implement procedures for root cause and causal factors analyses and review of prior reports to identify trends and recurrent issues.

- At present, personnel are not assigned to review and closeout corrective actions associated with Radiation Occurrence Reports.

- The LANL Radiation Occurrence Report system is not compatible with the DOE 5000.3A system and does not include DOE 5000.3A radiological occurrence criteria.

- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-4) (RP.2-2) (H2/C1) **The Los Alamos National Laboratory Radiological Occurrence Reporting System is not defined or implemented with trend analysis and followup and is not consistent with DOE 5000.3A.**

FINDINGS:

- Director's Policy (DP No. 107) requires that the Health and Safety Division develop performance indicators for the radiological protection program. The Health and Safety Division has not established a sitewide radiological protection performance indicators program.

- AR 3-8, "ALARA Program," November 30, 1990, requires that the Health and Safety As-Low-As-Reasonably Achievable Coordinator perform sitewide trend analysis of radiological parameters and distribute the results to management. This requirement has not been implemented.

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (RP.2-3) (H2/C1) Los Alamos National Laboratory has not implemented a formal sitewide radiological protection performance indicator program as required by DOE 5482.1B and SEN-29-91.

RP.3 RADIOLOGICAL PROTECTION PROCEDURES AND POSTING

PERFORMANCE OBJECTIVE: Radiation protection procedures for the control and use of radioactive materials and radiation generating devices should provide for safe operations and for clearly identified areas of potential consequences.

FINDINGS:

- Radiation protection procedures developed at the division level for various buildings and operations are inconsistent throughout the Laboratory. Procedures used by different groups within the Health and Safety Division are also inconsistent.
- The Health and Safety Division does not, in many cases, participate in review of organization and site-specific radiation protection programs.
- Some LANL divisions are preparing separate DOE 5480.11 implementation plans that are inconsistent with the sitewide implementation plan approved by DOE.

CONCERN: See Concern TSA-1, RP.3-2.

FINDINGS:

- Criteria for defining, selecting, and identifying radiologically controlled areas are not consistent throughout the Laboratory.
- The posting of controlled areas is not uniform or consistent throughout the Laboratory and is not in compliance with DOE 5480.11.
- The technical bases for defining controlled areas is not documented.
- The posting policy is not uniform throughout LANL technical areas and facilities.
- Posted radiation survey information was found to be more than 1 year out-of-date in several facilities.
- Signs used to indicate controlled radiological areas are often not of acceptable quality or color and often do not contain information on the current radiological status of the area as required.
- Radiological hot-spots within controlled areas are not consistently posted according to DOE 5480.11, ANSI N2.1, and LANL AR 3-7. (See Section 4.5.1.14.2, RP.3.)
- Radiological area posting at access points and perimeters is not performed in accordance with the requirements of DOE 5480.11. (See Section 4.5.2.13.2, RP.3.)
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (RP.3-1) (H2/C1)

At the Los Alamos National Laboratory, specification of radiologically controlled areas and the posting of the radiological conditions of hot-spots, access points, and perimeters are not consistently in compliance with the requirements of DOE 5480.11.

FINDINGS:

- Contaminated items, such as wood scraps, wire rope and hooks, tools, pumps, and other equipment were improperly stored in the depleted uranium storage area of the TA-3 Bldg. 66.
- Packaged radioactive waste was stored in mislabeled areas within corridors of the Chemistry and Metallurgical Research Building.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-4) (RP.3-2) (H2/C2)

The practice of storing materials and radioactive wastes at Los Alamos National Laboratory does not comply with recommendations given in DOE 4330.4A, Chapter 2.

FINDINGS:

- Although line management is responsible for the approval of standard operating procedures and special work permits to identify potential hazards, Health and Safety Division personnel are not required to be involved in either the development process or the review process until the procedure has been approved by line management.
- There is no assurance that Health and Safety Division recommendations are incorporated into standard operating procedures and special work permits.
- See Concern TSA-4, TS.2-2.

CONCERN: See Concern TSA-1, RP.3-1.

FINDINGS:

The large cobalt-60 (2500 Ci) sealed-source irradiator in the TA-43 Health Research Laboratory does not have (1) audible or visual warning devices to alert personnel within the installation that the startup procedure is being initiated; (2) a "crash" button within the installation that can be used by personnel remaining in the installation to interrupt the startup procedure or the active beam; or (3) required warning signs at the entrance to the installation. Operating personnel maintain that the video camera within the installation is sufficient for identifying personnel working in the enclosure. However, a brick wall constructed around the sealed source obstructs the view of the camera.

The large cesium-137 irradiator in the TA-43 Health Research Laboratory has two sources (about 900 Ci, and 9 Ci, respectively). This irradiator has neither the required audible or visual warning devices, nor does it

have required warning signs at the entrance to the installation.

- The following concern was not identified in the LANL self-assessment.

CONCERN: (TSA-4) (RP.3-3) (H1/C1) CAT. II

At the Los Alamos National Laboratory, the two gamma irradiators in the TA-43 Health Research Laboratory do not have positive controls for radiological protection as required by ANSI N543-1974.

FINDINGS:

- Line managers "must ensure" compliance with the requirements specified in AR 3-4 "Radioactive Source Control," July 19, 1991. However, only 76 of 209 groups at LANL have complied.

- Leak testing of encapsulated radioactive sources does not meet the requirements of AR 3-4 and, in many cases, has never been performed. Only one-third the required tests have been completed.

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (RP.3-4) (H2/C1)

There is no program at Los Alamos National Laboratory to identify deficiencies in radioactive source control and to assure the integrity of encapsulated sources, as required by Los Alamos National Laboratory AR 3-4.

FINDINGS:

- There is no audit program in place to identify discrepancies in the radioactive source control program.

- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-4) (RP.3-5) (H2/C1)

The source control and audit program (inventory, location, and custodian) does not comply with Los Alamos National Laboratory AR 3-4.

RP.5 EXTERNAL RADIATION DOSIMETRY

PERFORMANCE OBJECTIVE: The routine and accident personnel radiation dosimetry programs should ensure that personnel radiation exposures are accurately determined and recorded.

FINDINGS:

- External radiation personnel dosimeters are exchanged monthly, sitewide, without regard to a worker's potential for exposure.
- The LANL external radiation personnel dosimeter is accredited by the Department of Energy Laboratory Accreditation Program (DOELAP) and was recently re-accredited; however, it was not accredited in all 13 categories.
- The existing LANL external dosimeter cannot be used for determining low-energy beta or positron doses, such as from thallium-204.
- LANL has determined that medium-energy beta emitters are infrequently handled at the Laboratory and has opted not to test in the low-energy beta categories. The dosimeter in use cannot meet the criteria for accreditation in those categories.
- LANL has not performed an assessment of their requirements for low-energy beta dosimetry, even though they currently process and handle radionuclides having low-energy beta radiations. These include bromine-77, technetium-99, and uranium. DOE 5480.11 requires the monitoring of all workers where the potential for exposure exceeds 100 millirem per year to the whole body and 5 rem to the skin and extremities.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (RP5-1) (H2/C1)

The Los Alamos National Laboratory personnel dosimeter can not accurately measure some radiations to which workers are exposed as required by DOE 5480.11.

- There is one outstanding deficiency from the last accreditation site review: approximately 200 to 500 personnel dosimeters out of a total of 7500 are not returned at each exchange period for processing. An effective means is not in place to reduce the number of personnel dosimeters that are not returned on time.
- The personnel dosimeter has a lower limit of detection of 10 mrem, resulting in doses of 9 mrem or less being recorded as zero. This practice results in a potential missed dose of up to 108 mrem per year.

- See Section 4.5.1.14.2, RP.3.

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (RP.5-2) (H2/C1) **At the Los Alamos National Laboratory an effective personnel dosimeter exchange program is not in place, and this deficiency is an unresolved issue from a previous appraisal conducted under requirements of DOE 5480.15.**

FINDINGS:

- There is no program in place to assure that the personnel dosimeter is worn correctly by LANL personnel.

- The improper use of chains and necklaces, and the clipping of dosimeters to shirt collars may result in erroneous albedo measurement of neutron doses.

