REVIEW AND CRITIQUE OF THE DRAFT NIOSH SITE PROFILE DOCUMENT FOR LOS ALAMOS NATIONAL LABORATORY

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EXECUTIVE SUMMARY

Introduction

The Energy Employees Occupational Illness Compensation Program Act (EEOICPA) is a federal entitlement program with two sets of claims criteria for radiation-related cancer. One set of criteria applies to members of the Special Exposure Cohort (SEC). All other claims for radiation-related cancer are subject to the highly detailed scientific methodologies of dose reconstruction and the probability of causation.

Gaseous diffusion plant workers and workers on three underground nuclear tests in Alaska prior to 1974 were written into the SEC in the original EEOICPA law. The current status of petitions to add new groups of workers to the SEC is summarized in Table 1.

Dose Reconstruction

To carry out its duties to perform dose reconstruction, NIOSH has contracted with Oak Ridge Associated Universities (ORAU) for the services of health physicists. A series of guidance documents, called "site profiles," is being prepared. Each site profile is intended to describe the technical details of how radiation doses were measured at DOE sites where claims are undergoing dose reconstruction.

The site profile document owes its existence to EEOICPA which, in turn, resulted from a sociopolitical process. Previously, many occupational health concerns at LANL were muted by the DOE-LANL "culture of secrecy." EEOICPA passed in 2000 with New Mexico political leaders at the helm.

Individual workers, government agencies and researchers with legitimate claims to exposure- and health-related information have long encountered resistance from LANL. "Frontstage" explanations for information access restrictions at LANL generally involve national security concerns. Lab managers' "backstage" concerns, documented in internal memoranda, have included avoidance of lawsuits and public embarrassment.

Four Key Issues

This EEOICPA context for the use of pertinent information in dose reconstruction and claims adjudication raises the following issues for the site profile process:

1. Completeness and fidelity of the site profiler's retrieval and use of information *already* 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
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

This report analyzes the site profile document in the light of the first three issues.

Issue #4 can best be addressed by comparing the administrative records of dose reconstructions in rejected claims to pertinent information available elsewhere. As this report was being finalized, the release of the administrative record for such a claim was pending. (It was under review by the NIOSH FOIA Office). Thus, this author intends to address Issue #4 outside the scope of this report.

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

The site profile document incorrectly states that H-Division Monthly Progress Reports are not available after October 1960. On the contrary, numerous such reports have been in the public domain for more than a decade. Ambiguity exists as to whether H-Division Monthly Progress Reports were issued after 1964. The possibility of a "curious hiatus" in public availability of reports during the late 1960's and 1970's, due to secrecy or environmentally provocative information, merits consideration. Monthly or quarterly reports were issued by LANL group H-1 throughout the 1960's and 1970's. Transfer request (TR) forms indicate the contents of some monthly reports in the 1960's include "Secret" material or "Conf. R.D." (confidential research and development).

The site profile document willfully fails to consider the landmark Tiger Team Report on LANL (1991). A large proportion of the cited sources in the site profile document are technical reports issued by LANL. The technical reports emphasize recommended procedures for measuring doses. 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).

Failure to consider the Tiger Team report and other critical depictions of worker health and safety at LANL leads to idealized presentations of several technical issues in the site profile document. These issues include: radiation doses resulting from numerous problems with continuous air monitoring (CAM) alarms; serious deficiencies with the bioassay program for internal dosimetry; and variation in health physics programs among groups at LANL. Several additional issues cited by the Tiger Team report are listed on pages 25-6 of this report but not discussed in depth here due to resource limitations.

At the June 18 meeting in Espanola, the issue of censoring of radiation badge data was raised at least three times. Specific events were described. In a subsequent interview, a glove box worker described the widespread practice of wearing dosimetry badges underneath a lead apron.

The site profile document does not cite several other important publicly available documents. Apparent inconsistencies between sections of the site profile document are noted.

Section 2. LANL's Furnishing of Access to Information *Not Yet* in the Public Domain

Two tables (2-4 and 5-22) in the site profile document list incidents that resulted in worker exposure to radiation. However, NIOSH and ORAU do not appear to have yet made comprehensive use of a voluminous Occurrence Reports Collection (ORC) located at TA-35 under the custodianship of John Voltin and William Inkret.

Based on this author's first-hand experience in the ORC at TA-35, it is apparent that Tables 2-4 and 5-22 of the site profile document do not take account of numerous worker contamination episodes. A lower bound estimate of 64 net additional occurrences involving worker radiation contamination is derived for the years 1970-1980, 1985 and 1990 alone (Table 2), using this author's research notes taken when he had access to the ORC at TA-35 from 1996 to 1998. Extrapolation of this lower bound estimate to the entire period of 1944 to 1991 translates into more than 230 occurrences involving worker radiation contamination for which documentation would be available if NIOSH and ORAU were to thoroughly utilize the ORC at TA-35. Illustrative examples of incidents documented in this collection but not included in the site profile document are listed in Table 3. In addition, Table 4 presents a similar list for years other than the 13 years noted above, drawing upon multiple sources including the LAHDRA repository at UNM's Zimmerman Library and the files of the Joint Committee on Atomic Energy in Washington, D.C..

It cannot be assumed that occurrence reports were added to the medical records of individual workers. A comprehensive search and retrieval of the ORC at TA-35 should be performed by NIOSH and ORAU. Occurrence reports could be used to improve EEOICPA dose reconstructions in several ways. A truly "claimant friendly" dose reconstruction process would leave no stone unturned in locating documentation of such incidents. The ORC at TA-35 also holds the potential for a portion of LANL dose reconstructions to be based on primary documentation. Use of primary documentation could serve as a quality check on dose reconstructions performed with internal dosimetry data which, according to Chapter 5 of the site profile document, LANL has provided in a piecemeal fashion, and only after long delays and re-formatting.

Participants in the June 18 meeting in Espanola, and in subsequent discussions, emphasized the vitally important information contained in another record series: the daily log books of RCTs.

Section 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

Access to the complete docket of agency criteria documents, memoranda, and technical reports is the *sine qua non* of good public interest science. To evaluate whether the NIOSH site profile process at LANL is amenable to a public interest science approach, the public availability of all 254 sources cited in the site profile document was analyzed. At LANL the public computer terminals were used to search the following

online sources to determine the public availability of cited sources in the site profile document:

1. LANL Library's online catalogue (http://library.lanl.gov/)
2. Energy Citations Database (http://www.osti.gov/energycitations/)
3. DOE's Opennet database (https://www.osti.gov/opennet/)
4. CDC-ChemRisk LAHDRA database (http://www2.cdc.gov/nceh/radiation/LANL/default.htm)

Seventy-eight (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. For the 17.7% of documents which are available in the LAHDRA repository at UNM Zimmerman Library, photocopying charges and travel costs are entailed. Similarly, NTIS's page and shipping costs for the 6.3% of documents not available elsewhere are non-trivial. Thus, in effect, one-third to one-half (i.e., 30.7% + 17.7% + 6.3% = 54.7%) of the basis for the NIOSH site profile document cannot be scrutinized using a public interest science approach.

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.

Conclusions

The "ought" of LANL technical reports and standard operating procedures has been repackaged for NIOSH into a purported profile of what "is" (or was). A desultory approach to utilizing the Occurrence Reports Collection at TA-35 is unconscionable in light of the large number of contamination incidents documented in the collection.

Especially grievous are newly proffered but never published retrospective numbers from LANL for the total persons monitored and population dose (person-rems) which differ markedly from the official public record. This reinforces an impression gained by some workers over the course of their careers at LANL that "the books are cooked."

Little has changed for LANL workers and families, despite passage of EEOICPA. The Lab's "official line" continues to prevail. "Cold war heroes" have been told repeatedly that the information needed to reconstruct their radiation doses will soon be forthcoming. Meanwhile, claimants are dying. At the beginning of the twenty-first century a federal public health agency should not be providing the kind of leadership which leaves citizens thinking that inexorable death is the likeliest outcome.

The term “investigatory surrender” is coined as an analogy to “regulatory capture.” In its current form, the site profile document represents investigatory surrender because it is captive to the Lab’s idealized version of “ought”; an audience of Lab managers will be assuaged that recommended dosimetry procedures were routinely followed.

A series of questions is posed to focus NIOSH actions at LANL. Interminable, obsequious investigation is a roadblock to fulfilling the objectives of EEOICPA for LANL workers and families.

INTRODUCTION

The Energy Employees Occupational Illness Compensation Program Act (EEOICPA) is a federal entitlement program intended to provide "efficient, uniform and adequate" compensation for occupational illnesses incurred by workers in government owned, contractor operated (GOCO) nuclear weapons plants and research facilities. [1] The word "entitlement" does not mean that all GOCO employees unconditionally receive payments. Rather, it denotes the direct spending mechanism adopted by Congress when EEOICPA was passed and signed into law in October 2000.[2, 3] Funds for "entitlement" programs are set aside in special trust funds, managed by the U.S. Department of Treasury, so as to avoid the risky situation of payments to eligible beneficiaries hinging on Congressional appropriations annually (which posed problems for uranium miners and "downwinders" seeking compensation under the Radiation Exposure Compensation Act [RECA] in the 1990's). Colloquially, "entitlements" exist for those who not capable of "self-reliance," such as the elderly, infirm, disabled, etc.. Another example of an occupational illness compensation program paid for with "entitlement" spending is the federal program which provides benefits for coal miners suffering from black lung, enacted in 1977.

Every entitlement program has claims criteria. U.S. Department of Labor regulations under EEOICPA repeatedly use the terms "determination of entitlement"[4] and "claims for entitlement."[5] EEOICPA's criteria depend upon the specific illness claimed. If radiation-related cancer is claimed, then there are two sets of criteria which apply. One set of criteria applies to members of the special exposure cohort (SEC), or their survivors, who have filed a claim for any of 22 kinds of specified cancer. All other claims for

radiation-related cancer are subject to the second set of criteria which are based upon the highly detailed scientific methodologies of dose reconstruction and the probability of causation.

SEC. In the legislative debates which led to EEOICPA's passage, the labor union (PACE) which represents workers at the three gaseous diffusion plants (Paducah, Portsmouth, Oak Ridge) presented extensive evidence of how the federal government and contractors intentionally withheld from workers information about exposure to energetic internal emitters such as NP^{237} and Pu^{239} and failed to measure internal doses until the late 1980's.[6, 7] The Washington Post gave the story wide coverage. [8, 9] As a result, gaseous diffusion plant (GDP) workers were written into the original EEOICPA law passed in 2000 as the first members of the SEC. Also, workers on three underground nuclear tests on Amchitka Island, Alaska prior to 1974 were written into the SEC.

The law created a petition process for adding more groups of workers to the SEC if "it is not feasible to estimate with sufficient accuracy the radiation dose they received." [1] On December 11, 2000 President Clinton issued Executive Order 13179 which directed NIOSH to develop regulations for a petition process by which groups of workers can be added to the SEC.[10] NIOSH issued these regulations in final form in May 2002.[11] The law also specified that the Advisory Board on Radiation and Worker Health will "advise" the President and make recommendations in response to petitions, in addition to advising NIOSH on dose reconstruction procedures. Groups of workers already in, or petitioning for inclusion in, the SEC are summarized in Table 1.

Other Workers. Claims for radiation-related cancer in workers who are not members of the SEC, or SEC members with a non-listed cancer, must undergo a two-step process of:

1. dose reconstruction
2. probability of causation determination

to receive EEOICPA entitlement benefits. The reconstructed dose is inputted to the "IREP" model (Interactive Radioepidemiological Program). For 33 kinds of cancer IREP calculates the percent probability that a given dose of radiation caused the cancer. Because there is a great deal of uncertainty in such a calculation, IREP also provides an "error bar" (or "confidence interval") around the calculated probability of causation. Congress specified in EEOICPA that the upper 99% confidence internal around the probability of causation would be used. This was intended to be "claimant friendly," resulting in more decisions to award compensation than if the probability of causation were used.

> Senator Jeff Bingaman explained in the Congressional Record:
>
> For example, for a given worker with a particular cancer and radiation exposure history, the PC may be 0.38 with 99% confidence interval of 0.21 to 0.55. This means that it is 38% likely that this worker's cancer was caused by this radiation dose, and we can say with 99% confidence that this estimate is between 21% and 55%. Since the upper bound, 55%, is greater than 50%, this person's cancer would be considered to be at least as likely as not to have been caused by exposure to radiation, and the person would be eligible for benefits... [12]

A minor point of clarification to Senator Bingaman's remarks is in order: compensation is awarded if the upper bound is *equal to or greater* than 50%.

DOSE RECONSTRUCTION

The remainder of this report focuses on dose reconstruction, a key criterion used to determine the eligibility of radiation-related cancer claimants for EEOICPA entitlement benefits.

Background. To carry out its duties to perform dose reconstruction, NIOSH has contracted with Oak Ridge Associated Universities (ORAU) for the services of health physicists. A series of guidance documents, called "site profiles," is being prepared. Each site profile is intended to describe the technical details of how radiation doses were measured at DOE sites where claims are undergoing dose reconstruction. The standard site profile format consists of six chapters:

1. Introduction
2. Site Description
3. Occupational Medical Dose (i.e., x-rays by medical staff)
4. Occupational Environmental Dose (i.e., ambient exposures on-site)
5. Occupational Internal Dose
6. Occupational External Dose

An ORAU-affiliated health physicist assigned to reconstruct a worker's dose will refer to the site profile(s) for the site(s) where the worker was exposed to radiation. The site profile will give health physicists (hereinafter "dose reconstructionists") insight into monitoring methods, record-keeping procedures, facility operations, etc.. Conflict of interest rules limit the degree to which a dose reconstructionist may work on DOE sites where s/he has had a financial or employment relationship with the contractor. So the site profiles will serve as a principal source of information for dose reconstructionists who have not previously performed extensive work at that DOE site.

Pursuant to EEOICPA and Executive Order 13179 the ABRWH has a prominent role in overseeing the dose reconstruction activities of NIOSH and, by extension, ORAU and its affiliated dose reconstructionists. The Board has engaged the services of a

scientific consulting firm (Sanford Cohen & Associates) to audit selected dose reconstructions and review key work products, including site profiles.

