

NIOSH Comments on the *Review and Critique of the Site Profile Document for the Los Alamos National Laboratory* by Ken Silver, D.Sc., S.M.

INTRODUCTION

As an expert on historical radiological records at the Los Alamos National Laboratory (LANL), the National Institute for Occupational Safety and Health's (NIOSH) Office of Compensation Analysis and Support (OCAS) provided funding to Dr. Ken Silver to independently review its site profile of the Los Alamos facility. The site profile, which was developed by NIOSH in conjunction with Oak Ridge Associated Universities (ORAU), was prepared to provide technical guidance to health physicists involved in the reconstruction of radiation doses for claimants under the Energy Employees Occupational Illness Compensation Program Act (EEOICPA). Dr. Silver's review report, issued on September 19, 2005, outlined four key issues that he believed are relevant to the information presented in the site profile. These are:

1. *Completeness and fidelity of the site profile's retrieval and use of information in the public domain;*
2. *LANL's furnishing of access to information not yet in the public domain;*
3. *Ability of worker and community organizations to independently evaluate how cited sources of information have been analyzed and interpreted in the site profile document; and,*
4. *Verification and assurance for individual claimants that no pertinent sources of information have been overlooked in performing dose reconstructions, as a matter of fairness.*

The review provided by Dr. Silver focused on the content of the site profile in light of the first three issues identified above. In Dr. Silver's opinion, a review of the site profile against the fourth criteria required access to the administrative record for rejected claims which was not available to him at the time of publication of the report. The fourth issue was, therefore, not evaluated in his report.

General Comment

NIOSH appreciates the thorough review and critique provided by Dr. Silver. It is clear that his specialized knowledge of historical records at Los Alamos uniquely enables him to evaluate the inclusiveness and availability of the information contained in the site profile. While we agree with some of the issues raised in the review report, it was clear that some observations which are identified as significant failures to include certain data sets might be the result of a misunderstanding of the dose reconstruction process and how the site profiles are applied to individual cases. As an example, the report cites the failure to include the voluminous occurrence reports in the site profile as evidence that NIOSH dose reconstructions might not be *truly claimant friendly*.

NIOSH's approach to dose reconstruction has always been to provide the claimant with an estimate of dose that will allow the Department of Labor to arrive at the correct compensation decision (i.e., the probability of causation is on the correct side of 50%). To accomplish this, individual monitoring data has been given the highest emphasis. When reconstructing doses, for even infrequently monitored workers, the dose reconstruction will often rely on missed dose. That is, given the individual monitoring data, what is the maximum plausible dose that could have been received by the worker without being detected by the monitoring program. The use of this technique, coupled with the assumption of chronic exposure conditions where applicable, is inclusive of any exposure that might have been received as a result of an incident. For unmonitored workers, who were in exposure conditions where they should have been monitored, NIOSH applies a co-worker model that assumes these workers were exposed to the upper end of the distribution of results collected from the monitored population.

Specific Comments

The following discussion provides NIOSH's specific comments on issues raised in the report. The comments and responses are ordered to be consistent with the sequence of comments for the three key areas evaluated in the report. The comment or issue presented in the review document is provided, along with the page number it appears. The NIOSH OCAS discussion/response follows the comment and is followed by discussion of any significant impact that this might have on dose reconstruction. Where applicable, we have also included planned actions. The implementation of these actions will be coordinated with the review of the Los Alamos site profile currently underway by the Advisory Board.

Section 1 - Completeness and fidelity of the site profiler's retrieval and use of information already in the public domain.

In this section, a number of issues are raised that relate to NIOSH's failure to include information already made public by: 1) the Los Alamos Historical Documents Retrieval and Assessment (LAHADRA) project; 2) the 1991 Tiger Team report; and, 3) other information already in the public domain.

Health Division Reports

As excerpted below, there are several statements in the review report that are critical of the completeness of the Health Division reports contained in the site profile. The review points out that much more data than was reported in the site profile are in the LAHADRA collection and additional documents, that have also been made available to the public, are not represented.

