General

MEMORANDUM

February 26, 1992

Subject: Regulation of Radiological Wastes at Los Alamos National Lab (LANL)

From: Fred Humke, 6W-PI

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EPA - Reg 6's Water Mgmt Div

Based on the information contained in the attached EPA OGC interpretation for RCRA, the Atomic Energy Act (AEA) regulates the following radioactive wastes at DOE facilities:

<u>Source Material</u>

Uranium
Thorium
Ores containing those elements

<u>Special Nuclear Material</u>

Plutonium
Enriched uranium

<u>By-product Material</u>

Material made radioactive by exposure to the radiation incident in the process of producing or utilizing special nuclear material (which may include only radionuclides or a broader matrix)

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Other radioactive materials at DOE facilities may be regulated under the CWA. These are identified by OGC as <u>naturally occuring and accelerator produced radioactive materials</u>. At DOE process outfalls the primary natural occuring radionuclide considered (exclusive of those regulated by AEA) has been radium which has limits under NM WQS. An assessment may be needed to establish if any other natural occuring radionuclides (exclusive of those regulated under the AEA) exist. Accelerator produced isotopes must be identified on a site specific basis.

Therefore, it would seem to follow that in the operating permit, radium limits would apply at all outfalls (although application data shows all outfalls far below WQS levels for radium). Accelerator produced wastes are associated only with Outfall 09S. Tritium is the parameter in question.

In future solid waste management unit (SWMU) permitting, radium may be limited at all outfalls. Historical information would be needed to establish the source of these wastes some 30 to 50 years prior, and an assessment may be needed to determine if some fraction of these wastes is natural occuring or exclusively associated with past AEA disposal activities.

APPENDIX A from the NM Radiation Protection Regulations is attached. This lists the radionuclides and associated isotopes.

Attachments

12335

source, special nuclear, or by-product material, and is a listed waste or exhibits a characteristic, will not be subject to RCRA (again, only the non-nuclear material is subject to RCRA). For example, radioactive chromium that fails the EP toxicity test is not subject to the hazardous waste regime of RCRA. Section 1006 of RCRA can still be used to waive requirements which are inconsistent with the Atomic Energy Act; however, to date no such waivers have been granted.

Naturally occurring or accelerator produced radioactive materials (NARM) are not covered by the Atomic Energy Act and have no special status under RCRA. NARM waste is not subject to the §1006 exemption for AEA waste because it is not regulated by AEA; however, NARM is neither listed RCRA hazardous waste, nor does it display a hazardous characteristic (radioactivity is not a RCRA hazardous characteristic). Thus, NARM is not currently specifically regulated under Subtitle C of RCRA. However, like any other material, if NARM is mixed with hazardous waste then the entire mixture is a hazardous waste. NARM is a solid waste and is subject to Subtitle D of RCRA, like any other solid waste.

NARM is not in any special waste category and a NARM waste would only be eligible for a special exemption from RCRA if the waste fit under one of the other special waste categories. The special waste category most likely to include some NARM waste is the mining waste category which contains waste from the extraction, benefication, or processing of ores and minerals.

The Agency is currently making an effort to impose regulations on the disposal of NARM waste. This is due to the fact that NARM may be of similar radioactive concentration as low-level AEA wastes. The larger sources of NARM are the naturally occurring radionuclides, principally radium, and the two major types, discrete sources and diffuse sources.

Radium 226 has been a primary concern for the Agency because of its long half life, its inclination to concentrate in bones, and the fact that it emits energetic alpha particles and gamma and X-rays. Most of the accelerator produced radionuclides are used in medicine for research and have relatively short half lives.

To summarize NARM regulation: NARM is subject to Subtitle D regulation for solid waste. Some States regulate NARM as low-level waste, while other States don't regulate it at all. In fact, a number of low-level waste disposal facilities will not accept NARM waste, and much of the NARM waste is being stored until further guidance can be obtained concerning proper disposal. As an impending Agency rulemaking will point out, there have been a number of hazardous incidents related to the improper storage and disposal of NARM waste.

EPA is considering regulating NARM waste under the Toxic Substances Control Act (TSCA). EPA's draft proposal would require that NARM in concentrations above 2 nanocuries per gram be disposed of in Atomic Energy Act licensed facilities. The proposal in its current form would exclude smoke detectors, and watches and clocks using radioluminescent paint. The Agency decided not to pursue RCRA Subtitle C regulation of NARM because some of RCRA's statutory requirements are not appropriate for the disposal of NARM waste. The draft proposed NARM regulations would require that the waste be properly classified before disposal, that transport be accompanied by a shipping manifest, that the waste go to a facility either licensed under the Atomic Energy Act such as NRC facilities or facilities authorized by the AEA, namely DOE facilities, and that the process and disposal facilities keep a copy of the radioactive material shipment manifest. It should be emphasized that this is a draft regulation which EPA expects to propose soon and which will then be subject to public comment before final promulgation.

LA-12200-MS
August 1991

Los Alamos National Laboratory ES&H Self-Assessment Report

Los Alamos
NATIONAL LABORATORY

APPENDIX A

CONCENTRATIONS IN AIR AND WATER ABOVE NATURAL BACKGROUND

Element (atomic number)	Isotope[1]		Table I Column 1 Air (μCi/ml)	Table I Column 2 Water (μCi/ml)	Table II Column 1 Air (μCi/ml)	Table II Column 2 Water (μCi/ml)
Actinium (89)	Ac-227	S	$2X10^{-12}$	$6X10^{-5}$	$8X10^{-14}$	$2X10^{-6}$
		I	$3X10^{-11}$	$9X10^{-3}$	$9X10^{-13}$	$3X10^{-4}$
	Ac-228	S	$8X10^{-8}$	$3X10^{-3}$	$3X10^{-9}$	$9X10^{-5}$
		I	$2X10^{-8}$	$3X10^{-3}$	$6X10^{-10}$	$9X10^{-5}$
Americium (95)	Am-241	S	$6X10^{-12}$	$1X10^{-4}$	$2X10^{-13}$	$4X10^{-6}$
		I	$1X10^{-10}$	$8X10^{-4}$	$4X10^{-12}$	$3X10^{-5}$
	Am-242m	S	$6X10^{-12}$	$1X10^{-4}$	$2X10^{-13}$	$4X10^{-6}$
		I	$3X10^{-10}$	$3X10^{-3}$	$9X10^{-12}$	$9X10^{-5}$
	Am-242	S	$4X10^{-8}$	$4X10^{-3}$	$1X10^{-9}$	$1X10^{-4}$
		I	$5X10^{-8}$	$4X10^{-3}$	$2X10^{-9}$	$1X10^{-4}$
	Am-243	S	$6X10^{-12}$	$1X10^{-4}$	$2X10^{-13}$	$4X10^{-6}$
		I	$1X10^{-10}$	$8X10^{-4}$	$4X10^{-12}$	$3X10^{-5}$
	Am-244	S	$4X10^{-6}$	$1X10^{-1}$	$1X10^{-7}$	$5X10^{-3}$
		I	$2X10^{-5}$	$1X10^{-1}$	$8X10^{-7}$	$5X10^{-3}$
Antimony (51)	Sb-122	S	$2X10^{-7}$	$8X10^{-4}$	$6X10^{-9}$	$3X10^{-5}$
		I	$1X10^{-7}$	$8X10^{-4}$	$5X10^{-9}$	$3X10^{-5}$
	Sb-124	S	$2X10^{-7}$	$7X10^{-4}$	$5X10^{-9}$	$2X10^{-5}$
		I	$2X10^{-8}$	$7X10^{-4}$	$7X10^{-10}$	$2X10^{-5}$
	Sb-125	S	$5X10^{-7}$	$3X10^{-3}$	$2X10^{-8}$	$1X10^{-4}$
		I	$3X10^{-8}$	$3X10^{-3}$	$9X10^{-10}$	$1X10^{-4}$
Argon (18)	Ar-37	Sub[2]	$6X10^{-3}$	———	$1X10^{-4}$	———
	Ar-41	Sub	$2X10^{-6}$	———	$4X10^{-8}$	———
Arsenic (33)	As-73	S	$2X10^{-6}$	$1X10^{-2}$	$7X10^{-8}$	$5X10^{-4}$
		I	$4X10^{-7}$	$1X10^{-2}$	$1X10^{-8}$	$5X10^{-4}$
	As-74	S	$3X10^{-7}$	$2X10^{-3}$	$1X10^{-8}$	$5X10^{-5}$
		I	$1X10^{-7}$	$2X10^{-3}$	$4X10^{-9}$	$5X10^{-5}$
	As-76	S	$1X10^{-7}$	$6X10^{-4}$	$4X10^{-9}$	$2X10^{-5}$
		I	$1X10^{-7}$	$6X10^{-4}$	$3X10^{-9}$	$2X10^{-5}$
	As-77	S	$5X10^{-7}$	$2X10^{-3}$	$2X10^{-8}$	$8X10^{-5}$
		I	$4X10^{-7}$	$2X10^{-3}$	$1X10^{-8}$	$8X10^{-5}$

(See notes at end of appendix)

APPENDIX A (continued)

Element (atomic number)	Isotope[1]		Table I Column 1 Air (µCi/ml)	Table I Column 2 Water (µCi/ml)	Table II Column 1 Air (µCi/ml)	Table II Column 2 Water (µCi/ml)
	Ca-47	S	2X10^{-7}	1X10^{-3}	6X10^{-9}	5X10^{-5}
		I	2X10^{-7}	1X10^{-3}	6X10^{-9}	3X10^{-5}
Californium (98)	Cf-249	S	2X10^{-12}	1X10^{-4}	5X10^{-14}	4X10^{-6}
		I	1X10^{-10}	7X10^{-4}	3X10^{-12}	2X10^{-5}
	Cf-250	S	5X10^{-12}	4X10^{-4}	2X10^{-13}	1X10^{-5}
		I	1X10^{-10}	7X10^{-4}	3X10^{-12}	3X10^{-5}
	Cf-251	S	2X10^{-12}	1X10^{-4}	6X10^{-14}	4X10^{-6}
		I	1X10^{-10}	8X10^{-4}	3X10^{-12}	3X10^{-5}
	Cf-252	S	6X10^{-12}	2X10^{-4}	2X10^{-13}	7X10^{-6}
		I	3X10^{-11}	2X10^{-4}	1X10^{-12}	7X10^{-6}
	Cf-253	S	8X10^{-10}	4X10^{-3}	3X10^{-11}	1X10^{-4}
		I	8X10^{-10}	4X10^{-3}	3X10^{-11}	1X10^{-4}
	Cf-254	S	5X10^{-12}	4X10^{-6}	2X10^{-13}	1X10^{-7}
		I	5X10^{-12}	4X10^{-6}	2X10^{-13}	1X10^{-7}
Carbon (6)	C-14	S	4X10^{-6}	2X10^{-2}	1X10^{-7}	8X10^{-4}
	(CO_2)	Sub[2]	5X10^{-5}	—	1X10^{-6}	—
Cerium (58)	Ce-141	S	4X10^{-7}	3X10^{-3}	2X10^{-8}	9X10^{-5}
		I	2X10^{-7}	3X10^{-3}	5X10^{-9}	9X10^{-5}
	Ce-143	S	3X10^{-7}	1X10^{-3}	9X10^{-9}	4X10^{-5}
		I	2X10^{-7}	1X10^{-3}	7X10^{-9}	4X10^{-5}
	Ce-144	S	1X10^{-8}	3X10^{-4}	3X10^{-10}	1X10^{-5}
		I	6X10^{-9}	3X10^{-4}	2X10^{-10}	1X10^{-5}
Cesium (55)	Cs-131	S	1X10^{-5}	7X10^{-2}	4X10^{-7}	2X10^{-3}
		I	3X10^{-6}	3X10^{-2}	1X10^{-7}	9X10^{-4}
	Cs-134m	S	4X10^{-5}	2X10^{-1}	1X10^{-6}	6X10^{-3}
		I	6X10^{-6}	3X10^{-2}	2X10^{-7}	1X10^{-3}
	Cs-134	S	4X10^{-8}	3X10^{-4}	1X10^{-9}	9X10^{-6}
		I	1X10^{-8}	1X10^{-3}	4X10^{-10}	4X10^{-5}
	Cs-135	S	5X10^{-7}	3X10^{-3}	2X10^{-8}	1X10^{-4}
		I	9X10^{-8}	7X10^{-3}	3X10^{-9}	2X10^{-4}
	Cs-136	S	4X10^{-7}	2X10^{-3}	1X10^{-8}	9X10^{-5}
		I	2X10^{-7}	2X10^{-3}	6X10^{-9}	6X10^{-5}
	Cs-137	S	6X10^{-8}	4X10^{-4}	2X10^{-9}	2X10^{-5}

(See notes at end of appendix)

APPENDIX A (continued)

Element (atomic number)	Isotope[1]		Table I Column 1 Air (µCi/ml)	Table I Column 2 Water (µCi/ml)	Table II Column 1 Air (µCi/ml)	Table II Column 2 Water (µCi/ml)
		I	$1X10^{-5}$	$6X10^{-2}$	$4X10^{-7}$	$2X10^{-3}$
Dysprosium (66)	Dy-165	S	$3X10^{-6}$	$1X10^{-2}$	$9X10^{-8}$	$4X10^{-4}$
		I	$2X10^{-6}$	$1X10^{-2}$	$7X10^{-8}$	$4X10^{-4}$
	Dy-166	S	$2X10^{-7}$	$1X10^{-3}$	$8X10^{-9}$	$4X10^{-5}$
		I	$2X10^{-7}$	$1X10^{-3}$	$7X10^{-9}$	$4X10^{-5}$
Einsteinium (99)	Es-253	S	$8X10^{-10}$	$7X10^{-4}$	$3X10^{-11}$	$2X10^{-5}$
		I	$6X10^{-10}$	$7X10^{-4}$	$2X10^{-11}$	$2X10^{-5}$
	Es-254m	S	$5X10^{-9}$	$5X10^{-4}$	$2X10^{-10}$	$2X10^{-5}$
		I	$6X10^{-9}$	$5X10^{-4}$	$2X10^{-10}$	$2X10^{-5}$
	Es-254	S	$2X10^{-11}$	$4X10^{-4}$	$6X10^{-13}$	$1X10^{-5}$
		I	$1X10^{-10}$	$4X10^{-4}$	$4X10^{-12}$	$1X10^{-5}$
	Es-255	S	$5X10^{-10}$	$8X10^{-4}$	$2X10^{-11}$	$3X10^{-5}$
		I	$4X10^{-10}$	$8X10^{-4}$	$1X10^{-11}$	$3X10^{-5}$
Erbium (68)	Er-169	S	$6X10^{-7}$	$3X10^{-3}$	$2X10^{-8}$	$9X10^{-5}$
		I	$4X10^{-7}$	$3X10^{-3}$	$1X10^{-8}$	$9X10^{-5}$
	Er-171	S	$7X10^{-7}$	$3X10^{-3}$	$2X10^{-8}$	$1X10^{-4}$
		I	$6X10^{-7}$	$3X10^{-3}$	$2X10^{-8}$	$1X10^{-4}$
Europium (63)	Eu-152	S	$4X10^{-7}$	$2X10^{-3}$	$1X10^{-8}$	$6X10^{-5}$
	(T/2=9.2 hrs)	I	$3X10^{-7}$	$2X10^{-3}$	$1X10^{-8}$	$6X10^{-5}$
	Eu-152	S	$1X10^{-8}$	$2X10^{-3}$	$4X10^{-10}$	$8X10^{-5}$
	(T/2=13 yrs)	I	$2X10^{-8}$	$2X10^{-3}$	$6X10^{-10}$	$8X10^{-5}$
	Eu-154	S	$4X10^{-9}$	$6X10^{-4}$	$1X10^{-10}$	$2X10^{-5}$
		I	$7X10^{-9}$	$6X10^{-4}$	$2X10^{-10}$	$2X10^{-5}$
	Eu-155	S	$9X10^{-8}$	$6X10^{-3}$	$3X10^{-9}$	$2X10^{-4}$
		I	$7X10^{-8}$	$6X10^{-3}$	$3X10^{-9}$	$2X10^{-4}$
Fermium (100)	Fm-254	S	$6X10^{-8}$	$4X10^{-3}$	$2X10^{-9}$	$1X10^{-4}$
		I	$7X10^{-8}$	$4X10^{-3}$	$2X10^{-9}$	$1X10^{-4}$
	Fm-255	S	$2X10^{-8}$	$1X10^{-3}$	$6X10^{-10}$	$3X10^{-5}$
		I	$1X10^{-8}$	$1X10^{-3}$	$4X10^{-10}$	$3X10^{-5}$
	Fm-256	S	$3X10^{-9}$	$3X10^{-5}$	$1X10^{-10}$	$9X10^{-7}$
		I	$2X10^{-9}$	$3X10^{-5}$	$6X10^{-11}$	$9X10^{-7}$

(See notes at end of appendix)

APPENDIX A (continued)