The Site Profile Process

It is important to distinguish between process and content. The site profile document owes its existence to EEOICPA which, in turn, resulted from a sociopolitical process. Many LANL families' occupational health concerns were first brought to the attention of high level government officials and the general public in meetings held in late 1999 and early 2000.[13, 14] Previously, many of these concerns were muted by the DOE-LANL "culture of secrecy." EEOICPA passed in October 2000 with Senator Jeff Bingaman as the lead sponsor and former northern New Mexico Congressman Bill Richardson (then Energy Secretary, now Governor) as the principal proponent. Public participation soon shifted to the DOL claims process and to the formal federal advisory committee process in which the ABRWH operates.[15] EEOICPA issues have also been aired in recent sessions of the New Mexico state legislature. [16]

Access to Information at LANL. Access to information about exposures is a fundamental process issue, one which is never far from discussions of LANL occupational and environmental health concerns among New Mexicans. Access to information sets the parameters of any fact-based discussion of LANL health issues. Individual workers, government agencies and researchers with legitimate claims to exposure- and health-related information have long encountered resistance from LANL.

- In the 1970's the attorney representing William Van Buskirk in a state workers' compensation claim for berylliosis had to resort to a subpoena delivered to LANL

by the Bernalillo County sheriff in order to obtain his client's chest x-rays from the Lab.[14]

- In the mid-1990's the widow of a LANL radiation worker who had died of leukemia complained to the state health department that the Lab was claiming that her husband's medical records were "classified."[17]
- A steamfitter who volunteered to clean up after the criticality accident which killed Cecil Kelley in 1959 was dismayed to find no documentation of this incident, or several other very "hot" jobs he performed over the course of his 40 year career at LANL, when he sought his official medical records upon retirement. (Meeting Transcript, pp. 21-2)
- In 2002 the adult children of a machinist who had died of a progressive lung disease prior to 1993 found it necessary to apply considerable pressure through the formal appeals process of the Espanola Resource Center in order to obtain complete medical records from LANL. This tactic made the difference between initial denial of their EEOICPA Subtitle B claim for CBD and the ultimate award on appeal – but only after the complete medical file was in-hand.[18]
- To this day, despite repeated requests made since the passage of EEOICPA, a former LANL plutonium glove box worker has been unable to obtain his finger ring dosimetry data. A supervisory lab scientist confirmed that the documentation does exist.[19]

Workers and families are not alone. Government agencies and researchers have also encountered marked resistance from LANL in attempting to access relevant health and environmental data. LANL information management practices and policies have

stymied the New Mexico Attorney General's office[20] highly qualified academicians carrying out research with grants from NIOSH,[21] and others.[22] The LANL Archives spurned efforts in the mid-1990's by the DOE headquarters history staff to make public a finding aid to the archives. The federal Centers for Disease Control's Los Alamos Historical Documents and Assessment (LAHDRA) project, the most comprehensive and highly sanctioned effort ever to retrieve documentation pertinent to radiation exposures at LANL, encountered no less than 20 obstacles to accessing information at the Lab.[23, 24]

In 2004, a Congressionally mandated report issued by NIOSH found LANL to be among a handful of DOE sites "not consistently providing adequate responses to data requests for dose reconstruction."[25]

Environmental sociologists distinguish between the "backstage" and "frontstage" behavior of institutions.[26] Frontstage behavior is intended for public view. Institutional actors portray the polluting facility in the best light possible. Backstage behavior consists of candid internal deliberations by managers and workers. This distinction is helpful in analyzing LANL information policies. "Frontstage" explanations for information access restrictions at LANL generally involve national security concerns.[24] Less frequently cited in public are concerns over whether certain records are "owned" by the contractor or by the DOE.[27] For example, a former worker at the June 18, 2005 meeting in Espanola organized by ATL recounted how records documenting the contents of waste barrels from DP West, buried at Area G, are maintained by a consulting firm (Benchmark). When asked to provide access to the records, the firm replied that are "owned by the Lab" (Meeting Transcript, p. 15). Another ground cited by LANL for limiting access to

records is the lack of specific funding (or "cost code") to pay for staff members' time in assisting outside researchers.

Occasionally, official memoranda become publicly available which describe the "backstage" concerns of Lab management over public access to information. In 1946 Dr. J. Robert Oppenheimer instructed subordinates to create special security classification for any health-related information; one of the subordinates wrote that its purpose was to "safeguard the project against being sued by people claiming to have been damaged." Two years later AEC officials balked at disseminating to affected Los Alamos chemists the results of an occupational health study which showed hematological abnormalities after handling radiolanthanum and related fission products.[28] How long a special security classification for health information remained in existence *de jure* at the Lab is difficult to ascertain, but its *de facto* influence appears to have been long-lasting. More recently, waste managers at LANL issued memoranda admonishing workers to maintain tight control of documents which might cause the Lab public embarrassment. These memos invoke the terms "sensitive" and "official use only" to justify restricting public dissemination of waste-related information. National security is not cited.[29, 30]

Perhaps the most detailed glimpse into the "backstage" concerns of Lab managers is provided in a series of depositions obtained in the discovery phase of a tort lawsuit (brain cancer in the community) against LANL in the early 1990's. The details are beyond the scope of this report.

Information Access for EEOICPA Claims. Under EEOICPA and implementing regulations, claimants are not required to gather information on past exposures. Rather,

NIOSH is supposed to obtain the information needed for dose reconstruction from DOE and its contractors. An individual claimant may request copies of the documents (the "administrative record") used in the dose reconstruction. Claimants may also provide supplemental information. Due in part to long-standing restrictive information practices and policies at LANL, few individual claimants are likely to have relevant documentation in their personal possession. However, worker and community-based organizations, such as the Los Alamos Project for Worker Safety and El Rio Arriba Environmental Health Association, have used their extensive collections of documents and familiarity with public collections (e.g., reading rooms, online data bases, etc.) to provide technical assistance to claimants.[31, 32]

FOUR KEY ISSUES

This EEOICPA context for the use of pertinent information in dose reconstruction and claims adjudication raises the following issues for the site profile process:

1. Completeness and fidelity of the site profiler's retrieval and use of information *already* 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
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 site profile document is analyzed and discussed in the light of issues #1-3 in the following sections of this report.

Issue #4 can best be addressed by comparing the administrative records of dose reconstructions in rejected claims to other pertinent sources of information. As this report was being finalized, the release of the administrative record for such a claim was pending (under review by the NIOSH FOIA Office). This author hopes to address issue #4 outside the scope of this report.

Section 1.

Completeness and Fidelity of the Site Profiler's Retrieval and Use of Information *Already* in the Public Domain

Relationship to the LAHDRA Project. The site profiler is well qualified to access publicly available information on historical exposures at LANL, having served on the technical team of the Los Alamos Historical Documents Retrieval and Assessment Project (LAHDRA). Although mainly focused on off-site environmental emissions, LAHDRA is the most comprehensive effort ever to retrieve documentation pertinent to radiation exposures at LANL. LAHDRA documents constitute one of the largest collections of publicly available information. The assets of LAHDRA are most evident in Chapter 2 of the site profile, a nearly comprehensive historical overview of LANL technical areas, activities and radionuclides. Chapter 4, "Occupational Environmental Dose," also relies heavily on LAHDRA disclosures.

Omissions and Errors. Noted below are two types of errors of omission in the site profile:

- Omission of information already made publicly available by LAHDRA; and
- Omission of other highly pertinent information that is already in the public domain.

In addition, contradictory information presented within different sections of the site profile is noted.

Monthly Health Division Progress Reports After 1960 are Publicly Available

The following statement appears on page 48 of Chapter 2 of the site profile document:

> "The Health Group (later Division) produced over 150 Progress Reports. The reports were produced on a monthly basis; - the oldest is dated November 1943, and the most recent report was published in October 1960."

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

This is a very serious error. At any DOE site, the progress reports of health-related groups provide a narrative account of the principal problems and exposures with which health physicists, industrial hygienists and other occupational and environmental health specialists were grappling.[33] Mention of a problem or exposure in these narrative reports is a clue to the existence of further documentation, such as monitoring data and occurrence reports.

LAHDRA's most recent report affirms the value of H-Division Monthly Progress reports (pp. 16-17) and confirms the availability of monthly issues after 1960. (The site profiler's photo appears on page 18).[23] Monthly issues in this report series after 1960 are publicly available from several sources. Indeed, some have been in the public domain for more than a decade.

a. LAHDRA Collection. A simple search of CDC's online data base yields 38 monthly and one quarterly H-Division Progress Reports issued after 1960. The latest monthly report is September 1964; the quarterly is from the fourth quarter of 1969.

b. Human Studies Project Team (HSPT) Notebooks. The 31 volumes of historical documents pertaining to human radiation experiments, which were released to the public by LANL in 1994, contain numerous H-Division Monthly Progress reports after 1960. Indeed, the monthly issues released by LAHDRA ("a," above) closely match the

monthly issues released by the HSPT. Neither source contains the following monthly issues:

(for the month ending)

October 1963
February 1964
April 1964
June 1964
October 1964
November 1964
December 1964

The occupational and environmental health significance of these omissions may include exposure to fission products present in large quantities in spent fuel elements from the Rover nuclear rocket program which were handled in the hot cells at CMR Building (TA-3) in this time frame. Other documentation made available by LAHDRA evinces concern among Health Division personnel about I-132 in June 1964. Moreover, spent fuel from the Kiwi NRX rocket test would have reached CMR Building in about October 1964.

c. Opennet. Selected H-Division Monthly Progress Reports for the time period of 1961-1963 have long been publicly available from the DOE's Opennet data base. Additional monthly issues may be stored in hard copy format at DOE's Coordination and Information Center in North Las Vegas, Nevada,[34] based on this author's (K.S.) prior experience using this repository.

d. Advisory Committee on Human Radiation Experiments (ACHRE). In the fall of 1994, this author (K.S.) photocopied LANL H-Division Monthly Progress Reports in the public documents room of ACHRE, a presidential advisory committee, in Washington, D.C.. A compilation of excerpts from these reports -- which was widely distributed to

citizens, tribal governments, and organizations in northern New Mexico in November 1994 -- contained numerous entries from monthly reports after 1960.

ACHRE's charter has lapsed, but a finding aid to its documents is maintained online by the National Security Archive at George Washington University (http://www.gwu.edu/~nsarchiv/radiation/). ACHRE's document collection was transmitted to the National Archives, a federal agency.

Post-1964 Ambiguity. Ambiguity exists as to whether H-Division Monthly Progress Reports were issued after 1964. LAHDRA's most recent report asserts this series was "discontinued in September 1964 in favor of quarterly reports," yet also states that there are "some additional reports issued in the early 1980's." To further complicate the picture, at a November 2001 public meeting, a project member cited a Lab memo which admits the issuance of H-Division Monthly Progress Reports as late as 1967.

The possibility of a "curious hiatus" in public availability of reports during the late 1960's and 1970's, due to secrecy or environmentally provocative information, merits consideration.

Former LANL workers verbally dispute the assertion that the monthly reports ceased in 1964; however none have furnished documentary evidence to support their position. One possible explanation is that the division-level report ceased, but group-level reports continued. As shown in Appendix A of this report it is quite clear that "Monthly Progress Reports" were issued by LANL group H-1, the "Health Physics" group after 1964. This is made plain by official "TR" forms ("transfer request"), used by LANL managers to designate long-term storage locations for records. A collection of

transfer request forms detailing the locations of many historical health-related records was made publicly available in the LANL-UC Reading Room in Los Alamos in 1998.

The site profile document does not explicitly cite "H-1 Monthly Progress Reports" in the late 1960's or early 1970's. The transfer request forms (Appendix A) indicate that the contents of some monthly reports in the 1960's include "Secret" material or "Conf. R.D." (confidential research and development). Group H-1 was the LANL unit with primary technical responsibility for controlling worker exposure to radiation. 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. The fact that monthly reports later than 1964 exist – at least those issued by group H-1 -- has been in the public domain since 1998.

Since February 1999 this author (K.S.) has been urging CDC and its LAHDRA contractor to make public as many H-Division Progress reports as possible.[35, 36]

1991 DOE Tiger Team Report Not Considered

At the June 18, 2005 meeting in Espanola, New Mexico on the LANL site profile, organized by ATL International, the site profiler acknowledged that he owns (or has available at work) a copy of the 1991 DOE Tiger Team report on LANL. He made this statement in response to this author's (K.S.) criticism that the site profile document did not cite the Tiger Team report. Former workers quoted directly from the Tiger Team report[37] and submitted annotated excerpts into the formal record of the meeting.

Universe of Citable Sources. This raises the question of "What process is used to define the universe of citable sources?" Clearly, the Tiger Team report was sanctioned at the highest levels of the U.S. Department of Energy. It was not issued by a fringe

organization. The engineers and scientists on the Tiger Team were selected for their impressive credentials.[38, 39] They were not a group of "Lab bashers."

Willful failure to include this landmark report in the universe of citable sources is so grievous that it raises questions about motive and intended audience for the site profile document. As described in Section 3 (below), a large proportion of the cited sources are technical reports issued by LANL, many of which are not readily available to the public. Few of these LANL technical reports have been subjected to external review or independent criticism. These technical reports emphasize recommended procedures for measuring radiation doses.

"Is" versus "Ought." It is helpful to invoke the classic distinction between what "*is*" and "*ought*" to be. It's the difference between depiction and espousal. LANL technical reports and standard operating procedures describe how radiation doses "ought" to be measured. Recommended procedures are delineated. An institutional *espousal* that these procedures *should* be followed is plain. In contrast, the Tiger Team was the most systematic effort ever to *depict* what "is" (or was) the situation for worker and health and safety at LANL.

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). An audience of lab technical managers reading the site profile document will be pleased to find no difference between their recommended technical procedures and past dosimetry practices. This legerdemain depends upon the exclusion of not just the Tiger Team report but all other external, critical *depictions* of what "is" (or was) the situation for worker health and safety at LANL. Moreover, the fact that many of

the cited LANL technical reports are inaccessible (see Section 3) 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. The worker's depiction of what "is" (or was) the situation with radiation dosimetry at LANL gets shunted to a meeting or two.