Page 12: *The date of October 1960 as the "most recent" H-Division Progress Report is highly erroneous.*

Page 14: *Ambiguity exists as to whether H-Division Monthly Progress Reports were issued after 1964.*

Page 15: *The failure of the site profile document to consider the "H-1 Monthly Progress Report" in the late 1960's and early 1970's series is a serious omission.*

NIOSH strives to utilize all available, relevant resources to complete dose reconstructions. At many sites, but not all, site profiles assist in the dose reconstruction process by providing dose reconstructors with a concise set of information to evaluate claims under the Energy Employees Occupational Illness Compensation Program Act (EEOICPA). Authors of the LANL site profile include members of the LAHDRA project, a program funded by the Centers for Disease Control and Prevention (CDC) to evaluate releases of materials that had the potential to cause off-site health hazards. This helps to insure that a broad scope of documents have been evaluated in the development of the site profile. It should be pointed out that not every document that was reviewed in the preparation on the site profile was cited, unless it was determined to be relevant to the accurate reconstruction of doses for workers at Los Alamos.

Since the original site profile was prepared, the LAHDRA and ORAU teams have located many more Health Division reports. The available reports now cover the years through 1981. Many of these documents have been reviewed by LANL site profile authors for information useful to dose reconstruction. This review, which was completed in May of 2006, included all of the Health Division reports noted to be missing in the site profile. Those listed as missing became available to the LAHDRA project and NIOSH after the completion of the site profile document. A table that lists the Health Division documents available to NIOSH from the LAHDRA collection as of July 17, 2006 is provided in Attachment A.

In light of this new information, chapter 2 of the Los Alamos site profile will be revised to accurately reflect the current inventory of Health Division reports that are available to NIOSH. As additional reviews of Health Division reports are completed, revisions will be made to the site profile to ensure that any new information is adequately represented. A revision to Chapter 2 will be submitted by the site profile team to NIOSH by September 30, 2006.

The following table provides a list of currently available Health Division reports that have already been reviewed by the site profile team:

- 1947: May, July, August, September, October, November, and December
- 1948: January, February, March, April, May, June, July, August, September, October, November, and December
- 1949: January, February, March, April, May, June, July August, October, November, and December
- 1950: January, February, March, April, May, June, July, August, September, and October
- 1951: January, February, March, April, May
- 1952: January, February, March, April, May, June, July, August, September, October, November, and December
- 1953: January, February, March, April, May, June, July, August, September, October, November, and December
- 1954: January, February, March, April, May, June, July, August, September, October, November, and December
- 1955: January, February, March, April, May, June, July, August, September, October,

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- November, and December
- 1956: January, February, March, April, May, June, August, September, October, November, and December
- 1957: January, February, April, May, June, July, August, September, October, November, and December
- 1958: January, February, March, April, May, June, July, August, September, October, November, and December
- 1959: January, February, March, April, May, June, July, August, September, October, November, and December
- 1960: January, February, March, April, May, July, August, September, October, November, and December
- 1961: January, February, March, April, May, June, July, August, September, October, November, and December
- 1962: January, February, March, April, May, June, July, August, September, November, and December
- 1963: January, February, March, April, May, June, July, August, September, October, November, and December
- 1964: February, April, June, July, August
- 1965-1980s: Additional reports from this period have been or are currently being reviewed by the site profile team or are awaiting release from LANL record centers. These collections also include monthly, quarterly, and annual Health Physics reports for this and other specific time periods as the title and content of Health Division type reports changed over time.

DOE Tiger Team report from 1991

The 1991 report of the DOE Tiger Team assessment of LANL operations is cited as another example of information that was not considered in the site profile. The following excerpts from the review report are critical of the site profiles reliance on laboratory procedures and practices, rather than on available independent program reviews.

Page 16: *1990 Tiger Team Report Not Considered.....LANL technical reports and standard operating procedures describe how radiation doses “ought” to be measured.”..... “By willfully ignoring the Tiger Team report, the site profile document has, quite dangerously, repackaged the “ought” of LANL technical reports into a purported profile of what “is” (or was).*

Page 24: *Standard Operating Procedures. The Site Profile’s reliance upon the Lab’s Standard Operating Procedures is an obvious blurring between “is” and ought”. Written SOPs are a technical community’s formal expression of how tasks “ought” to be performed...*

Standard operating procedures (SOPs) and technical reports are among the key documents used to prepare a site profile; however, many other documents and items of correspondence were reviewed in preparation of the site profile which do not fit the description of SOPs or technical reports. For example, much of the content of the LANL Photodosimetry Evaluation Book contains very basic documentation of how external dosimetry was actually practiced, “warts and all,” including a description of instances when practices deviated from standard procedures and steps that were taken to correct those practices and/or adjust measured doses accordingly. Many other LANL references used for the site profile report shortcomings of LANL’s radiation protection program. The site profile does not rely predominantly or exclusively on LANL’s “SOPs” and in fact uses raw or basic information wherever possible.