- See Section 4.5.1.14.2, RP.5.

- The following concern was not identified by the LANL self-assessment.

CONCERN: (TSA-4) (RP.5-3) (H2/C1) **At the Los Alamos National Laboratory, the correct use and wearing of personnel dosimeters to assure the accuracy of the measurement of worker dose as required by DOE 5480.11 and Los Alamos National Laboratory are not enforced.**

FINDINGS:

- Line managers do not make appropriate changes in a staff member's dosimetry requirements using the Employee Health Physics Checklist (ES&H Form 3-1A), as required in the event of intra-group transfers or job content changes.

- See Concern TSA-4, RP.7-1.

- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-4) (RP.5-4) (H2/C1) **At the Los Alamos National Laboratory, there is 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.**

FINDINGS:

- The current LANL extremity dosimetry system uses thick chips sensitive only to photon and high-energy beta particles. The system cannot meet all impending DOELAP performance objectives.

- Extremity exposures involving neutrons are corrected in the field using assumed neutron-to-gamma ratios, but these corrections are not entered in the dosimetry records for the individual.

- High extremity exposures involving beta radiation are investigated. Retrospective correction factors for

dosimeter under-response are derived for high exposures, but routine data are not corrected.

To date, LANL has not reported extremity dosimetry results to DOE as required by DOE 5484.1.

- See Section 4.5.1.14.2, RP.5.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (RP.5-5) (H2/C1)

The Los Alamos National Laboratory extremity dosimetry system cannot meet the external radiation monitoring and accuracy requirements specified in DOE 5480.11.

INTERNAL DOSIMETRY

INTERNAL

RP.7 INTERNAL RADIATION DOSIMETRY

PERFORMANCE OBJECTIVE: The internal radiation dosimetry program should ensure that personnel radiation exposures are accurately determined and recorded.

FINDINGS:

- The LANL internal dosimetry program involves staff from three separate organizations. The program lacks clear organization, defined responsibilities, and authorities.

- The information needed by internal dosimetry specialists from the Employee Health Physics Checklist (HS Form 3-1A) is not being obtained by internal dosimetry specialists for various reasons. In many cases, the checklists are not filled out and returned to the Health Physics Policy and Programs Group; in other cases, the information submitted is incomplete, inconsistent with work assignments, or inaccurate. (See Concern TSA-4, RP.5-4.)

- Employee Health Physics Checklists are often not reviewed and resubmitted by line management and reevaluated by the Health Physics Policy and Programs Group when specific work assignments change. Reminder letters to line managers from the Health Physics Policy and Programs Group for return of checklists in many cases received no response. One example was observed where a response was not received after eight reminder letters were sent.

- Personnel of the Isotope and Structural Chemistry Group, the Ceramic Science and Technology Group, and the Materials Technology Metallurgy Group working with thorium-232 and its decay products during chemistry operations at TA-21 and TA-3 Bldg. SM-66 are not enrolled in the bioassay program for assessment of potential internal exposures. Line managers were not aware that thorium and its decay products were internal radiological hazards and that workers handling gram quantities of dispersable thorium oxide powders and other thorium compounds should be identified by the checklist system for participation in the bioassay program.

- There is no formalized authority to allow the Health and Safety Division personnel to stop work for noncompliance with the bioassay program checklist system.

- Radiation protection technicians are not reviewing operations involving radioactive materials to ensure that workers who should participate in the bioassay program do so. Low priority is given to enforcement of the requirement.

- The appendices to AR 3-6, "Personnel Radiation Dosimetry," August 30, 1991, provide criteria for worker participation in the bioassay program. These appendices are cumbersome, difficult to interpret, and difficult to implement and enforce.

- Not all workers at the plutonium and depleted uranium facilities are evaluated for participation in the bioassay program as required by DOE 5480.11. (See Section 4.5.1.14.2, RP.7.)

- The following concern was addressed in the LANL self-assessment.

CONCERN: (TSA-4) (RP.7-1) (H2/C1) **Los Alamos National Laboratory is not effectively identifying workers for whom bioassay is required under DOE 5480.11.**

FINDINGS:

- The time taken to collect, process, and analyze some bioassay samples is longer than appropriate for timely evaluation and follow-up to assure the accuracy of worker dose assessment.

- There is a deficiency in the bioassay program for short-term workers, visitors, and students that leads to the failure to obtain baseline and routine samples during and after work with radioactive materials.

- Not all managers have exercised their responsibility to conduct the chain-of-custody program for bioassay samples as required in AR 3-6, Appendix G. (See Section 4.5.2.13.2, RP.7-2.)

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (RP.7-2) (H2/C1) **Procedures for collecting, processing, and analyzing some bioassay samples do not ensure the accuracy, timeliness, and quality of internal dose assessment as required by DOE 5480.11 and Los Alamos National Laboratory AR 3-6, Appendix G.**

FINDINGS:

- Internal dosimetry program personnel do not conduct an internal audit program to ensure quality radiochemistry measurements on bioassay samples.

- Nasal smears are counted for plutonium, uranium, and other radionuclides in the TA-55 Health Physics Analysis Laboratory liquid-scintillation counter system. Secondary alpha counting standards are made at LANL for system calibration and quality assurance/quality control, but traceability of these standards to the National Institute of Standards and Technology is not established.

- Chain-of-custody paperwork to track bioassay samples is not always completed, making it difficult to track the status of many samples or to assure that tampering with the samples did not occur. Bioassay sample collection kits are sometimes left in rest rooms and not picked up for analysis in a timely manner.

- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-4) (RP.7-3) (H2/C1) **The Los Alamos National Laboratory internal dosimetry program lacks the functional elements of an internal audit program to assure the quality and accuracy of bioassay measurements required by DOE 5480.11 and DOE 5480.1B.**

FINDINGS:

- Studies have not been performed at LANL work locations having major potential for worker internal exposure to airborne uranium and plutonium compounds to characterize the in vivo solubility characteristics of specific chemical forms.

- Sitewide studies have not been performed at LANL to determine aerosol particle-size distributions in locations where processed uranium or plutonium may be inhaled by workers.

- The following concern was not identified in the LANL self-assessment.

CONCERN: (TSA-4) (RP.7-4) (H2/C2) **At the Los Alamos National Laboratory, characterization of airborne radioactive material is not performed to allow appropriate assessment of internal dose as suggested by DOE 5480.11.**

FINDINGS:

- Plutonium workers in some facilities (e.g., TA-3 Chemistry and Metallurgical Research Building) handle mixtures of plutonium, americium, uranium, and fission products. About 1600 workers are counted each year in the LANL In Vivo Measurements Laboratory for potential intakes of radioactive materials. The Laboratory uses two 5-inch phoswich detectors for measuring plutonium and americium in the lungs. However, phoswich detectors are not state-of-the-art and cannot accurately measure plutonium and americium in the presence of interfering gamma emitters (such as cesium-137).

- The In Vivo Measurements Laboratory cannot meet the requirements of draft standard ANSI N13.30.

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (RP.7-5) (H2/C1) **At the Los Alamos National Laboratory, the In Vivo Measurements Laboratory cannot provide monitoring appropriate to the workplace or adequate to demonstrate compliance with radiation protection standards as currently required by DOE 5480.11.**

CMR

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CMR

RP.10 RADIATION MONITORING/CONTAMINATION CONTROL

PERFORMANCE OBJECTIVE: The radiation monitoring and contamination control program should ensure worker protection from radiation exposures.

FINDINGS:

- The use of open-front hoods in the TA-3 Chemistry and Metallurgical Research Building leads to an increased frequency of radioactive material contamination incidents.

- AR 3-7, "Radiation Exposure Control," January 11, 1991, refers to a workplace monitoring program. Responsibility for a current plan rests with each line manager, resulting in different radiation survey programs and program inconsistencies.

- Cracked glovebox gloves contaminated with plutonium were observed in TA-21 Bldg. 146.

- The storage of new HEPA filters was found to have signs of rodent infestation that could lead to rodent damage of the filters.

- TA-21 Bldg. 5, room 500A, has various vacuum systems and pumps connected with tygon tubing. The tubing has several low spots with most having oil accumulations.