Element (atomic number)	Isotope[1]		Table I Column 1 Air (μCi/ml)	Table I Column 2 Water (μCi/ml)	Table II Column 1 Air (μCi/ml)	Table II Column 2 Water (μCi/ml)
	In-115	S	$2X10^{-7}$	$3X10^{-3}$	$9X10^{-9}$	$9X10^{-5}$
		I	$3X10^{-8}$	$3X10^{-3}$	$1X10^{-9}$	$9X10^{-5}$
Iodine (53)	I-125	S	$5X10^{-9}$	$4X10^{-5}$	$8X10^{-11}$	$2X10^{-7}$
		I	$2X10^{-7}$	$6X10^{-3}$	$6X10^{-9}$	$2X10^{-4}$
	I-126	S	$8X10^{-9}$	$5X10^{-5}$	$9X10^{-11}$	$3X10^{-7}$
		I	$3X10^{-7}$	$3X10^{-3}$	$1X10^{-8}$	$9X10^{-5}$
	I-129	S	$2X10^{-9}$	$1X10^{-5}$	$2X10^{-11}$	$6X10^{-8}$
		I	$7X10^{-8}$	$6X10^{-3}$	$2X10^{-9}$	$2X10^{-4}$
	I-131	S	$9X10^{-9}$	$6X10^{-5}$	$1X10^{-10}$	$3X10^{-7}$
		I	$3X10^{-7}$	$2X10^{-3}$	$1X10^{-8}$	$6X10^{-5}$
	I-132	S	$2X10^{-7}$	$2X10^{-3}$	$3X10^{-9}$	$8X10^{-6}$
		I	$9X10^{-7}$	$5X10^{-3}$	$3X10^{-8}$	$2X10^{-4}$
	I-133	S	$3X10^{-8}$	$2X10^{-4}$	$4X10^{-10}$	$1X10^{-6}$
		I	$2X10^{-7}$	$1X10^{-3}$	$7X10^{-9}$	$4X10^{-5}$
	I-134	S	$5X10^{-7}$	$4X10^{-3}$	$6X10^{-9}$	$2X10^{-5}$
		I	$3X10^{-6}$	$2X10^{-2}$	$1X10^{-7}$	$6X10^{-4}$
	I-135	S	$1X10^{-7}$	$7X10^{-4}$	$1X10^{-9}$	$4X10^{-6}$
		I	$4X10^{-7}$	$2X10^{-3}$	$1X10^{-8}$	$7X10^{-5}$
Iridium (77)	Ir-190	S	$1X10^{-6}$	$6X10^{-3}$	$4X10^{-8}$	$2X10^{-4}$
		I	$4X10^{-7}$	$5X10^{-3}$	$1X10^{-8}$	$2X10^{-4}$
	Ir-192	S	$1X10^{-7}$	$1X10^{-3}$	$4X10^{-9}$	$4X10^{-5}$
		I	$3X10^{-8}$	$1X10^{-3}$	$9X10^{-10}$	$4X10^{-5}$
	Ir-194	S	$2X1-^{-7}$	$1X10^{-3}$	$8X10^{-9}$	$3X10^{-5}$
		I	$2X10^{-7}$	$9X10^{-4}$	$5X10^{-9}$	$3X10^{-5}$
Iron (26)	Fe-55	S	$9X10^{-7}$	$2X10^{-2}$	$3X10^{-8}$	$8X10^{-4}$
		I	$1X10^{-6}$	$7X10^{-2}$	$3X10^{-8}$	$2X10^{-3}$
	Fe-59	S	$1X10^{-7}$	$2X10^{-3}$	$5X10^{-9}$	$6X10^{-5}$
		I	$5X10^{-8}$	$2X10^{-3}$	$2X10^{-9}$	$5X10^{-5}$
Krypton (36)	Kr-85m	Sub[2]	$6X10^{-6}$	———	$1X10^{-7}$	———
	Kr-85	Sub	$1X10^{-5}$	———	$3X10^{-7}$	———
	Kr-87	Sub	$1X10^{-6}$	———	$2X10^{-8}$	———
	Kr-88	Sub	$1X10^{-6}$	———	$2X10^{-8}$	———

(See notes at end of appendix)

APPENDIX A (continued)

Element (atomic number)	Isotope[1]		Table I		Table II	
			Column 1 Air (μCi/ml)	Column 2 Water (μCi/ml)	Column 1 Air (μCi/ml)	Column 2 Water (μCi/ml)
Neptunium (93)	Np-237	S	$4X10^{-12}$	$9X10^{-5}$	$1X10^{-13}$	$3X10^{-6}$
		I	$1X10^{-10}$	$9X10^{-4}$	$4X10^{-12}$	$3X10^{-5}$
	Np-239	S	$8X10^{-7}$	$4X10^{-3}$	$3X10^{-8}$	$1X10^{-4}$
		I	$7X10^{-7}$	$4X10^{-3}$	$2X10^{-8}$	$1X10^{-4}$
Nickel (28)	Ni-59	S	$5X10^{-7}$	$6X10^{-3}$	$2X10^{-8}$	$2X10^{-4}$
		I	$8X10^{-7}$	$6X10^{-2}$	$3X10^{-8}$	$2X10^{-3}$
	Ni-63	S	$6X10^{-8}$	$8X10^{-4}$	$2X10^{-9}$	$3X10^{-5}$
		I	$3X10^{-7}$	$2X10^{-2}$	$1X10^{-8}$	$7X10^{-4}$
	Ni-65	S	$9X10^{-7}$	$4X10^{-3}$	$3X10^{-8}$	$1X10^{-4}$
		I	$5X10^{-7}$	$3X10^{-3}$	$2X10^{-8}$	$1X10^{-4}$
Niobium (41)	Nb-93m	S	$1X10^{-7}$	$1X10^{-2}$	$4X10^{-9}$	$4X10^{-4}$
		I	$2X10^{-7}$	$1X10^{-2}$	$5X10^{-9}$	$4X10^{-4}$
	Nb-95	S	$5X10^{-7}$	$3X10^{-3}$	$2X10^{-8}$	$1X10^{-4}$
		I	$1X10^{-7}$	$3X10^{-3}$	$3X10^{-9}$	$1X10^{-4}$
	Nb-97	S	$6X10^{-6}$	$3X10^{-2}$	$2X10^{-7}$	$9X10^{-4}$
		I	$5X10^{-6}$	$3X10^{-2}$	$2X10^{-7}$	$9X10^{-4}$
Osmium (76)	Os-185	S	$5X10^{-7}$	$2X10^{-3}$	$2X10^{-8}$	$7X10^{-5}$
		I	$5X10^{-8}$	$2X10^{-3}$	$2X10^{-9}$	$7X10^{-5}$
	Os-191m	S	$2X10^{-5}$	$7X10^{-2}$	$6X10^{-7}$	$3X10^{-3}$
		I	$9X10^{-6}$	$7X10^{-2}$	$3X10^{-7}$	$2X10^{-3}$
	Os-191	S	$1X10^{-6}$	$5X10^{-3}$	$4X10^{-8}$	$2X10^{-4}$
		I	$4X10^{-7}$	$5X10^{-3}$	$1X10^{-8}$	$2X10^{-4}$
	Os-193	S	$4X10^{-7}$	$2X10^{-3}$	$1X10^{-8}$	$6X10^{-5}$
		I	$3X10^{-7}$	$2X10^{-3}$	$9X10^{-9}$	$5X10^{-5}$
Palladium (46)	Pd-103	S	$1X10^{-6}$	$1X10^{-2}$	$5X10^{-8}$	$3X10^{-4}$
		I	$7X10^{-7}$	$8X10^{-3}$	$3X10^{-8}$	$3X10^{-4}$
	Pd-109	S	$6X10^{-7}$	$3X10^{-3}$	$2X10^{-8}$	$9X10^{-5}$
		I	$4X10^{-7}$	$2X10^{-3}$	$1X10^{-8}$	$7X10^{-5}$
Phosphorus (15)	P-32	S	$7X10^{-8}$	$5X10^{-4}$	$2X10^{-9}$	$2X10^{-5}$
		I	$8X10^{-8}$	$7X10^{-4}$	$3X10^{-9}$	$2X10^{-5}$

(See notes at end of appendix)

APPENDIX A (continued)

Element (atomic number)	Isotope[1]		Table I Column 1 Air (μCi/ml)	Table I Column 2 Water (μCi/ml)	Table II Column 1 Air (μCi/ml)	Table II Column 2 Water (μCi/ml)
Promethium (61)	Pm-147	S	$6X10^{-8}$	$6X10^{-3}$	$2X10^{-9}$	$2X10^{-4}$
		I	$1X10^{-7}$	$6X10^{-3}$	$3X10^{-9}$	$2X10^{-4}$
	Pm-149	S	$3X10^{-7}$	$1X10^{-3}$	$1X10^{-8}$	$4X10^{-5}$
		I	$2X10^{-7}$	$1X10^{-3}$	$8X10^{-9}$	$4X10^{-5}$
Protactinium (91)	Pa-230	S	$2X10^{-9}$	$7X10^{-3}$	$6X10^{-11}$	$2X10^{-4}$
		I	$8X10^{-10}$	$7X10^{-3}$	$3X10^{-11}$	$2X10^{-4}$
	Pa-231	S	$1X10^{-12}$	$3X10^{-5}$	$4X10^{-14}$	$9X10^{-7}$
		I	$1X10^{-10}$	$8X10^{-4}$	$4X10^{-12}$	$2X10^{-5}$
	Pa-233	S	$6X10^{-7}$	$4X10^{-3}$	$2X10^{-8}$	$1X10^{-4}$
		I	$2X10^{-7}$	$3X10^{-3}$	$6X10^{-9}$	$1X10^{-4}$
Radium (88)	Ra-223	S	$2X10^{-9}$	$2X10^{-5}$	$6X10^{-11}$	$7X10^{-7}$
		I	$2X10^{-10}$	$1X10^{-4}$	$8X10^{-12}$	$4X10^{-6}$
	Ra-224	S	$5X10^{-9}$	$7X10^{-5}$	$2X10^{-10}$	$2X10^{-6}$
		I	$7X10^{-10}$	$2X10^{-4}$	$2X10^{-11}$	$5X10^{-6}$
	Ra-226	S	$3X10^{-11}$	$4X10^{-7}$	$3X10^{-12}$	$3X10^{-8}$
		I	$5X10^{-11}$	$9X10^{-4}$	$2X10^{-12}$	$3X10^{-5}$
	Ra-228	S	$7X10^{-11}$	$8X10^{-7}$	$2X10^{-12}$	$3X10^{-8}$
		I	$4X10^{-11}$	$7X10^{-4}$	$1X10^{-12}$	$3X10^{-5}$
Radon (86)	Rn-220	S	$3X10^{-7}$	—	$1X10^{-8}$	—
		I		—		—
	Rn-222[3]	S	$3X10^{-8}$	—	$3X10^{-9}$	—
Rhenium (75)	Re-183	S	$3X10^{-6}$	$2X10^{-2}$	$9X10^{-8}$	$6X10^{-4}$
		I	$2X10^{-7}$	$8X10^{-3}$	$5X10^{-9}$	$3X10^{-4}$
	Re-186	S	$6X10^{-7}$	$3X10^{-3}$	$2X10^{-8}$	$9X10^{-5}$
		I	$2X10^{-7}$	$1X10^{-3}$	$8X10^{-9}$	$5X10^{-5}$
	Re-187	S	$9X10^{-6}$	$7X10^{-2}$	$3X10^{-7}$	$3X10^{-3}$
		I	$5X10^{-7}$	$4X10^{-2}$	$2X10^{-8}$	$2X10^{-3}$
	Re-188	S	$4X10^{-7}$	$2X10^{-3}$	$1X10^{-8}$	$6X10^{-5}$
		I	$2X10^{-7}$	$9X10^{-4}$	$6X10^{-9}$	$3X10^{-5}$
Rhodium (45)	Rh-103m	S	$8X10^{-5}$	$4X10^{-1}$	$3X10^{-6}$	$1X10^{-2}$
		I	$6X10^{-5}$	$3X10^{-1}$	$2X10^{-6}$	$1X10^{-2}$
	Rh-105	S	$8X10^{-7}$	$4X10^{-3}$	$3X10^{-8}$	$1X10^{-4}$

(See notes at end of appendix)

APPENDIX A (continued)

Element (atomic number)	Isotope[1]		Table I Column 1 Air (µCi/ml)	Table I Column 2 Water (µCi/ml)	Table II Column 1 Air (µCi/ml)	Table II Column 2 Water (µCi/ml)
Silver (47)	Ag-105	S	6X10^{-7}	3X10^{-3}	2X10^{-8}	1X10^{-4}
		I	8X10^{-8}	3X10^{-3}	3X10^{-9}	1X10^{-4}
	Ag-110m	S	2X10^{-7}	9X10^{-4}	7X10^{-9}	3X10^{-5}
		I	1X10^{-8}	9X10^{-4}	3X10^{-10}	3X10^{-5}
	Ag-111	S	3X10^{-7}	1X10^{-3}	1X10^{-8}	4X10^{-5}
		I	2X10^{-7}	1X10^{-3}	8X10^{-9}	4X10^{-5}
Sodium (11)	Na-22	S	2X10^{-7}	1X10^{-3}	6X10^{-9}	4X10^{-5}
		I	9X10^{-9}	9X10^{-4}	3X10^{-10}	3X10^{-5}
	Na-24	S	1X10^{-6}	6X10^{-3}	4X10^{-8}	2X10^{-4}
		I	1X10^{-7}	8X10^{-4}	5X10^{-9}	3X10^{-5}
Strontium (38)	Sr-85m	S	4X10^{-5}	2X10^{-1}	1X10^{-6}	7X10^{-3}
		I	3X10^{-5}	2X10^{-1}	1X10^{-6}	7X10^{-3}
	Sr-85	S	2X10^{-7}	3X10^{-3}	8X10^{-9}	1X10^{-4}
		I	1X10^{-7}	5X10^{-3}	4X10^{-9}	2X10^{-4}
	Sr-89	S	3X10^{-8}	3X10^{-4}	3X10^{-10}	3X10^{-6}
		I	4X10^{-8}	8X10^{-4}	1X10^{-9}	3X10^{-5}
	Sr-90	S	1X10^{-9}	1X10^{-5}	3X10^{-11}	3X10^{-7}
		I	5X10^{-9}	1X10^{-3}	2X10^{-10}	4X10^{-5}
	Sr-91	S	4X10^{-7}	2X10^{-3}	2X10^{-8}	7X10^{-5}
		I	3X10^{-7}	1X10^{-3}	9X10^{-9}	5X10^{-5}
	Sr-92	S	4X10^{-7}	2X10^{-3}	2X10^{-8}	7X10^{-5}
		I	3X10^{-7}	2X10^{-3}	1X10^{-8}	6X10^{-5}
Sulfur (16)	S-35	S	3X10^{-7}	2X10^{-3}	9X10^{-9}	6X10^{-5}
		I	3X10^{-7}	8X10^{-3}	9X10^{-9}	3X10^{-4}
Tantalum (73)	Ta-182	S	4X10^{-8}	1X10^{-3}	1X10^{-9}	4X10^{-5}
		I	2X10^{-8}	1X10^{-3}	7X10^{-10}	4X10^{-5}
Technetium (43)	Tc-96m	S	8X10^{-5}	4X10^{-1}	3X10^{-6}	1X10^{-2}
		I	3X10^{-5}	3X10^{-1}	1X10^{-6}	1X10^{-2}
	Tc-96	S	6X10^{-7}	3X10^{-3}	2X10^{-8}	1X10^{-4}
		I	2X10^{-7}	1X10^{-3}	8X10^{-9}	5X10^{-5}
	Tc-97m	S	2X10^{-6}	1X10^{-2}	8X10^{-8}	4X10^{-4}
		I	2X10^{-7}	5X10^{-3}	5X10^{-9}	2X10^{-4}

(See notes at end of appendix)

APPENDIX A (continued)

Element (atomic number)	Isotope[1]		Table I Column 1 Air (μCi/ml)	Table I Column 2 Water (μCi/ml)	Table II Column 1 Air (μCi/ml)	Table II Column 2 Water (μCi/ml)
		I	$6X10^{-12}$	$4X10^{-4}$	$2X10^{-13}$	$1X10^{-5}$
	Th-230	S	$2X10^{-12}$	$5X10^{-5}$	$8X10^{-14}$	$2X10^{-6}$
		I	$1X10^{-11}$	$9X10^{-4}$	$3X10^{-13}$	$3X10^{-5}$
	Th-231	S	$1X10^{-6}$	$7X10^{-3}$	$5X10^{-8}$	$2X10^{-4}$
		I	$1X10^{-6}$	$7X10^{-3}$	$4X10^{-8}$	$2X10^{-4}$
	Th-232	S	$3X10^{-11}$	$5X10^{-5}$	$1X10^{-12}$	$2X10^{-6}$
		I	$3X10^{-11}$	$1X10^{-3}$	$1X10^{-12}$	$4X10^{-5}$
	Th-natural	S	$6X10^{-11}$	$6X10^{-5}$	$2X10^{-12}$	$2X10^{-6}$
		I	$6X10^{-11}$	$6X10^{-4}$	$2X10^{-12}$	$2X10^{-5}$
	Th-234	S	$6X10^{-8}$	$5X10^{-4}$	$2X10^{-9}$	$2X10^{-5}$
		I	$3X10^{-8}$	$5X10^{-4}$	$1X10^{-9}$	$2X10^{-5}$
Thulium (69)	Tm-170	S	$4X10^{-8}$	$1X10^{-3}$	$1X10^{-9}$	$5X10^{-5}$
		I	$3X10^{-8}$	$1X10^{-3}$	$1X10^{-9}$	$5X10^{-5}$
	Tm-171	S	$1X10^{-7}$	$1X10^{-2}$	$4X10^{-9}$	$5X10^{-4}$
		I	$2X10^{-7}$	$1X10^{-2}$	$8X10^{-9}$	$5X10^{-4}$
Tin (50)	Sn-113	S	$4X10^{-7}$	$2X10^{-3}$	$1X10^{-8}$	$9X10^{-5}$
		I	$5X10^{-8}$	$2X10^{-3}$	$2X10^{-9}$	$8X10^{-5}$
	Sn-125	S	$1X10^{-7}$	$5X10^{-4}$	$4X10^{-9}$	$2X10^{-5}$
		I	$8X10^{-8}$	$5X10^{-4}$	$3X10^{-9}$	$2X10^{-5}$
Tungsten (74)	W-181	S	$2X10^{-6}$	$1X10^{-2}$	$8X10^{-8}$	$4X10^{-4}$
		I	$1X10^{-7}$	$1X10^{-2}$	$4X10^{-9}$	$3X10^{-4}$
	W-185	S	$8X10^{-7}$	$4X10^{-3}$	$3X10^{-8}$	$1X10^{-4}$
		I	$1X10^{-7}$	$3X10^{-3}$	$4X10^{-9}$	$1X10^{-4}$
	W-187	S	$4X10^{-7}$	$2X10^{-3}$	$2X10^{-8}$	$7X10^{-5}$
		I	$3X10^{-7}$	$2X10^{-3}$	$1X10^{-8}$	$6X10^{-5}$
Uranium (92)	U-230	S	$3X10^{-10}$	$1X10^{-4}$	$1X10^{-11}$	$5X10^{-6}$
		I	$1X10^{-10}$	$1X10^{-4}$	$4X10^{-12}$	$5X10^{-6}$
	U-232	S	$1X10^{-10}$	$8X10^{-4}$	$3X10^{-12}$	$3X10^{-5}$
		I	$3X10^{-11}$	$8X10^{-4}$	$9X10^{-13}$	$3X10^{-5}$
	U-233	S	$5X10^{-10}$	$9X10^{-4}$	$2X10^{-11}$	$3X10^{-5}$
		I	$1X10^{-10}$	$9X10^{-4}$	$4X10^{-12}$	$3X10^{-5}$
	U-234	S[4]	$6X10^{-10}$	$9X10^{-4}$	$2X10^{-11}$	$3X10^{-5}$