The LANL site profile team reviewed the Tiger Team document for information that was potentially relevant to the dose reconstruction process. Many of the issues raised, such as angular dependence of LANL dosimeters or inadequate management of the dosimetry program, are either currently addressed in the site profile or are already accounted for by the dose reconstructors. These types of issues are often documented by NIOSH in technical information bulletins. Reports on biases in energy response characteristics and measurement uncertainties for LANL dosimeters are additional examples of LANL information cited in the site profile.

Many of the technical shortcomings regarding internal and external dosimetry are known to exist, not only at LANL, but in the radiation protection community at large. The Tiger Team report does not address the programmatic elements in earlier years when the potential for intakes were likely more significant. As stated previously, many of these issues have already been addressed in the site profile document or have been addressed in Technical Information Bulletins (TIBs) or other project documentation. The combined information from the site profile, technical information bulletins, the computer assisted telephone interview (CATI), the claimant’s exposure records are all part of the dose reconstruction process. This multi-source approach ensures that technical issues and shortcomings, such as those raised in the Tiger Team report are addressed in the completed reconstruction.

To be certain that all technical issues have been adequately addressed, the Tiger Team report was re-examined for content that may be applicable to the site profile. While the Tiger Team report provides much information related to radiation exposures, the limitations of monitoring data, and the inadequacy of LANL safety procedures, nothing has been found in the report that would alter the manner in which dose reconstructions are being performed for claimants from Los Alamos.

Specific Examples of Tiger Team Technical Issues

The site profile review provides a number of additional examples of specific technical issues in the Tiger Team report that, in the author’s opinion, might lead to *idealized presentation of several technical issues*. NIOSH’s evaluation of these issues is provided below.

Continuous Air Monitor Alarms

Page 18: *Radiation Dosimetry CAM Alarms. Chapter 4¹ (“Internal Occupational Dose”) includes a discussion of continuous air monitors (CAM) alarms. Citing a report by LANL scientists, the site profile considers the suboptimal locations of CAM alarms: “when a worker causes a release and is at or near the release point, the worker could be exposed to intakes that did not trigger the alarms... However, the site profile does not consider numerous other mechanisms cited by the Tiger Team which cast serious doubt about the efficacy of the CAM alarms protecting LANL workers.*

In addition to the text cited above, additional explanatory information is provided in the Internal Occupational Dose chapter of the site profile. In this chapter, the text continues as follows:

However, after 1970 when bioassay programs were well-established, the majority of workers with the potential for monitored and unmonitored intakes are expected to have participated in a bioassay program.

While CAMs serve a purpose in providing information about general workplace conditions, they are not typically useful in a retrospective dose reconstruction because they may or may not be representative of a given individual’s exposure. Results of these measurements are more likely to be used when there is no other information available on which to base an assessment. For purposes of dose reconstructions under EEOICPA, however, a coworker approach would be utilized as the preferred option.

Regarding comments on the efficacy of the alarms and other workplace mechanisms for protecting the workers, intakes that resulted due to a failure in these systems would be detected through the bioassay program. The default assumption when reconstructing the internal dose for radiation workers is that they were chronically exposed to airborne radioactivity; even individuals with no radioactive material detected in their samples would be assigned a missed dose. The missed dose is based on the intake that could have gone undetected by the bioassay. The internal dose chapter also points out that the potential existed at LANL for missed or unmonitored intakes/dose which directs the dose reconstructors (primary users of the site profile) to consider the use of NIOSH Technical Information Bulletins (TIB), coworker dose or worst-case exposures recorded at LANL. A coworker dose study is currently in process for LANL that is based on all available bioassay results from the site. This data set will be used to assign intakes to unmonitored individuals. Use of these alternative approaches to reconstruct doses in the absence of reliable individual monitoring data can be shown to result in conservative estimates of exposure.

¹ The review document identifies the internal dose section of the site profile as Chapter 4. The internal dose section is actually in TBKS-0010-5, which is the 5th section or chapter of the profile.