Role of Quality Programs. Organizations address the gap between "ought" and "is" by means of quality assurance and quality control programs. An internal auditing function is commonly used to provide assurance that written policies are actually being followed.

Deficiencies in quality assurance were among the principal shortcomings found at LANL by the Tiger Team. At the highest levels of the Lab, the Quality Operations Office (QOO) was found to suffer from an "organizational conflict of interest" (p. 5-16), due to its accountability to the same Associate Director as the divisions it audited. Further, the Tiger Team cited QOO's inability to perform audits unless requested and funded by the organization to be audited (p. 4-262).

Health and safety audits were found to be lacking in comprehensiveness and consistency (p. 4-774). Comprehensive records on occupational radiation exposures were not readily available (p. 4-190). The Tiger Team could find:

> "..no Health and Safety Division assurance that accurate monitoring of either external or internal exposures is accomplished using current procedures and policies or that DOE 5480.11 monitoring requirements are satisfied."

In sum, at the time of the Tiger Team report in 1991 -- and presumably in the years preceding – there was a large gap between the "ought" and "is" of worker protection at LANL. This gap was not well characterized by audits.

Technical Issues. Failure to consider the Tiger Team report and other critical depictions of worker health and safety at LANL leads to idealized presentations of several technical issues in the site profile document. If left unchallenged, the site profile will lead dose reconstructionists to make assumptions which are not "claimant friendly." More LANL claims will be denied than if the facts contained in the Tiger Team report and other critical sources had been incorporated into the site profile.

1. Radiation Dosimetry: CAM Alarms. Chapter 4 ("Internal Occupational Dose") includes a discussion of continuous air monitor (CAM) alarms. Citing a report by LANL scientists, the site profile considers the issue of the suboptimal location of CAM alarms:

> "When a worker causes the release and is at or near the release point, the worker could be exposed to intakes that did not trigger alarms ... [T]he *possibility exists* that workers could be exposed to intakes that did not trigger alarms." [emphasis added]

However, the site profile does not consider numerous other mechanisms cited by the Tiger Team which cast serious doubt on the efficacy of CAM alarms in protecting LANL workers. (See box, p. 20). In light of this litany of deficiencies recognized by the Tiger Team in 1991, the site profile's conclusion that "the possibility exists" of worker exposure prior to a CAM alarm is quite weak. On the contrary, there is a strong likelihood that such overexposures occurred.

Two recent incidents illustrate the ongoing failure of CAM alarms to protect workers from internal emitters at LANL. Although both incidents are well-documented in publicly available, authoritative sources of information, neither is considered in the site profile document.

TA-55 Glove Box. According to a March 2003 report by the DOE Inspector General, a

Tiger Team Observations About CAM Alarms and Related Radiation Monitoring Devices at LANL

"lack of LANL capability to calibrate and test high-range instruments used for emergency warning and evacuation" (p. 2-6)

"Calibration and response checking of fixed instrument and tritium monitors does not reflect the same level of attention and commitment given to portable instrumentation." (p. 4-174)

"The check sources used to response check fixed instrumentation are disks of depleted uranium attached to each detector. The sources have not been characterized, are not documented, and emit at an unmeasured rate." (p. 4-184)

"There are no procedures to ensure that failed radiation protection equipment at accelerators are promptly removed from operation and evaluated to determine the impact of the failure." (p. 4-185)

"Fixed and portable radiation survey instruments are not calibrated annually or source checked in compliance with Los Alamos National Laboratory procedures and ANSI N 323-1978…" (p. 4-185)

"Tritium detectors in laboratories and on stack monitors are not source checked."

"With the exception of the WET Facility, documented studies of airflow in the workplace were not available to identify the airflow patterns and problem areas." (p. 4-384)

"Tritium air monitors do not have a uniform alarm setpoint, and no written justification was available for the alarm setpoints that were chosen." (p. 4-384)

"Tritium room air monitors were purchased at TA-41 Building 4 by operations personnel without support from calibrations staff or calibration and testing at the calibration facility." (p. 4-390)

"Facility monitor alarms points…are not always set at a uniform level. The setpoint may vary from monitor to monitor even in the same building." (p. 4-394)

"The setpoint on the tritium monitor at the IBF was reset by operations staff without ES&H review or approval." (p. 4-463)

contamination episode in February 2001 involving Pu-238 at TA-55 was worsened when the Lead Technician attempted to shut off the monitoring device which had initially warned of contamination:

> "The Lead Technician attempted to reset the monitoring device, but could not reach the reset button. The Lead Technician took a notebook with his contaminated hand, thereby spreading the contamination onto the notebook, and hit the reset switch. He handed the notebook back to another team member, whose hand then also became contaminated." [40]

It is noteworthy that members of the "team" handling plutonium at TA-55 assist each other in hitting the reset button when monitoring devices sound. Indeed, a former TA-55 glove box worker who was last employed in 1996 confirms that operator intervention in resetting CAM alarms was commonplace, with the routine complicity of line managers.[19]

TA-50 Paint Crew. A March 3, 2005 incident is described in Energy Daily, one day after it was discussed at a May 5 Congressional hearing.[41] Several construction trades workers received internal doses while cleaning up contaminated paint chips in a vault containing a leaking radioactive waste tank at TA-50. Contrary to standard operating procedures (what "ought" to happen) safety technicians failed to put a CAM into the vault. No alarm warned the workers of airborne dust contaminated with plutonium.

Clearly, problems with CAM alarms at LANL are long-standing and far more complex and serious than the site profile's narrow discussion of suboptimal placement of devices would suggest. The issue of suboptimal placement alarms was studied by LANL scientists; the site profile dutifully discusses the issue. Many other issues involving the failure of CAM alarms have been identified by the Tiger Team, the DOE Inspector General, and the U.S. Congress. The site profile document completely ignores these sources of information.

In addition, at the June 18 meeting in Espanola organized by ATL International, a former worker at TA-54 (Area G) mentioned how monitoring devices called "sniffers" were turned off, thus avoiding detection of tritium (Meeting Transcript, p. 16). Further, a separate interview and follow-up discussions were held with a former lab services inspector, whose job entailed walking through numerous facilities like CMR Building. He remembers being told to turn off any hand and foot monitors that were alarming. The same instructions applied to CAM alarms that were sounding.[19, 42]

2. Internal Dosimetry: Bioassay Program

The aforementioned section of the site profile document on the problem of suboptimal placement of CAM alarms continues:

> "However, after 1970 when the *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." [emphasis added]

Here again, the Tiger Team report tells a very different story. The Tiger Team's review of LANL's internal dosimetry program in 1991 is devastating.

DOE orders required contractors to identify workers for participation in a bioassay program. An Employee Health Physics Checklist (HS form 2-1A) was to be completed for each employee potentially exposed to radioactive materials. Radiation Protection Technicians were supposed to review work operations to evaluate who should participate in the bioassay program.

Instead, the Tiger team found a "low priority" was given to the requirement that radiation protection technicians review operations (p. 4-783). For example, at the firing sites (including TA-36 and TA-15) "LANL personnel are not evaluated for inclusion in

the bioassay program" (p. 4-183). Furthermore: "Not all personnel at the plutonium and depleted uranium facilities are evaluated for participation in the bioassay program" (p. 4-183). Similarly, despite an employee's potential exposure to "substantial quantities of tritium contamination (i.e., oxide and organic bound)" at the Ion Beam Facility: "The facility does not provide proper controls and protection or require bioassay analyses for potentially exposed personnel" (p. 4-385).

In sum, at the time of the Tiger Team report in 1991 LANL did not have an adequate internal dosimetry program for four of the major categories of exposed workers: firing site workers, and workers potentially exposed to tritium, plutonium and depleted uranium. An underlying reason may have been that three separate organizations were involved in staffing the bioassay program, resulting in an effort that "lacks clear organization, defined responsibilities and authorities" (p. 4-783).

Given this state of affairs, it is not surprising that refinements such as particle-size distribution and solubility studies had not been conducted for areas where workers were potentially exposed to airborne plutonium and uranium (p. 4-785). It is also unsurprising that documented procedures and administrative requirements for evaluating exposures to "unusual" radioactive materials were non-existent (p. 4-775).

Even when workers were properly enrolled in internal dosimetry programs line managers had "not accepted responsibility for conducting the chain-of-custody program" to ensure the integrity of bioassay samples against tampering, neglect and delay (p. 4-388). This posed a threat to the chain-of-custody program because:

> "In several instances radiation protection technicians are not permanently located in the building where bioassay samples are to be left, making it difficult to conduct an effective program" (p. 4-388)

And, although radiation protection technicians were trained in the chain-of-custody requirements "a few do not properly conduct the program." The report gives actual examples of samples that had been misplaced for months, mislabeled, never sealed, and/or lacked complete paperwork (p. 4-388, 4-784). (Indeed, at the June 18, 2005 meeting in Espanola organized by ATL International, a former worker described how urine samples sat for a month before being picked up for analysis [Meeting transcript, p. 13]).

Entirely consistent with these above deficiencies, the Tiger Team also found that the Lab did not have an internal audit program "to ensure quality radiochemistry measurements on bioassay samples" (p. 4-784).

The site profile document's contention that "bioassay programs were well-established" after 1970 and that "the majority of workers with the potential for monitored and unmonitored intakes are expected to have participated" is wishful thinking. It results from a willful failure to consult the Tiger Team report and amounts to a simplistic, idealized portrayal of the LANL bioassay program.

3. Variation in Health Physics Programs

In an organization as large and complex as LANL, sweeping generalizations – such as the reliability of CAM alarms or the coverage of the bioassay program – are inherently suspect. Indeed, the Tiger Team noted marked variation in radiation protection programs among the various groups and divisions of the Lab:

> "Radiological protection programs vary considerably from group-to-group and division-to-division within the Laboratory, even though the requirements and conditions are similar" [p. 4-22].

Line managers' review of radiation protection standards and practices within their groups was found to be "informal and inconsistent and is not in compliance with Chapter XVI of DOE 5480.19" [p. 4-176].

Standard Operating Procedures. The site profile's reliance upon the Lab's written Standard Operating Procedures is an obvious example of the blurring of the line between "is" and "ought." Written SOPs are a technical community's formal expression of how tasks "ought" to be performed. However, the reliability of the Lab's written SOPs as a basis for historical dose reconstructions is cast in doubt by findings of the Tiger Team. Missing from the Lab's internal audit program (required by a DOE order) was a system for:

> "… review of standard operating procedures for correctness, approval by Health and Safety Division, or to determine whether standard operating procedures are current" [p. 4-378].

Furthermore:

> "A few safety and radiation protection officers reported that they did not need to seek approval from the Health and Safety Division for changes in standard operating procedures, etc. In addition, they did not need to accept recommendations from Health and Safety Division." [p. 4-376]

Thus, written Lab SOPs which may appear to have been generally applicable were, in fact, subject to unilateral change by field technicians, with no systematic oversight or review.

The ability of today's EEOICPA dose reconstructionists to utilize Lab SOPs is further undermined by the fact that SOPs and radiation work permits were not included in the occupational exposure record system, a clear violation of ANSI Standard N13.6. The Tiger Team reported:

> "LANL standard operating procedures are not being routed to the Health Physics Policy and Programs Group for inclusion in occupational exposure records" [p. 4-396]

Had such a system been followed, today's dose reconstructionists might at least know where to begin in deciding whether a given Lab SOP is pertinent to a specific cancer claim. Data collected in interviews could then fill the gap between "ought" and "is" (or was).

In light of the above deficiencies identified by the Tiger Team in 1991, dose reconstructionists cannot assume that:

- a written SOP didn't simply undergo unilateral revision in the hands of a field technician; nor
- the revised SOP was reviewed and approved by health physicists.

Fundamentally, one cannot assume that SOPs which happen to be contemporaneous with the worker's employment history actually describe how the radiation monitoring tasks were performed.

4. Other Tiger Team Findings. The three volumes of the Tiger Team report on LANL contain many additional findings which seriously cast in doubt the ability of EEOICPA dose reconstructionists to rely on the LANL technical reports, SOPs and other publications which form so much of the basis of the site profile document. Resource limitations prohibit an in-depth discussion of each of these issues. They include:

- based on numerous deficiencies, a lack of accreditation for the Lab's external radiation personnel dosimetry program;
- lack of extremity dosimeters for large groups of exposed workers;
- dubious gamma-to-neutron ratios for extremity doses;

- inadequate programs for tracking of and protection from the many radioactive sources and x-ray units around the Lab;
- inadequate radiological protection programs for the Lab's accelerator workers;
- inadequate training and management of radiation protection technicians; and
- lack of calibration of fixed and portable instruments.

Workers' Recollections

At the June 18 meeting in Espanola organized by ATL International, the difficult but all-too-familiar subject of censoring of radiation badge readings was raised at least three times.

A long-time employee who carried an ionization chamber recalled: "I was around radiation sources… [A]nd my film badge always showed up zero, but in my ionization chamber it always showed up something else." Another former worker recalled a clean-up operation in which pencil dosimeters taped to his wrists measured high levels of external radiation. As was customary, an RCT noted the readings in a log book as the worker exited the hot zone. However, the worker's dosimetry badge data came back later with "zero" exposure. [42]

A former Radiation Control Technician (RCT) described operations at two facilities (TA-3 and TA-55) involving intensive handling of radioactive materials where he and other RCTs expected dose rates to be elevated. "But when the RCTs got their reports, the exposure rates were very low," he recalled. Furthermore, a former RCT described having been instructed not to turn in filter counts for stacks at CMR Building if

the count was over a certain level. He was instructed "to just dispose of it in the trash can."

A specific event was described by a former worker in which "the Lab hired summer students to purge the medical records" of Zia employees. It is unclear whether dose records were purged, but the former worker thinks probably so. According to this former worker, the purpose was to shield the Lab from potential liability related to a change in the maintenance contractor from Zia to another company.