(See notes at end of appendix)

APPENDIX A (continued)

Element (atomic number)	Isotope[1]		Table I Column 1 Air (μCi/ml)	Table I Column 2 Water (μCi/ml)	Table II Column 1 Air (μCi/ml)	Table II Column 2 Water (μCi/ml)
	Zn-69m	S	$4X10^{-7}$	$2X10^{-3}$	$1X10^{-8}$	$7X10^{-5}$
		I	$3X10^{-7}$	$2X10^{-3}$	$1X10^{-8}$	$6X10^{-5}$
	Zn-69	S	$7X10^{-6}$	$5X10^{-2}$	$2X10^{-7}$	$2X10^{-3}$
		I	$9X10^{-6}$	$5X10^{-2}$	$3X10^{-7}$	$2X10^{-3}$
Zirconium (40)	Zr-93	S	$1X10^{-7}$	$2X10^{-2}$	$4X10^{-9}$	$8X10^{-4}$
		I	$3X10^{-7}$	$2X10^{-2}$	$1X10^{-8}$	$8X10^{-4}$
	Zr-95	S	$1X10^{-7}$	$2X10^{-3}$	$4X10^{-9}$	$6X10^{-5}$
		I	$3X10^{-8}$	$2X10^{-3}$	$1X10^{-9}$	$6X10^{-5}$
	Zr-97	S	$1X10^{-7}$	$5X10^{-4}$	$4X10^{-9}$	$2X10^{-5}$
		I	$9X10^{-8}$	$5X10^{-4}$	$3X10^{-9}$	$2X10^{-5}$
Any single radionuclide not listed above with decay mode other than alpha emission or spontaneous fission and with radioactive half-life less than 2 hours.		Sub[2]	$1X10^{-6}$	———	$3X10^{-8}$	———
Any single radionuclide not listed above with decay mode other than alpha emission or spontaneous fission and with radioactive half-life greater than 2 hours.			$3X10^{-9}$	$9X10^{-5}$	$1X10^{-10}$	$3X10^{-6}$
Any single radionuclide not listed above, which decays by alpha emission or spontaneous fission.			$6X10^{-13}$	$4X10^{-7}$	$2X10^{-14}$	$3X10^{-8}$

(See notes at end of appendix)

APPENDIX A (continued)

Note: In any case where there is a mixture in air or water of more than one radionuclide, the limiting values for purposes of this Appendix should be determined as follows:

1. If the identity and concentration of each radionuclide in the mixture are known, the limiting values should be derived as follows: Determine, for each radionuclide in the mixture, the ratio between the quantity present in the mixture and the limit otherwise established in Appendix A for the specific radionuclide when not in a mixture. The sum of such ratios for all the radionuclides in the mixture may not exceed "1" (i.e., "unity").

Example: If radionuclides a, b, and c are present in concentrations C_a, C_b, and C_c, and if the applicable MPC's are MPC_a, MPC_b, and MPC_c respectively, then the concentrations shall be limited so that the following relationship exists:

$$\frac{C_a}{MPC_a} + \frac{C_b}{MPC_b} + \frac{C_c}{MPC_c} \leq 1$$

2. If either the identity or the concentration of radionuclide in the mixture is not known, the limiting values for purposes of Appendix A shall be:

a. For purposes of Table I, Col. 1 . . . . 6×10^{-13}
b. For purposes of Table I, Col. 2 . . . . 4×10^{-7}
c. For purposes of Table II, Col. 1 . . . . 2×10^{-14}
d. For purposes of Table II, Col. 2 . . . . 3×10^{-8}

3. If any of the conditions specified below are met, the corresponding values specified below may be used in lieu of those specified in paragraph 2 above.

a. If the identity of each radionuclide in the mixture is known but the concentration of one or more of the radionuclides in the mixture is not known, the concentration limit for the mixture is the limit specified in Appendix "A" for the radionuclide in the mixture having the lowest concentration limit; or

b. If the identity of each radionuclide in the mixture is not known, but it is known that certain radionuclides specified in Appendix A for any radionuclide which is not known to be absent from the mixture; or

Department of Energy
Field Office, Albuquerque
Los Alamos Area Office
Los Alamos, New Mexico 87544

MAR 1 1992

Mr. D. Bruce Jones
Assistant Regional Counsel
U.S. Environmental Protection
Agency, Region 6
1445 Ross Avenue, Suite 1200
Dallas, TX 75202-2733

0436
General

Dear Mr. Jones:

Lisa Cummings asked me to send you the Department of Energy, Los Alamos Area Office, Assessment of Environmental, Safety, and Health Practices at Los Alamos dated September 1991 and the Los Alamos National Laboratory ES&H Self-Assessment Report dated August 1991.

Sincerely,

Perrie T. Wolford

Perrie T. Wolford
Secretary
Office of Counsel

Enclosures

UNITED STATES

DEPARTMENT OF ENERGY

DOE FIELD OFFICE/ALBUQUERQUE

LOS ALAMOS AREA OFFICE

**Assessment of
Environmental, Safety, and
Health Practices at Los Alamos**

SEPTEMBER 1991

TABLE OF CONTENTS

TABLE OF CONTENTS (cont)

ACTION/ MILESTONES	TARGET DATE	RESOURCES	RESPONSIBLE ORGANIZATION

Environmental

Develop SOP's with UC for regulatory notifications.	3/92	300 hrs	ES&HB
Implement project management for environmental submittals.	11/92	100 hrs	ES&HB
Develop and implement procedure for SEN-7A environmental reporting.	12/91	80 hrs	ES&HB
Develop SOP for AIP interface.	8/92	200 hrs	ES&HB

CORRECTIVE ACTION PLAN:

ACTION/ MILESTONES	TARGET DATE	RESOURCES	RESPONSIBLE ORGANIZATION
Core Corrective Actions			
Continue recruitment and selection for allocated positions.	Ongoing	Level of Effort (LOE)	Branch Chiefs (Coord-ADMB)
Conduct staff retreat with facilitator to finalize roles and responsibilities.	4/92	$15K/500 hrs	Branch Chiefs (Coord-AM)
Define and develop task assignments for staff with backup of significant tasks based on roles and responsibilities.	7/92	240 hrs	Branch Chiefs (Coord-AM)
Review and revise LAAO employees' current position descriptions.	9/92	120 hrs	Branch Chiefs (Coord-ADMB)
Review and revise performance appraisal plans.	9/92	120 hrs	Branch Chiefs (Coord-ADMB)
Identify additional staff requirements and hiring priorities based on roles and responsibilities.	9/92	200 hrs	Branch Chiefs (Coord-AM)
Formally request additional staff.	11/92	80 hrs	Branch Chiefs (Coord-ADMB)
Develop IDP's for staff based on roles, responsibilities, and experience level.	10/92	240 hrs	Branch Chiefs (Coord-ADMB)
Develop methodology for risk-based surveillances.	4/92	$10K	ES&HB
Develop and implement SOP's for risk-based surveillances.	6/92	$5K	ES&HB
Set priorities based on resource availability.	7/92	100 hrs	Branch Chiefs (Coord-AM)
Develop surveillance schedule.	8/92	$2.5K	FOB
Revise AL 1120 to reflect current functions.	7/92	40 hrs	Branch Chiefs (Coord-AM)
Submit AL 1120 for approval.	8/92	80 hrs	ADMB

The fifth key finding, Training, addresses the **lack of a comprehensive training program for LAAO**. Corrective actions include developing an overall training program, conducting a needs assessment, and developing individual development plans. The last key finding, Communication, addresses the **lack of open, effective communication between LAAO and UC and between LAAO and AL**. Corrective actions include forming a LAAO/LANL Environmental Coordination Group, holding consistent senior staff meetings, and developing protocols for communication requirements between LAAO and UC and LAAO and AL.

Root cause analysis was conducted by a team from AL using management oversight and risk tree (MORT) root cause analysis. Eight preliminary root causes were identified. Operational readiness was the leading root cause with training, supervision, communications, policy implementation, policy, risk management, and management also identified as root causes. As the self-assessment process continued, the root cause analysis performed appeared to have some weaknesses. For example, the senior LAAO staff felt that staffing was a leading root cause. As the senior staff worked through the self-assessment process, staff developed root causes were addressed as well as MORT-identified root causes. Corrective actions have been written to eliminate root causes.

In developing corrective action plans to address the deficiencies, the Area Office recognizes the need to develop and implement an aggressive program for direction and oversight of ES&H activities in four management areas:

- Organization - LAAO must be well organized to facilitate mission accomplishment.

- Staffing - LAAO must identify staffing needs, recruit personnel, and select competent professionals in sufficient numbers to carry out the mission.

- Training - LAAO must provide training programs to ensure that employees have the requisite knowledge required to perform their job functions.

- Management Systems - LAAO must develop adequate management systems and improve them continually to ensure that the LAAO staff maintains full productivity and achieves its goals.

The following document describes the steps taken-to-date and planned corrective action to ensure that LAAO accomplishes its mission. Each part consists of narrative text followed by a corrective action table outlining the actions, schedules, resources, and responsibility assignments established to correct deficiencies found by the assessments. Major elements of the corrective plan are effective performance of management and oversight for environment, safety, and health activities. Actions taken-to-date demonstrate a commitment to excellence, but the identified deficiencies indicate that much remains to be done.

Many of the identified corrective actions are fundamental to strong organizational development and management. However, the demands of daily operational requirements, both routine and off-normal, have severally strained the capabilities of an already overworked staff. Normal duties are accomplished only as a result of significant overtime by a majority of the staff. The completion of the identified corrective actions can only be accomplished if additional staff support is made available or at the expense of daily operational requirements. Even considering these difficulties, completing the actions identified in this report is fundamental to our success. We are strongly committed to working with AL to define an orderly and effective process that ensures timely completion of these actions.

The process of developing this self-assessment was a major step which identified deficiencies for which we must acknowledge ownership and act to solve. We must also provide the key to preventing similar deficiencies in the future.

Jerry L. Bellows
Area Manager

DOE LOS ALAMOS AREA OFFICE

Office of the Manager

Jerry Bellows, Area Manager
Michael Zamorski, Acting Deputy Area Manager

Security & Nuclear Safeguards Branch
Branch Chief
Jerry Tillman

Counsel
Joyce H. Laeser

Facility Operations Branch
Acting Branch Chief
Michael Zamorski

Environment, Safety, & Health Branch
Acting Branch Chief
Monet Harrison

Administrative Branch
Branch Chief
Danna Koelling

Project Management Branch
Branch Chief
Eloy M. Nunez

ADMINISTRATIVE BRANCH
Branch Chief
Danna Koelling

Industrial Property Management Specialist
Peggy Baca

Procurement Analyst
Elizabeth Romero

Contract Specialist
Alfred Geoffrion

Contract Specialist
Nancy Romero

Staff Accountant
Dennis Martinez

Administrative Specialist
Mary Ann Mosley

Budget Analyst
Ray Ortiz

ENVIRONMENT, SAFETY, & HEALTH BRANCH

Acting Branch Chief

Monet Harrison

Environmental/Safety QA Program
Benjamin Snow

Environment

ENVIRONMENTAL ENGINEERING CLEAN WATER ACT
Don George, Alicia Davis
NPDES, NEPA, SPCC, SDWA, UST

ENVIRONMENTAL ENGINEERING CLEAN AIR ACT
Stephen Fong
NESHAPS, Clean Air Act, Cultural & Natural Resources, Environmental Reports, (NM/DOE) Agreement in Principle

ENVIRONMENTAL ENGINEERING ENVIRONMENTAL RESTORATION
Steve Slaten, Rebecca Redeker
HSWA, Environmental Restoration, SARA Title III

ENVIRONMENTAL ENGINEERING WASTE MANAGEMENT
Selected
Waste Management Program, RCRA Compliance

Health & Safety

SAFETY & OCCUPATIONAL HEALTH MANAGEMENT
Tom Rush
Fire Protection, OSHA, Operational Safety, Firearms Safety, Electrical, Explosives, Federal Employees Safety

SAFETY ENGINEERING (INDUSTRIAL)
Armando Chavez
Construction Safety, OSHA, Aviation Safety, Crane Safety, NVO Operations

INDUSTRIAL HYGIENE
John Ryan
Occupational Health, Asbestos & Beryllium Programs, Respiratory Protection, Hazardous Chemicals

HEALTH PHYSICS
Scott Salen
Industrial & Environmental Radiological Protection

FACILITIES OPERATIONS BRANCH
Acting Branch Chief
Michael Zamorski

TA-55 PU Processing Facility
Annell Danczyk
Veronica Martinez
(Co-op)

TA-3-29 & TA-3-102 CMR Shops
James Phoenix
Young Tremain
(Co-op)

TA-3-164 - U Vault
TA-41-1 - Storage Vault
TA-55 PF41 Storage Vault
Chris Steele
Selected 7/29/91

TA-50-37, 69 Waste Treatment
Size Reduction, Incinerator
Vacant

TA-21 TSTA & Tritium Salt
Terry Wallace

TA-18 Los Alamos Critical
Experiment Facility
TA-2 Omega West Reactor
Margrette Makram

TA-41-4 Ice House
Vacant

TA-54 Waste Management Site
Vacant

TA-53 LAMPF
TA-3-16 Van DeGraaf
Joseph Votella
(Selected 7/31/91)
Johnnie Nevarez
(Intern)

S-Site (TA-6, 8, 14, 15, 16, 36, 39)
DARHT & PHERMEX
Rudy Valdez
S-Site Support
Vacant

TA-35 Laser Facility
Vacant

SECURITY & NUCLEAR SAFEGUARDS BRANCH

Branch Chief

Jerry Tillman

- **Technical Security** — Robert Ferran
- **Nuclear Materials Safeguards** — Diane Otero-Bell
- **Plant Protection** — William Risley
- **Support** — Vacant
- **Personnel Security** — Paul Maestas
  - **Personnel Specialist** — Lucille Martinez
  - **Personnel Specialist** — Pamela Valdez
  - **Personnel Specialist** — Wayne Budwine
  - **Personnel Specialist** — Philippa Sanchez
  - **Personnel Specialist** — Theresa Brady
  - **Personnel Specialist** — Carmen Lucero

PART 1 - ENVIRONMENTAL ASSESSMENT

KEY FINDING:

Environmental oversight and management direction by LAAO is less than adequate.

•DISCUSSION: ENVIRONMENTAL PROGRAMS DIRECTION AND OVERSIGHT

Environmental issues and situations that may lead to noncompliance are not independently identified by LAAO. LAAO becomes aware that a problem exists only after an appraisal is completed or the occurrence is reported. The principal role of the LAAO staff has, for the most part, been to submit UC-developed regulatory notifications (both permit based and off-normal) to regulators. LAAO currently does not have the staff to adequately review submittals to ensure compliance with regulatory requirements, nor does LAAO perform the necessary oversight of field work associated with regulatory requirements. In many cases, regulatory notifications are received at LAAO from UC on the submittal due date so that careful review is precluded.

Also, LAAO has been performing only "pipeline" activities for submittals between AL and UC. Requests for information, such as lessons learned, and so forth, come through LAAO before going to the contractor. LAAO spends the majority of review and handling time forwarding information among the contractor, AL, and regulatory agencies, with little value added in any direction. In some cases, LAAO handling is a source of delay in transmission.

Clean air programs and activities at LANL are not adequately overseen by LAAO. Oversight is hampered by the lack of staff required to adequately track operations, programs, and associated permits. Additional demand is placed on the LAAO staff due to the 1990 Clean Air Act (CAA) amendments. LAAO does not have staff adequately trained to determine the effects of the new rules on operations at Los Alamos.

LAAO and UC are not in full compliance with Subpart H of the National Emission Standard for Hazardous Air Pollutant (NESHAP) regulations dealing with the emission of radionuclides. These regulations became effective in December 1989. Although LANL meets the radionuclide emission limit established by Subpart H, it does not use the required monitoring method at many stacks. The number of stacks not in compliance with the monitoring requirements will not be known until a preliminary survey is completed. At this time, LAAO and UC are participating in strategy meetings to address and comply with the NESHAP requirements for monitoring radionuclides. LAAO's oversight is inadequate in ensuring timely actions by UC to avoid noncompliance. One staff member is responsible for the CAA oversight and is also responsible for the natural and cultural protection acts and for environmental reporting.

LAAO is performing only minimal oversight of the soil, sediment, and biota protection programs due to lack of adequately trained staff.

Oversight by LAAO of surface water programs and the associated National Pollutant Discharge Elimination System (NPDES) permit activities is inadequate. Oversight is hampered by insufficient and inadequately trained staff. With more than 120 outfalls, the Los Alamos NPDES permit is one of the most complex permits issued to a single organization. Some progress has been made in the surface water quality assurance area. LAAO has recently begun to oversee the sampling program for the NPDES permit.

