MEMORANDUM

TO: Los Alamos National Laboratory Work Group
FROM: Joe Fitzgerald, SC&A, Inc.
DATE: March 10, 2017
SUBJECT: Remaining Site Profile (TBD) Issues

At the meeting of the Advisory Board on Radiation and Worker Health (the Board) in Santa Fe, New Mexico, on November 29–30, 2016, SC&A, Inc. was tasked with ascertaining what site profile issues for Los Alamos National Laboratory (LANL) remained for work group consideration. To accomplish this task, SC&A reviewed the original SC&A site profile review, transcripts of the four LANL Work Group meetings, available Special Exposure Cohort (SEC) issues matrices, and documents on the National Institute for Occupational Safety and Health (NIOSH) public website and internal O drive.

The LANL Work Group addressed relevant SEC issues in 2010, at which time SC&A drew from its 2006 site profile review (SC&A 2006) to identify these issues. Of the 11 site profile issues identified by SC&A in 2006, only one issue was not addressed as or subsumed in an SEC issue for Work Group deliberation in 2010. This issue was in regard to how LANL dose records were addressed for workers on temporary assignment to the Nevada Test Site (NTS). This issue was subsequently raised during the May 2, 2011, Work Group meeting. At that time, NIOSH offered to clarify how personnel exposure at NTS for individuals from the three weapons laboratories were addressed in dose reconstruction (DR) (NIOSH 2011a). Because it is not evident that NIOSH provided this clarification, the issue is retained in the attached LANL site profile issues matrix as "SP-1" for further Work Group disposition.

During its SEC evaluation review, the Work Group tasked SC&A with reviewing the recently revised technical basis document (TBD) for occupational environmental dose, ORAUT-TKBS-0010-4, *Los Alamos National Laboratory – Occupational Environmental Dose*, Revision 01, dated March 26, 2010 (NIOSH 2010). SC&A provided its comments on the revised TBD in a February 2, 2011, memorandum (SC&A 2011) to the Work Group. SC&A had several findings and suggested to the Work Group that clarification be sought from NIOSH about revisions to the new TBD regarding treatment of internal and external dose reconstruction. The Work Group agreed, as did NIOSH, during ensuing discussions at the May 2, 2011, Work Group meeting (NIOSH 2011a). It was determined that these questions and clarifications should be addressed with the TBD drafting team for possible inclusion in a future revision. The status of this action is not clear; therefore, it is listed as "SP-2" in the attachment for further Work Group disposition.

From a review of Work Group transcripts, the focus of the Work Group has been on resolving SEC critical issues, culminating in the September 11, 2012, Work Group meeting in which NIOSH discussed its conclusion that it could not reconstruct dose from internal emitters, particularly "exotics," with

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sufficient accuracy for the SEC petition period of 1976–1995. The Work Group subsequently reviewed and agreed with this assessment, and the full Board recommended an SEC class for:

> *All employees of the Department of Energy, its predecessor agencies, and their contractors and subcontractors who worked at the Los Alamos National Laboratory (LANL) in Los Alamos, New Mexico, from January 1, 1976, through December 31, 1995, for a number of work days aggregating at least 250 work days, occurring either solely under this employment, or in combination with work days within the parameters established for one or more other classes of employees included in the Special Exposure Cohort.*

The LANL Work Group subsequently tasked SC&A with revising the standing SEC issues matrix to reflect outstanding issues and deliverables as of the final meeting (a conference call) on September 11, 2012. This December 2012 version (SC&A 2012a) outlined the following outstanding issues and deliverables (a summary follows).

SEC (post-1995)

1. **LANL Capability to Monitor and Measure Mixed Fission and Activation Products**

   Follow-up actions (e.g., modeling beryllium-7 and cesium-137 in vivo data) would be necessary if routine bioassay data were not available per the conclusions of the August 13, 2012, petition evaluation report (NIOSH 2012a)—that is, for the post-1995 period—and the originally proposed DR methods were to be pursued.