Even more fundamental than censored dosimeter readings is the practice of workers wearing their film badges underneath their lead aprons. A former plutonium glove box worker described this as "common practice" while doing "hot work, especially gamma" at CMR Building, DP West and TA-55. Americium, Pu-242 and the changing of hot equipment were jobs in which this practice was common, through the mid-1990's. In one specific incident, the worker's pen dosimeter read "greater than 10R." In several other incidents it exceeded 1R. Yet in all of these cases the worker's film badge was underneath the lead apron where the recorded dose would turn out to be much lower. [42]

Other Important Publicly Available Documents Not Cited in Site Profile

Nyhan Report. In September 1990, Dr. Jack Nyhan of LANL's Environmental Science Group produced a draft report on past activities associated with contamination at TA-21.[43] This report documents the use of small incinerators called "salamanders" in the 1960's and 1970's to burn organic solvents and oils contaminated with transuranics and fission products. This activity is not mentioned in the site profile document's description of work at TA-21.

History Associates "…Guide to Records Series...". Due to the information access issues described above, public confidence in the dose reconstruction process depends on the degree to which NIOSH gains access to relevant record series at LANL. Certain record series have long been known to exist, but have proven inaccessible to workers and families.

The most systematic compilation of such records series, published by History Associates in 1995, is entitled "Los Alamos National Laboratory: A Guide to Records Series Supporting Epidemiologic Studies Conducted for the Department of Energy." [44] Among the record series described in this compilation which are not explicitly mentioned in the site profile document are:

- "Source Records, 1978-1990" (for Wiggs et al study[45])
- Zia Company Employee Mortality and Occupational Exposure Analysis Reports, 1991
- Plutonium body burden records, 1977-1992
- Exposure Rates Analysis Record, 1977
- Zia Company , External Exposure reports, 1984, 1986-1990 (for Galke et al study[46])

The great difficulties experienced by NIOSH-funded researchers during the 1990's in gaining access to LANL record series[21] augers badly for the agency's ability to access records for EEOICPA. However, there is now a larger, better-informed public constituency to support NIOSH access to LANL records. The site profile process is an opportunity to make more citizens aware of the specific LANL record series that may be helpful in assessing health risks. By excluding the History Associates report, the site profile document misses an opportunity to build informed public participation. Moreover, it raises the question of whether the pertinent record series have been accessed.

"Human Radiation Experiments: The Department of Energy Roadmap..." Table 5-22 of the site profile document lists the "Radioiodine Experiments: In the late 1950's…," asserting that 19 subjects received doses of either I-125 or I-131. In 1995 DOE published a report which lists eight radioiodine experiments at LANL, the last in "about 1963." [47] As shown in Table 3, the total number of experimental subjects exceeds 100; however, it is unclear whether individuals were enrolled in more than one study. The potentially large number of experimental subjects should be cited in the site profile document. LANL employees were among the research subjects.

Apparent Inconsistencies Between Sections of the Site Profile

CMR Hot Cells. Throughout the 1960's a major activity at LANL with serious potential for worker exposure to radioactive materials took place in the hot cells at CMR Building (TA-3). Fuel elements from test nuclear reactors of various kinds were subjected to post-mortem studies. Large inventories of fission products, along with irradiated Pu and U, were handled. The site profile document does not consistently portray the nature and magnitude of this activity. An accurate, consistent portrayal is essential due to the great potential for worker exposure to radioactive materials.

Chapter 2 misses several opportunities to describe these operations (e.g., Table 2-1; Section 2.3 Description of Site Activities and Processes; Section 2.3.10.7 Project Rover). Chapter 5 states "Radioiodine and noble gases are released from facilities performing fission product chemistry [Wing 9, CMR (TA-3) and TA-48]…" This comes closer to describing hot cell operations, but use of the term "fission product chemistry" does not convey the large inventories present. A further mention of the CMR hot cells is made in Chapter 6, but the context is neutron doses so only U and Pu are mentioned.

The implications of this oversight become clear on p. 96 of Chapter 5 where it is stated:

> "…interviews with current and past LANL personnel involved with bioassay indicate that fission products were not considered a significant source term for intake among LANL workers."

A complete portrayal of activities in the CMR hot cells in the 1960's would cast serious doubt on this assumption. Research and analysis on the hot cells at DP West and TA-48 would deepen these doubts. For example, Appendix B shows several monitoring sheets (obtained by this author [K.S.] under the Freedom of Information Act in 1996) for the hot cells in Room 401 of DP West in July 1969. Alongside the unusually high counts is the notation "These Figures Should Not Be Recorded..."

Regrettably, the parsimonious description of the CMR hot cells is all too consistent with the site profile document's serious errors of omission regarding H-Division Progress Reports (see above). Some data on environmental releases from the hot cells at CMR in the 1960's and 1970's are available in the LAHDRA repository at UNM. Health Division Progress Reports from the mid- to late-1960's (Appendix A) are likely to prove revealing, if they are ever made public. In this light, the fragmentary descriptions of these operations in various chapters of the site profile are quite curious.

"…OWR Facility is not a source of radioiodine." This declarative statement appears on p. 30 of Chapter 5. Yet Table 2-1 lists I-131 as one of the radionuclides released from TA-2. Data contained in the LAHDRA repository at UNM, along with the most recent LAHDRA report,[23] show that OWR was a source of I-131.

Section 2. LANL's Furnishing of Access to Information *Not Yet* in the Public Domain

Incidents, Accidents and Occurrences. A principal shortcoming of the site profile document is an incomplete listing of incidents, accidents and occurrences involving worker contamination. Table 2-4 (pp. 50-1) lists 54 "accidents and incidents" covering the time period of 1943 to 1996. The criteria for inclusion in Table 2-4 are: "either reported to DOE or the subject of a Los Alamos report, or that involved criticality events with or without exposure." The documentary sources of information from which these incidents and accidents were drawn include H-Division Reports, Lab technical reports, a widely available AEC compilation published in 1975, and a LANL technical report reviewing criticality accidents published in 2000.

A second table (Table 5-22) contains 45 entries of "Reported Exposure Incidents and Results" from 1944 to 1983. The sources of information for the list in Table 5-22 are primarily Health Division reports.

Background. From 1996 to 1998 this author (K.S.) had access to a LANL Occurrence Reports Collection maintained in a non-classified vault at TA-35 under the custodianship of William Inkret and John Voltin of ESH-12. The focus of the research was environmental releases from LANL during the 1970's. To determine the proportion of all reported occurrences which involved environmental releases of radioactive materials, cursory notes were also taken on all "worker-only" occurrences between 1970 and 1980. In addition, for a grant proposal to NIOSH in collaboration with colleagues at the University of New Mexico, this author also took cursory notes on occurrences in 1985 and 1990. Finally, in investigating thyroid cancer in Los Alamos County, notes were also

taken on environmental releases potentially involving fission products in the mid- to late-1960's.

The Occurrence Reports Collection at TA-35 is a paper collection, organized chronologically in binders labeled by year. Its contents span the period of the Lab's founding in the early 1940's during the Manhattan Project to the early 1990's. In 1991, the DOE's electronic occurrence reporting system became operational and the paper collection lapsed.

Most, if not all, of the reports in the ORC at TA-35 were prepared by Los Alamos managers to comply with regulations and administrative orders issued by the AEC and its successor agencies for the reporting of occurrences. Most reports are about five pages in length. A standard reporting form, adapted from a form in use at Hanford, was introduced in 1972, but it did not gain uniform use thereafter. Many reports are in the form of internal memos, usually from group leaders, with attached sampling results and official correspondence. In the early 1970's the Group Leader of H-1 (Health Physics) urged his subordinates to "investigate all contamination incidents in detail," regardless of whether they met the formal AEC reporting requirements.[48] This policy affirms the impression that the ORC at TA-35 includes a large number of "off-normal" incidents. On fewer than five occasions in the 1970's were full-scale investigations of a particular "Type A" occurrence conducted. These resulted in final reports longer than 100 pages.

Analysis of Selected Years. Based on this author's first-hand experience in the ORC at TA-35, it is apparent that Tables 2-4 and 5-22 of the site profile document do not take account of numerous worker contamination episodes. Here, a lower bound estimate is developed for the additional occurrences likely involving worker radiation contamination

which might be obtained if NIOSH and ORAU were to thoroughly utilize the ORC at TA-35. A thorough search and retrieval of this collection would bring to light many additional worker radiation contamination episodes.

This analysis is limited to the following years:

1970 to 1980

1985

1990

because these are the only years' occurrences on which this author took notes when in the vault at TA-35. In each of these years, the number of occurrences known to have involved radioactive materials is shown in column 5 of Table 3. This excludes a relatively small number of traumatic injuries and fatalities, "near misses" involving physical dangers (e.g., lock-out), breeches of security fences, and incidents involving non-radioactive substances.

Occurrences which involved radioactive materials and are likely to have resulted in worker contamination are tallied in column 6 of Table 3. Included among these incidents are nose swipes, elevated air sampling results, contamination of personal articles and effects, and/or reports with descriptors such as "significant." Incidents involving depleted uranium are also included. Table 4 gives illustrative examples of the kinds of incidents that are tallied in column 6 of Table 3.

The numbers in column 6 of Table 3 are likely to be underestimates for two reasons. First, this author's notes are cursory when it comes to the details of "worker-only" contamination incidents. Second, the numbers in column 6 exclude incidents for which this author's notes indicate only that a "spill" had occurred in the work area. In

some "spills" surface counts were on the order of 10^5 cpm. Modern exposure modeling techniques might yield significant doses which influence IREP calculations under EEOICPA.

The difference between the number of occurrences provided by the site profile (Table 3, column 4) and those in the ORC likely involving worker radiation contamination (Table 3, column 6), is shown in column 7 of Table 3. This represents a lower bound estimate of the additional occurrences which might be obtained for just the 13 years analyzed if NIOSH and ORAU were to thoroughly utilize the ORC at TA-35.

A rate of 64 additional occurrences in a 13 year period is roughly five per year. Extrapolated to the other 34 years of operation from 1944 to 1991 this translates into 170 more occurrences involving worker contamination with radioactive materials which could be utilized in dose reconstructions if the ORC at TA-35 were to be thoroughly utilized. All told, at least 230 new occurrences would be obtained from this paper collection between 1944 and 1991.

Occurrences in Other Years. Table 5 of this report shows 35 occurrences which are not listed in Table 2-4 or Table 5-22 of the site profile document. The occurrences in Table 5 were obtained from the following sources:

A. Occurrence Reports Collection at TA-35 (author's notes)
B. Files of the Joint Committee on Atomic Energy in the National Archives in Washington, D.C.
C. LAHDRA repository at UNM-Albuquerque's Zimmerman Library
D. Author's June 2003 Freedom of Information Act request for the entire ORC at TA-35 (only the first 250 pages were provided, covering 1944-1950)

In no way does Table 5 purport to be comprehensive. Rather, it is intended to give the reader a qualitative appreciation of the large number and wide variety of contamination

incidents. LANL routinely documented many such incidents. But the Lab's historical documentation is not currently being tapped for dose reconstructions under EEOICPA.

Use of Occurrence Reports in Dose Reconstruction. It cannot be assumed that copies of occurrence reports were routinely added to individuals' medical records. Numerous workers and survivors have voiced frustration upon reviewing their supposedly "complete" medical records from LANL, only to find key pieces of documentation missing – occurrence reports, finger ring dosimetry data, internal biosassay results, etc.. Importantly, the reports in the ORC at TA-35 contain individual identifiers such as names, Z-numbers, and group affiliation (e.g., Zia, MP Division, etc.). These reports could be used to improve the quality of dose reconstructions in several ways. First, and most obvious, the listing of an individual's Z-number in an occurrence report is conclusive evidence of the worker's presence at an incident where a dose was likely incurred, a dose which may not be documented elsewhere. In particular, this applies to internal radiation doses received in contamination incidents taking place before the bioassay program was fully implemented. According to the Tiger Team report (see Section 1) the bioassay program was not fully implemented as late as 1991.

Second, in cases where the interviewee describes an incident but is unable to provide precise dates, the ORC at TA-35 should be mined in pursuit of contemporaneous documentation. For example, an individualized docket notebook was compiled for an EEOICPA leukemia claimant[32] using the "Surrogate Incident Report" form in Appendix C. Its purpose was to alert dose reconstructionists to the possible availability of documentation for incidents which the worker recalled from memory. Third, exposures resulting from incidents which were never documented, but are described in sufficient

detail by interviewees, could be quantitatively modeled using similar incidents documented in the ORC at TA-35.

Conclusions. A comprehensive search and retrieval of the ORC at TA-35 should be performed by NIOSH and ORAU. Names and Z-numbers should be extracted, indexed, and linked to the primary occurrence reports. Until this valuable source of information is accessed and utilized systematically in the performance of dose reconstructions, LANL claimants cannot have confidence that their individualized dose reconstructions are truly "claimant friendly." Involvement in an occurrence was a significant and often stressful event in a worker's career at the Lab. Some were life-threatening. A truly "claimant friendly" dose reconstruction process would leave no stone unturned in locating documentation of such incidents.

Addenda.

Occurrence Reports Can Supplement Bioassay Data that Are Missing or Suspect.

Chapter 5 (p. 11) of the site profile document on internal dosimetry states:

> "At the time of this technical basis document, LANL had submitted bioassay data for only a few individuals. Only summary dose reports have been submitted for all claims. The submitted bioassay results were for plutonium only and in an interim format excerpted from the current database. The format of these results is not the final format expected for the data. All descriptive information provided in this document is *based on speculation* of the final format of the data that will eventually be supplied." [emphasis added]

A worker or public interest scientist experienced in seeking data from DOE contractors would draw the following logical inferences. First, LANL has not provided bioassay data on a timely basis, despite the public finding in NIOSH's 2004 report to Congress that the

lab was "not consistently providing adequate responses to data requests for dose reconstruction."[25] Second, the data submitted are no longer in the form of primary documentation, having been entered into a LANL database and reformatted. Third, the format in which some data have been provided is a further impediment to NIOSH's ability to perform dose reconstructions. Fourth, NIOSH can't be sure the agency will receive the necessary information – hence, the rest of Chapter 5 is "based on speculation."