LAAO provides less than adequate oversight of groundwater compliance programs. Historically, this has been a low priority activity due to a presumption of minimal risk because of the depth of groundwater.

Oversight of waste management programs is inadequate. Resources devoted to waste management oversight has only recently increased. With land disposal restrictions, LAAO needs additional staff resources to ensure compliance with mixed waste and toxicity characteristics requirements.

LAAO currently provides limited oversight of environmental radiation programs. Until recently, LAAO performed no oversight. In recent months LAAO has had the support of a health physicist detailed from AL. In August 1991, a full-time health physicist began working at LAAO. The AL health physicist cross-trained the new LAAO health physicist for approximately three weeks to ensure consistency during the changeover of responsibility.

Quality assurance oversight for environmental programs has just begun at LAAO. A quality assurance engineer was added to the staff in early 1991.

LAAO's role in community right-to-know is undefined at this time. Past involvement has been inconsistent.

The Environmental Restoration program is undergoing a massive ramp-up to deal with over two thousand solid waste management units (SWMU's) under the HSWA permit portion of the Los Alamos RCRA permit. LAAO has acquired a fully qualified person responsible for oversight of the LANL environmental restoration program. Necessary oversight of field activities and involvement in preparation of numerous sampling plans for EPA approval will require several more full-time employees. LAAO has only recently begun playing a major role in this rapidly increasing arena. The present staffing levels in both ES&H Branch (ES&HB) and Project Management Branch (PMB) for overseeing environmental restoration and related construction activities are not sufficient to provide adequate oversight of this program.

LAAO does not provide thorough review of the National Environmental Policy Act (NEPA) submittals by UC. LAAO's management of the NEPA program has historically been to conduct minimal reviews of NEPA determinations. The issuance of Secretary of Energy Notice (SEN) 15-90 and, subsequent DOE and AL guidance, revised the role of the contractor, LAAO, and AL. The issuance of SEN-15-90 defines LAAO's role as providing local review and approval before transmitting NEPA documentation to the AL NEPA Compliance Officer for determination or submittal to DOE-HQ. Given the large number of NEPA documents submitted, LAAO personnel do not have adequate time or training to competently review these documents. LAAO is not able to determine the status of NEPA documentation related to projects because it does not have access to any database with this information.

LAAO has strengthened its involvement in the Underground Storage Tank (UST) program. Although current levels of oversight are an improvement, LAAO staff still lacks time for oversight of field activities, time to keep abreast of UC plans and activities, and time to develop proactive direction for this activity.

Programs associated with the historic presentation/cultural protection programs do not receive proper oversight by LAAO. Oversight is hampered due to the lack of adequately trained staff. LAAO has not developed a program for disposition of human remains found on LANL property. For three years, LAAO has not been able to complete a formal memo of understanding with the State of New Mexico to streamline procedures for protecting cultural and historic resources.

The environmental reporting program (SEN-7A) at LAAO is considered adequate by AL. Development and implementation of procedures at LAAO is needed for reporting environmental issues to the person responsible for compiling the SEN-7A report on an on-going basis.

Future environmental oversight requirements will increase with the Agreement In Principle (AIP) between DOE and the state of New Mexico. This AIP will require additional LAAO staff support to state resident inspectors at LANL.

•DISCUSSION: REGULATORY SUBMITTALS

Regulatory notifications are received at LAAO in the "eleventh hour." LAAO has not implemented adequate procedures for ensuring that regulatory reports and permit applications are submitted in time to allow for adequate LAAO review. These documents and reports are required by federal or state regulations or by permit provisions.

LAAO does not play a major role in the preparation and review of regulatory submittals. UC and DOE are required by federal, state, and local laws and regulations, the RCRA and NPDES permits, and DOE directives to submit many documents related to environmental compliance. UC prepares many of these documents for submittal by DOE or, in some cases, for joint submittal by DOE and UC. The documents are frequently given to LAAO for review close to the due date, sometimes on the due date. A recent tabulation of actual UST and NPDES reporting showed that for eighty percent of the submittals, UC provided LAAO the document on or after the regulatory due date. In many cases, LAAO has had to perform a cursory review, validate, prepare the transmittal on DOE letterhead, and forward the document on or after the regulatory due date. LAAO does not have enough staff or expertise to conduct field verifications to ensure accuracy of data, or to participate in the development of documents or strategy for regulatory compliance. Consequently, LAAO cannot give adequate technical and administrative review to the documents, some of which are quite lengthy and complicated, requiring several days for adequate review.

Some regulatory submittals are incomplete. The documents sometimes lack information clearly called for. LAAO usually gets only the final draft, rather than interim drafts. Because LAAO is not involved in earlier discussions about issues contained in the document, LAAO, upon receiving the final draft, must be "brought up to speed" on issues. UC's resolution, therefore, is often accepted without review. Review by LAAO is deficient because of lack of staffing, expertise, training, and sufficient time for review. This often permits errors to remain unnoticed and uncorrected.

CORRECTIVE ACTIONS:

LAAO recently implemented a Facility Representative Program to provide on-site DOE presence at critical facilities. Enhanced environmental oversight at each facility will be a direct effect of this presence. Facility representatives are responsible for general environmental oversight at their assigned facility. ES&HB will support site representatives in resolving issues that require specific expertise. The implementation of this program will alleviate some of the future workload of ES&HB.

LAAO is currently defining roles and responsibilities to determine preliminary staffing requirements. Preliminary staffing estimates indicate a need for a significant increase in positions to carry out current responsibilities. Using support contractors for environmental activities will be a requirement until additional positions are available and qualified staff are hired.

In August 1991, the Area Manager formed an Environmental Coordination Group composed of environmental, legal, and engineering representatives from LAAO and UC. The Group will meet on a monthly basis and will exchange information at the working level on current issues of significance to LANL. This Group should facilitate a more constant flow of information between LAAO and UC.

A joint working group composed of LAAO and UC personnel will be formed to define and establish protocols for regulatory notifications and submittals.

Because staff levels are not adequate to oversee all the contractors' environmental programs, a risk-based environmental surveillance schedule will be developed. This schedule will identify, by facility, the number of surveillances required annually by LAAO. Other oversight activities will be factored into this environmental surveillance schedule.

A document tracking system has been implemented at LAAO, which is improving the timeliness of handling and response to requirements and is providing some insurance against overlooked or lost documents.

In addition to the corrective actions reported above, LAAO and UC will jointly draft standard operating procedures (SOPs) for submission of documents required by regulations or by permit. Procedures will detail information required and deadlines for submission to LAAO by UC to allow adequate time for review. LAAO is currently purchasing software for automated project management control to help track regulatory due dates. This will facilitate planning and evaluation of information to be submitted to the regulators. This system will replace manual records, which have been used sporadically.

Executive Summary for LAAO Self-Assessment

This report documents the results of the Los Alamos Area Office Pre-Tiger Team Self-Assessment. It reflects an internal self-assessment of the Los Alamos Area Office. Additional self-assessment information regarding the DOE Field Office, Albuquerque, may be found in the AL Self-Assessment, dated September 1991.

Before discussing the deficiencies found through the self-assessment, it is important to note that aspects of a self-assessment program, although not institutionalized, exist at LAAO. A few months after starting at LAAO, I recognized the need for a LAAO organization which would ensure that operations at critical facilities are conducted at acceptable levels of performance, with the appropriate formality of operations. In addition, I recognized the need for the implementation and oversight of sitewide management operations. To that end, in 1991, I created the Facilities Operations Branch, which complements the traditional Environment, Safety and Health Branch. The new Branch provides a balanced approach to oversight of and management direction to the LANL's ES&H program. LAAO organization charts follow this Executive Summary. I have also recognized the need to increase staffing levels in the areas of ES&H. Since my appointment and with significant support from the AL Field Manager, the ES&H staff directly responsible for ES&H functions has increased from eight persons to over twenty.

The LAAO Self-Assessment evaluates the performance of LAAO in fulfilling its primary ES&H role of providing management direction to, and oversight of, activities and operations at the Los Alamos National Laboratory. This report formally documents deficiencies identified during the assessment process. The LAAO assessment teams identified a number of deficiencies, which were combined into general areas of concern called key findings. Root cause analysis was then performed for each of the key findings and corrective action plans were developed by me and my staff.

The report is divided into three assessment parts, Environmental, Safety and Health, and Management and Organization. The key finding under the Environmental area is **inadequate oversight of and management direction to LANL environmental programs**. Corrective actions include defining roles and responsibilities for environmental oversight, development of standard operating procedures for environmental reporting, and increased training and staffing. The key finding under the Safety and Health area is **inadequate oversight of and management direction to LANL safety and health programs**. Corrective actions include activities similar to the Environmental area.

Part three, Management and Organization Assessment, has six key findings and corresponding corrective action plans. The first key finding, Organization and Administration, deals with the **lack of identified functions for which LAAO is responsible and the confusion of roles and responsibilities within LAAO and between LAAO and AL**. Corrective actions include AL issuance of a document defining Environmental Restoration and Waste Management roles and responsibilities, LAAO publication of a mission and vision statement,and the development of an internal roles and responsibilities document. The second key finding, Staffing, addresses the **lack of sufficient staff to adequately perform the mission of LAAO**. Corrective actions include continuing to seek staff support from AL, developing a plan for aggressive recruitment, and studying and developing actions to improve staff retention. The third key finding, Management Systems, identifies LAAO's **lack of adequate oversight of LANL management systems and management direction to programs**. Corrective actions include assigning oversight functions to staff, developing and implementing programs for lessons learned, trending occurrences and DOE Order 5480.19, and implementing the AL ES&H database. The fourth key finding, Policy Dissemination, discusses **LAAO's lack of a consistent process for disseminating DOE Directives and the direct outcome of not knowing compliance status against DOE Orders**. Corrective actions include enhancing the LAAO system by adopting elements of the Kirtland Area Office/Sandia National Laboratory program and completing an in-depth review of LANL compliance with 93 DOE Orders.

INTRODUCTION

This report represents the results of a three-phased approach in developing the Los Alamos Area Office (LAAO) self-assessment and the Los Alamos National Laboratory assessment. This documents an internal assessment of LAAO, an assessment of LANL's ES&H programs, and an assessment of LANL's self-assessment program, both Pre-Tiger Team and institutional. The chart on the next page represents the methodology used.

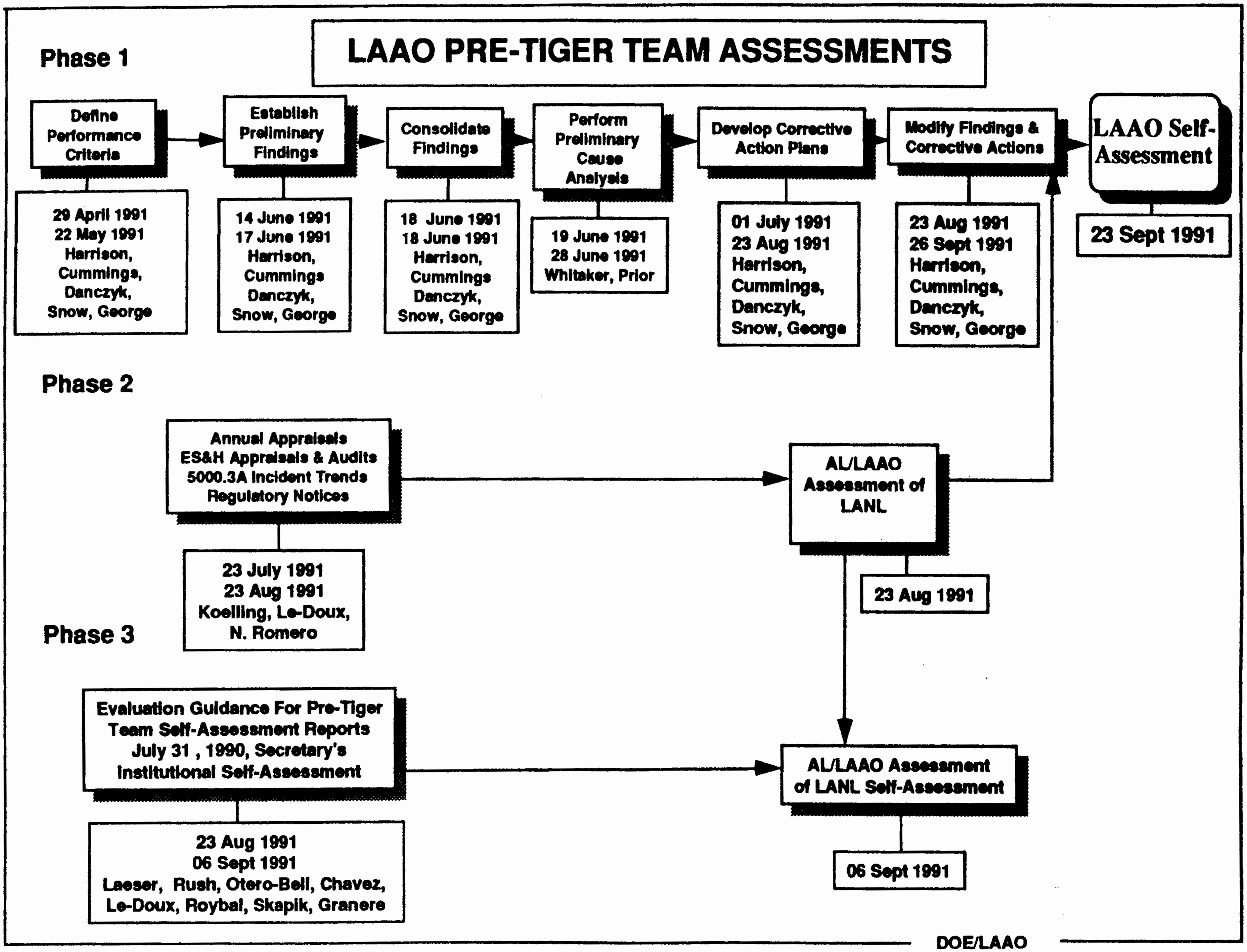
Phase I. The purpose of this effort was to assess LAAO to determine its performance in fulfilling the role of providing management direction to, and oversight of, LANL operations and activities. Four teams were used for this assessment: Team 1 was responsible for evaluating past Tiger Team findings of the DOE Field Office, Albuquerque, including other Area Offices, to determine if those were applicable to LAAO. Team 2 was responsible for determining whether LAAO roles and responsibilities were understood and whether LAAO was performing those roles and responsibilities. Team 3 was responsible for evaluating an assessment of LAAO, which was performed by a contractor, to determine if identified deficiencies were still applicable. Team 4 was responsible for reviewing the Tiger Team performance objectives and determining if those performance objectives were being met by the Area Office.

The majority of the Area Office staff participated in this effort, including the Area Manager and Acting Deputy Manager. Each team spent approximately one month identifying deficiencies based on a comparison of LAAO performance against criteria referenced above. The teams used personal interviews, surveys, samples, and document reviews to identify the deficiencies.

Based on the above process, approximately 80 deficiencies were identified. The teams combined these weaknesses into general areas of concern called key findings and then performed a root cause analysis. On completion of the root cause analysis, the Area Manager and LAAO staff developed corrective action plans.

Phase 2. The Assessment of Los Alamos National Laboratory was performed by AL and LAAO. Four program areas were reviewed: Environmental Protection, Health Protection, Safety, and Management Systems. Each program area was further divided into functional areas. Performance data was gathered from appraisals, reports, audits, and technical experts, from 1988 to the present. The information was then reviewed for strengths and deficiencies. For each function, a performance grade of satisfactory, marginal, deficient, or not rated was assigned. A significance code was also assigned as high, moderate, or low, representing the degree of concern for the specific function. The Executive Summary is included in this report. The assessment of LANL is presented in a separate document which may be obtained from the LAAO ES&H Branch (FTS 855-5027).

Phase 3. A team of LAAO and AL personnel assessed the LANL ES&H Self-Assessments. The team was given two tasks. The first task was to assess LANL's Pre-Tiger Team Self-Assessment Report. This assessment focused on the process used by UC in developing their self-assessment report. The team used performance criteria developed by the Sandia National Laboratory Tiger Team. The second task was to evaluate the UC institutional self-assessment program. The team used performance objectives published in the Secretary's July 31, 1990, Guidance on ES&H Self-Assessments.