- LANL does not have a formal program to ensure quality and timely radiation surveys as required by DOE 5480.11. (See Section 4.5.2.13.2, RP.10.)

- Floor surveys in TA-55 Bldg. PF-4 are not performed at a frequency or with the precision to ensure the minimization of the spread of contamination as required by DOE 5480.11. (See Section 4.5.1.14.2, RP.10.)

- The following concern was identified in the LANL self-assessment.

CONCERN: **(TSA-4) (RP.10-1) (HI/C1)**

At the Los Alamos National Laboratory, the lack of thorough radiation protection practices could result in loss of contamination control required by DOE 5480.11 and the release of radioactive materials in excess of limits specified in DOE 5400.5.

FINDINGS:

- The removable- and fixed-contamination limits for tritium and pure gamma emitters are specified in AR 3-7, Appendix C, as 100,000 disintegrations per minute per 100 centimeters square. This limit contradicts the surface contamination limit specified in DOE 5480.11, Attachment 2.

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (RP.10-2) (H2/C1)

Surface contamination limits for tritium and pure gamma emitters in Los Alamos National Laboratory AR 3-7, Appendix C, do not comply with the limits specified in DOE 5480.11.

FINDINGS:

- Engineered ventilation controls to prevent the intake of radioactive materials in some plutonium areas do not have backup power in the event of interruption of electrical power.
- Following the loss of and then restoration of electrical power in TA-21 DP-West laboratories, pre-entry surveys were not conducted by radiation protection technicians prior to re-entry of evacuated personnel. TA-21 does not have a re-entry plan.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-4) (RP.10-3) (H1/C1)

At the Los Alamos National Laboratory, engineered controls and radiological re-entry surveys are not performed following the loss of electrical power as required by DOE 5480.11; therefore, contamination control cannot be assured.

FINDINGS:

- Personnel in the TA-48 Bldg. RC-1 operates under their own organizational radiation protection plan, dated September 1991, with no indication of review or approval by the Health and Safety Division.
- "Self-surveying" as observed throughout Laboratory facilities is ineffective in assuring contamination control.
- Anti-contamination protective clothing removal procedures were not posted at all controlled locations.
- The current use of "green tags" to identify surplus materials is an ineffective means of certifying materials and equipment for release or salvage.
- LANL does not have a procedure approved by the Office of the Assistant Secretary for Environment, Safety and Health for release of volume contaminated materials and equipment to the public.
- Radiation monitoring and contamination control procedures (and documentation) at the plutonium and depleted uranium areas do not ensure control of the spread of contamination as required by DOE 5480.11. (See Section 4.5.1.14.2, RP.10.)
- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-4) (RP.10-4) (H1/C1)

The Los Alamos National Laboratory radiation protection plans and procedures do not preclude the spread of radioactive contamination to employees and the public as required by DOE 5480.11 and DOE 5400.5.

FINDINGS:

- Areas exist within certain firing test areas where radioactive uranium "hot spots" have not been identified. TA-15 is one example where there are readily identifiable pieces of depleted uranium on the ground.
- The need for extensive radiation protection procedures (respiratory protection, bioassay, etc.) was considered by LANL to be unnecessary following previous experience with health physics coverage of test-firing areas. However, there is no documentation of those findings.
- Cleanup procedures following test firings of depleted uranium do not comply with DOE 5400.5 and DOE 5480.11 for radiological controls.
- The following concerns were not identified in the LANL self-assessment.

CONCERN: (TSA-4) (RP.10-5) (H2/C1)

At the Los Alamos National Laboratory, the partial cleanup of sites following test-firing of depleted uranium does not prevent the further release of uranium to the environment or the spread of contamination by workers on the site; satisfactory cleanup is required by DOE 5400.5.

CONCERN: (TSA-4) (RP.10-6) (H2/C1)

At the Los Alamos National Laboratory, there are deficiencies in the procedures and documentation of health physics surveys, bioassay results, and studies on the spread of contamination by airborne transport or other means after test-firings using depleted uranium; these radiological protection procedures are required to document need, quality, and appropriateness as required by DOE 5480.11.

AX.5 VENTILATION SYSTEMS

PERFORMANCE OBJECTIVE: Ventilation systems should reliably direct all airborne effluents from contaminated zones or potentially contaminated zones through cleanup systems to ensure that the effluent reaching the environment is below the maximum permissible concentration and is as low as reasonably achievable.

FINDINGS:

- In TA-48 Bldg. 1, Radio Chemistry, magnehelic gages in the exhaust system at the point of discharge are not routinely calibrated. (See Concern TSA-4, QV.4-1.)
- In TA-48 Bldg. 1, Radio Chemistry, the exhaust system recently had to be shut down to replace the HEPA filters when airflow became inadequate.
- In TA-48 Bldg. 1, Radio Chemistry, alpha hood ventilation is being controlled in a reactive mode by changing HEPA filters based on periodic airflow checks; the system has no real time equipment, with alarms, to notify occupants when ventilation is inadequate.
- LANL does not have a real time program for capturing change in pressure data over time in order to predict the appropriate time for filter changes.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-4) (AX.5-1) (H2/C1) **Los Alamos National Laboratory has not implemented a program for utilizing available data to alert when high-efficiency particulate air filters should be changed as required by DOE 5480.19.**

FINDINGS:

- TA-59 Bldg. 1, Occupational Health, is an aging facility with air-balancing problems in the ventilation system, which has had several modifications since the original design.
- Current air-balancing problems with the ventilation system surfaced about 2 years ago.
- Flue gases from the two forced-draft gas-fired boilers have back-flowed carbon monoxide into the basement of the facility on several occasions.
- The exhaust from the forced-draft gas-fired boilers, the ventilation exhaust, and the laboratory hoods discharge into the same exhaust stack in close proximity to each other.
- In TA-59 Bldg. 1, Occupational Health, the facility outside air dampers were held open by 2-inch by 4-inch wooden props, indicating control problems with aging equipment.

LAMPF
(TA-53)
&
other
accelerators

LAMPF & accelerators

OP.2 CONDUCT OF OPERATIONS

PERFORMANCE OBJECTIVE: Operational activities should be conducted in a manner that achieves safe and reliable operation.

TA-8 LAMPF

FINDINGS:

- Passive shielding for Line LI of the LANSCE beam delivery system is insufficient to protect against accidental beam loss. Accidental loss can result in more than 3000 rem per hour fields, exceeding LAMPF policy.
- LAMPF has studied the issue of shielding in the past; however, the methods used for design and review were insufficient to discover all problem areas.
- The GTA will require added shielding to prevent high radiation levels under failure conditions of active safety systems.
- The barrier fence for the beam stop at the ITS/DARHT facility is not substantial and does not prevent access to a very high radiation area.
- The beam stop for the Free Electron Laser located at Bldg. WA-161 is obtained by directing the electron beam into the floor with a magnet. The magnet current is interlocked with a current comparator circuit. No active external radiation monitors are available.
- LANL has not effectively implemented policies or guidelines detailing the requirements for shielding and barriers.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-3) (OP.2-1) (H1/C1) Los Alamos National Laboratory has not implemented policies for the design, installation, testing, and operation of barriers; moreover, accelerator operations do not ensure that the dose limits of DOE 5480.11 and ANSI N 43.1 are met.

FINDINGS:

- No accelerator at LANL has implemented DOE 5480.19.
- LANL did not establish a timely schedule for compliance.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-3) (OP.2-2) (H2/C1) Operations at accelerators at the Los Alamos National Laboratory are not conducted in accordance with the requirements of DOE 5480.19.

FINDINGS:

- During a recently observed response to an alarm at the IBF, the reconfiguration of the building air was delayed and no evacuation was ordered.

- The setpoint on the tritium monitor at the IBF was reset by operations staff without ES&H review or approval. The calculation that was shown to the appraiser was written on a desk pad. Personnel were unable to provide any technical basis for the stack alarm or vault alarm setpoints.

- IBF personnel declined either to attempt to reset the alarm or to purge the monitor, noting that the monitor was ES&H equipment and that they lacked the proper training. IBF personnel, however, had modified the alarm setpoint.