This further underscores the importance of NIOSH and ORAU thoroughly utilizing the ORC at TA-35. Many occurrence reports include primary documentation of bioassays on contaminated workers. The public will have little confidence in dose reconstructions based on data that has been extensively re-worked – with its release long delayed – by LANL. A portion of the dose reconstructions should be audited to ascertain whether reliance on primary documentation yields probability of causation intervals that are systematically different from those obtained when data reformatted by LANL is used.

Beyond Occurrence Reports: RCT Log Books. Participants at the June 18 meeting in Espanola organized by ATL International, as well as subsequent interviewees, emphasized the vitally important information contained in another record series: the daily "log books" of radiation control technicians (RCTs; also known as "health physics technicians").

"Many incidents were not reported up the chain of command," a former worker explained, "nor would they be found in any incident reports. The only record would be a note in the daily RCT log book."[49]

In addition, "On many clean-ups only the RCT wore a film badge. Whatever reading they received was considered to be the same for everyone involved."[42] This common approach to monitoring clean-up workers was obviously flawed. Every spill had "hot spots," resulting in variation in worker exposure. RCTs were typically the least exposed since their job did not involve hands-on clean-up tasks. Use of the RCT's badge reading as a proxy for all workers on the clean-up job casts doubt on doses recorded in all secondary sources of data. This underscores the importance of accessing the RCT log books.

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

Introduction. A sociopolitical process involving workers' and citizens' organizations in New Mexico, and across the United States, led to passage of EEOICPA in 2000. [13, 14, 50-52] These organizations have continued to provide leadership on EEOICPA implementation and technical assistance to selected individual claimants. This author (K.S.) was involved in developing the formal comments of the Los Alamos Project on Worker Safety on the NIOSH dose reconstruction rule, as well as several related legislative, regulatory and technical assistance initiatives.

These activities fall within the ambit of public interest science, which the Association for Science in the Public Interest defines as:

> "[R]esearch carried out primarily to advance the public good. Key characteristics distinguishing public interest science from other science include the following:
>
> * The primary beneficiary is society as a whole, future generations, or a specific 'public' unable to carry out research on its own behalf;
>
> * Research outcomes are freely available, that is, not patented, proprietary, or requiring proprietary means to access;
>
> * Research outcomes are developed in consultation or collaboration with members of the public; and
>
> * Any assumptions or values underlying or providing a context for the research are made explicit." [53]

Many citizens form their opinions about health risk issues on the basis of positions taken by organizations they trust.[54] Public interest and citizens' organizations employ or collaborate with scientists who independently review and critique the basis for the actions

of government agencies. Access to the complete docket of agency criteria documents, memoranda, and technical reports is the *sine qua non* of good public interest science.

Analysis of the Accessibility of Information Sources Cited in the Site Profile. Department of Energy facilities have long been inhospitable venues for the practice of public interest science, due to policies restricting the public availability of documents which form the basis for agency decisions. In addition to bona fide classification for national security reasons, there are several less clear-cut reasons why documents may be unavailable to the public:

- documents "born classified" in the era of the Atomic Energy Commission [55, 56]
- "unclassified controlled nuclear information" (UCNI)
- "sensitive" information[57]
- "official use only"
- re-reviews of documents previously available to the public[58]
- unexplained restrictions

To evaluate whether the NIOSH site profile process at LANL is amenable to a public interest science approach, the public availability of all 254 sources cited in the site profile document was analyzed.

Methods. Between July 26 and August 8, 2005 three visits were made to the Oppenheimer Study Center (the main library at LANL), and one visit to the Zimmerman Library at the University of New Mexico (which serves as a repository for LAHDRA documents). At LANL the public computer terminals were used to search the following

online sources to determine the public availability of cited sources in the site profile document:

1. LANL Library's online catalogue (http://library.lanl.gov/)
2. Energy Citations Database (http://www.osti.gov/energycitations/)
3. DOE's Opennet database (https://www.osti.gov/opennet/)
4. CDC-ChemRisk LAHDRA database (http://www2.cdc.gov/nceh/radiation/LANL/default.htm)

The visit to UNM's Zimmerman Library was necessary to resolve ambiguity over the availability of specific Health Division Progress Reports which are cited in Chapter 5 of the site profile document.

Results. Journal articles, published conference proceedings, DOE orders and published books account for the 35.0% (N=89) of cited sources which are available in the open literature (Table 6).

Although cited LANL technical reports ("LA-") usually had entries in the LANL Library's online catalogue, they were almost uniformly inaccessible to the public. They are maintained at the Oppenheimer Study Center in one or more of the following formats:

- PDF file "Access restricted to selected government agencies"
- Microfiche collection
- Technical reports collection

Only LANL technical staff have access to these materials at the Oppenheimer Study Center. An exception was one item found on the open shelves of the Library.

DOE's Opennet and the CDC-ChemRisk database were both created in response to public and worker health concerns at DOE facilities. Together, these databases could

be relied upon to provide 27.1% (N=69) of the cited sources not available in the open literature.

DOE's Energy Citations Database (ECDB) had just two (0.8%) of the cited sources as full-text (PDF) documents available for download to the public. According to ECDB 16 (6.3%) of the cited sources not otherwise available can supposedly be purchased from the National Technical Information Service (NTIS). However, the NTIS web site's search function (http://www.ntis.gov/search/advanced.asp) is not amenable to documents published prior to 1990. Older LANL technical reports would therefore require that a customized query regarding availability be submitted to the NTIS technical staff. Moreover, a fee will be charged for each report.

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)

Example: Population Dose. One of the 78 cited sources which is not publicly available has ramifications far beyond the site profile process. In Chapter 6 ("…External Dose") the following cited source:

> LANL 2004. Annual worker deep, neutron, shallow and collective dose values supplied by LANL for 1944 through part of 2004. July 26 and July 29, 2004 *[NB: no "LA-" number]*

is not publicly available. Yet it sharply contradicts the public record of workers' collective doses at LANL, established by the report series "Radiation Exposures for DOE and DOE Contractor Employees" which has been issued annually for over 30 years.

This author (K.S.) had on file data from selected years' DOE reports. Total numbers of employees (EEs) of UC and Zia, as well as visitors who were monitored, are provided. As shown in Figure 1, the numbers used by the site profile based on LANL (2004) do not agree with either the total number of persons monitored (includes visitors) or the number of UC plus Zia employees monitored ("EEs only") in the annual DOE report, except in 1975.

Further, Figure 2 shows the percent discrepancy between the population doses in the two sources of information. The annual population doses reported in LANL (2004) is systematically lower than that for reported in the annual DOE report for UC plus Zia employees (except 1987-9). Person-rems, a basic metric of population dose, has long been used by public health decision-makers in assessing and prioritizing concerns among nuclear facilities. For the site profile document to sharply contradict this public record without a word of explanation is naive. One possibility is that the Lab's numbers were developed subsequent to the alleged "purging" of Zia employees' dose records (Meeting Transcript, p. 27).

Caveats. More than 30 university and public libraries in the United States were part of the AEC depository system for technical reports.[59] These libraries received microfiche copies of many LANL technical reports. Under DOE, many of these libraries have continued to receive microfiche versions of technical reports from major facilities like LANL. It is theoretically possible that some of the 78 cited sources which are otherwise

unavailable could be found on microfiche at selected AEC depository librarires. However, this author's (K.S.) experience at the Massachusetts Institute of Technology and UNM's Centennial Library revealed the AEC depository collections to be incomplete and poorly maintained. Harvard's AEC depository collection could not be located by library staff in response to this author's persistent inquiries in 1996.

It is unlikely that there is a single university library anywhere in the United States where a public interest scientist would be able to retrieve all of the "LA-" technical reports in order to critically review how the cited sources were actually interpreted by the author of the site profile.

Conclusions. Despite the seminal role of citizens' and workers' organizations in successfully advocating for adoption and implementation of EEOICPA [13, 14, 31, 60], these organizations cannot now undertake a meaningful public interest science approach to the NIOSH site profile process at LANL. Thirty percent of the documents cited in the site profile are not available to the public. Moreover, for the 17.7% of documents which are available at UNM Zimmerman Library, photocopying charges and travel costs are entailed. NTIS's page and shipping costs for the 6.3% of documents not available elsewhere are non-trivial. Thus, in effect, one-third to one-half (i.e., 30.7% + 17.7% + 6.3% = 54.7%) of the basis for the NIOSH site profile document cannot be scrutinized using a public interest science approach on behalf of the very organizations that advocated for EEOICPA's passage.

CONCLUSIONS

The sociopolitical process which led to EEOICPA's passage in 2000 has entered a phase dominated by technical and administrative specialists in dose reconstruction and claims processing. The site profile process provides a public window into the interaction between federal agencies and LANL over access to information on past radiation exposures. Problems with access to information for dose reconstructions at LANL were not unanticipated, in light of past controversies between LANL and others with legitimate claims to health- and exposure-related data.

However, this author (K.S.) never anticipated the legerdemain by which the "ought" of LANL technical reports and SOPs would be repackaged for NIOSH into a purported profile of what "is" (or was). The site profile document disregards independent, critical analyses of worker safety and health at LANL, even those from highly-sanctioned, reputable sources like the Tiger Team and the DOE Inspector General's Office.

A desultory approach to utilizing the voluminous Occurrence Reports Collection at TA-35 is unconscionable. Numerous contamination incidents which are not likely to be documented in claimants' medical records are readily accessible at TA-35 to researchers and contractors. National security is not the issue. This author (K.S.) has never held a security clearance, but was allowed to use the collection from 1996 to 1998 with a badge provided by the DOE Area Office. Unlike some other record collections at LANL which have been exhaustively searched by the LAHDRA project team, the ORC at TA-35 contains no extraneous information. Under a conservative estimate presented in Section 2 of this report, more than 230 occurrence reports of radioactive contamination of

LANL workers prior to 1991 could be obtained by a thorough search and retrieval of the ORC at TA-35. The ORC at TA-35 also holds the potential for basing LANL dose reconstructions on primary documentation. This would provide a quality check on dose reconstructions performed with dosimetry data which LANL has only provided only after long delays and re-formatting.

Especially grievous are newly proffered but never published retrospective numbers from LANL for the total persons monitored and population dose (person-rems). Until now, the official record has been an annual report which DOE has published for more than 30 years. 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" (Meeting Transcript, p. 27).

The fact that the site profile document cannot be scrutinized using a public interest science approach exposes a fundamental lack of public openness in the dose reconstruction process. The site profile process is associated with the Advisory Board on Radiation and Worker Health, a federal advisory committee. The public interest science movement has grown up on the terrain of federal advisory committees where scientists advise federal decision-makers on issues of public importance.[61, 62] Although the draft site profile document is available on the Internet, one-third to one-half of the 254 cited sources are unavailable to the public. These cited sources are not classified documents. They have nothing to do with weapons design, but everything to do with radiation workers' health.

Little has changed for LANL workers and families, despite passage of EEOICPA with New Mexico political leaders at the helm. The Lab's "official line" continues to prevail, due to health agencies' and contractors' willful disregard of information that deviates. Having failed to aggressively pursue one of the most germaine sources of *documentary* information (the ORC at TA-35), a contractor now seeks to enlist former workers to voluntarily attend meetings for the purpose of eliciting largely *anecdotal* information (Meeting Transcript, p. 19). And Chapter 5 of the site profile document is based almost entirely on "speculation" that data will be forthcoming.

"The cavalry is coming. The cavalry is coming," a local leader in Hurricane Katrina was told by federal officials, as rising flood waters inexorably drowned residents of a nursing home. Analogously, the "Cold War heroes" of Los Alamos have been told repeatedly that the information needed to reconstruct their radiation doses will soon be forthcoming. This author (K.S.) expects rebuttals to this report to emphasize "new developments since June 2005," in which the Lab is showing signs of "turning over a new leaf," etc.. But, with past experience as a guide,[23, 24] in about 18 months no one will be surprised to learn that NIOSH is *still* not getting the information needed to reconstruct doses. One thing is certain. More LANL cancer claimants will be dead, along with their families' faith in the government program for which they campaigned. At the beginning of the twenty-first century a federal public health agency should not be providing the kind of leadership which leaves citizens thinking that inexorable death is the likeliest outcome.

The term "regulatory capture" describes a process whereby government regulators come to be dominated by the industries they are supposed to regulate. NIOSH is not a regulatory agency; it has an investigatory role under EEOICPA. So a more appropriate

term might be "investigatory surrender." In its current form, the site profile document represents investigatory surrender because it is captive to the Lab's idealized version of "ought"; an audience of Lab managers will be assuaged that recommended dosimetry procedures were routinely followed.

- Will NIOSH and ORAU incorporate into the site profile document insights and facts contained in widely available reports which *critically* evaluate radiation worker safety and health practices at LANL?
- Will NIOSH and ORAU *aggressively* pursue occurrence reports at TA-35?
- Will NIOSH and ORAU seek to resolve discrepancies between the official public record of DOE annual reports and the Lab's newly proffered but never published retrospective numbers of the total persons monitored and population dose? Is the discrepancy related to the *alleged "purging"* of Zia workers' records? (Meeting Transcript, pp. 9-10)
- Will resources be made available for organizations that advocated for EEOICPA to participate on the terms of public interest science?
- Above all, *how long* will "speculation" as to the future availability of data be allowed to continue before NIOSH determines that doses cannot be reconstructed?

Overt surrender might be the most claimant-friendly outcome. A statement by NIOSH that it cannot obtain timely information needed for dose reconstruction would provide a basis for including LANL workers in the SEC. As a first step, NIOSH should regularly present data to the Advisory Board on Radiation and Worker Health on LANL

claims for which doses could not be reconstructed, showing the technical areas and eras of employment. On-the-record updates on access issues at LANL are also needed.

Interminable, obsequious investigation is a roadblock to fulfilling the objectives of EEOICPA for LANL workers and families. Conceiving of the site profile document as "a living, breathing document" (Meeting Transcript, p. 19) is morally akin to playing an endless audio loop of the sound effects of approaching hoof beats. The sham cavalry never arrives to help the citizens. Because new information is always "just around the bend" as it were, those of us who are mulling petitions for including LANL workers in the SEC must give pause. This would-be SEC petitioner (K.S.) does not relish the public humiliation of basing a well-honed petition on the current version of the site profile document only to have "newly released" information materialize in defense of the Lab's past dosimetry practices.