LAAO PRE-TIGER TEAM ASSESSMENTS
Phase 1
Define Performance Criteria
29 April 1991
22 May 1991
Harrison, Cummings, Danczyk, Snow, George
Establish Preliminary Findings
14 June 1991
17 June 1991
Harrison, Cummings Danczyk, Snow, George
Consolidate Findings
18 June 1991
18 June 1991
Harrison, Cummings Danczyk, Snow, George
Perform Preliminary Cause Analysis
19 June 1991
28 June 1991
Whitaker, Prior
Develop Corrective Action Plans
01 July 1991
23 Aug 1991
Harrison, Cummings, Danczyk, Snow, George
Modify Findings & Corrective Actions
23 Aug 1991
26 Sept 1991
Harrison, Cummings, Danczyk, Snow, George
LAAO Self-Assessment
23 Sept 1991
Phase 2
Annual Appraisals
ES&H Appraisals & Audits
5000.3A Incident Trends
Regulatory Notices
23 July 1991
23 Aug 1991
Koelling, Le-Doux, N. Romero
AL/LAAO Assessment of LANL
23 Aug 1991
Phase 3
Evaluation Guidance For Pre-Tiger Team Self-Assessment Reports
July 31 , 1990, Secretary's Institutional Self-Assessment
23 Aug 1991
06 Sept 1991
Laeser, Rush, Otero-Bell, Chavez, Le-Doux, Roybal, Skapik, Granere
AL/LAAO Assessment of LANL Self-Assessment
06 Sept 1991
DOE/LAAO

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ABBREVIATIONS

ADMB	Administrative Branch, LAAO
AL	Department of Energy Field Office, Albuquerque
AM	Area Manager
CAA	Clean Air Act
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
Counsel	Office of Counsel, LAAO
CWA	Clean Water Act
DOE	Department of Energy
EP	Emergency Preparedness
EPA	United States Environmental Protection Agency
ER	Environmental Restoration
ES&H	Environment, Safety, and Health
ES&HB	Environment, Safety, and Health Branch, LAAO
FEOSH	Federal Employee Occupational Safety and Health
FOB	Facilities Operations Branch, LAAO
FTE	Full Time Equivalent
HQ	Department of Energy, Headquarters
HSWA	Hazardous and Solid Waste Amendments
IH	Industrial Hygiene
IR	Incident Reporting
JCI	Johnson Controls, Inc.
LAO	Laboratory Assessment Office
LAAO	Los Alamos Area Office
LANL	Los Alamos National Laboratory
LOE	Level of Effort
M&O	Management and Operating Contractor
MORT	Management Oversight and Risk Tree

ABBREVIATIONS (cont)

MOU	Memorandum of Understanding
NEPA	National Environmental Policy Act
NESHAP	National Emissions Standards for Hazardous Air Pollutants
NIOSH	National Institute for Occupational Safety and Health
NPDES	National Pollutant Discharge Elimination System
ORPS	Occurrence Reporting and Processing System
OSHA	Occupational Safety and Health Act
PI	Performance Indicator
PMB	Project Management Branch, LAAO
RCRA	Resource Conservation and Recovery Act
S&NSB	Security, and Nuclear Safeguards Branch, LAAO
SEN	Secretary of Energy Notice
SOP	Standard Operating Procedure
State	State of New Mexico
SWMU	Solid Waste Management Unit
UC	University of California
UST	Underground Storage Tank

PART 2 - SAFETY AND HEALTH ASSESSMENT

KEY FINDING:

Safety and health oversight and management direction by LAAO is less than adequate.

•DISCUSSION: SAFETY OVERSIGHT

LAAO needs to improve its oversight and proactive approach for management direction of UC safety programs. LAAO is primarily reactive in the approach to safety surveillances and response to appraisals. Usually, LAAO becomes involved at the time of helping mitigate events or incidents.

LAAO's oversight of maintenance management at LANL is inadequate. DOE has not approved the UC implementation plan for DOE Order 4330.4A. UC's programmatic equipment is deficient, training is inadequate, and a central maintenance manager is not available. LAAO's involvement in oversight is hindered by inadequate staffing, undefined roles and responsibilities, and poorly understood DOE requirements. LAAO's oversight is inadequate in ensuring timely actions by UC to avoid deficiencies attributed to maintenance of equipment and facilities. LAAO does not have an integrated approach to ensure that auxiliary equipment is designed, constructed, and tested appropriately.

LAAO is performing only minimal oversight of LANL to ensure experimental activities are conducted safely. LAAO is performing only minimal oversight of nuclear criticality.

At present, weapons component and hazardous materials packaging and transportation is receiving minimal attention due to lack of adequately trained staff. One person is currently responsible for oversight of packaging and transportation. This person, is also responsible for other functional areas and therefore cannot provide adequate coverage.

LAAO has a trained staff member in the Safeguards and Security Branch responsible for oversight of "accountability" for nuclear materials. The FOB staffing plan identifies a facility representative for the vaults, which will also be responsible for nuclear criticality. Individual facility representatives will be responsible for their respective facilities' nuclear criticality.

LAAO performs minimal oversight of medical services. Currently LAAO provides oversight of medical transportation services only.

Oversight of firearm safety is inadequate. The LAAO safety engineer responsible for firearm safety is also responsible for several other functional areas.

LAAO is responsible for overseeing the LANL fire protection program and for providing fire protection services to LANL and to the community of Los Alamos through a contract with Los Alamos County. LAAO is responsible for ensuring that an improved risk level of fire protection is maintained at LANL. One person is currently performing fire protection oversight in addition to many other tasks. The fire department does not have an internal oversight mechanism in operation; therefore, additional oversight must be performed by LAAO to ensure proper adherence to requirements. LAAO has not been fully successful in ensuring that contract requirements are fulfilled. The person responsible for administration of the contract with the County is also the PMB Chief and cannot devote sufficient attention to the Fire Department.

The facility representative for S-Site is currently responsible for explosive safety. LAAO oversight in this area is minimal.

Due to staffing levels, oversight of training and certification is limited. LAAO has not established agreed-to roles and responsibilities in this area.

Emergency Preparedness (EP) requirements are extensive. LAAO is responsible for overseeing LANL EP programs and is responsible for ensuring that emergency services are available for neighboring counties. To meet these requirements, one full-time employee is needed. LAAO has not kept existing Memorandums of Understanding (MOU) with local hospitals or participating organizations current. One LAAO employee is assigned responsibility for emergency preparedness, in addition to several other duties.

LAAO has not defined the security/safety interface with clarity and, thus, has not met oversight requirements.

LAAO has performed minimal oversight in the site/facility safety review area.

LAAO is responsible for oversight of LANL's radiation protection activities. LAAO has not had a health physicist; therefore, radiation protection has not received professional staff evaluation. In August 1991, a health physicist reported to work at LAAO. Before his arrival, AL provided support to meet minimal oversight requirements. The AL health physicist cross-trained approximately three weeks with the newly-hired health physicist.

LAAO provides adequate oversight of quality verification for construction safety. In other areas of safety quality assurance, only minimal oversight is provided due to lack of staff and this is not provided consistently.

LAAO fails to provide adequate direction to UC regarding oversight of aviation activities. In the past, LAAO provided direct oversight of the subcontractor's aviation activities, but as contracts changed LAAO did not ensure that the oversight roles of UC and LAAO were defined.

LAAO does not have enough safety staff available to provide oversight of industrial safety on a continuing basis.

The construction safety program is a major responsibility of LAAO. LAAO must ensure that UC has an adequate program in effect for contractor compliance with OSHA standards and applicable DOE Orders. The PMB is responsible for ensuring that this program is being implemented on all projects. Due to the lack of staff available for the construction safety program, LAAO's oversight is not adequate.

The Federal Employee Occupational Safety and Health Program is administered by LAAO. At present, due to the lack of staff, this program does not met DOE Order requirements. For example, LAAO performed the required annual fire drill only recently; the last drill occurred almost three years ago.

LAAO administers the Personnel Assurance Program (PAP) under the provisions of DOE Order 5610.11 and AL Order 5610.3. UC employees assigned to nuclear explosives duties are certified fit by the Area Manager. LAAO keeps certification records and reports changes in the list of persons authorized to perform nuclear explosives duties to the Director of the Personnel Security Operations Division (PSOD), AL. LAAO has done an adequate job of ensuring that requirements for certification have been met and that certification records are completely documented.

•DISCUSSION: HEALTH OVERSIGHT

LAAO is responsible for oversight of UC operations to ensure compliance with DOE Orders and applicable Occupational Health and Safety (OSHA) regulations. Oversight deficiencies include chemicals storage, hazard labeling, ventilation systems, hazard communication, laboratory chemicals, radiation protection, and radiation contamination.

LAAO is not able to provide direction, field verification, or follow-up on the LANL chemical storage program. LAAO's priority for these activities is low due to the limited resources available. Control of exposure to chemicals in laboratories, appropriate labeling of hazards in the workplace, and hazard communication have been neglected. Other priorities and resource allocations have precluded a more active program.

As required by DOE Orders, an active and effective Industrial Hygiene program must be administered for Los Alamos. LAAO is responsible for providing oversight to ensure compliance with occupational health standards. Due to the lack of qualified staff, the field visits, design/process reviews, and oversight of the Industrial Hygiene Program (I H) at Los Alamos is considered deficient. LAAO performance is reactive to external appraisal findings and to events.

Staff shortages limit evaluations and field reviews of workplace ventilation.

With one industrial hygienist and no health physicist until late August, it is possible to perform only the most urgent work for UC and DOE employee health concerns. Lack of qualified staff means that the following important work has been omitted or reduced in scope:

- Review of plans and operations,
- Field verifications and reviews,
- Tracking application of regulations and DOE Orders to UC operations,
- Reviews for compliance, and
- Development of locally applicable policies and methods.

Generally, LAAO is deficient in following up and verifying health-related appraisal findings. The response is reactive, instead of one providing strong corrective direction.

Because of the lack of staff and time for field visits, LAAO does not provide planning, direction, and development of relationships with UC and regulators to ensure that overall occupational health programs are improved to meet new and stringent DOE policies.

CORRECTIVE ACTIONS:

Two experienced DOE safety specialists now are assigned full-time responsibility for oversight of the DOE and contractor safety activities.

LAAO added an experienced industrial hygienist to the staff in late 1990 and the resulting contribution is beginning to appear in performance of oversight of health-related disciplines.

LAAO was using health physicists detailed from AL to provide oversight of LANL radiation protection programs. A health physicist was added to the LAAO staff in August 1991.

Until staffing is increased, support contractors will be used to supplement the LAAO ES&H staff. This assistance will permit the LAAO staff to focus on overseeing UC plans and programs; conducting field visits to verify and review contractor on-the-job safety; directing the application of new DOE safety standards to current programs; and providing and implementing safety and health programs for federal employees.

Establishing the Facilities Operation Branch has placed LAAO representatives in critical facilities. This facility presence has augmented safety, health, and radiation protection field verifications by LAAO for a certain number of critical facilities.

LAAO will complete roles and responsibilities for safety and health activities based on requirements of DOE Orders, AL supplements to DOE Orders, and regulatory controls. These roles and responsibilities provide the basis for budget requests for FY 1994 and beyond to provide needed DOE professional staff.

LAAO and UC have jointly agreed on oversight responsibilities regarding aviation safety at the airport.

Because current LAAO staff levels are not adequate to oversee all the contractors' industrial health programs, a risk-based surveillance program will be developed. This program will identify by facility the number of surveillances required annually by LAAO. AL and other oversight activities will also be factored into this Safety and Health surveillance schedule.

CORRECTIVE ACTION PLAN:

ACTION/ MILESTONES	TARGET DATE	RESOURCES	RESPONSIBLE ORGANIZATION

Core Corrective Actions

Continue recruitment and selection for allocated positions.	Ongoing	Refer to Part 1 for resources	Branch Chiefs (Coord-ADMB)
Conduct staff retreat with facilitator to finalize roles and responsibilities.	4/92	Refer to Part 1 for resources	Branch Chiefs (Coord-AM)
Define and develop task assignments for staff with backup of significant tasks based on roles and responsibilities.	7/92	Refer to Part 1 for resources	Branch Chiefs (Coord-AM)
Review and revise LAAO employees' current position descriptions.	9/92	Refer to Part 1 for resources	Branch Chief (Coord-ADMB)
Review and revise performance appraisal plans.	9/92	Refer to Part 1 for resources	Branch Chiefs (Coord-ADMB)
Identify additional staff requirements and hiring priorities based on roles and responsibilities.	9/92	Refer to Part 1 for resources	Branch Chiefs (Coord-AM)
Formally request additional staff.	11/92	Refer to Part 1 for resources	Branch Chiefs (Coord-ADMB)
Develop IDP's for staff based on roles, responsibilities, and experience level.	10/92	Refer to Part 1 for resources	Branch Chiefs (Coord-ADMB)
Develop methodology for risk-based surveillances.	4/92	Refer to Part 1 for resources	ES&HB
Develop and implement SOP's for risk-based surveillances.	6/92	Refer to Part 1 for resources	ES&HB
Set priorities based on resource availability.	7/92	Refer to Part 1 for resources	Branch Chiefs (Coord-AM)
Develop surveillance schedule.	8/92	Refer to Part 1 for resources	FOB
Revise AL 1120 to reflect current functions.	7/92	Refer to Part 1 for resources	Branch Chiefs (Coord-AM)
Submit AL 1120 for approval.	8/92	Refer to Part 1 for resources	ADMB

ACTION/ MILESTONES	TARGET DATE	RESOURCES	RESPONSIBLE ORGANIZATION

Safety and Health

Determine general safety training requirements.	12/91	80 hrs	ES&HB
Implement safety training program for LAAO employees.	1/92	Level of Effort	ES&HB
Develop FEOSH standard operating procedures.	12/91	40 hrs	ES&HB

PART 3 - MANAGEMENT AND ORGANIZATION ASSESSMENT

KEY FINDING:

LAAO has not identified all the functions for which it is responsible and has not clearly defined and assigned all roles and responsibilities.

•DISCUSSION: ORGANIZATION AND ADMINISTRATION

Increasing responsibilities and changing roles of the Area Office has led to confusion between LAAO's and AL's roles and responsibilities. In the past, roles and responsibilities and mission and vision statements have not been documented. This led to duplication of effort and areas not being adequately covered.

"ES&H Responsibilities within the Albuquerque Operations Office," issued in April 1991, delineated most roles and responsibilities, but the roles and responsibilities in some areas, for example, waste management, are still confusing.

Until recently, roles and responsibilities for LAAO ES&H functions were not addressed on an organization-wide basis. This includes a lack of definition of individual staff responsibilities and job descriptions and performance appraisal plans which adequately address duties being performed. Assumed roles and responsibilities between LAAO Branches overlap, are not recognized, and/or are not documented. Increasing responsibilities and changing roles highlight the need to develop position descriptions and performance appraisal plans with well-defined roles, responsibilities, and expectations.

Although LAAO recently revised the AL 1120, reflecting the reorganization creating FOB, deficiencies still exist. For example, the function of radiation protection is currently assigned to FOB, but should be assigned to ES&HB. In addition, other functions, such as medical services oversight requirements, are not addressed.

The above deficiencies have been compounded by the fact that over the past two years, five different Area Managers or acting Area Managers have ben assigned to LAAO. In addition, Branch Chief positions have also been vacant for extended periods in the ES&HB and PMB. The ES&HB has had six Branch Chiefs or acting Branch Chiefs over the past two years. The FOB has had only acting Branch Chiefs.

CORRECTIVE ACTIONS:

AL issued "ES&H Responsibilities within the Albuquerque Operations Office" and presented it at a LAAO All Hands Meeting on May 20, 1991. AL has also developed the same type of document for the Environmental Restoration/Waste Management areas. That document has provided a better understanding of waste management roles and responsibilities. These documents provide an important first step in formalizing and clarifying the AL/LAAO interface, but some confusion still exists and will continue until organizations have implemented these policies and until personnel at both LAAO and AL become more familiar in applying these policies.

As a result of the commitments made at senior staff retreat, LAAO completed a re-definition of its mission and formulated a vision statement directed towards excellence in all LAAO activities. In addition, LAAO established weekly senior staff meetings with follow-up weekly Branch staff meetings. Monthly meetings between the Area Manager and the Branch staff and monthly breakfast meetings for senior staff have also been implemented.

LAAO also made a commitment to develop procedures for increasing involvement in the development of the LANL Institutional Plan and budget. This increased involvement will allow LAAO tc ensure that ES&H issues continue to be a high priority in LANL planning and budgeting.

LAAO recently drafted roles and responsibilities within the Area Office for all functional areas. For example, the ES&H Branch developed its roles and responsibilities based on a published list of ES&H Requirements (federal, state, local, and DOE Orders). From this listing, each staff member took a functional area and addressed seven criteria:

(1) General Information regarding the functional area,
(2) Regulatory Requirements,
(3) DOE Order Requirements,
(4) Regulatory Relationships,
(5) Metrics for Performance,
(6) Conclusions, Vulnerabilities, and Recommendations, and
(7) Area Office Roles.

The ES&H staff addressed 26 subject areas representing 19 functional areas and 7 DOE Orders, reviewed them for technical accuracy, and sent them to the Richland Field Office for peer review. The Richland comments were incorporated into the package, which was provided to each of the LAAO Branch Chiefs. Each Area Office Branch completed a similar exercise for their functional areas. In addition, FOB recently developed a charter and operation protocol for facility representatives. A copy of roles and responsibility drafts is available at the Area Manager's office.

The comparison of draft roles and responsibilities for each Branch showed that roles and responsibilities were not clearly defined. In several cases, responsibilities were duplicated and in other cases responsibilities had not been identified. The Area Manager and Branch Chiefs will participate in a retreat to resolve these issues.

(Refer to the end of Part 3 for the Corrective Action Plan and schedule.)

KEY FINDING:

The level of LAAO staffing is not enough to adequately perform the mission of the Area Office.

•DISCUSSION: STAFFING

Staffing problems exist throughout LAAO. As a result, major performance deficiencies exist within ES&H functions, as identified in this self assessment. Authorized ES&H staffing levels during the last three years are as follows:

YEAR	LAAO PERSONNEL				OTHER ES&H SUPPORT
	ES&HB	FOB	COUNSEL	PMB	(Contractor)
1989	8		1	4	
1990	14		1	4	
1991	11	12	1	4	6

LAAO did not plan for an expanded ES&H role that would have identified necessary resources. As a result, preparation for current levels of ES&H direction and oversight is inadequate. Current staffing requests are also inadequate.

Changing roles and priorities and the failure to recognize the complexity, diversity, and number of operations that LAAO is responsible for complicates identification and justification of resources needed for satisfactory ES&H performance.

Employee morale has suffered as a result of insufficient staffing and growing expectations. Believing that working conditions would not improve, employees worried about being unable to adequately perform their functions, although circumstances were beyond their control. Considerable overtime requirements led to burnout. None of the technical staff in ES&HB has been in his or her current position more than two years. In addition, ES&HB has had six acting Branch Chiefs in the last 15 months.

Because Branch Chiefs and other supervisors are all "working" supervisors required to perform so much high-priority ES&H staff work, they do not have time to perform assigned management and supervisory functions.

The ability to attract technical candidates with the requisite experience is hampered by the LAAO grade structure, intensity of task assignments, and high cost of living in Los Alamos. Security clearance delays for selected job applicants have left jobs vacant for months.