- During the response to the tritium alarm, IBF personnel declined to fix a jammed strip chart recorder for the stack tritium monitor readings, based on lack of training and lack of system ownership. Later, the ES&H technicians who responded to a request for service for the tritium alarm also declined to fix the jammed strip chart recorder because of lack of ownership.

- See Concern TSA-3, AX.1-3.

- The following concern was not identified in the LANL self-assessment.

CONCERN:
(TSA-3)
(OP.2-3)
(H2/C1)

At the Los Alamos National Laboratory, the response to off-normal conditions at the Ion Beam Facility is not conducted in accordance with DOE 5480.19.

OP.3 OPERATIONS PROCEDURES AND DOCUMENTATION

PERFORMANCE OBJECTIVE: Approved written procedures, procedure policies, and data sheets should provide effective guidance for normal and abnormal operation of each facility on a site.

FINDINGS:

- Operating procedures for the secondary beamlines at LAMPF are out-of-date.
- Engineering support procedures in use at accelerator facilities are not controlled documents. Procedures were missing from manuals used by the support staff at LAMPF.
- Cave sweep procedures have not been established for IBF, and operations personnel stated that alternate sweep sequences were permissible at the discretion of the staff.
- The Operations Group at the Betatron (TA-8 Bldg. WA-23) has no procedure for testing the interlocks. When debriefed, two qualified operators described different methods for conducting the same test.
- No procedure has been developed for handling flaky or degraded targets at IBML.
- Detailed procedures have not been developed for conducting interlock tests on safety systems for liquid hydrogen targets used at accelerator facilities.
- Before issuance of the 1991 LANL procedure on locks and tags, the Operations Group had conducted a lockout/tagout once (over 15 years ago) at the Betatron facility in TA-8 Bldg. WA-23.

CONCERN: See Concern TSA-1, OP.3-2.

FINDINGS:

- Operators of the TA-8 linear accelerator log only those machine operations that result in radiographic images.
- When used in portable field radiography, the logbook for the TA-18 linear accelerator does not record the placement of the device or of postings and barriers used to limit access to the radiation area.
- All bypasses at LAMPF are removed at the end of an operating period. The board where bypasses are kept has none remaining in use. Yet, the bypass installation and removal logbook at LAMPF indicates that several bypasses have not been removed.
- Some entries into the operations logbook at GTA are recorded in pencil.

Pulsed High Energy Radiographic Machine Emitting X-Rays

- Pulsed High Energy Radiographic Machine Emitting X-Rays (PHERMEX) personnel have no knowledge of DOE records retention requirements. Logbooks from the 1960s are kept in a desk and have never been microfilmed.

- After a high tritium alarm at IBF, an informal debrief was held in the control room. No formal notes were taken. The information was not recorded in the logbook.

CONCERN: See Concern TSA-4, OP.4-1.

OP.4 FACILITY STATUS CONTROLS

PERFORMANCE OBJECTIVE: Operations personnel should know the status of the systems and equipment under their control and should know the effect of non-operational systems and equipment on continued operations. They should ensure that systems and equipment are controlled in a manner that supports safe and reliable operation.

FINDINGS:

- A system is not in place to ensure that the environmental qualification of monitors at LAMPF has been established and that use of the radiation monitors is restricted to conditions for which the devices are qualified.
- The interlock system for the portable linear accelerator at TA-18 uses radiation monitors with Geiger-Muller detectors that cannot monitor pulsed radiation from an electron linear accelerator. These devices do not perform their intended safety function.
- The Betatron in TA-8 does not have any radiation area monitors.
- Radiation detectors at the IBF have not been evaluated to determine whether they must be part of the interlock system.
- See Concern TSA-3, AX.1-4.
- The following concern was not identified in the LANL self-assessment.

CONCERN:
(TSA-3)
(OP.4-1)
(H1/C1)

At the Los Alamos National Laboratory, continuous radiation monitoring systems, for which appropriate monitoring equipment is readily available, are not designed or installed at accelerators in accordance with ANSI N43.1.

OP.5 OPERATION STATIONS AND EQUIPMENT

PERFORMANCE OBJECTIVE: Operation stations and facility equipment should effectively support facility operation.

FINDINGS:

- Personnel at LAMPF were not trained to use the portable survey instruments provided as a convenience at exits.
- No external dose survey meter is available at the Betatron in TA-8.
- The ion chamber survey instrument used at IBML does not have sufficient sensitivity to measure activity at DOE release limits, and personnel are not formally trained in the use and proper documentation of surveys.
- Operations personnel at portable linear accelerators are neither trained nor equipped to monitor for radiation. Health Physics Operations Group personnel do perform monitoring but are not required to be present during operation.
- See Concerns TSA-3, TC.4-1, and TSA-3, RP.1-2.

CONCERN: See Concern TSA-2, RP.8-5.

Accelerators

4.5.3.13 Radiological Protection

4.5.3.13.1 Overview

Radiological protection practices conducted at accelerator facilities, installations with x-ray generating devices and sealed gamma ray sources, and incidental x-ray radiation-producing devices at LANL were evaluated against all 12 performance objectives of the Radiological Protection technical area. LANL operations were reviewed against the requirements of DOE Orders, prescribed DOE policies and ANSI standards, documented and accepted best practices, and recommended standards.

The Radiological Protection appraisal for radiation-generating devices at LANL was conducted by a team of two health physicists. One health physicist primarily evaluated x-ray producing devices and some sealed sources. The other reviewed radiological protection programs for accelerators and participated in the review of x-ray devices. The appraisal was conducted by (1) interviewing LANL employees; (2) inspecting selected facilities; and (3) reviewing documents, procedures, and records associated with radiological protection programs. During the appraisal, 12 of 21 accelerators, 30 of 265 x-ray installations, and 4 sealed-source installations were inspected. These inspections represent a cross-section of the types of radiation-producing devices being operated at LANL.

Based on the these observations, the Radiological Protection appraisal concluded that LANL does not provide effective management oversight for implementation of a safety program for designing, operating, and surveying radiation-producing installations. Consequently, these devices do not comply with the requirements of regulatory standards.

All observed installations having radiation-producing devices (with the exceptions of LAMPF, LANSCE, and the Weapons Neutron Research Facility) fail to implement at least some of the requirements for interlocks, barriers, warning devices, interlock and personnel safety system testing, and postings. Some facilities do not meet any of these requirements. This is a Category II concern because of the scope of the problem and because LANL has not established any sitewide standards or mechanisms to facilitate compliance with the requirements. LAMPF, LANSCE, and the Weapons Neutron Research Facility have a formal and well-developed program to meet these requirements, and although it is not perfect, it meets the principal requirements of the standards.

LANL has not identified the need to develop a program to identify, control, and release potentially volume-contaminated material in accordance with the requirements of DOE 5400.5. Radiation protection technicians and radiation workers are not appropriately trained. Deficiencies have also been identified in the following areas: (1) procedures; (2) control of radiation exposure from depleted uranium; (3) selection, installation, and source checks of radiation instruments; (4) radiation monitoring and contamination control; and (5) ALARA programs.

Radiation protection for accelerators, x-ray devices, and source installations at LANL is implemented at the group level, with no single organization assigned the responsibility for sitewide standards and oversight. Radiation protection is a line responsibility, and the Health and Safety Division serves

primarily in a support role. Consequently, radiation protection programs are developed and implemented without uniformity between divisions or groups within the same division. Commensurate with this role, the Health and Safety Division does not have the authority or responsibility to develop radiation protection policies, establish standards, or provide oversight to assure that line organizations conform with regulatory standards.

Radiation protection programs at accelerator facilities are primarily implemented as cooperative efforts between the Health and Safety Division and the line organizations. However, the relationship and interface between line and Health and Safety Division groups and line radiation protection officers is not well defined. These cooperative efforts work well at TA-53 because an entire health physics section provides dedicated support to this area. This practice does not work well at other accelerator facilities because, in most cases, there is only a single radiation protection technician assigned to a facility or because it is covered by a roving radiation protection technician.