2. **NIOSH's Assumption Regarding Intake Values for Exotic Radionuclides at LANL**

   Follow-up actions—i.e., specifying an approach for using surrogate uranium and plutonium data—would be necessary if routine bioassay data were not available as indicated in the August 13, 2012, evaluation report (NIOSH 2012a) for the post-1995 period and, therefore, the originally proposed DR methods (surrogate use of uranium and plutonium data) were to be pursued. *Note: During the subsequent September 11, 2012, Work Group meeting, NIOSH indicated that this approach had proved infeasible.*

3. **Completeness and Reliability of LANL In-Vitro and In-Vivo Data, and Adequacy of NIOSH Coworker Model (ORAUT-OTIB-0062 and ORAU-OTIB-0063)**

   Further action is dependent on the disposition of 2012 matrix Items 1 and 2, above.

4. **Feasibility of Dose Estimation for Neutron Exposure at LANL, Post-1975**

   NIOSH will apply the 95th percentile of neutron/photon ratio distribution. No further action is necessary.

5. **Feasibility of Dose Estimation for Radiological Exposure Sources at Los Alamos Meson Physics Facility (LAMPF)/Los Alamos Neutron Science Center (LANSCE) (Exposure to Workers Adjacent to the Facility)**

SEC-00109, Revision 1, renders this issue moot, given that the SEC period has been extended through 1995, thereby encompassing the exposure period of concern.

NIOSH will develop an estimate of the tritium exposure to nearby workers from the LAMPF/LANSCE evaporation pond. No further action is necessary. (It is not clear whether NIOSH has provided this estimation; therefore, it is included in the attachment as "SP-3" for further disposition).

6. Radiation Exposure to Special Tritium Compounds

Follow-up actions (i.e., follow-up on characterizing the source terms, the potential for exposure, and who would get assigned dose via ORAUT-OTIB-0066) would be necessary if routine bioassay data were not available for the post-1995 period, as indicated by the August 13, 2012, evaluation report (NIOSH 2012a), and the originally proposed DR methods were to be applied.

7. Unmonitored Exposure of Support Service Personnel

NIOSH is to provide additional follow-up on the basis of the bioassay program for security guards and other support workers.

8. Petitioner Issues or Issues Raised during Work Group Meetings

Firing Site: NIOSH will demonstrate that the coworker model will bound potential exposures from resuspension of uranium contamination at the firing sites and other "release sites."

Cerro Grande Fire: In its May 30, 2012, review (SC&A 2012b) of NIOSH's white paper on the Cerro Grande fire (NIOSH 2011b), SC&A indicated that it "*agrees that* [whether using averaging or maximum values for reported air sampling concentrations], *the resulting dose estimates will be low; however, whether or not the dose is 'below the level regarded as significant'* [nominally, taken as 1 mrem per year, in past reviews] *as indicated on page 3 of the revised white paper is questionable. Can NIOSH clarify what level is regarded as 'significant,' and by whom on what basis?*" No NIOSH response to these clarifying questions is apparent.

Other Petitioner Issues: NIOSH should check various petitioner submissions to assure a response has been provided to all other issues.

As evident in this summary, the preceding SEC matrix issues encompass those that are of SEC significance post-1995 and those that the Work Group may ultimately judge to be of site profile significance upon further review and NIOSH response. Other than the one Work Group action on the LAMPF/LANSCE pond, SC&A has not attempted to discern whether the above SEC issues have been sufficiently resolved to be recommended as site profile issues. It would be appropriate for NIOSH to make such specific recommendations to the Work Group for the above action items in the context of its ongoing review of its post-1995 SEC evaluation position.

References

NIOSH 2004. *Los Alamos National Laboratory – Occupational Environmental Dose*, ORAUT-TKBS-0010-4, Revision 00, National Institute for Occupational Safety and Health, Cincinnati, Ohio. October 8, 2004.

NIOSH 2007. *Calculation of Dose from Intakes of Special Tritium Compounds*, ORAUT-OTIB-0066, Revision 00, National Institute for Occupational Safety and Health, Cincinnati, Ohio. April 26, 2007.