Technical employees have left LAAO for jobs with UC, AL, or contractors who offer higher salaries to persons with special skills and qualifications. In addition, reassignments within LAAO have impacted continuity of operations.

CORRECTIVE ACTIONS:

The professional and support staff at LAAO provided high performance during 1990 and 1991. This was done with intense effort, extra hours, and skills far exceeding normal expectations. Many employees handled assignments normally requiring two or three people, and often handled programs that would ordinarily be assigned to a more senior person.

Several technical specialists were reassigned from ES&HB to the newly formed FOB. Completely staffing and fully training this new branch will significantly improve oversight of critical Los Alamos facilities. The ES&HB will also be relieved of a moderate amount of field surveillance work.

The FOB has identified 21 critical facilities (including 17 nuclear facilities) and established priorities for facility representative staffing requirements. LAAO re-allocated 12 FTE's in FY 1991. Staffing requests for FY 1994 and beyond are in the development stage. The acting Branch Chief for FOB has been detailed to LAAO by AL.

At LAAO's request, experienced technical personnel have been detailed from AL. This practice has helped in handling critical assignments and in reducing work backlog, and will be continued until the assistance is no longer required. In addition, LAAO has used contractor staff support to supplement LAAO's technical staff.

(Refer to the end of Part 3 for the Corrective Action Plan and schedule.)

KEY FINDING:

LAAO provides less than adequate oversight and management direction of LANL management systems.

•DISCUSSION: MANAGEMENT SYSTEMS

Before formation of the Facilities Operations Branch in early 1991, LAAO did not have a comprehensive program for oversight of management systems. FOB and PMB are assigned to oversee the management systems. This oversight, however, is not fully implemented and formal implementation plans have not been established.

Although LAAO is responsible for providing guidance and direction to UC for developing and implementing management systems, LAAO provides only minimal attention to these issues. Also, LAAO has not yet addressed UC's poor implementation record for those systems. Major areas of concern include Conduct of Operations (DOE Order 5480.19), Maintenance Management (DOE Order 4330.4A), Incident Reporting (DOE Order 5000.3A), Emergency Preparedness (DOE Order 5500 Series), Performance Indicator (PI) Programs for both AL and DOE HQ (Secretary of Energy Notice 29), and ES&H tracking systems. Other areas of concern include Safety Analysis, Operational Readiness, Nuclear Facility Training, and Self-Assessment.

LAAO's oversight of Conduct of Operations at Los Alamos is minimal. UC just recently submitted a DOE Order 5480.19 implementation plan for DOE approval. LAAO's oversight was inadequate to ensure UC submitted their DOE Order 5480.19 Implementation Plan in a timely manner. LAAO involvement in oversight is hindered by limited staffing, unclear roles and responsibilities, and the high number of relatively new or revised DOE requirements. LAAO has not developed an implementation plan for conduct of operations within its own organizations. LAAO is awaiting guidance from AL.

The Quality Assurance program at LAAO is not comprehensive. LAAO hired a quality assurance staff person in October 1990 as an initial step in strengthening LAAO oversight. LAAO recognizes the need for additional quality assurance personnel. Although in its infancy, oversight of environmental quality assurance has begun.

The self-assessment program at LAAO is new. LAAO is awaiting guidance from AL before formalizing an institutional self-assessment program. A FOB site representative is responsible for oversight of the UC institutional program, although very little attention is focused on the UC program due to other job responsibilities.

Most of the time, LAAO is able to coordinate external appraisals; however, follow-up of recommendations and findings is inadequate. External appraisals and internal reviews have disclosed large numbers of deficiencies in UC operations. LAAO does not have enough qualified staff to pursue corrections needed or to establish programs to eliminate root causes.

AL and HQ Performance Indicator programs (PI) at LANL are inadequate. LAAO's oversight is inadequate in ensuring UC implementation of AL and HQ Performance Indicator programs.

LAAO does not have a database for ES&H deficiencies and corrective actions. Therefore, LAAO does not track, trend, or forecast ES&H issues.

LAAO's oversight of Incident Reporting (IR) at UC is unsatisfactory. Currently, more than 80 final reports await LAAO approval. Until recently, only the Area Manager had the authority to approve final reports. The Automated Occurrence Reporting and Processing System (ORPS) was not installed into LAAO until mid-August 1991. UC has not fully incorporated IR into all UC operations. The draft implementation plan has significant discrepancies. UC is making revisions at this time.

Inadequate oversight of UC's Safety Analysis and Review system has contributed to deficiencies in safety documentation. The oversight of UC's Safety Analysis and and Review system has been assumed by one staff member in FOB, in addition to other responsibilities. Guidance from AL and a LAAO charter is needed to further implement oversight of this program.

CORRECTIVE ACTIONS:

In addition to facility responsibilities, staff in the Facility Operations Branch have been assigned management systems to oversee such as Safety Analysis, Conduct of Operation, and Occurrence Reporting. As LAAO adds more facility representatives, additional management systems will receive increased attention.

PMB provides oversight of management systems in the area of construction safety and quality assurance and utility operations.

AL's new automated tracking system (Environment, Safety, and Health Appraisal System) promises to provide the necessary database capabilities for formal tracking procedures and activities. Policy, guidance, and training on the system is scheduled to be complete by November 1991.

The AL PI program is being updated to better incorporate the requirements of the HQ PI program. A new format will be used to better capture the necessary data and to lessen the work required.

A plan to use support contractor staff assistance for appraisal management has been implemented. One full-time employee will be used to eliminate backlogs and to establish continuing procedures for effective management control and improvement based on appraisals, audits, and reviews.

The cleanup and reorganization of the ES&H Document Center is intensive and ongoing. All documentation applicable to current operations will be catalogued in a single location and will be easily retrievable.

An SOP for LAAO's 5000.3A requirements has been drafted. Each facility representative will be delegated the authority to approve assigned occurrence reports. This should help alleviate the more than 80 final reports awaiting approval. This policy will better handle the increasing load of reports as all LANL facilities incorporate DOE Order 5000.3A.

AL has been tasked to determine the applicability and further guidance for DOE Order 5480.19 and the self-assessment program to Field and Area Offices. Policy from AL in these areas will provide necessary criteria to implement the programs at LAAO.

(Refer to the end of Part 3 for the Corrective Action Plan and schedule.)

KEY FINDING:

LAAO's process for disseminating DOE directives is inconsistent and ineffective. Furthermore, LAAO does not know UC's status of compliance with applicable DOE Orders.

•DISCUSSION: POLICY DISSEMINATION

LAAO is responsible for ensuring that DOE Directives, including DOE Orders and Secretary of Energy Notices (SENs), are transmitted to UC and that these directives are implemented appropriately. Because a formal procedure for disseminating DOE directives, determining applicability to site facilities, and tracking their implementation has not been in effect, LAAO cannot be assured that UC has appropriately addressed DOE policy and implemented DOE directives.

CORRECTIVE ACTIONS:

LAAO instituted a protocol for the directive process in June 1991. The protocol establishes a point of contact in LAAO to receive draft and final DOE directives and to disseminate the directives to the appropriate Branches within the Area Office. However, the protocol does not establish a standard process for Branch offices to review the Order and forward to UC when necessary, nor does it provide time lines for completing these tasks. Although the new protocol ensures better tracking of the receipt and dissemination of DOE directives, it lacks instructions for a standardized procedure for disseminating to UC (when applicable), determining applicability, and ensuring appropriate implementation of applicable directives.

A system that has proven effective at the Kirtland Area Office for tracking policy communications and directives between that office and Sandia National Laboratory is being considered for use by LAAO. LAAO plans to adopt elements of this system.

UC and LAAO are now assessing their performance against DOE Order compliance requirements. The objective is to complete a rigorous review of 93 Level I & II DOE Orders to develop a baseline for use in justifying continued operations. The program has been developed by the Office of Defense Programs, and contains methodology for a graded approach to implementation and for analysis. The first phase will address 21 Level I ES&H Orders and is scheduled for completion in November 1991. All deficiencies and noncompliance issues will then be resolved through compliance schedule approvals, short term compliance statements, exemptions or retrofit implementation plan and schedule. This process will provide a baseline for compliance with the 93 DOE orders and facilitate oversight of LANL.

(Refer to the end of Part 3 for the Corrective Action Plan and schedule.)

KEY FINDING:

No comprehensive training plan exists for LAAO.

•DISCUSSION: TRAINING

Effective oversight of LANL operations requires well-qualified persons with adequate technical and DOE management training.

Historically, there has been minimum training of LAAO technical personnel. Training requirements weren't properly recognized, nor were training and travel budgets adequate. For example, in 1989, the training budget for the entire office was $3650. Employees often do not know which training classes are available and which classes would be beneficial. The FY 1990 and FY 1991 budget for training was very limited. A major contributing factor to this situation was a failure to plan for and request the proper amount of training funds.

Past poor planning was the result of no comprehensive formal training plan for LAAO to address the extent and type of duties required by each position. Needs assessments have not been developed. In addition, LAAO personnel do not have Individual Development Plans (IDPs) based on their past experience and position requirements.

CORRECTIVE ACTIONS:

The draft role and responsibility documents have assisted in identifying knowledge and skills required to fulfill the LAAO mission. FY 1994 Budget requests will reflect this.

LAAO Branches have submitted requests for increased amounts of training during FY 1992-1994 during the FY 1994 budget request process. Training for the staff increased during 1991. The following is a sample of training accomplished in FY 1991 that truly represents an improvement over past years.

CLASS TITLE	STAFF TRAINED
Fundamentals of Operations (DOE-AL)	17
Leadership through Quality (DOE-AL)	21
Basic Environment Class (Various Sources)	17
Basic Safety Class (Various Sources)	20

(Refer to the end of Part 3 for the Corrective Action Plan and schedule.)

KEY FINDING:

Communications within LAAO, between LAAO and UC, and between AL and LAAO are inconsistent, reactive, or inadequate.

•DISCUSSION: COMMUNICATIONS

LAAO, UC, and AL do not have open communication paths so that issues are addressed pro-actively. Communications among LAAO organizations are reactive to external events. Until recently, staff meetings were virtually non-existent.

LAAO has no formal protocol for sharing information among LAAO organizations. Currently, information is exchanged haphazardly. For LAAO to interact efficiently, a system must be developed to share information such as unusual occurrences, best management practices, management strategies, lessons learned, and status of activities. The success of LAAO ES&H oversight and management direction of LANL depends on meaningful internal communication.

As owner/operators of LANL, daily communications must exist between LAAO and UC. On the average, LAAO and UC submit 75 documents to regulators annually. Because communications channels are not open between LAAO and UC, instances have occurred in which agreements with regulators have been made without knowledge by the other owner/operator.

Many communications are not formalized when needed. In the past, discussions and time extensions between LAAO or UC and regulators have been made orally, without formal documentation, and in some instances without notification of the other owner/operator.

Biweekly meetings are scheduled between the ES&H Branch Chief and UC designated organizations, but, in many cases, meetings are cancelled. The lack of communication has led to management decisions, which do not necessarily represent a joint decision. A recent example of this was the submittal of a RCRA Part B Application for the storage of mixed waste at TA-53 storage lagoons. In retrospect, if dialogue between LAAO and UC had been ongoing, the decision to submit the permit application for the lagoons might not have been made.

Communication between UC and AL is inconsistent and does not ensure exchange of essential information. LAAO has not been completely successful in ensuring that communications from AL to UC are routed through LAAO when appropriate.

CORRECTIVE ACTIONS:

In August 1991, the Area Manager formed an Environmental Coordination Group composed of environmental, legal and engineering representatives from LAAO and UC. The group will meet on a monthly basis and will exchange information at the working level on current issues of significance to LAAO and UC. This group will ensure a more constant flow of information between LAAO and UC.

Also, a joint working group of LAAO and UC ES&H employees will be designated to define and establish protocols for regulatory notifications and submittals. LAAO and UC will jointly draft standard operating procedures (SOPs) for submitting required documents as well as guidelines for communicating with regulators.

A protocol for communication between LAAO and UC has been published and disseminated to UC. Although this document can be strengthened by identifying what should be communicated, it does identify who should be communicating with whom.

The Area Manager has made a commitment to have monthly All Hands meetings to share information with the entire LAAO staff. On September 16, 1991, an All Hands meeting was held at which the Area Manager communicated the new LAAO mission and vision statements. Commitments for weekly senior staff meetings, Area Manager/Branch meetings, and monthly breakfast meetings have also been made.

CORRECTIVE ACTION PLAN:

ACTION/ MILESTONES	TARGET DATE	RESOURCES	RESPONSIBLE ORGANIZATION

Core Corrective Actions

Continue recruitment and selection for allocated positions.	Ongoing	Refer to Part 1 for resources	Branch Chiefs (Coord-ADMB)
Conduct staff retreat with facilitator to finalize roles and responsibilities.	4/92	Refer to Part 1 for resources	Branch Chiefs (Coord-AM)
Define and develop task assignments for staff with backup of significant tasks based on roles and responsibilities.	7/92	Refer to Part 1 for resources	Branch Chiefs (Coord-AM)
Review and revise LAAO employees' current position descriptions.	9/92	Refer to Part 1 for resources	Branch Chiefs (Coord-ADMB)
Review and revise performance appraisal plans.	9/92	Refer to Part 1 for resources	Branch Chiefs (Coord-ADMB)
Identify additional staff requirements and hiring priorities based on roles and responsibilities.	9/92	Refer to Part 1 for resources	Branch Chiefs (Coord-AM)
Formally request additional staff.	11/92	Refer to Part 1 for resources	Branch Chiefs (Coord-ADMB)
Develop IDP's for staff based on roles, responsibilities, and experience level.	10/92	Refer to Part 1 for resources	Branch Chiefs (Coord-ADMB)
Develop methodology for risk-based surveillances.	4/92	Refer to Part 1 for resources	ES&HB
Develop and implement SOPs for risk-based surveillances.	6/92	Refer to Part 1 for resources	ES&HB
Set priorities based on resource availability.	7/92	Refer to Part 1 for resources	Branch Chiefs (Coord-AM)
Develop surveillance schedule.	8/92	Refer to Part 1 for resources	FOB
Revise AL 1120 to reflect current functions.	7/92	Refer to Part 1 for resources	Branch Chiefs (Coord-AM)
Submit AL 1120 for approval.	8/92	Refer to Part 1 for resources	ADMB

ACTION/ MILESTONES	TARGET DATE	RESOURCES	RESPONSIBLE ORGANIZATION

Organization and Administration

(These items are contained in Core Corrective Actions listed above.)

Staffing

Develop plan for aggressive recruitment.	12/91	40 hrs	Branch Chiefs (Coord-ADMB)
Implement program and track performance	1/92	$20K	ADMB
Study and develop actions to improve staff retention.	5/92	3000 hrs	Branch Chiefs/AL (Lead-ADMB)

Management Systems

Develop and implement lessons learned program and trending analysis.	1/92	1/2 FTE	FOB
Implement plan for central ES&H filing system.	9/91	1/2 FTE (permanent)	ES&HB
Implement DOE 5480.19 at LAAO, based on AL task group finding.	11/91	LOE	FOB
Develop DOE 5000.3A SOP for LAAO responsibilities.	1/92	40 hrs	FOB
Implement ESHAS at LAAO.	12/91	LOE	ES&HB

Policy Dissemination

Assign directives responsibility to LAAO ADMB Branch.	11/91		AM
Redraft Directive SOP to ensure compliance with DOE Orders and policy requirements. (KAO/SNL system)	4/92	80 hrs	ADMB
Implement procedure for disseminating directives.	4/92	1/2 FTE	ADMB
Complete DOE Order Compliance Phase I.	10/91	Under Review	FOB
Complete DOE Order Compliance Phase II.	1/92	Under Review	FOB

ACTION/ MILESTONES	TARGET DATE	RESOURCES	RESPONSIBLE ORGANIZATION

Training

Develop training program.	1/92	80 hrs	Branch Chiefs (Lead-ADMB)
Consolidate requirements for FY 95 budget request.	9/92	20 hrs	Branch Chiefs (Lead-ADMB)
Develop plan for new employee orientation.	2/92	80 hrs	Branch Chiefs (Coord-ADMB)
Implement new employee orientation plan.	3/92	LOE	Branch Chiefs (Coord-ADMB)

Communications

Conduct first monthly All Hands meeting	9/91	LOE	AM
Develop protocol for communicating essential information between AL and LAAO and UC and LAAO.	5/92	120 hrs	Branch Chiefs
Develop protocol for communicating essential information between AL and LAAO and UC and LAAO.	6/92	8 hrs	AM

Executive Summary
of AL/LAAO Assessment of Los Alamos

In July 1991, the Albuquerque Field Office initiated a Self-Assessement Program which reviewed activities at each site in order to assess the level of compliance/conformance with respect to ES&H requirements. This allows AL to assess their management performance in the area of ES&H oversight. At each site, four programs were identified as part of a Technical Assessment: Safety, Environmental Protection, Health Protection, and Management Systems. For each of the programs, functional areas were identified that would aid in the characterization of each program and provide information on the status of the activities. For each function, a performance grade of Satisfactory, Marginal, Deficient, or Not Rated was assigned. A significance code was added as High, Moderate, or Low to assign the degree of concern for the specific function.

The Los Alamos Area Office staff participated in the review and were a part of the assessment process. A separate report, entitled AL Self-Assessment, Los Alamos National Laboratory, contains the detailed assessment. This document may be obtained from the LAAO ES&H Branch (FTS 855-5027).

A summary of the findings below are taken from the Site Summary and indicate the areas of concern for Los Alamos National Laboratory. Refer to Table 1 through Table 4, Performance Assessment summary at the end of this Executive Summary.

Based on the function evaluations, items of concern were identified. These are items which require near term action or special attention to correct unacceptable situations or assure that functions rated as Marginal do not become Deficient. Unacceptable situations include functions rated Deficient or Not Rated and specific function deficiencies that warrant special attention. In addition, circumstances where lack of clear definition of roles and responsibilities may adversely impact ES&H performance are identified. Major concerns are any function rated Deficient and any high significance function that was Not Rated. The items of concern are presented below by Program and are ordered within each Program by "Major Concerns" and "Other Concerns."