Accelerators used to produce x-rays are considered "special case" accelerators at LANL and are treated and controlled by the Health and Safety Division in the same manner as simple x-ray machines. These accelerators require much more complicated radiation protection controls and surveys than do conventional x-ray machines. A single individual is assigned responsibility to survey and inspect x-ray accelerators, along with concurrent sitewide responsibilities to control about 265 x-ray machines and 319 registered sealed sources. Effective oversight and control--in addition to compliance with regulatory requirements--is not achieved for these accelerators, x-ray devices, and sealed sources.

LANL has partially recognized these deficiencies and has initiated preliminary steps toward correcting them. Operational health physics functions have been assigned to a single group, and changes have been made in the ES&H Manual. More importantly, the Director has issued a series of policies assigning radiation protection responsibilities and clarifying the interrelationship between the Health and Safety Division and the line organizations.

The development of uniform standards and programs is essential in order to implement these new policies. The Health and Safety Division is developing standards and sitewide programs, but its progress is hampered by limited resources. Line organizations are having trouble implementing radiation protection requirements because of the absence of definitive standards, because they do not have the necessary expertise, and because the Health and Safety Division cannot provide the necessary technical support.

The LANL self-assessment identifies the oversight concerns regarding radiation-producing installations; however, it does not identify the more detailed concerns associated with the safe operation and interlocks of accelerators, x-ray and sealed source installations, and incidental x-ray devices. Twenty concerns have been identified by the Radiological Protection portion of this appraisal. Of these, approximately one-third have already been identified in the LANL self-assessment, one-third have been partially identified, and one-third have not been identified.

4.5.3.13.2 Findings and Concerns

RP.1 ORGANIZATION AND ADMINISTRATION

PERFORMANCE OBJECTIVE: Site/facility organization and administration should ensure effective implementation and control of radiological protection activities.

FINDINGS:

- The Health and Safety Division has oversight responsibility for radiation protection at accelerator facilities, but formal mechanisms are not in place to ensure that line management complies with radiological protection requirements.
- LANL does not provide management oversight for implementation of a safety program for design and operation of facilities with radiation-producing devices.
- Most accelerators do not have a designated radiation protection officer as required by ANSI N43.1. Accelerators with a designated radiation protection officer have not established position descriptions, minimum qualifications, and procedures for implementing the radiation protection officer responsibilities defined in ANSI N43.1.
- Qualified individuals are not assigned as radiation protection officers for x-ray devices as required by ANSI N43.2 and ANSI N543. The role of the x-ray safety officer relative to the x-ray machine radiation protection officer required by ANSI standards is not defined.
- The division of responsibilities and interaction between radiation protection officers and the Health and Safety Division are not defined.

CONCERN: See Concern TSA-2, RP.1-2.

FINDINGS:

- Some Dynamic Testing Division personnel who work with depleted uranium or in the proximity of accelerators and radiation-producing devices are not classified and trained as radiation workers. A review of 1990 Dynamic Testing Division dosimetry records indicates that some personnel received more than 100 millirem during 1990 but were not classified as radiation workers.
- Individuals who operate radiation-producing devices or who work with radioactive material are not always trained as radiation workers, even though they are defined as such by LANL AR 3-1, "Radiation Protection Program," dated August 30, 1991.
- A formal training program for radiation protection technicians at accelerator facilities is not in place for

radiation protection technicians in the Tritium/Other Sites Health Physics Section of the Health Physics Operations Group.

- LANL does not require that radiation protection technicians be trained before or during assignment to their duties.

- LANL policy allows individuals to perform work before they have received radiation worker or x-ray operator training.

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-3) (RP.1-1) (H2/C1) **Training of radiation protection technicians and radiation workers at facilities with radiation-producing devices does not meet the requirements of DOE 5480.11 and Los Alamos National Laboratory AR 3-1.**

FINDINGS:

- Shielding initially installed over Line D at LAMPF was not designed to provide radiation protection for a maximum credible accident.

- Shielding at the LANSCE Target 1 Service Area is not designed to provide radiation protection for a maximum credible accident.

- *See Concern TSA-3, OP.2-1.*

- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-3) (RP.1-2) (H1/C1) **Qualified expert reviews of accelerator and shielding design, required by ANSI N43.1, did not correct shielding deficiencies in the design of some accelerator facilities at the Los Alamos National Laboratory.**

RP.2 INTERNAL AUDITS AND INVESTIGATIONS

PERFORMANCE OBJECTIVE: The internal audit program for both routine operations and unusual radiological occurrences should provide adequate performance assessments.

FINDINGS:

- Internal appraisals of radiological protection have not been performed for any accelerator facilities.

CONCERN: See Concern TSA-4, RP.1-1.

RP.3 RADIOLOGICAL PROTECTION PROCEDURES AND POSTING

PERFORMANCE OBJECTIVE: Radiation protection procedures for the control and use of radioactive materials and radiation generating devices should provide for safe operations and for clearly identified areas of potential consequences.

FINDINGS:

- Interlock testing at TA-36 and TA-15 determines whether the failure of an interlock will prevent the machine from being operated. This type of test fails to evaluate whether the interlock system will shut down the machine during operation.
- The interlock test procedures at ITS/DARHT, Beam Accelerator for Novel Super High Energy Electrons (BANSHEE), and GTA confirm that the controller receives a scram signal but does not verify that the operation interrupt performs as designed.
- Many accelerator facilities do not perform and document full interlock testing every 6 months, and some do not perform any formal interlock checks at all.
- Access points to outdoor exclusion areas at PHERMEX and ITS/DARHT are not equipped with interlocks. Entry to these exclusion areas is not passively controlled to prevent activation of the accelerator while personnel are in the exclusion zone.
- Scram switches are not installed in all exclusion areas (indoor and outdoor) at accelerator facilities. Many interlocks are designed so that a local reset, followed by a reset at the console, is not required to resume operations. Interlock hardware, solid-state relays, programmable controllers, and associated wiring are not hardened and tamperproof. Some facilities do not maintain formal controlled copies of interlock schematics.
- Entrance points to all high radiation areas do not have warning lights. In general, there is no consistency in warning lights between different facilities, and an alarm does not sound when a warning light malfunctions.
- Software used to implement the interlock logic at IBF and PIXY is not developed, tested, and maintained using formal QA controls. Testing is not performed every time the program is loaded, and the interlock logic configuration at IBF is chosen from menu selections that are not independently verified by another operator.
- Evaluations have not been performed at all facilities with radiation producing devices to determine when duplicate or redundant interlocks must be installed as recommended by ANSI N43.1 and NCRP 88.

- See Concern TSA-3, TS.3-1.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-3) (RP.3-1) (H1/C1) CAT. II

The design, installation, maintenance, and testing of accelerator interlock and warning systems at the Los Alamos National Laboratory do not meet the requirements of ANSI N43.1.

FINDINGS:

- The accelerator and x-ray firing areas at TA-36 are not surrounded by a barrier, and the fences surrounding PHERMEX and ITS/DARHT do not provide reasonable access restraint.
- The key to the main door of the building housing ITS/DARHT is tightly controlled, but the access door in the rear of the building may be opened with a key that is commonly available to workers at the facility.
- Access to the upper level of the BANSHEE accelerator is blocked by a gate that does not provide reasonable access restraint.
- This following concern was not identified in the LANL self-assessment.

CONCERN: (TSA-3) (RP.3-2) (H1/C1)

Contrary to the requirements of ANSI N43.1, not all accelerator facilities at the Los Alamos National Laboratory have been provided with barriers that restrain access to areas where dose limits could be exceeded.

FINDINGS

- There is no hierarchy of documentation that leads from the radiation protection standards set forth in the ES&H Manual to line management implementation procedures.
- The Health Physics Operations Group does not have a standard set of operational health physics procedures. A different set of procedures is used by each of the two Health Physics Operations Group sections having accelerator responsibilities, and the two sets are not consistent.
- Procedures are not issued and maintained under a controlled copy system, and all procedures do not have properly completed approval sheets.
- Most accelerator line divisions do not have standard operating procedures for all work related to radiological or safety systems.

CONCERN: See Concern TSA-1, RP.3-2.