Worker participation in a bioassay program

Page 21: *DOE orders required contractors to identify workers for participation in a bioassay program. An Employee Health Physics Checklist (Form HS 2-1A) was to be completed for each employee potentially exposed to radioactive materials.....Instead the Tiger Team found a “low priority” was given to the requirement that radiation protection technicians review operations.*

Chapter 5 of the site profile points out that the potential existed at LANL for missed or unmonitored intakes/dose which directs the dose reconstructors to consider the use of technical information bulletins, coworker dose or worst-case exposures recorded at LANL. This issue is largely being addressed by the dose reconstructors and is not exclusively by design addressed by the site profile.

Other Tiger Team findings

As previously discussed, issues presented in the Tiger Team report related to external dosimetry are addressed either in the site profile, technical information bulletins, or other procedures. Content related to other issues presented in this section of the Tiger Team report, such as tracking of radiation sources and x-ray units, protection for accelerator workers, training and management of radiation protection technicians, and lack of calibrations of fixed and portable instruments, lacks sufficient specificity to be of use to the site profile authors.

Site profile authors revisited the LANL Tiger Team Report and will include it as a reference in the revision to Chapter 2. No additional information from the Tiger Team, however, will be included in the revised site profile documents at this time.

Worker recollections

The site profile authors have worked extensively with William Moss and James Lawrence (both former LANL workers). Bill Moss (employed between the 1950s – 1990s) was a radiochemist responsible for the urine bioassay analytical program and James Lawrence was the health physicist responsible for dosimetry and other programs (1950s – 1990s). Moss and Lawrence have had a significant positive impact on the site profile and both have helped to resolve questions regarding bioassay and external dosimetry. Site profile research team members will continue to work with Moss and Lawrence and other retired and active LANL workers as appropriate

Worker outreach efforts, although off to a slow start, has significantly improved. NIOSH is committed to meeting with the line workers at the site and making sure that each and every comment brought forth at these meetings is addressed

Other Important Publicly Available Documents

Nyhan report

The Nyhan report citation has been noted and will be reviewed for applicability to the site profile. Chapter 4 of the site profile addresses all available monitoring data including data collected at TA-21.

History Associates report

The LAHDRA project reviewed this report and found the majority of the information already in the LAHDRA database or available through NIOSH. The impact of this report to dose reconstruction is not considered significant at this time.

Site profile researchers revisited this work to ensure that all relevant information has been captured for use in the EEOICPA project. No additional useful information for the site profile was identified.

Human Radiation Experiments

Human radiation experiments conducted as workers at Los Alamos, even if voluntary, is considered covered employment under EEIOCPA. The information concerning participation in these human studies is available and will be researched at the Human Subject Project Team (HSPT) archives. OCAS will research the information to assist with dose reconstruction for those involved. The site profile will be updated as necessary.

Review of Apparent Inconsistencies between Sections of the Site Profile

The site profile will be reviewed for inconsistencies among various sections and the will be revised as necessary.

Section 2 - Incident and Occurrence Reports not Found in the Public Domain

The major issue raised in section 2 is summarized in the excerpt provided below.

Page 31: *A principal shortcoming of the site profile document is the incomplete listing of incidents, accidents, and occurrences involving worker contamination.*

The purpose of the site profile is not to report every incident or accident (collectively referred to as occurrences) that ever occurred at LANL but rather to serve as a guide to dose reconstructors for uniformly assessing LANL claims. While it is known that some reported occurrences resulted in worker radiation exposures, it is also known that an equal or larger number of occurrences resulted in minimal or no exposures at all. The challenge always for the site profile authors is to decide which of the thousands of reported occurrences to present in the site profile. OCAS requested and received an excel sheet from Dr. Silver regarding incidents that occurred at LANL. This and other applicable references will be cited in the next revision to the site profile.

For purposes of clarification, information presented in the site profile should provide useful data to the dose reconstructors for completing claimant dose assessments. To this end, the site profile

provides a summary of major events highlighting potentially significant releases or exposure events that occurred at LANL. Upper bound values for the types and magnitude of incidents that occurred can allow dose reconstructors to develop conservative intakes for both monitored and unmonitored workers. Research continues to identify the intakes for both maximizing and general conditions. Examples of intakes identified thus far are listed in Table 5-22 of the site profile. Other approaches being used to account for missed dose or assign dose to unmonitored workers include the use of co-workers data and other workplace survey data.