Governments have long been able to force "official" versions of history onto society, even when evidence to the contrary is abundant and widely available.[63] As one who counts among his most esteemed colleagues and teachers many NIOSH staff and grantees -- and well remembers how NIOSH scientists lent a willing ear to LANL workers' concerns in 1998 and 1999 -- it is this author's heartfelt wish that NIOSH not be complicitous in such a grave injustice.

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Tables and Figures

TABLE 1. SPECIAL EXPOSURE COHORT

Group	Basis for Inclusion	Minimum Employment	Era	Additional Criteria
MEMBERS				
Gaseous Diffusion Plants (Oak Ridge, Paducah, Portsmouth)	EEOICPA statute (2000)	250 days	before 2/1/92	were or could have been badged
Amchitka (Long Shot, Milrow or Cannikin tests)	EEOICPA statute (2000)	None	before 1/1/74	exposed to radiation
Mallinckrodt Chemical Works, Destrehan St. Facility (St. Louis, MO)	petition granted	250 days	1942-1948	
Iowa Ordnance Plant, Line 1	petition granted	250 days	3/49-12/74	
Y-12 Plant Uranium enrichment, Building 9201-5, Beta Building	petition granted	250 days	1944-1947	

UNDER REVIEW				
National Bureau of Standards, Radioactivity Lab, Building #2 (Washington, D.C.)	1943-1952			

OTHER PETITIONS "QUALIFIED FOR EVALUATION"	**Era**	**Workers**		
Rocky Flats	1952-2005	All workers represented by Steelworkers Union		
Y-12 Eastman		lab equipment cleaning work		
Pacific Proving Ground	7/1-8/31/58	Operation Hardtack		

UNSUCCESSFUL PETITIONS (“NOT QUALIFYING FOR EVALUATION”)

LANL – withdrawn by petitioner

Multiple Facilities Nationwide – petitioner status could not be determined

Oak Ridge K-25 – already included

Paducah - uncelar

TABLE 2. Radioiodine Experiments at LANL (excerpted from DOE's 1995 report, "Human Radiation Experiments: The Department of Energy Roadmap…")

Experiment's Serial Designation	Number of Subjects	Route of Administration	Subjects
LANL-7	17	oral	Normal of ill male or female, ages 10-57
LANL-9	26	oral	Adults: 17 females, 10 males. Children: 3 girls, 3 boys
LANL-10	4	Skin	2 employees
LANL-11	28	Injection	10 normal, 18 liver disease
LANL-14	unspecified		
LANL-19	8		Adults
LANL-20	2		Female
LANL-23 "in about 1963"	19	I-125, I-131	
	Total: 104+		

TABLE 3. Lower Bound Estimate (last column) of the Number of Additional Occurrences Likely Involving Worker Radiation Contamination (for selected years) Obtainable by a Thorough Search of the Occurrence Reports Collection at TA-35 (ESH-12)

	Site Profile Document			Silver's Research Notes from ORC at TA-35 (1996-8)		
Year	**Table 2-4**	**Table 5-22**	**Sum**	**Radioactive Materials Involved**	**Likely Worker Radiation Contamination**	**Net Additional Occurrences**
1970	2	0	2	25	4	2
1971	1	1	2	19	6	4
1972	1	2*	3	34	12	9
1973	0	2*	2	69	13	11
1974	0	0	0	30	10	10
1975	1	0	1	31	?	?
1976	0	0	0	50	10	10
1977	2	10	14	57	14	0
1978	0	2	2	30	11	9
1979	2	1	3	44	6	3
1980	0	3	3	33	5	2
1985	0	0	0	37	1	1
1990	0	0	0	30	3	3
		Totals:	**32**	**489**	**95**	**64**

*Table 5-22 lists a total of four incidents in 1972-3. For compatibility with the analysis performed here, it was assumed that two incidents occurred in each year.
? Author's notes on "worker-only" occurrences in 1975 were too cursory to allow an estimate

TABLE 4. Illustrative examples of incidents documented in the Occurrence Reports Collection (TA-35, ESH-12) which involved worker contamination with radioactive materials (1970-1980, 1985, 1990)

Date	Tech Area/Location	Description
January 5, 1970	52	five workers counted for I-131 exposure
July 31, 1971	SD-6	Worker's high badge readings
November 2, 1972	TA-21, DPW	Finger rings, one >25 rem/Q4; Pu-238 through non-Pb glove
December 5, 1972	TA-15, Phermex	Three people > 1.0 rem
October 11, 1972	TA-21, 21-213	Worker sprayed with Pu-239
September 14, 1973	TA-21, 401W hot cells	110 mR gamma
November 15, 1974	TA-33, Building 86, Room 9	Tritium to room, worker 3.43 rem
May 8, 1974	TA-53	Three badges 5 to 10R
February 27, 1974	TA-53, A-2 target	Dermatitis
January 30, 1974	TA-33, Building 86	3 rem in first quarter, tritium
May 18, 1976	TA-53, MPF1, D125	C-11 lungs due to air plenum
April 26, 1976	TA-21, Building 5, Room 500A	Pu-239, U-235, operator highly contaminated
February 4, 1976	TA-3, CMR	Fire inspector contaminated
May 31, 1977	TA-21, Building 5, Room 500	9.81 rem badge
March 9, 1978	TA-21, Building 4, Room 401W	35 rem badge Co-60
August 12, 1978	TA-53, Area B, BR	Neutron exposures
January 15, 1979	TA-3, Building 16, Neutron Room	128 mR to badge; Pu-238 source misplaced
September 12, 1985	TA-55, PF4 Room 429	Pu-239, some "significant," metal prep line
April 1, 1990	TA-55, PF4	High worker badge readings
May 30, 1990	TA-53, MPF3	Isotope production workers

TABLE 5. Selected occurrences not reported in site profile document

Date	Tech Area	Description	Source
March 8, 1945	1	Po source resulted in "extremely high hand counts" due to poor packaging of shipment	D
September 26, 1945	1	fire in contaminated pit; smoke "contaminated badly"; urinalysis	D
November 28, 1945	1	Po source contaminated Gamma Building, Room 76	D
March 29, 1946	1	two plumbers exposed to Po source in W Building	D
May 3, 1946	1	chemical explosion spread Pu contamination in Building D	D
June 1, 1946	21	nose counts and second hand account of accident by Dean Meyer	D
July 11, 1946	1	Pu metal turnings caught fire in room D-317, "very high contamination"; nose counts	D
July 19, 1946	1	hand wound in chemical operator 8,000 c/m	D
December 19, 1946	21	hand wound from Po-contaminated glassware 265.7 c/m	D
October 1, 1947	21	pipefitters contaminated; nose counts	D
November 7, 1947	21	radioactive solution sprayed in faces of two operators; nose counts	D
November 12, 1947	21	hand wound 900 c/m	D
July 20, 1948	1	Pu-249 solution spilled in Building D; two workers contaminated	D
September 14, 1948	1	worker contaminated in cleaning operation; nose counts	D
November 14, 1949	unk	Pu-249 thumb contamination to 20K c/m	D
March 10, 1950	K-Site	worker contaminated; elevated urine counts	
March 25, 1950	1	hand would cleaning glassware in Building D; to 1,500 c/m	D
July 5, 1950	10	member of decontamination crew overexposed to gamma radiation	D
July 24, 1950	R-Site	two accelerator workers "showed a gamma exposure so high as to be essentially unreadable on Eastman Type K film"	D
August 11, 1950	2	Omega site worker exposed: 1.6 r gamma body badge; 5.0 r gamma wrist	D
October 3, 1950	21	"extreme contamination" of worker opening tape sealed can of Pu; prompts investigation of earlier incident involving three more workers	D

January 15, 1960	3	"a glass bottle containing a plutonium solution ruptured violently," resulting in elevated nose counts in three chemists; room counts	B, C
October 7, 1960	TX-NM	tritium container leaked en route from TX to LASL, contaminating three couriers	B
January 11, 1963	33	"exposure problem at TA-33." Destruction of memo March 30, 1972 by C. Buckland due to "confidential RD"	A
April 22, 1964	21	explosion and fire in rag incinerator damaged filters. spread to adjoining hood; U-235; room counts	A
February 16, 1965	33	release to atmosphere; refers to March 4, 1965 classified memo	A
April 15, 1966	P-9 accelerator	1,200 Ci tritium released	A
October 26, 1967	3	650 Ci tritium released	A
February 7, 1968	3	300 Ci tritium released	A
October 28, 1968	21	Room 500 DP West contaminated incident	A
March 3, 1969	21	chemical fire during leaching of U-235 filter	A
June 26, 1969	21	explosion in incinerator burning U-235 metal turnings; dust in Room 313	A
July 30, 1969	21	CMB 11 worker with elevated nose counts upon opening a can containing Pu metal inside a ruptured plastic bag	C
September 22, 1969	21	Pm-147 contamination of open glove box; room counts	A

Sources: A: ORC at TA-35 B: JCAE at National Archives C: LAHDRA D: FOIA June 2003

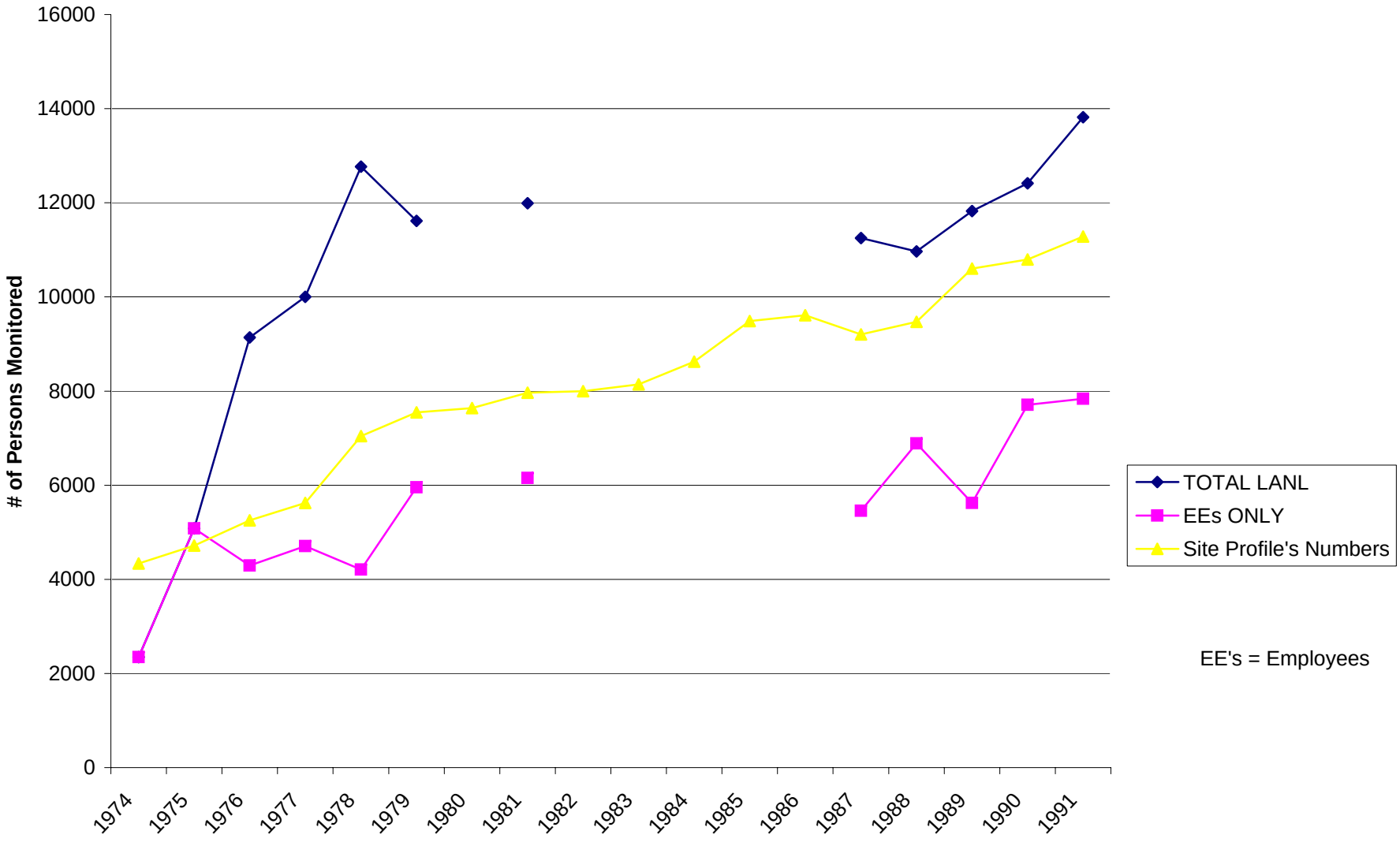
TABLE 6. Analysis of the Availability of Sources Cited in the LANL Site Profile

		Available from…					
Chapter	**No. of citations***	**Open Literature**	**DOE's OpenNet**	**CDC Chem Risk**	**Library or online full text**	**NTIS**	**Not Available**
2	42	10	2	19	1	6	3
3	29	16		3			10
4	21	11		12			
5	106	30	17	15			46
6	62	23	5	4	1	10	19
Totals	254	89	24	45	2	16	78
%		35.0%	9.4%	17.7%	0.8%	6.3%	30.7%