FINDINGS:

- Postings at access points and marked boundaries of accelerator facilities, except at TA-53, are incorrectly based on the radiation field at the access point rather than on the radiation field within the area. The fences around the ITS/DARHT and PHERMEX outdoor exclusion zones are not posted as radiation areas.

- The area outside the rollup doors at the Betatron in TA-8 is not posted as a radiation area, even though radiation levels in excess of 5 millirem per hour have been measured under operating conditions.

- Posted barricades have not been erected around any of the areas where accelerators or x-ray machines in TA-36 are used to perform radiography of explosive events. Very high radiation dose rates exist in these areas whenever the machines are in operation.

CONCERN: See Concern TSA-4, RP.3-1.

RP.4 EXTERNAL RADIATION EXPOSURE CONTROL PROGRAM

PERFORMANCE OBJECTIVE: External radiation exposure controls should minimize personnel radiation exposure.

FINDINGS:

- The need for requirements to control dose to the skin, extremities, and lens of the eye during work performed with depleted uranium components has not been evaluated and documented.

- Accelerator personnel who work with depleted uranium components or with activated targets in the IBML have not been evaluated to determine whether they must wear extremity dosimeters.

- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-3) (RP.4-1) (H2/C1) **Work at the Ion Beam Materials Laboratory and with depleted uranium components at the Los Alamos National Laboratory has not been evaluated to ensure compliance with the external exposure control and dosimetry requirements of DOE 5480.11.**

FINDINGS:

- The staff of the Health and Safety Division is too small to conduct periodic surveys and to provide oversight for approximately 265 x-ray generating devices, 21 accelerators, and incidental x-ray generating installations.

- Periodic inspections are not always conducted to check interlocks and access controls.

- The Health and Safety Division staff is too small to provide oversight of radioactive sources sitewide, including 319 registered sealed sources, and to conduct the radioactive source inventory program, including registration and leak testing.

- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-3) (RP.4-2) (H1/C1) **The Health and Safety Division staff at the Los Alamos National Laboratory is too small to provide sitewide oversight and to conduct periodic surveys and inspections for radiation-producing devices and sources as required by DOE 5480.4, ANSI N543, and ANSI N43.1.**

FINDINGS:

- X-ray installations as defined by LANL AR 3-3, "X-Ray Generating Devices," dated July 19, 1991, do not conform to existing ANSI standards.

- LANL AR 3-3 does not include guidance and requirements to assist in the design, modification, and operation of x-ray installations.

- Personnel assigned to x-ray installations are not familiar with the ANSI standards that address the requirements for the design and operation of these installations.

- The following concern was not identified in the LANL self-assessment.

CONCERN: (TSA-3) (RP.4-3) (H2/C1) **Definitions for x-ray generating devices in Los Alamos National Laboratory AR 3-3 do not conform with existing standards, and many x-ray installations do not fully comply with ANSI N543 and ANSI N43.2.**

FINDINGS:

- Some open-beam x-ray devices at LANL do not have ports equipped with beam shutter interlocks; some have shutters at unused ports that are not physically secured; some do not have guards or interlocks; and some have system barriers consisting of plexiglass shields that are not interlocked or otherwise passively controlled.

- Some enclosed beam SCINTAG access doors are not interlocked with the x-ray tube high-voltage supply or primary beam shutter. The shutters, which are not fail-safe, fail in the open position.

- Some x-ray generating devices do not have separate red warning lights located near all energizing switches to indicate "x ray on."

- Interlocks, indicator lights, and other safety functions are not adequately tested to ensure that they are fail-safe or that they perform their intended function. Nor are detailed procedures provided to describe how such tests are performed.

- Some installations do not have any interlocks at all, and others have only a single interlock. Some interlocks appear to be relatively small and of light-weight construction.

- Some open x-ray installations do not have conspicuously posted perimeters limiting the area in which exposure could exceed 100 millirem per hour. These perimeters are not posted with signs reading, "Danger High Radiation Area."

- Some open x-ray installations do not have conspicuously posted perimeters limiting the area in which exposure could exceed a 5 millirem per hour. These perimeters are not posted with signs reading, "Caution Radiation Area."

- Open x-ray installations do not have any positive means, such as locked enclosures, for preventing access during periods of unattended exposure. Use of these devices is

unattended because operators are located in a bunker with no visual access to the exposure area.

- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-3) (RP.4-4) (H1/C1) **Not all x-ray installations at the Los Alamos National Laboratory include access control and warning devices required by ANSI N43.2 and ANSI N543.**

RP.6 INTERNAL RADIATION EXPOSURE CONTROL PROGRAM

PERFORMANCE OBJECTIVE: Internal radiation exposure controls should minimize internal exposures.

FINDINGS:

- HEPA filters on vacuum cleaners and pumps used for contaminated areas at the Proton Storage Ring and Area A-East in TA-53 are not efficiency tested or replaced on a periodic basis.

- HEPA filters for vacuum cleaners and pumps are not checked by an approved DOE facility before being placed into service.

- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-3) (RP.6-1) (H2/C2)

The testing program for high-efficiency particulate air filters at the Los Alamos National Laboratory does not include periodic testing and replacement of filters on contaminated vacuum cleaners and pumps used at accelerator facilities, nor does it ensure that the filters are certified by an approved Department of Energy facility before installation.

RP.8 FIXED AND PORTABLE INSTRUMENTATION

PERFORMANCE OBJECTIVE: Personnel dosimetry and radiological protection instrumentation used to obtain measurements of radioactivity should be calibrated, used, and maintained so that results are accurately determined.

FINDINGS:

- Portable health physics survey instruments used by line personnel in some accelerator organizations are not always source-checked before and during routine operations.
- Reference readings are not obtained and recorded on each instrument by exposing them to a check source in a constant and reproducible manner at the time of, or promptly after, primary calibration.
- Source checks are not performed for each instrument scale or decade normally used. The allowed instrument response to a source check is greater than ±20 percent of the reference value.

CONCERN: See Concern TSA-2, RP.8-5.

FINDINGS:

- Most line personnel at accelerator facilities are not formally trained in the use of portable health physics survey instruments.
- Procedures establishing requirements for the control, source check, use, and return of portable survey instruments by line personnel are not in place at most accelerator facilities.
- Untrained personnel are not restricted from using portable health physics instruments to survey and release potentially contaminated material.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-3) (RP.8-1) (H2/C1) Procedures and training to control the use of portable health physics survey instruments by line personnel are not in place at some Los Alamos National Laboratory accelerator facilities to ensure that the monitoring requirements of DOE 5480.11 and DOE 5400.5 are met.

RP.10 RADIATION MONITORING/CONTAMINATION CONTROL

PERFORMANCE OBJECTIVE: The radiation monitoring and contamination control program should ensure worker protection from radiation exposures.

FINDINGS:

- Inappropriate contamination controls are implemented for personnel exiting from a contaminated area in the TA-53 Isotope Production Area.
- After exiting from contaminated areas at the Isotope Production Facility and Area A-East in TA-53, personnel perform contamination monitoring while wearing plastic booties and rubber gloves. Final monitoring is not performed after protective clothing is removed.
- Work was performed on a potentially contaminated piece of equipment in the Radioactive Storage Facility at TA-53 without using controls to minimize the spread of contamination.
- Loose debris and dirt were observed in one section of a contaminated area at Area A-East and in a contaminated material storage cage in LANSCE (TA-53 Bldg. MPF-30). Posting and control of the LANSCE storage area were incorrect.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-3) (RP.10-1) (H2/C1)

Personnel monitoring and contamination control at the Clinton P. Anderson Meson Physics Facility at the Los Alamos National Laboratory are not always conducted in accordance with the requirements of DOE 5480.11.

FINDINGS:

- LANL has not developed or implemented a program to identify, control, and store potentially volume-contaminated material before it is released for unrestricted use.
- Significant amounts of material at LAMPF have been exposed to protons and neutrons and are potentially volume contaminated. The IBML also generates potentially volume-contaminated material.
- LANL does not have criteria or survey techniques approved by the office of the Assistant Secretary for Environment, Safety and Health to release volume-contaminated material.
- The following concern was not identified in the LANL self-assessment.