A. Environmental Protection

1. Major Concerns

   a. Environmental Protection - Radiation performance is rated Deficient. Four LANL internal audits identified numerous deficiencies including 22 Priority 2 findings (failure to comply with DOE Orders or federal, state, or local regulations). Approved action plans and timely corrective actions are required.

2. Other Concerns

   a. Five high significance functions (Air, Surface Water, Waste Management, Toxic and Chemical Materiel, and NEPA) are rated marginal. Due to their high significance, these functions should be closely monitored to assure corrective actions are completed in a timely manner so that a Deficient situation does not develop.

   b. Stack monitoring for radionuclides is not in full compliance with the December 1989 National Emission Standards for Hazardous Air Pollutants, 40 CFR 61 subpart H requirements. LANL is preparing an analysis to support discussions with EPA for a compliance strategy plan. Timely resolution of this deficiency with EPA is required.

c. Milestones under current LANL Administrative Orders must be met in order to achieve National Pollutant Discharge Elimination System Permit compliance.

d. Characterization and evaluation of all lagoons for RCRA.

e. Line management's lack of understanding and implementation of regulatory requirements appears to be a strong contributing factor to specific deficiencies experienced in several functions.

B. Safety

1. Major Concerns

a. Fire Protection, Aviation Safety, and Industrial Safety performance are rated Deficient. Appropriate and timely action is required to correct current deficiencies.

Implementation of corrective actions for Aviation Safety is impacted by unclear authorities and responsibilities between DOE and LANL.

b. Non-Weapons Transportation and Packaging is a high significance function that was not rated due to insufficient information. Because of its high significance, sufficient information must be acquired in a timely manner to properly rate this function.

2. Other Concerns

a. The shutdown of five nuclear facilities since November 1989, raises concerns regarding formality of operations within the Laboratory.

b. Eight high significance functions (Firearms Safety, Non-Weapons Transport/Packaging, Weapons Transport/Packaging, Construction Safety, Safety Analysis Program, Preoperational Readiness, Electrical Safety and OSHA) are rated Marginal. Due to their high significance, these Functions should be closely monitored to assure corrective actions are completed in a timely manner so that a Deficient situation does not develop.

c. Fire protection support by the Los Alamos County Fire Department has not been satisfactory. While automatic fire protection systems are in place for Laboratory facilities, and constitute the first line of defense, the absence of an effective fire department response capability could result in significant loss of facilities and/or be mission impactive. This situation must be resolved as soon as possible to assure a complete fire protection program is provided for Laboratory facilities.

C. Health Protection

1. Major Concerns

   a. Occupational Radiological Protection performance is rated Deficient. A number of similar deficiencies were found during separate reviews which indicates potential lack of root cause identification; correction and a concern about line management understanding; and a lack of consistent site wide implementation as identified in Environmental Protection Item A2e above. LANL has not submitted an action plan to address findings and recommendations from an August 1990, appraisal by AL Health Protection Division. LANL must assure that appropriate and timely action is taken to correct current deficiencies.

   b. Industrial Hygiene is rated Deficient due to the fact that corrective actions for findings from an April 1989 appraisal are behind schedule. LANL must assure that appropriate and timely action is taken to complete these corrective actions.

D. Management Systems

1. Major Concerns

   a. Conduct of Maintenance, Conduct of Operations, Emergency Preparedness, and Incident Reporting, all high significance management systems, are rated Deficient at LANL. Timely submittals of implementation plans for DOE approval are required.

   b. Operational Readiness could not be rated at LANL due to the lack of definitive guidance from AL. Guidance must be provided in a timely manner for this high significance system.

2. Other Concerns

   a. Three moderate significance management systems were rated Deficient at LANL. Timely submittal of an implementation plan for Self-Assessment is required, and major deficiencies associated with Resource Management/Project Control and Performance Indicators must be corrected.

   b. Resources Management/Budget Systems, a moderate significance system, could not be rated at LANL. AL does not have responsibility for the majority of funding received by LANL.

   c. Issues Management, a low significance system, could not be rated at LANL. Information must be acquired in a timely manner to properly rate this system.

TABLE 1
PERFORMANCE ASSESSMENT SUMMARY

PROGRAM: Environmental Protection

FUNCTIONS	LANL	
	PERF	SIGNIF
Air	M	H
Surface Water	M	H
Groundwater	S	M
Waste Management	M	H
Toxic and Chemical Materials	M	H
Radiation	D	H
Inactive Waste Sites	S	H
National Environmental Policy Act	M	H

D - Major Concern

PERF - Performance
S - Satisfactory
M - Marginal
D - Deficient
NR - Not Rated
NA - Not Applicable

SIGNIF - Significance

H - High
M - Moderate
L - Low
NA - Not Applicable

TABLE 2
PERFORMANCE ASSESSMENT SUMMARY

PROGRAM: Safety

FUNCTIONS	LANL	
	PERF	SIGNIF
Explosive Safety	S	H
Fire Protection	D	H
Firearm Safety	M	H
Aviation Safety	D	H
Transport/Packaging (Non-Weapons)	NR	H
Transport/Packaging (Weapons)	M	H
Nuclear Facility Safety	M	H
Nuclear Reactor Safety	S	H
Industrial Safety	D	H
Construction Safety	M	H
Safety Analysis Program	M	H
Preoperational Readiness	M	H
Electrical Safety	M	H
OSHA/FEOSH	M	H

NR, D - Major Concern

PERF - Performance
S - Satisfactory
M - Marginal
D - Deficient
NR - Not Rated
NA - Not Applicable

SIGNIF - Significance
H - High
M - Moderate
L - Low
NA - Not Applicable

TABLE 3
PERFORMANCE ASSESSMENT SUMMARY

PROGRAM: Health Protection

FUNCTIONS	LANL	
	PERF	SIGNIF
Radiological Protection	Ⓓ	H
Industrial Hygiene	Ⓓ	H
Occupational Medicine	S	H
OSHA	M	H

Ⓓ - Major Concern

PERF - Performance
S - Satisfactory
M - Marginal
D - Deficient
NR - Not Rated
NA - Not Applicable

SIGNIF - Significance

H - High
M - Moderate
L - Low
NA - Not Applicable

TABLE 4
PERFORMANCE ASSESSMENT SUMMARY

PROGRAM: Management Systems

FUNCTIONS		LANL PERF	LANL SIGNIF
Conduct of Maintenance		D	H
Conduct of Operations		D	H
Corrective Actions Tracking		S	H
Emergency Preparedness		D	H
Incident Reporting		D	H
Operational Readiness		NR	H
Performance Indicators		D	M
Resource Management	Budget Systems	NR	M
Resource Management	Project Control	D	M
Self-Assessment		D	M
Issues Management		NR	L

NR, D - Major Concern

PERF - Performance
S - Satisfactory
M - Marginal
D - Deficient
NR - Not Rated
NA - Not Applicable

SIGNIF - Significance
H - High
M - Moderate
L - Low
NA - Not Applicable

FUNCTIONS	LAAO PERF	LAAO SIGNIF
Contract Performance Measurement	S	M
Facility Representatives	M	M
SEN-7A	S	M

EXECUTIVE SUMMARY

LAAO ASSESSMENT OF LANL SELF-ASSESSMENT PROGRAMS

This report provides the results of an assessment of the environmental, safety and health (ES&H) self-assessment program at the Los Alamos National Laboratory (LANL). The Team concluded that the LANL Self-Assessment Report is a thoroughly candid and comprehensive document which will form the basis for all necessary corrective action and that LANL's institutional self-assessment program is comprehensive and varied to the extent necessary to assure LANL maintains a continued awareness of its compliance status and has in place institutional systems for correcting deficiencies in the future.

In order to assess LANL's program, two separate evaluations were carried out:

1. An evaluation of the institutional self-assessment program at LANL using the Tiger Team Performance Objectives and Criteria for Evaluating DOE and Contractor Self-Assessment Programs (Attachment 2 to Secretary Watkin's July 31, 1990, memorandum on the subject: Guidance on Environment, Safety, and Health Self-Assessment); and

2. A process evaluation of LANL's Pre-Tiger Team Self-Assessment (Los Alamos National Laboratory ES&H Self-Assessment Report, LA-12200-MS, August 1991) (hereinafter referred to as "LANL Self-Assessment Report" or "the Report") using the Outline of Evaluation Guidance for Self-Assessment Reports developed by the Sandia National Laboratories (SNL) Tiger Team Management Subteam (Attachment 2 to Chapter 6 of the Draft SNL Tiger Team Assessment).

These evaluations were conducted over a two-week period by eight DOE staff persons–six from LAAO, one from the AL Safety Programs Division and one from the Dayton Area Office Programs and Operational Surety Branch. The methodology of each evaluation is set forth in the introduction to the section reporting on that evaluation. The credentials of the eight team members are set forth at the end of this report.

This report provides an assessment of the LANL Self-Assessment Program as of the first week of September 1991. At the time the report was written, only the LANL Self-Assessment Report was in final form.

One recommendation is included regarding a need for more definition in the graded approach to the health and safety assessment in the Pre-Tiger Team Self-Assessment Report and four recommendations are provided to improve the institutional self-assessment program.

SECTION 1

Evaluation of the Los Alamos National Laboratory Institutional Self-Assessment Program

Introduction

The LANL Assessment Program is managed by the Laboratory Assessment Office (LAO). Although LANL has other institutional mechanisms, such as the ES&H Council, to enhance continual self-assessment of its ES&H programs, this evaluation covers only those activities carried out or coordinated by LAO.

LAO has drafted a Policy, Plan, and Procedure on "Assessments." This document will serve as the LANL Assessment Program Document (hereinafter referred to as the Program Document). The information included in the Program Document was evaluated as well as information provided by the LAO Director and other LAO staff. Although the Program Document is not in final form, LAO, or its predecessor organization, has been conducting independent internal assessments since June 1989.

The evaluation was performed using the Tiger Team Performance Objectives and Criteria for Evaluating DOE and Contractor Self-Assessment Programs (Attachment 2 of the July 31, 1990 guidance from Secretary Watkins on Environment, Safety, and Health (ES&H) Self-Assessment). The referenced performance objectives and associated criteria are set forth in full in Exhibit 1 following the conclusion of this section. The Discussion section of this report is organized into five subsections corresponding to the five performance objectives in the Secretary's guidance.

The LANL Self-Assessment Program consists of three sub-programs--the External Assessment Program, the Independent Internal ES&H Appraisal Program, and the Line Management ES&H Self-Assessment Program.

The Program reflects a comprehensive approach to institutional self-assessment meeting most of the referenced performance objectives and associated criteria. Because the program is still in the formative stages, it was not possible to evaluate the actual implementation of many the of its plans and requirements. The following recommendations resulted from the evaluation of the Program.

Recommendations

1. **LANL should develop a plan that targets implementation dates for the portions of the assessment program that have not yet been implemented. LANL should then follow the plan and implement all portions of the program.** Such a plan would contribute to sustaining the momentum of the development of the Program after the Tiger Team Assessment is over.

2. LANL should obtain DOE approval of the LANL Self-Assessment Program. Because the Program Document is not complete, it has not yet been submitted to DOE for approval. LAO anticipates that the Program Document will be finalized and submitted to DOE in September 1991.

3. The Program Document should include a policy on the use of external contractors; a requirement for peer review to assist in providing an evaluation of the technical and professional judgement exercised in implementing the Program; and a requirement for identifying areas of good performance as well as deficiencies. The criteria supporting the first performance objective in the Secretary's guidelines reflect the need for these elements which are not evident in the Program Document.

4. LANL should fully implement a Performance Indicator Program on a site-wide basis. Although LAO recently began tracking and reporting ES&H Performance Indicators at nine facilities, LANL has not fully implemented the program on a site-wide basis.

Evaluation

1. Internal Appraisals

Formality, Scope, Definition

When approved, the LANL Assessment Program Document will formalize the LANL Self-Assessment Program. The Program Document includes plans and procedures for managing external appraisals, independent internal ES&H appraisals, and Line Management ES&H self-assessments.

The Independent Internal ES&H Appraisal Program and a Line Management ES&H Self-Assessment Program provide internal reviews of LANL. The Line Management ES&H Self-Assessment Program requires each LANL Division to develop its own self-assessment program and to report annually the results of assessments conducted under these programs. Each Division has been requested to submit its self-assessment program document and its first self-assessment report to the LANL Director by September 20, 1991. Because these documents were not available, this report does not provide a review of each Division's Self-Assessment Program. However, the LAO Plan and Procedure provided to each Associate Director for developing a Self-Assessment Program and conducting and reporting self-assessments were reviewed and an assessment is provided in this report.

The procedures included in the Program Document define the roles and responsibilities of LAO, the Nuclear Criticality Safety Committee, the Reactor Safety Committee, Associate Directors, Division Leaders, the Quality Operations Office, Management at all levels, support divisions, and employees at all levels.

Specifically, LAO is responsible for managing the Institutional Self-Assessment Program. LAO manages external assessments, performs independent internal assessments, and manages the line management self-assessment program. LAO schedules assessments, provides criteria for performing assessments, tracks all findings, disseminates all related information, and verifies that all corrective actions have been adequately completed. LAO's current staff is fifteen, including three Laboratory Associates. Ten contract personnel augment this staff. LAO has requested and plans eventually to have a staff of thirty-five individuals.

The scope of the LANL Assessment Program includes the areas of environment, safety and health, and management and organization. The program will be implemented for all departments and all facilities.

LANL independent internal assessments use documented Performance Objectives and Criteria (POCs) to perform assessments. There are currently four sets of criteria (see Revision 15 of the POCs for LANL Category I, II, III, and IV facilities) and these criteria address all of the lines of inquiry identified in the July 31, 1990 guidance from the Secretary. Each division will develop its own checklists as part of its Line Management ES&H Self-Assessment Program. Discussions with the LAO Director indicate that eventually the Line Management Self-Assessment Program will also use the LAO developed POCs.

A three-year schedule of assessments will be published by LAO in September of each year (starting with 1991). This schedule will provide the information necessary to assess whether all departments, all facilities, all ES&H technical areas, and management (including those areas specifically required by DOE Orders) are covered as required by DOE guidance and Orders.

Goals for appraisal frequency are set in both the Independent Internal ES&H Procedure and the Line Management ES&H Self-Assessment Procedure. The Independent Internal ES&H Appraisal Procedure states that "Nuclear facilities will be appraised annually, functional areas will be appraised per the requirements of Line Management and DOE Orders, and organizations (other than those managing nuclear facilities) will be appraised once every three years." The Line Management ES&H Self-Assessment Procedure requires that line manager's ES&H appraisals be conducted at least annually and that ES&H physical inspections be conducted at least quarterly.

The Program Document defines appraisal protocols. In summary, LAO is the primary contact for all ES&H related appraisals (internal and external) except audits by the University of California, the Government Accounting Office, or the DOE Inspector General which generally cover financial areas and are currently managed by the Internal Evaluation Office. LAO will be the focal point for external government appraisals (DOE, EPA, etc.) and LAO will coordinate these appraisals with the DOE Los Alamos Area Office (LAAO).

The POCs used to conduct appraisals have a complete listing of lines of inquiry. The Line Management ES&H Self-Assessment Plan also lists 16 key elements that further describe the lines of inquiry listed in the Secretary's guidance.

Qualifications, Independence of Appraisal Personnel

LAO is responsible for conducting independent internal assessments. LAO reports directly to the LANL Director's Office and is independent of program and line organizations. Line Management ES&H self-assessments, by definition, are performed by personnel associated with program and line organizations. However, the Program Document requires that these assessments be conducted by individuals within the organization who are not directly responsible for the activities being assessed.

There are no limitations identified as to the use of external (independent) contractors. Discussions with the LAO Director indicate that independent internal assessment team leaders will always be LANL employees and there is a pool of LANL experts who will be used before external (independent) contractors.

Two Job Advertisements were reviewed which provided examples of the qualifications required of LAO appraisal personnel. They specifically identify required technical expertise and auditing experience. The qualifications for line management self-assessment personnel identified in the Line Management ES&H Self-Assessment Procedure also meet this criteria.

A draft document, Training Requirements for Laboratory Assessment Office Appraisers, Auditors, and Team Leaders, details the proposed formal training program for personnel conducting independent internal appraisals. The Line Management ES&H Self-Assessment Procedure lists recommended training for self-assessment personnel. Each division will establish its own specific qualification requirements for self-assessment personnel. A formal training program for personnel conducting appraisals has not been implemented.

Appraisal Objectives

The Performance Objectives and Criteria used to perform independent internal assessments require an assessment of the degree of management support of ES&H goals and objectives and an evaluation of employee awareness of and commitment to corporate policy, as well as employee attitudes toward ES&H goals and objectives which apply to their activities. The Program Document does not, however, require an evaluation of the technical and professional judgement exercised in implementing ES&H programs, nor does it require the identification of areas of good performance and achievement as well as deficiencies and problem areas. According to LAO staff, however, noteworthy activities are currently noted in appraisals, and the Program Document will be revised to reflect this practice.

Both the Independent Internal ES&H Appraisal Program and the Line Management ES&H Self-Assessment Program will identify vulnerabilities. The associated risks will be determined and both program procedures specify a priority to be given to findings. Both internal assessment program documents identify the action to be taken based upon the risk that is associated with vulnerabilities that are identified.

Follow Up and Self Review

Both the Independent Internal Appraisal Program Document and the Line Management Self-Assessment Program Document identify time guidelines for reporting the results of internal appraisals. Independent appraisals will be available no later than ten working days after completion of the field investigation and the Line Management Document provides that serious deficiencies or any situation generating work stoppage will be reported immediately upon discovery.