*Corrected for citations which appear in multiple chapters

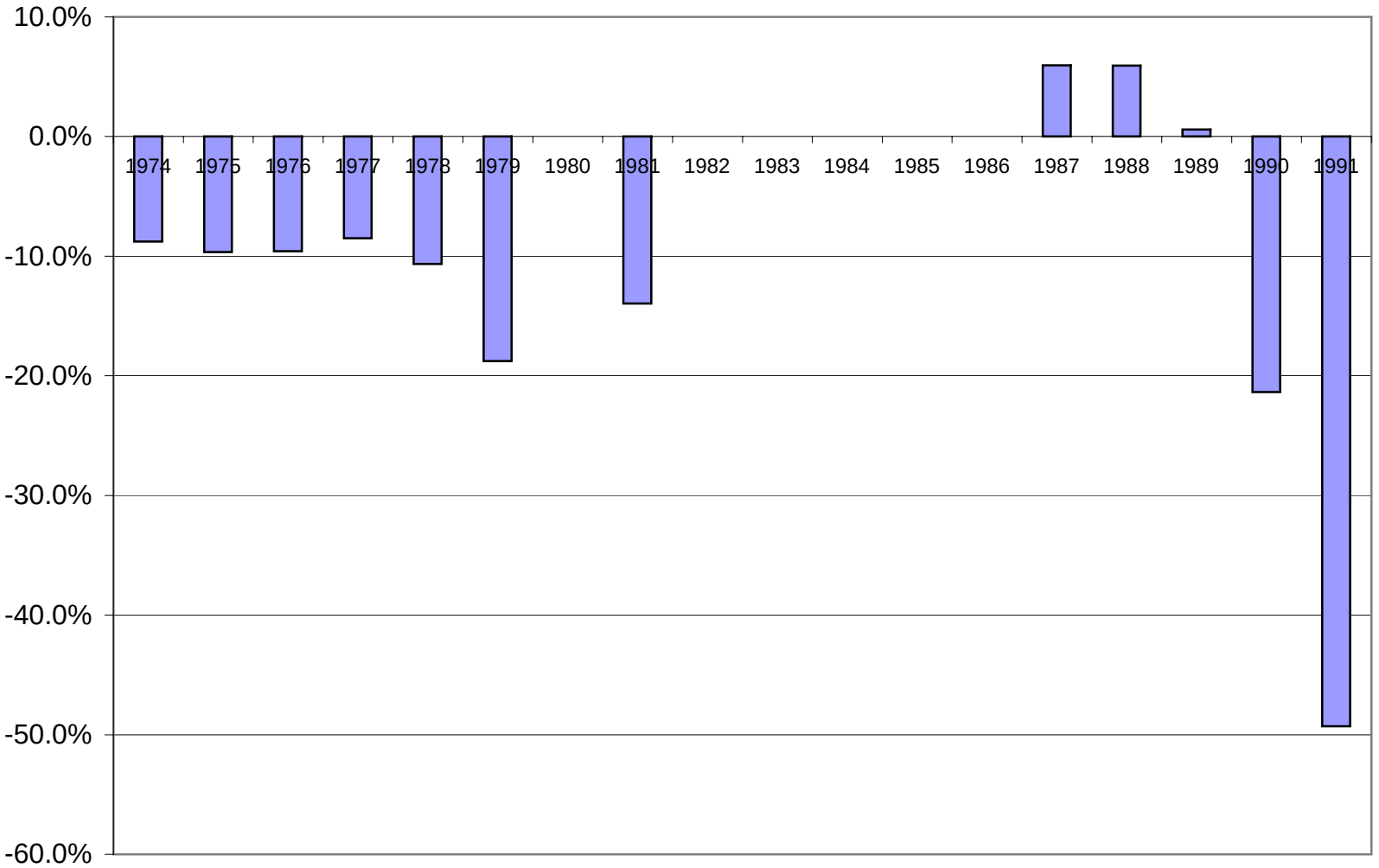
Figure 1. Number of Persons Monitored for External Radiation

("Radiation Exposures for DOE…" annual report vs. Site Profile's LANL [2004] cited source)



EE's = Employees

Figure 2. Percent Discrepancy Between Reported Person-Rems: Site Profile's LANL (2004) Relative to "Radiation Exposures for DOE…"



Appendix A

UNIVERSITY OF CALIFORNIA
LOS ALAMOS, NEW MEXICO 87545
Telephone Ext:

OFFICE MEMORANDUM

TO : Records Storage Section, ISD-5, MS-322 DATE: May 5, 1978

FROM : Esther Dorsey, H-1

SUBJECT : RECORDS RETRIEVAL

SYMBOL : H-1

MAIL STOP: 401

Please send the following folders to me at TA-3-422, Room 101:

Location: TR #2272, RMC, R-4, E-Bay, B-125

1. H-1 Intra-group Memos & Reports - 1965
2. Radiation & Contamination Surveys of Misc. Bldgs., Sites, etc. - 1965
3. H-1 Decontamination Memos & Reports - 1965
4. Misc. Accident Reports - 1965

Location: TR #4472, RMC, E-Bay, Row 4, Box 121

1. Monthly Progress Reports - 1965 (Conf. R.D.)

FORM 547 SM 1-78

THE LOS ALAMOS SCIENTIFIC LABORATORY
UNIVERSITY OF CALIFORNIA
RECORDS CENTER
REQUEST FOR SERVICES — DOCUMENT RECEIPT

This No. Must Be Referred To in All Communications.

No. 20272

REQUESTING OFFICE	REQUESTING INDIVIDUAL		
H-1	ESTHER DORSEY (DELIVER TO CHARLES BLACKWELL)		
ROOM NO. AND BLDG.	TELEPHONE	MAIL STOP	HOW REQUESTED (CHECK ONE)
TA-3-422-102	4127	401	___PHONE _X_WRITING ___PERSON

DESCRIPTION OF RECORDS	CLASSIFICATION	LOCATION
TR-1237: H-1 MONTHLY PROGRESS REPORT 12/21/56 THRU 12/20/63 (1 FOLDER)	SECRET	E-BAY ROW-5 BOX-79
TR-449: MONTHLY REPORTS, CM AREAS, 1957 (1 FOLDER)	SECRET	E-BAY ROW-6 BOX-47
TR-311: MONTHLY REPORTS 1946 (1 FOLDER)	CONF	E-BAY ROW-6 BOX-36
" " 1947 "	SECRET	" " "
" " 1948 "	SECRET	" " "
" " 1949 "	SECRET	" " "
" " 1950 "	SECRET	" " "
" " 1951 "	SECRET	" " "
" " 1952 "	SECRET	" " "
" " 1953 "	SECRET	" " "
" " 1954 "	SECRET	" " "
" " 1955 "	SECRET	" " "
" " 1956 "	SECRET	" " "

	DATE	TIME	INITIALS	REMARKS
REQUESTED	8/24/78	3:45	PM	
FORWARDED	8/25/78	11:30	JR/AM	
RETURNED	9/8/78	9:15	m	

The attached file is withdrawn from the Records Center. Extreme care shall be taken to insure its safeguarding : return. This file is charged to you for a period not to exceed two weeks. If your need for the file exceeds this per please notify the Records Center, telephone 5079.

RECEIPT

I have personally received from the sender the records as identified above. I assume full responsibility for the s handling, storage, transmittal and return of these records in accordance with existing regulations.

SIGNATURE OF RECIPIENT	DATE RECEIVED
[signature]	8-25-78

COPY FOR RECIPIENT - TO REMAIN WITH FILE

FORM NO. ISD-5-2

RECORDS TRANSFER REQUEST
(Continuation Sheet)

Transfer Req. # 5937

BOX NO.	DESCRIPTION OF RECORDS (Accountability Data if Required)	DISPOSAL AUTHORITY	STORAGE LOCATION
1	Monthly Progress Reports - 1964 Monthly Progress Reports - 1966 Monthly Progress Reports - 1967 Monthly Progress Reports - 1968 Monthly Progress Reports - 1969 Monthly Progress Reports - 1970 Monthly Progress Reports - 1975 RADIATION & CONTAMINATION SURVEYS-MISC. BLDGS.,SITES, ETC.-1975 Memo: Chavez to Stafford, 12/17/75 - Report - Radiation and Contamination Shops Survey Memo: Buckland to McClure, 12/16/75 - Health Clearance While Maintaining and Testing Certain Backflow Preventers Memo: Buckland to File, 10/16/75 - Contaminated Vacuum Pump Memo: Montoya to File, 8/6/75 - Radiation Survey of Area 6 Dump After Removal of Debris Note: Cordova, SD-DO to Riechman, 7/24/75 re contaminated excess items & Note from Buckland to Chief re these items Memo: Gibbons to File, 7/22/75 - Radiation Survey of J-7 Graphic System Memo: Chavez, Zia to Miller, Zia, 6/16/75 - Radiation and Contamination Shops Survey Memo: Buckland to Dist., 6/18/75 - Monitoring of Clean Dumpsters for Alpha & Beta-Gamma After Being Emptied Memo: Blankenship to File, 6/18/75 - H-1 Contamination Survey of Zia Shops on 6/14/75 Memo: Blackwell to Montoya, 5/6/75 - Radiological Survey of Bldgs. 26, 88, 89, 127 at TA-33 Memo: Blackwell to Montoya, 6/3/75 - Radiation Survey of Central Fire Alarm Blad, Tract OO, Eastern Area No. 3 Memo: Amies to File, 6/2/75 - Monitoring Report of M-1 Radiography Inspection, TA-3-43, D-Wing Memo: Pierce to File, 5/28/75 - Radiation Survey of Electron Discharge Over a Spark Gap at TA-18, Bldg.1, Rm. 1 for L-1 SURVEYS OF GOVERNMENT VEHICLES-CLEARANCE OF SURPLUS VEHICLES-1975 Memos: (9) Blackwell to Riechman re Clearance of Surplus Vehicles MONTHLY STACK REPORTS & STACK SAMPLE WORK SHEETS-1975 SAFETY - MEETINGS, COMMITTEES, ETC. - 1975 Minutes of H-1 Safety Committee Meeting - 12/12/75 Memo: Buckland to File, 8/8/75 - Report of Safety Meeting Memo: Buckland to Dummer, 7/29/75 - Report of a Safety Plan for the H-1 General Monitoring Section Memo: Buckland to Members H-1 GM Section, 7/29/75 - The Program to Achieve Safety Consciousness A-1 MEMOS & REPORTS (TA-35-27) - 1975 Monthly A-1 Operations Reports CNC-11 (TA-48) MEMOS & REPORTS - 1975 75-12 75-11 75-10 3 Radiation Occurrence Reports - Dated 7/22/75, 7/11/75, 7/8/75 PAJARITO SITE MEMOS & REPORTS - 1975 (Groups A-2 & A-5) Airborne Contamination Tests Memo: Pederson to Valentine, 8/28/75 - Godiva Dose Study - July 22 - July 31, 1975 Memo: Pederson to File, 7/16/75 - UF_6 (Uranium Hexafluoride) Memo: Pederson to Dist., 5/8/75 - Radiation Dose at TA-18, Outside Ad. Bldg. 30	0230, C-8, Item 15, 75 years, 1/1/2053	RMC, E-2, Box-94

Form No. CRMO-2 (1/81)

LOS ALAMOS NATIONAL LABORATORY
UNIVERSITY OF CALIFORNIA
LOS ALAMOS, NEW MEXICO 87545

RECORDS TRANSFER REQUEST

Page 1 of 2 Page(s)

RECEIVED BY: PRES MARTINEZ
(This certifies that the records described below have been received and stored in the CRMO Records Center)

DATE: 6/18/82

TRANSFER REQUEST NUMBER 7147
(Assigned by CRMO)

DIVISION/DEPARTMENT/GROUP OFFICE: H-1

NAME OF CUSTODIAN: Allen Vallentine

QUANTITY (in cubic feet): 3.00

TO ORIGINATOR : Prepare in triplicate - forward original and one copy to the CRMO Records Center, MS-322; retain a copy in suspense pending receipt of signed copy. (See Section III of the Manual of Office Procedures for further instructions.

THE SENDER HEREBY CERTIFIES THAT APPROPRIATE LOG ENTRIES HAVE BEEN MADE WHICH RECORD THE TRANSFER OF CLASSIFIED ACCOUNTABLE DOCUMEN INCLUDED HEREWITH:

(Signature)

BOX NO.	DESCRIPTION OF RECORDS (Classification if Classified)	DISPOSAL AUTHORITY	STORAGE LOCATION
1	H-1 SECTION PROGRESS REPORTS-SECOND QUARTER-1974 H-1 SECTION PROGRESS REPORTS-FIRST QUARTER-1974 H-1 SECTION PROGRESS REPORTS 1969 H-1 QUARTERLY PROGRESS REPORTS 1970 PROGRESS REPORTS 1970 H-1 QUARTERLY PROGRESS REPORTS 1971 H-1 QUARTERLY PROGRESS REPORTS 1972 H-1 QUARTERLY PROGRESS REPORTS 1973 QUARTERLY PROGRESS REPORTS FROM GROUP H-1 SECTIONS 1973 8501 ACTIVITIES REPORTS-1973&1974 H-1 SECTION PROGRESS REPORTS 1974 SECTION PROGRESS REPORTS FOURTH QUARTER-1974 QUARTERLY PROGRESS REPORTS H-1 GROUP OFFICE-1974 QUARTERLY PROGRESS REPORTS H-1 GROUP OFFICE-1975 H-1 3RD QTR 75 JULY-SEPTEMBER 1975 H-1 4TH QTR 75 OCTOBER-DECEMBER 1975 H-1 1ST QTR 76 JANUARY-MARCH 1976 H-1 2ND QTR 76 APRIL-JUNE 1976 H-1 3RD QTR 76 JULY-SEPTEMBER 1976 H-1 4TH QTR 76 OCTOBER-DECEMBER 1976 H-1 1ST QTR 77 JANUARY-MARCH 1977 H-1 2ND QTR 77 APRIL-JUNE 1977 H-1 3RD QTR 77 JULY-SEPTEMBER 1977 H-1 4TH QTR 77 OCTOBER-DECEMBER 1977 Note: All these reports were filmed on 5/20-28/82 and the microfiche resides in the H-1 Group Office.	DOE 1324.2 SCH C-16 ITEM 8(1)b 6 YEARS 7/1/88	RMC, E-BAY ROW-8 BOX-129
2	H-1 1ST QTR 78 JANUARY-MARCH 1978 H-1 2ND QTR 78 APRIL-JUNE 1978 H-1 3RD QTR 78 JULY-SEPTEMBER 1978 H-1 4TH QTR OCTOBER-DECEMBER 1978 AREA HEALTH PHYSICS MONTHLY REPORT JULY, 1978 AREA HEALTH PHYSICS MONTHLY REPORT AUGUST 1978		BOX-130

