevant for Pu processes are included in the class.

Plutonium History: 50 pages, 1995:
- Very interesting accounts from LANL Pu workers during different operational periods of LANL. All workers were involved in some sort of Pu exposure incident and all are in relatively good health.
- Not relevant to this SEC issue regarding inclusion and exclusion of TAs.

7) Folder: TA-10 – Bayo Canyon (7 pdf files)

Environmental Analyses of Bayo Canyon, Ferenbaugh et al., LA-9252-MS, May 1982

- Describes environmental survey of radioactive contamination of Bayo Canyon with regard to potential future land use.
- Contains many environmental data for that particular site, but is not really relevant for any excluded areas.

GAO Radioactive releases, Nuclear Health and Safety: Examples of Post WW II radiation releases at US Nuclear Sites, 24 pages, Nov 1993:
- About releases in general, not LANL specific, but contains some info regarding the RaLa tests.
- Not really relevant for this SEC Evaluation.

Radioactive La shots at Bayo Canyon, report by Advisory Committee on Human Radiation Experiments, DOE-031095-B-O, 75 pages, 1995 draft
- Info on Air Force measurements while flying over LANL during tests at Bayo Canyon.
- Page 49 mentions the old East Gate Lab ("Emilio Segre's old laboratory" - which is in TA-19); it may have received some fallout from shot # 114.

Conclusion: NIOSH has added TA-19 to the list of Technical Areas where radioactive material was used.

Radioactive Trees LANL Bayo Canyon: Reuters press release, 27 Nov 02, 2 pages
- News article about trees that could be potentially contaminated from tests
- Not relevant to SEC excluded areas.

Radiological Survey of Bayo Canyon, DOE/EV-0005/15, June 1979, Final report, 120 pages
- Environmental report on Bayo Canyon.
- Not relevant to SEC excluded areas.

RaLa Dose Assessments: Detailed general dose assessments for the experiments involving radioactive La at LANL 1944-1962, Jacobson et al., 12 pages, 08/22/95.
- Describes modeling of atmospheric dispersion of fallout from RaLa experiments.
- Not relevant to SEC excluded areas.

RaLa Program SNChapter, The RaLa/Bayo Canyon implosion experiments, J.C. Taschner, 9 pages.
- Not relevant to SEC excluded areas.