NIOSH 2009a. *Internal Dosimetry Coworker Data for Los Alamos National Laboratory*, ORAUT-OTIB-0062, Revision 00, National Institute for Occupational Safety and Health, Cincinnati, Ohio. October 15, 2009.

NIOSH 2009b. *Los Alamos National Laboratory Bioassay Repository Database*, ORAUT-OTIB-0063, Revision 00, National Institute for Occupational Safety and Health, Cincinnati, Ohio. August 24, 2009.

NIOSH 2010. *Los Alamos National Laboratory – Occupational Environmental Dose*, ORAUT-TKBS-0010-4, Revision 01, National Institute for Occupational Safety and Health, Cincinnati, Ohio. March 26, 2010.

NIOSH 2011a. Transcript of May 2, 2011, meeting of Los Alamos National Laboratory Work Group, Advisory Board on Radiation and Worker Health, pages. 324–325.

NIOSH 2011b. *Revision to Cerro Grande White Paper*, Revision 1, National Institute for Occupational Safety and Health, Cincinnati, Ohio. April 4, 2011.

NIOSH 2012a. *SEC Petition Evaluation Report – Petition SEC-00106*, Revision 1, National Institute for Occupational Safety and Health, Cincinnati, Ohio. August 13, 2012.

NIOSH 2012b. *Discussion Points for the ABRWH's Work Group on LANL*, Revision 0, National Institute for Occupational Safety and Health, Cincinnati, Ohio. April 6, 2012.

SC&A 2006. *Los Alamos National Laboratory Site Profile Review*, Sanford Cohen and Associates, Inc., Vienna, Virginia. August 28, 2006. [SRDB Ref. ID 46217]

SC&A 2011. Memorandum from Joe Fitzgerald, SC&A, to Los Alamos National Laboratory Work Group, "LANL Work Group – SC&A Action Items." February 2, 2011.

SC&A 2012a. *Draft LANL SEC Issues Matrix*, SC&A, Inc., Vienna, Virginia. December 2012.

SC&A 2012b. Memorandum from Joe Fitzgerald, SC&A, Inc., to Greg Macievic, NIOSH, and Los Alamos National Laboratory Work Group, "Comments Regarding Cerro Grande White Paper (Revision 01, April 4, 2011)." May 30, 2012.

LANL Site Profile Issues Matrix – Remaining Actions (as of March 2017)

Issue #	ISSUE	DESCRIPTION	SOURCE
SP-1	Dose estimation not addressed for LANL personnel assigned to weapons testing	NIOSH offer to clarify how weapons laboratory personnel exposure while at NTS addressed. [Was this provided? No record found.]	NIOSH commitment: SC&A-TR-TASK1-0011, Issue 4; Work Group meeting, 5/2/11, transcripts, pp. 324–327.
SP-2	Occupational environmental exposures	SC&A memo (2/2/11) to the Work Group raises questions and asks for clarification on the 2010 Occupational Environmental Dose TBD revision: 1) Changed basis for selecting radionuclides of significance for DR from 1 mrem CEDE to any organ or 10 mrem CEDE whole body to those radionuclides contributing at least 95% of worker's 50-year CEDE during each year 2) Whether revision reflects full consideration of LAMPF/LANSCE emission of MAPs 3) Adequacy of stack monitoring and completeness of emission records (given reported NESHAPS noncompliance) 4) Whether a "more comprehensive consideration of resuspension" had been addressed as cited in 2004 TBD, but apparently dropped in 2010 TBD revision 5) Potential exposure contribution of Cerro Grande fire lacking	SC&A memo to WG, Feb 2, 2011; Work Group meeting, 5/2/11, transcripts, pp. 278–315.
SP-3	Estimate of tritium exposure from LAMPF/LANSCE pond	"NIOSH will develop an estimate of the tritium exposure from this pond." "A model can be constructed from these data to bound dose from the east and west over-flow lagoons." [Was this provided? No record found.]	WG action: SEC-00109 Issues Matrix (Dec 2012), Issue 5; *Discussion Points for the ABRWH'S Work Group on LANL*, Rev. 0, (NIOSH 2012b, last updated by ORAUT April 6, 2012)