DO NOT TYPE BELOW THIS LINE

INDEX: REPORTS(PROGRESS), VALENTINE, ALLEN

ITEM NO.	DESCRIPTION OF RECORDS (Accountability Data if Required)	DISPOSAL AUTHORITY	STORAGE LOCATION
	MISC. BLDGS, SITES, ETC. (Cont'd) Memo: Belcher to Clayton, 7/20/76 - Disposal of Radioactive Material - Richard L. Hermann Case Memo: Blackwell to Montoya, 7/23/76 - Radiation Survey of TA-6-33 and TA-6-34 Memo: Blackwell to Valentine, 7/28/76 - Resurvey of Rear Porches & Concrete Step at 2140 33rd St in Los Alamos SURVEYS OF GOVERNMENT VEHICLES - CLEARANCE OF SURPLUS VEHICLES Memo: Blackwell to Ortiz, 6/9/76 - Contaminated Special Purpose Vehicles Memo: Stafford to Crismon, 7/14/76 - Radiation and Contamination ZIA and LACI Shops Survey Memo: Blackwell to Clayton, 10/28/76 - Assignment of Vehicles That May Be Subjected to Radioactive Contamination MONTHLY STACK REPORTS & STACK SAMPLE WORK WHEETS - 1976	0230, C-8, Item 15, 75 years,	RMC, E-Bay, Row-2, B-94
	URINARY URANIUM-235 - 1977 Memo: ~~Blackwell to Dummer, 2/2/78 - Results of Uranium Urine Sampling for 1976 & 1977~~ PROGRESS REPORTS - 1977 H-I MEMOS & REPORTS (& INTER-GROUP) - 1977 Memo: Elliott to Valentine, 1/12/77 - Contaminated Piece of Equipment from EG&G Memo: Buckland to Storm, 1/12/77 - Exposure to December 1976 Film Badge Issued to Steve W. Bowman, Z-48076, LACI Memo: Buckland to Umbarger, 2/22/77 - Consideration for Routine Maintenance of Civil Defense Radiation Survey Instruments Memo: Valentine to Distribution, 3/1/77 (w/handwritten note by C. Buckland attached) Tritium Contamination Control Handwritten note Buckland to Valentine, 4/29/77, Comment on control of D-38 casks Memo: Buckland to Valentine, 5/13/77 - Review of Draft "Contaminated Property Control" Memo to Dwight Clayton Memo: Amies to Thomas, 5/13/77 - Swipe Test of ^{60}Co Gamma Cell Memo: Blackwell to Storm, 6/21/77 - Film Badge Exposure of F.A. Braentigan, Z-78634, Employee of Dover Elevator Co., Santa Fe, NM Memo: Blackwell to Storm, 7/15/77 - Investigation of Film Badge Exposures for June, 1977 Memo: Buckland to Storm, 8/23/77 - Review of Exposures to Certain July 1977 Film Badges Memo: Buckland to Howard, 9/14/77 - Location of Radioactive Materials Memo: Blackwell to Dummer, 9/15/77 - Film Badge Exposure of Henry P. Nunes, Z-82200, Group G-5 Memo: Buckland to Storm, 10/20/77 - Explanation of Exposure to Sept. 1977 Film Badge Issued to F.H. Rick, ISD-7, Z-74894 Memo: Buckland to Storm, 11/1/77 - Investigation of High Zia Film Badge Results for September 1977.		

Appendix B

EA-100 [redacted] CONTAMINATION TESTS

Courtesy of Ken Silver

AREA D.P. WEST LOCATION 401 EQUIPMENT ROOM

TEST	DATE	TOTAL M³	d/m³	[redacted]	O.T.	REMARKS
1	[redacted]	628	10	1	0	
2	[redacted]	611	12	1	0	
3	[redacted]	571	31	1	0	
4	4-1-69 4-30-69	625	21	1	0	
5	5-1-69 5-29-69	600	38	1	0	
6	6-2-69 6-30-69	600	30	1	0	
7	7-1-69 7-19-69	344	3/279600	1	6	THESE FIGURES SHOULD NOT BE RECORDED ON FINAL REPORT
8	7-19-69 7-31-69	287	248	1	0	
9	8-1-69 8-27-69	600	2472	1	0	
10	9-2-69 9-30-69	600	3180	1	1	
11	10-1-69 10-31-69	651	4920	1	1	
12	11-3-69 11-26-69	514	6266	1	1	
13	12-1-69 12-31-69	628	6822	1	1	
14						
15		6801	24050	12	4	AVE-4
16						
17						
18						
19						
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27						
28						

002.19 22.9D

4A-100

AIR BORNE CONTAMINATION TESTS

AREA D.P. WEST LOCATION 401 CELL CORRIDOR

TEST	DATE	TOTAL M³	d/m³	[redacted]	O.T.	REMARKS
1	1-2-67 1-31-67	1885	42	1	0	
2	2-3-67 2-28-67	1530	31	1	0	
3	3-3-67 3-28-67	1714	136	1	0	
4	4-1-67 4-30-67	1875	90	1	0	
5	5-1-67 5-29-67	1799	107	1	0	
6	6-2-67 6-30-67	1799	88	1	0	
7	7-1-67 9-17-67	1032	9886216	1	1	THESE FIGURES SHOULD NOT BE ENTERED ON MONTHLY SUMM
8	7-18-67 7-31-67	861	7826	1	1	
9	8-1-67 8-29-67	1799	940	1	0	
10	9-2-67 9-30-67	1799	952	1	0	
11	10-1-67 10-31-67	1990	766	1	0	
12	11-3-67 11-26-67	1542	592	1	0	
13	12-1-67 12-31-67	1885	2660	1	0	
14						
15		20458	14270	12	1	AVE-1
16						
17						
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27						
28						

4A-100

AIR BORNE CONTAMINATION TESTS

Courtesy of Ken Silver

AREA D.P. WEST LOCATION Room 401 CELL #1

GROUP CMD-11 (ALPHA PU)

TEST	DATE	TOTAL M³	d/m³	# Tests	O.T.	REMARKS
1	1-2-69 1-31-69	628	26	1	0	
2	2-3-69 2-28-69	511	159	1	0	
3	3-3-69 3-28-69	571	33	1	0	
4	4-1-69 4-30-69	625	31	1	0	
5	5-1-69 5-29-69	600	21	1	0	
6	6-2-69 6-30-69	600	30	1	0	
7	7-1-69 7-17-69	344	3190194	1	1	THESE PROBLEMS SHOULD NOT BE RECORDED ON YEARLY REPORT
8	7-18-69 7-31-69	287	2596	1	1	
9	8-1-69 8-29-69	600	1288	1	0	
10	9-2-69 9-30-69	600	12482	1	1	
11	10-1-69 10-31-69	657	446	1	0	
12	11-3-69 11-26-69	514	546	1	0	
13	12-1-69 12-31-69	628	620	1	0	
14						
15		[redacted]	18293	12	2	AVE - 3
16						
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4A-100

AIR BORNE CONTAMINATION TESTS

Courtesy of Ken Silver

AREA D.P. WEST LOCATION Room 401 Cell # 2

TEST	DATE	TOTAL M³	d/m³	# TESTS	O.T.	REMARKS
1	1-2-67 1-31-67	628	0	1	0	
2	2-1-67 2-28-67	511	120	1	0	
3	3-1-67 3-28-67	591	33	1	0	
4	4-1-67 4-30-67	625	16	1	0	
5	5-1-67 5-27-67	600	27	1	0	
6	6-2-67 6-30-67	606	16	1	0	
7	7-1-67 7-17-67	344	3307596	1	1	THESE PREVIOUS SAMPLES ARE TO BE RECORDED ON WEEKLY REPORT
8	7-18-67 7-31-67	287	894	1	0	
9	8-1-67 8-29-67	600	68	1	0	
10	9-2-67 9-30-67	600	86	1	0	
11	10-1-67 10-31-67	657	64	1	0	
12	11-1-67 11-26-67	514	114	1	0	
13	12-1-67 12-31-67	628	102	1	0	
14						
15		7821	1540	12	0	AVE-0
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27						
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4A-100

AIR BORNE CONTAMINATION TESTS

Courtesy of Ken Silver

AREA D.P. West LOCATION Room 401 CELL #3

TEST	DATE	TOTAL M²	d/m²	[illegible]	O.T.	REMARKS
1	[illegible]-67 1-31-67	628	32	1	0	
2	[illegible]-67 [illegible]-28-67	511	150	1	0	
3	[illegible]-3-67 [illegible]-28-67	571	22	1	0	
4	4-1-67 4-30-67	625	24	1	0	
5	5-1-67 5-27-67	600	82	1	0	
6	6-2-67 6-30-67	606	30	1	0	
7	7-1-67 7-17-67	344	329/586	1	1	THESE FIGURES SHOULD NOT BE RECORDED ON TOTALS REPORT
8	7-18-67 7-31-67	287	4106	1	1	
9	8-1-67 8-29-67	600	1030	1	0	
10	9-2-67 9-30-67	600	1006	1	0	
11	10-1-67 10-31-67	657	706	1	0	
12	11-7-67 4-26-67	514	524	1	0	
13	12-1-67 12-31-67	628	880	1	0	
14						
15		6821	8592	12	1	AVE-1
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4A-100

AIR BORNE CONTAMINATION TESTS

Courtesy of Ken Silver

AREA D. P. WEST LOCATION Room 401 CELL # 4

TEST	DATE	TOTAL M³	d/m³	[redacted]	O.T.	REMARKS
1	6-2-67 6-9-67	628	4	1	0	
2	[illegible]-67 6-29-67	511	128	1	0	
3	[illegible]-67 [illegible]-67	591	35	1	0	
4	4-1-67 4-30-67	625	17	1	0	
5	5-1-67 5-29-67	600	31	1	0	
6	6-2-67 6-30-67	600	4	1	0	
7	7-1-67 7-12-67	344	218262	1	1	THESE FIGURES SHOULD NOT BE RECORDED ON WEEKLY REPORT
8	7-13-67 7-31-67	287	248	1	0	
9	8-1-67 8-29-67	600	134	1	0	
10	9-2-67 9-30-67	600	122	1	0	
11	10-1-67 10-31-67	657	64	1	0	
12	11-3-67 11-26-67	514	176	1	0	
13	12-1-67 12-31-67	628	880	1	0	
14		[redacted]		[redacted]	[redacted]	
15		6821	1843	12	0	AVE - 0
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Appendix C

SURROGATE INCIDENT REPORT

DATE:

TECHNICAL AREA:

DESCRIPTION:

OFFICIAL DOCUMENTATION MAY BE AVAILABLE FROM:

❑ LANL Occurrence Reports Collection, ESH-12 at TA-35 (William Inkret & John Voltin)

❑ OTHER: _____

Appendix D

Appendix D.

RECOMMENDED FORMATTING CHANGES

Chapter Headings. There are various indicia along the top of each page. However, unlike most books or reports, these indicia are not helpful to the reader who wants to determine what chapter he is in. To figure out the chapter, one has to look at the very last digit in a long string of numbers. Then one has to remember that "2" stands for the Site Description chapter, "5" is Internal Dosimetry, etc..

Non-technical readers – and even technical readers who did not write or edit the document – would experience less frustration if simple chapter descriptors appeared in the page headers. "At a glance" they would know which chapter they are reading.

Greek Symbol μ Erroneously Replaced By □. In several places in Chapter 5 (pp. 57, 60 and 65) and Chapter 2 (p. 18) the Greek symbol μ has been replaced by □. Similarly, the term □rem appears in the document. A cynic might surmise that ORAU is waiting to be told by the Lab whether the correct units are milli- or micro-. However, it is probably due to a glitch in file type conversions.

Appendix E

BIOGRAPHICAL SKETCH

Provide the following information for the key personnel in the order listed on Form Page 2.
Follow this format for each person. **DO NOT EXCEED FOUR PAGES.**

NAME	POSITION TITLE
Ken Silver	Assistant Professor of Environmental Health

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	YEAR(s)	FIELD OF STUDY
Univ. of Massachusetts, Amherst, MA	BS	1982	chemistry
Harvard School of Public Health, Boston, MA	SM	1990	environmental health
Boston University School of Public Health, Boston, MA	DSc	2003	environmental health

A. Positions and Honors

1991-2003 Environmental consultant

1993-7 Research analyst, Boston University School of Public Health

1990-1 Toxicologist, Gradient Corporation, Cambridge, MA

1989-90 Research Analyst, Massachusetts Institute of Technology, Cambridge, MA

Honors

2003 DELTA OMEGA, Honorary Society in Public Health

2002 NATIONAL INSTITUTE FOR ENVIRONMENTAL HEALTH SCIENCES, Program in Ethics and Environmental Health Policy

1986 NATIONAL INSTITUTE FOR ENVIRONMENTAL HEALTH SCIENCES CHARLES A. DANA FOUNDATION Financial support for graduate studies.

1982 SIGMA XI

1979 NATIONAL SCIENCE FOUNDATION, UNDERGRADUATE RESEARCH PROGRAM DARTMOUTH COLLEGE, HANOVER, N.H.

Selected Committee Memberships

ORAU, Chronic Beryllium Disease Institutional Review Board (2005-present)

NIEHS, Worker Education and Training Program, Grant Review Committee (2005-present)

ETSU Faculty Senate (2005-present)

Selected peer-reviewed publications

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Ferguson, D. and Silver, K., Toxics Release Inventory for Tennessee: Pollution Prevention Trends and Opportunities. Southern Appalachian Man and Biosphere Conference, Gatlinburg, TN, November 16, 2004

Challa, S. and Silver, K., Oral manifestations of industrial toxicants. Primary Care Research Day, ETSU School of Medicine, Johnson City, TN September 11, 2004

Ferguson, D. and Silver, K., Toxics Release Inventory for Tennessee: Pollution Prevention Trends and Opportunities. Primary Care Research Day, ETSU School of Medicine, Johnson City, TN September 11, 2004

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