CONCERN: (TSA-3) (RP.10-2) (H2/C1) Los Alamos National Laboratory does not have a program to ensure that the unrestricted release of potentially volume-contaminated material from accelerator facilities is conducted in accordance with the requirements of DOE 5400.5.

FINDINGS:

- Standards, procedures, or requirements are not in place to perform prestartup surveys at accelerators that are used as x-ray machines.

- Surveys of the portable linear accelerator used at the Betatron in TA-8 do not consider the effects of a worst-case scenario involving scattered radiation from the object being radiographed.

- Operating restrictions based on the results of surveys are not established for all accelerators.

- The following concern was not identified in the LANL self-assessment.

CONCERN: (TSA-3) (RP.10-3) (H2/C1) Prestartup and routine surveys at some Los Alamos National Laboratory accelerators are not performed in accordance with the requirements of ANSI 43.1.

TC.9 RADIOLOGICAL PROTECTION PERSONNEL

PERFORMANCE OBJECTIVE: The radiological protection personnel training and qualification program should develop and improve the knowledge and skills necessary to perform assigned job functions.

FINDINGS:

- Three operational health physics groups with responsibilities for radiation protection technicians required to fulfill DOE 5480.11 training were combined into the Health Physics Operations Group in July 1991. Each of the three groups have been developing and conducting radiation protection training which was partially coordinated across all groups.

- Two of the three groups have not specified the requirements that radiation protection technicians are required to complete to become certified. The Health Physics Operations Group has no approved training plan for radiation protection training.

- Staff within the Health Physics Operations Group could not agree in initial meetings with S&H Subteams 2 and 4 on which radiation protection technicians had fulfilled part or all of the required training for DOE 5480.11. In mid-October 1991 they wrote the internal procedure establishing the training requirements that each technician must complete.

- Not all site-specific procedures for operations performed by radiation protection technicians have been written. Therefore, site-specific on-the-job training using procedures has not been completed. (See Concern TSA-1, RP.3-2.)

- Untrained radiation protection technicians, as defined in DOE 5480.11, are technicians that are not certified to have been trained. LANL untrained technicians cannot be identified by sight. Some untrained radiation protection technicians are working alone but are encouraged to telephone their supervisors if they have questions.

- No documentation was provided indicating that lead technicians were informed of their supervisory responsibilities or their personal liabilities for untrained technicians.

- The Clinton P. Anderson Meson Physics Facility is operated using four, three-person shifts of trained and untrained health physics technicians who were responsible for 267 buildings with a variety of radiation concerns, making it essential that each crew include at least two trained technicians.

- Recertification of radiation protection technicians is in the planning stage for each former group, but lack of

documentation on when the original training was completed has hindered the efforts to identify the required date for recertification.

- The requirements for the Health Physics Operations Group Training Coordinator for radiation protection technicians cannot be fulfilled as a half-time position.

- The radiation protection techician training program is not audited periodically as required by ASME NQA-1-1989. (See Section 4.5.2.5.2, TC.9.)

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (TC.9-1) (H1/C1)

At the Los Alamos National Laboratory, radiation protection technician training does not meet the requirements of DOE 5480.11.

RRE

Oak Ridge Associated Universities
Post Office Box 117
Oak Ridge, Tennessee 37831-0117

Medical and Health Sciences Division

April 20, 1987

Mr. Milan Makale
Department of Zoology
University of Alberta
Edmonton, Canada T6G 2E9

Dear Dr. Milan:

I enjoyed reviewing with you the material on the Argentina II accident of 9/23/83 (Osvaldo Rogulich). We have been trying to obtain medical information on the case because the published cause of death (radiation pneumonitis in 49 hours) does not seem to be correct to me. Your information from Dan Beninson that suggests that this diagnosis is based on histologic evidence obtained at autopsy surprised me because our records indicate that no autopsy was done. I hope we are wrong. Our records also do not contain any medical data and are flawed by there being two, rather than just one, dose estimates. As far as we know a definitive report in the medical literature was never made. I hope Mr. Jorge Skvarca will tell us differently when you write to him. Please let me know.

I've attached a copy of a November 1983 memo I wrote to the file about a bone marrow rem dose estimate I made from the 1400 neutron rad/400 gamma rad exposure (?) estimate. This estimate is meaningless because of my arbitrary choice of an RBE of 10 for the 25% of the neutrons that might have reached his marrow.

The other dose (?) estimate in our records is ~2000 rads gamma and 1700 rads neutrons. Using the questionable "gymnatistics" stated in this 1983 memo (assuming these rad measurements are in kerma ("exposure rads"), I derive a corrected dose estimate of 6379 rem for the bone marrow. As long as you don't believe that the number has any certainty, a bone marrow dose that could be assigned to this case for reference purposes might be 5350 rem ± 1030 rem (the average of the two extrapolations I made from the two respective fields-of-exposure-dose estimates). So if you like to "round off," you could say that got 5000 ± 1000 rem in comparison to dose of 4500 rem and dose of 8000 rem. Subtracting the nonsense out of what I've just said, you are left with the conclusion that and are in the same class of radiation accident victims and died from a common pathologic modality which is basically vascular damage according to me. Loosely speaking, severe vascular damage, chiefly of the lung, can be called pneumonitis and this could produce a pre-(right sided) cardiac vascular obstruction that would terminate in a forward failure, hypotension, cerebral edema, and ischemia. I can't image therefore why the Argentine investigators didn't classify this death as CNS. (They would have been wrong if they had.) They were tempted to call it G.I. syndrome but I inferred from what's reported that they didn't believe he survived long enough for the "G.I. syndrome" to be operative.

OFFICIAL USE ONLY

TO: H-2 Medical Records

DATE: January 5, 1970

THRU: Dean D. Meyer, Group Leader, H-1

FROM: Tom H. Garcia, General Monitoring Section, H-1

SUBJECT: SUPPLEMENTAL IONIZING RADIATION EXPOSURE REPORT

Employee's Name:

Z-No.

TA: 35 Bldg. 2 Room 1-A-12

Exposure Period:

From: November 1969 Through: December 1969

Type of Radiation detection device:

See comment.

Where worn (location on body or extremity), if applicable:

Not applicable.

Origin of exposure (isotope, accelerator, x-ray machine, etc.):

Tritium

Type of radiation measured:

Bremsstrahlung

Results of evaluation:

Estimated integrated dose received [illegible] mrem to his hands (total hand contact time [illegible] minutes).

Comments:

Estimated dose rate from tritium material handled was 2,000 mrem/hr at contact. Estimates are based on previous [illegible] measurements [illegible] by J. [illegible] [illegible] 19[illegible]. Stop watch was used to time personnel involved each time tritium material was handled.

Medical Records
H-1 Section File
Tom Garcia
[illegible] Hopkins
[illegible]

Signature of evaluator

OFFICIAL USE ONLY

LOS ALAMOS SCIENTIFIC LABORATORY
UNIVERSITY OF CALIFORNIA
LOS ALAMOS, NEW MEXICO 87544

OFFICE MEMORANDUM

TO: Dean D. Meyer, Group Leader, H-1 DATE: October 17, 1969

THRU: Carl Buckland, Leader, General Monitoring Section, H-1

FROM: Tony H. Garcia, General Monitoring Section, H-1

SUBJECT: TEN SITE MONITORING FOR PERIOD OCTOBER 6 THRU 10, 1969

SYMBOL: H-1

Other than routine monitoring, the following operations required much of our time:

Monitoring for Shops Department personnel during the machining and handling of two tritium-containing objects in Room A-12.

The radiation level from each object was 500 mR/hr to the hands (Bremsstrahlung) through 25-gauge neoprene gloves. A Baird-Atomic, Model 644 instrument was used.

[illegible], SD-5, Z-[illegible], handled the object at intervals for a total of twenty-five minutes. [redacted] SD-6, Z-49450 handled the object at intervals for a total of eight minutes.

Urinalysis result for [redacted] was 17 µCi/liter and 20 µCi/liter for Robinson for the period ending October 10, 1969.

Routine alpha (Pu) airborne contamination tests collecting during this period read [illegible] dis/min-m³ or less.