For completeness, the ORAU team reviewed the available information in the LANL Occurrence Reports Collection at TA-35. Most of the information in these files was found to be related to: 1) the levels of surface or air contamination resulting from an accident; 2) descriptions of efforts by LANL workers to decontaminate facilities; and, 3) statements about worker protection and monitoring measures. Although no information has been identified thus far that would change the approaches employed in dose reconstructions, reconstructors will be made aware of the existence of these records and encouraged to review them if it appears warranted for the specific case being reconstructed. Acknowledgement of this resource will be added to the internal dosimetry section of the site profile document.

Section 3 - Ability of worker and community organizations to independently evaluate how primary sources of information have been analyzed and interpreted in the site profile document (p.39)

Page iv: *One of the cited sources, an internal LANL document that is not publicly available, sharply contradicts the official public record of workers' collective doses at LANL established by the annual report series "Radiation Exposures for DOE and DOE Contractor Employees. The numbers reported by the site profile do not agree with DOE's annual report for either the total number of persons monitored (which includes visitors) or the number of UC plus Zia employees monitored. The population dose (person-rems) in the site profile is systematically lower than the population dose reported in DOE's annual report for UC plus Zia employees. The site profile document furnishes the Lab's new numbers without even citing the DOE report series. The Lab's numbers are from a cited source with no "LA-" report number. The Lab's numbers for annual person-rems are systematically lower. This reinforces an impression gained by some workers over the course of their careers at LANL that "the books are cooked."*

Two files of historical external radiation dosimetry data were supplied to Tom Widner (Site Profile Chapter 6 primary author) by John Voltin and Kenneth Rowlison of LANL on July 26 and 29, 2004. The first file contains the following values for each calendar year from 1944 to 2004 (with 2004 being based on the partial year of data in the system at the time of reporting):

- Exposure Year

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- Under each year, values for the following for each (unidentified) person with non-zero dose of any kind: (1) Deep dose total (mrem), (2) Shallow dose total (mrem), and (3) Neutron dose total (mrem).
 - The total number of persons with any non-zero dose
 - Collective deep dose, shallow dose, and neutron dose (mrem)

The second file contains the following values for each calendar year from 1944 to 2004:

(1) Year, (2) Number of Employees Monitored, (3) Collective Deep Dose (person-mrem), and (4) Collective Neutron Dose (person-mrem).

An analysis of the LANL neutron-to-photon dose data (from the first data set described above) was performed by Jack Fix and colleagues at PNNL. Because the purpose of their analysis was to obtain the most definitive data available concerning values of neutron dose divided by deep dose, only those data where both the deep and neutron doses were equal to or greater than 50 mrem were included in the analysis.

The data provided by LANL to DOE's annual report series was examined and the reasons for the differences were evaluated. The values presented in Table 6-2 of the site profile represent external radiation doses. The values for LANL reported by DOE (such as in DOE/EH-0287P for 1990) were total doses, external plus internal. The numbers of workers monitored that are given in Table 6-2 include all persons that were monitored, in accordance with modern-day reporting guidelines, including workers in the following categories: LANL, Johnson Controls Inc. (analogous to Zia Company in earlier years), visitors, subcontractors, and DOE's Los Alamos Area Office. In accordance with the requirements of DOE Order 5484.1 at the time, LANL did not include subcontractors or visitors with zero doses in the numbers of workers reported each year.

Availability of reports to the public

Page 17: *... the fact that many of the cited LANL technical reports are inaccessible ... makes it impossible for citizens' or workers' organizations to mount an incisive challenge to management's idealized picture of "ought," which the site profile now proffers as reality.*

Page 42: *Finally, 78 (30.7%) of the 254 cited sources in the site profile are not available to the public using the open literature, ECDB, Opennet, or CDC-ChemRisk. Among these items are LANL Photodosimetry Evaluation Book ("the Bible"), Inkret's numerous technical reports on dosimetry practices (1998-1999), LANL Health Physics checklist (2004), Lawrence's numerous dosimetry reports (1967, 1984, 1990, 1992).*

While NIOSH strives for transparency in our activities under EEOICPA, there are legal and logistical constraints that preclude us from making all reports accessible on our website. As many of the documents contain personally identified information that is subject to the provisions

of the Privacy act, they could not be published without the redaction of all such information. In addition, some documents are designated as “official use only” which would preclude NIOSH from widely disseminating them among the public. As with all program documentation, Freedom of Information Act (FOIA) requests have been and will continue to be responded to in accordance with the applicable requirements.