Tony H. Garcia

THG/[illegible]

xc: H-2 Medical Record Folder of:
[redacted] SD-5, Z-[illegible]
[redacted], SD-6, Z-49400
Tony H. Garcia
File thru C. Blackwell

RECORD OF VISITS

CODE: RED - INDUSTRIAL VISIT BLUE - NON-INDUSTRIAL VISIT * - DICTATED NOTE

PLEASE STATE REASON FOR VISIT: HOW, WHEN AND WHERE ACCIDENT OCCURRED, DISPOSITION

Feb. 28, 1958 — Vision check for government driver's license:
10:10 am — Uncorrected - Rt. 20/30. Left 20/30. Hearing O.K. Ind.

E. Boyles, R.N.
SM-30 Dispensary

April 30, 1958 — Mild sore throat. Cepacol lozenges. Non-Ind.
9:45 a.m.

E. Boyles, R.N.
SM-30 Dispensary

[illegible]

Pulse Rate [illegible] ... ular ... Blood Pressure [illegible]

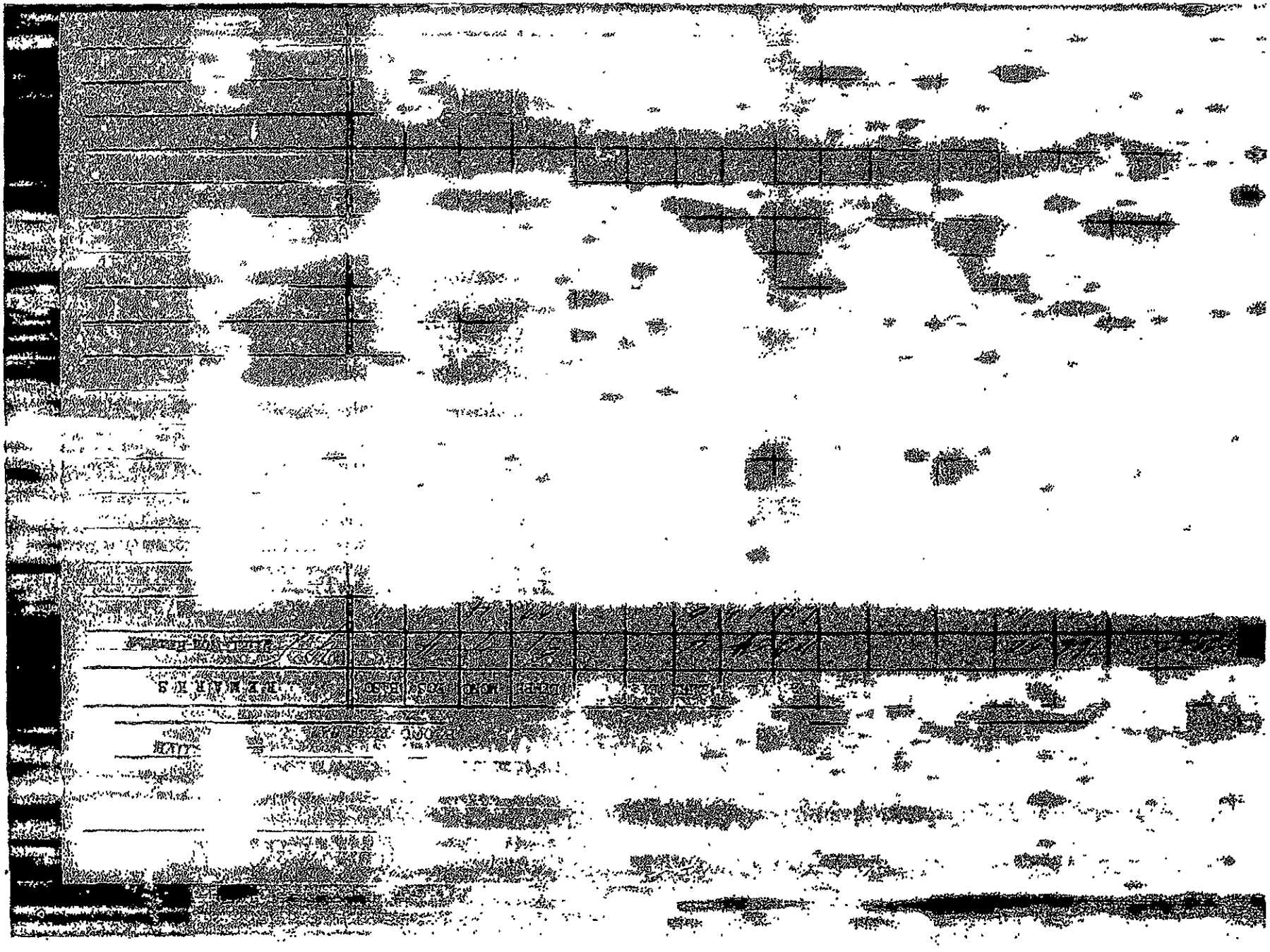
... murmurs

... een, and liver not palpable.
... nontender - no masses

...nder es
...pa e Organs
...ner Masse

... act. Knee jer...
... ctive

... tal not done



State of New Mexico
House of Representatives
Santa Fé

06-22-06A11:31 RCVD

SEC 51

COMMITTEES

INTERIM COMMITTEES

June 23, 2006

SEC 00051
Office of Compensation Analysis & Support
NIOSH MS-C-47
4676 Columbia Parkway
Cincinnati, OH 45226

Larry J. Elliott, MSPH, CH
Director;

In response to your letter dated May 25, 2006, I have enclosed the following. Please feel free to contact me at (505) 771-3059 if you have any questions or need additional information. I look forward to working with you and Laurie Ishal here in New Mexico in the near future.

REFERENCE:

E 5: Exhibit A. Affidavit from
Exhibit B. Affidavit from
Exhibit E. Affidavit from
Exhibit F. Affidavit from
Exhibit G. Affidavit from
Exhibit H. Affidavit from
Exhibit I. Affidavit from
Exhibit J. Affidavit from
Exhibit K. Affidavit from

F 2: Exhibit C. Los Alamos National Laboratory EEOICPA Dosimetry Response RE:

Exhibit D. National Institute for Occupational Safety and Health (NIOSH) on August 16, 2006 Page 6, Highlighted areas

Respectfully,

Special Exposure Cohort Petition
under the Energy Employees Occupational Illness Compensation Act

U.S. Department of Health and Human Services
Centers for Disease Control and Prevention
National Institute for Occupational Safety and Health

Special Exposure Cohort Petition — Form B

OMB Number: 0920-0639 Expires: 05/31/2007

Appendix — Petitioner 2

Use this Appendix for Petitioner 2.

This appendix form is to be used as needed. Petitioner 2, or his or her representative, should complete the parts applicable to him or her.

Refer to the General Instructions on completing petitioner information for Parts A, B, or C.

If you need more space to provide additional information, use the continuation page provided at the end of the form and attach the completed continuation page(s) to Form B.

Except for signatures, please **PRINT** all information clearly and neatly on the form.

If you are:	☐ An Energy Employee (current or former),	Start at C
	☐ A Survivor (of a former Energy Employee),	Start at B
	☒ A Representative (of a current or former Energy Employee),	Start at A

A Representative Information — Complete Section A if you are authorized by an Employee or Survivor(s) to petition on behalf of a class.

A.1 **Are you a contact person for an organization?** ☐ Yes (Go to A.2) ☒ No (Go to A.3)

A.2 **Organization Information:**

Name of Organization

Position of Contact Person

A.3 **Name of Petition Representative:**

Mr./Mrs./Ms. First Name Middle Initial Last Name

A.4 **Address:**

Street Apt # P.O. Box

City State Zip Code

A.5 **Telephone Number:** (

A.6 **Email Address:**

A.7 ☐ Check the box at left to indicate you have attached to the back of this form written authorization to petition by the survivor(s) or employee(s) indicated in Parts B or C of this form. An authorization form for this purpose is provided.

If you are a representative, go to Part B. If you are an Employee, go to Part C.

Name or Social Security Number of First Petitioner: _____