The Independent Internal ES&H Program Procedure states that corrective action plans for deficiencies found by the Independent Internal ES&H Appraisal Program will be developed concurrently with the transmittal of the report. Corrective action plans will be expeditiously reviewed and approved by the appraisal team leader. LAO team leaders will review the corrective action plans for adequacy in correcting actual deficiencies and root causes before approving these plans.

Each Division will develop its own self-assessment program which will establish the time allowed for the development of corrective action plans. At the time of this review, none of the divisions had established a self-assessment program document so the expediency of corrective action plan preparation could not be assessed.

The LANL Self-Assessment Program addresses both self-review by line organizations and independent internal review. The self-review program is not a substitute for independent internal review.

2. Management Systems

Performance Indicators

LAO recently began tracking and reporting ES&H Performance Indicators (PIs) as required by Secretary of Energy Notice (SEN) 29. This program currently covers nine facilities at LANL (it is not a site-wide program). AL directed implementation of a site-wide Performance Indicator program in 1989 but LANL has not responded to this direction. Site-wide distribution of PI data for use as part of the self-assessment program has not been implemented.

LANL has not yet put in place a system in which performance indicators are summarized, analyzed for trends, compared with past performance and industry-wise performance, and reported to all supervisors and managers. Performance indicator data has only recently been collected (starting with the first quarter of 1991). LAO staff indicate that when sufficient data has been collected, this criteria will be addressed.

Trending and Tracking

The Independent Internal Assessment Program staff will validate corrective actions made by assessed organizations and document their assessment. They will also review corrective action performance taken in response to line management self-assessments. Team leaders will assess the adequacy of proposed corrective actions prior to approving corrective action plans for deficiencies identified by the Independent Internal ES&H Appraisal Program. According to the Line Management ES&H Self-Assessment Procedure, each Division shall address this criteria in its Line Management ES&H Self-Assessment Program.

LAO has established four sets of POCs to evaluate the ES&H performance of groups and individuals. According to the Line Management ES&H Self-Assessment Procedure, the Line Management ES&H Self-Assessment Program will also use established goals and objectives.

The Independent Internal ES&H Appraisal Plan requires LAO to provide a monthly report to the ES&H Council as to the status of the assessment program except for reactor safety and criticality safety. Reactor and criticality safety information is reported by the respective safety committees that cover these areas.

Lessons Learned Program

A formal lessons learned program has not been implemented at LANL. A program has been proposed but implementation information was not available at the time of this review.

3. Root Cause Analysis and Corrective Action

Management Attention and Employee Participation

The Independent Internal Assessment Plan requires Division Leaders and higher level staff to be responsible for analysis of findings to determine root cause, development of action plans which correct the root causes, and timely completion of action plans. The Line Management ES&H Self Assessment Procedure requires determination of the root cause.

All employees involved in the LANL Assessment Program will be involved in the process of identifying and correcting root causes of problems. All LANL managers will be trained in the process of root causes analysis

Training in Root Cause Analysis

A training program to ensure that line and staff personnel are trained in the use root cause analysis has been implemented and two courses have been conducted. Eventually, all LANL managers will take this course. Both the Independent Internal ES&H Appraisal Procedure and the Line Management ES&H Self-Assessment Procedure stress that problem solving is aimed at root causes.

Integration of Root Cause Analysis in Corrective Actions

Both the Independent Internal ES&H Appraisal Procedure and the Line Management ES&H Self-Assessment Procedure require root cause analysis as a key part of any evaluation of problem areas. Root cause analysis is integrated into corrective action plans.

The LANL Institutional Assessment Program Document requires relevant line management organizations to be responsible for correcting any deficiencies identified in facilities under their purview. This includes deficiencies identified by external and internal organizations.

4. External Assessments

Management Attitude and Participation

LANL top management has shown a cooperative attitude and acceptance of the importance of external oversight as seen in the establishment of the LAO external assessment responsibilities.

The LANL ES&H Self-Assessment Report published in August 1991 identifies the lack of senior management participation in the review and resolution of deficiencies as a root cause for the number of ES&H deficiencies at LANL. Since the identification of this root cause, LANL top management has become re-committed to participation in the correction of ES&H deficiencies. For example, the senior managers that make up the ES&H Council have been meeting more frequently (sometimes weekly) to discuss ES&H matters.

Tracking Deficiencies

LAO manages all external assessments. LAO coordinates the assessments, tracks deficiencies, and ensures that corrective action plans are expeditiously developed and implemented.

5. Self Evaluation/Total Quality Management

The Line Management ES&H Self-Assessment Plan requires a Line Management "Physical Walk-Around Inspection" once each month. The Line Management ES&H Self-Assessment Procedure defines a line manager as a Laboratory Group or Division Leader, an Associate Director or their equivalents. The Line Management ES&H Self-Assessment Procedure requires all line managers to participate in the self-assessment process. The Line Management ES&H Self-Assessment Procedure requires a formal walk-the-spaces exercise at least quarterly by all levels of line management.

Attachment 2 to the Line Management ES&H Self-Assessment Procedure (16 Key Elements for ES&H Formality of Operations) presents questions to test the following aspects of the program:

a. the adequacy of a formalized self-inspection program and the adequacy of the programs for management/employee involvement. These questions include asking whether ES&H responsibilities are specified in job standards and performance standards and how employees are rewarded for ES&H excellence and disciplined for ES&H defiance.

b. the adequacy of a Graded Performance Objectives and Criteria program. These questions encourage involving both line management and employees in the process.

c. the adequacy of ES&H goals, objectives, policies, plans and organization. These questions encourage checking to be sure of employee understanding.

d. the adequacy of the programs for management/employee involvement. These questions include asking whether there are regular walkthroughs, whether employees are involved in self-inspections and policy development, whether employees understand their ES&H responsibilities and how employees are rewarded and disciplined for ES&H performance.

The Institutional Self-Assessment Plan includes adequate provisions for employee involvement.

TIGER TEAM PERFORMANCE OBJECTIVES AND CRITERIA FOR EVALUATING DOE AND CONTRACTOR SELF-ASSESSMENT PROGRAMS

The following Performance Objectives and Criteria will be used by Tiger Teams to evaluate ES&H self-assessment programs within the Department of Energy or contractor organizations. These Performance Objectives and Criteria can also be used by the program and field organizations to assist in establishing, modifying, or evaluating their own programs.

Performance Objective #1 - Internal Appraisals

Internal appraisals of Environment, Safety and Health activities shall be performed at the operating level by qualified personnel not directly responsible for performance of the activity being appraised (DOE 5482.1B).

Criteria

A. A formal process with procedures for independent internal appraisal is in place that defines the scope and schedule for reviews.

- Procedures clearly define roles and responsibilities.
- Scope and schedule are defined and comprehensive (all departments, all facilities, all ES&H technical areas, management), including those areas specifically required by DOE orders.
- Appraisal protocols and lines of inquiry are developed.

B. Internal appraisal is done by qualified personnel not directly responsible for performance of the activity being appraised (minimize organizational conflict of interest).

- Personnel conducting appraisals are from an M&O Contractor (or DOE) group outside the program or line organization. Independent contractors are used only when necessary to provide supplemental expertise or manpower and, when used, are fully integrated into the internal appraisal team structure.
- Personnel conducting appraisals have expertise in and are familiar with regulations, orders, and industry practices for the area of their appraisal responsibilities.
- Personnel conducting appraisals have experience and skills in inspection and audit techniques.
- Personnel conducting appraisals are part of a formal training program on appraisal skills and appropriate technical areas.

C. Internal appraisals assess the degree of management support of ES&H goals and objectives.

D. Internal appraisal includes an evaluation of employee awareness of and commitment to corporate policy, as well as employee attitudes toward ES&H goals and objectives which apply to their activities.

E. Internal appraisal includes an evaluation of the technical and professional judgement exercised in implementing ES&H programs.

F. Areas of good performance and achievements are identified, as well as deficiencies and problem areas.

G. Vulnerabilities are identified and associated risks are determined.

H. Results of internal appraisals are expeditiously reported to, and reviewed with, line managers.

I. Corrective action plans and schedules are expeditiously developed by line organizations and are reviewed by the appraising organization.

J. Self-review by line organizations is done on a routine basis, but such reviews are not a substitute for independent internal oversight.

Performance Objective #2 - Management Systems

Management systems should be in place which ensure ES&H requirements are effectively implemented throughout the organization. The systems should provide management with objective, timely, and reliable information on ES&H performance, including significant achievements and deficiencies (DOE 5482.1B).

Criteria

A. System identifies, tracks and reports significant ES&H performance indicators for all ES&H disciplines, including results of internal and external appraisals.

B. Performance indicators are summarized, analyzed for trends, compared with past performance and with industry-wide performance and reported to all supervisors and managers.

C. A system is used to track vulnerabilities, associated risks, and corrective action.

D. Corrective action performance is independently assessed.

E. ES&H performance of groups and individuals is evaluated against established goals and objectives.

F. ES&H trends, underlying causes of problems, and results of corrective actions are reviewed periodically with corporate levels of management.

G. System includes a "lessons learned" program for disseminating information on experiences (deficiencies, corrective actions and noteworthy practices) at the site and from other sites to line management.

Performance Objective #3 - Root Cause Analysis and Corrective Action

A system is in place that is effective in evaluating deficiencies in order to determine the underlying basic problem or root cause and that develops corrective actions aimed at the root causes.

Criteria

A. Management attention is directed toward identification and correction of root causes of problems rather than toward treatment of symptoms.

B. Line and staff personnel are trained in the use of root cause analysis; problem solving is aimed at root causes.

C. Employees are involved in the complete process of identifying and correcting root causes of problems.

D. Root cause analysis is a part of all evaluations of identified problem areas.

E. Corrective action plans are developed and implemented expeditiously and include actions specifically identified to correct root causes.

F. Responsibility for undertaking corrective action is assigned to appropriate line management organizations.

Performance Objective #4 - External Assessments

Management systems are in place to assure support and cooperation with organizations performing external assessments of ES&H activities (i.e., regulatory agencies, ACNFS, DNFSB, etc.). The systems ensure effective follow-up, tracking and corrective action for deficiencies (SEN-20).

Criteria

A. Managers have a positive and cooperative attitude toward external oversight and accept its importance in improving performance and achieving excellence.

B. Managers ensure that identified ES&H deficiencies are clearly defined and that line organizations clearly understand them in order to develop corrective action plans and schedules.

C. Senior managers participate actively in the review and resolution of deficiencies.

D. Deficiencies are tracked and corrective action plans are expeditiously developed and implemented.

Performance Objective #5 - Self Evaluation/Total Quality Management

Line managers exhibit an active interest in improving performance of their organizations in the ES&H areas and routinely evaluate performance and identify areas where improvement can be made.

Criteria

A. Line managers regularly survey and observe activities and facilities under their jurisdiction, and are active in improving ES&H performance and seeking excellence.

B. Managers encourage persons in their organization to routinely and continually look for ways to improve ES&H performance.

C. Employees are informed of the need to correct problems and are directly involved in corrective actions.

SECTION 2

EVALUATION OF THE LANL PRE-TIGER TEAM SELF-ASSESSMENT REPORT

Introduction

This report provides an evaluation of LANL's Pre-Tiger Team Self-Assessment (Los Alamos National Laboratory ES&H Self-Assessment Report, LA-12200-MS, August 1991) (hereinafter referred to as the "LANL Self-Assessment Report" or the "Report"). Information in the Report as well as information obtained from discussions with staff at the ES&H Coordination Center and the Laboratory Assessment Office (LAO) was evaluated.

The Report was evaluated per the Tiger Team Guidance Document titled: "Outline of Evaluation Guidance for Self-Assessment Reports," which is attached as Exhibit 1 to this Section. The Discussion portion of this Section is divided into subsections to correspond to the 12 performance objectives set forth in the referenced Guideline. The evaluation addresses all performance objectives in the Guidance except number 5, dealing with integration of the assessment on an organization-wide basis, and number 9, dealing with corrective action plans. These performance objectives could not be evaluated because, at the time the evaluation was performed, LANL had not yet completed its corrective action plans.

The focus of the performance criteria in the Evaluation Guidance is on the methodology used in preparing the Report. Therefore, no evaluation of the adequacy of the content of the findings in the Report is provided. However, the Team did compare the LANL Self-Assessment Report with the Assessment of LANL carried out by AL and LAAO. Although it was not possible to make any definitive conclusions from this comparison because the methodologies of the two reports varied so widely, it was apparent that there were no significant discrepancies in results and scope of the two reports.

The LANL ES&H Coordination Center, which is the LANL organization responsible for coordinating the LANL Self-Assessment Report, began work on the Report in December, 1990. The assessment carried out was a bottoms-up assessment beginning with line management and operating groups. There was substantial senior management involvement, especially in the formulation of key findings and root causes. Generally, the LANL Self-Assessment Report was found to be comprehensive in identification of functional areas and associated performance objectives. Deficiencies are presented in a very open manner. Only one recommendation resulted from the evaluation.

Recommendation

LANL should define the assumptions used in developing a graded application of TSA performance objectives and criteria in conducting safety and health self-assessments. Specifically, LANL should address hazards analysis performed and the assignment of hazard classification and risk level to facility. Although the application of a graded approach in performing a self-assessment of safety and health programs was determined to be satisfactory, a clear definition of the assumptions used in developing the approach is not provided in the LANL Self-Assessment Report.

Discussion

1. Comprehensiveness of Report Scope

The LANL Self-Assessment Report covers three areas: environment, safety and health, and management and organization. The evaluation of scope is divided into the same three areas. Each of these three areas was evaluated against the "Areas of Inquiry" included in the July 31, 1990, Secretary of Energy memorandum on the subject: Guidance on Environment, Safety, and Health Self-Assessment (hereinafter the "1990 Areas of Inquiry"). A few omissions are noted; however, ES&H functional areas were found to be fully addressed. While the execution of the assessment indicates a broad organizational participation, the exact identification of facilities, buildings, sites or activities covered is not provided.

Environmental Assessment

The environmental assessment addresses separately all those functional areas suggested in the 1990 Areas of Inquiry, except for Environmental Monitoring and Emergency Preparedness/Community Right-to-Know. These topics are discussed within the content of the areas which are addressed, however. Those areas separately addressed also include areas which are not listed in the 1990 Areas of Inquiry, specifically Natural Resources and Environmental Management.

The description in the Report of the methodology used to develop the environmental assessment is weak. The only information provided in the Report is that environmental professionals reviewed past audits, appraisals, and inspections and used DOE environmental checklists and other audit tools to identify deficiencies and root causes. There is no identification of facilities, sites, or operations actually observed. Further, the derivation of the performance objectives used in the assessment is not discussed. It was indicated through discussions with LANL personnel that the performance objectives were developed internally due to a lack of DOE identified environmental performance objectives at the time the self-assessment effort was initiated. DOE has since issued these performance objectives. It is also apparent from looking at the general methodology used in all three assessment, that the environmental assessment was subject to at least two levels of review by senior management.

Safety and Health Assessment

The safety and health assessment was based on Performance Objectives and supporting criteria identified in the DOE Technical Safety Appraisal (TSA) Criteria, DOE/EH-0135, dated June 1990. The safety and health assessment addresses the 22 functional areas covered in the TSA Criteria as well as two additional areas which are included in the Draft DOE objectives and criteria issued in March 1991. These two areas, Firearms Safety and Explosives Safety, are also included in the 1990 Areas of Inquiry.

The 1990 Areas of Inquiry include one functional area, Personnel Protection, which is not addressed separately in the safety and health assessment. However, personnel protection is addressed in the Report within the content of other areas addressed.

A number of approaches were used in the safety and health assessment. Occupational Safety and Health Administration (OSHA)-type inspections were conducted in three phases with 100 percent inspection of 2,200 buildings completed by mid-June, 1991. Overall, approximately 45,000 deficiencies were identified. This self-assessment approach in terms of addressing OSHA-type deficiencies indicates a comprehensive review of all LANL facilities.

A review of past appraisals was performed by the Laboratory Assessment Office (LAO) including information from 1989, 1990, and 1991 internal and external appraisals. Individuals with expertise in various TSA disciplines were also interviewed and included in the identification of deficiencies.

LANL divisions conducted self-assessments of their operations based on a graded application of TSA performance objectives and criteria. This graded approach was based on dividing LANL operations into four categories based on scale/degree of complexity, technological maturity, and hazard. The four categories are as follows:

Category 1 - 15 non-reactor nuclear facilities and 2 reactor facilities
Category 2 - 54 non-nuclear facilities
Category 3 - all other non-nuclear activities that are potentially hazardous
Category 4 - remaining activities not potentially hazardous

Category 1 facilities were assessed using the full TSA guidance. The other categories of facilities used partial TSA guidance. Although the exact listing of TSA criteria applied to these other categories is not identified in the LANL Self-Assessment Report, a separate document generated by LANL identifies the graded criteria used by the respective divisions.

Similarly, a detailed listing of facilities/activities under each category is not provided in the LANL Self-Assessment Report. A separate LANL document provides this information. A listing in the Report itself of the types of facilities/activities in each category, at a minimum, would have been beneficial in understanding the assumptions made in developing the graded approach. Further, the identification of potential hazards other than nuclear is not discussed in assigning a facility to a category.

Another approach involved three tiers of group reviews. The first tier consisted of team leaders from LAO. The second tier consisted of a variety of personnel including two Deputy Associate Directors, sector leaders from ES&H Coordination Center, ES&H coordinators from the associate directorate level, a LAO representative, and technical experts from the programmatic divisions. The third tier consisted of a group of senior LANL managers and a manager from Johnson Controls World Services, Inc., LANL's support services subcontractor. The use of this three-tiered review indicates a broad organizational participation in the execution of the assessment and preparation of the Report. However, the performance of any field observations and/or in-service inspections in validating these deficiencies is not indicated.

Management and Organization Assessment

The management and organization assessment addressed separately the following areas: Commitment and Leadership; Organization; Planning; Human Resource Management; Management Systems; Public and Institutional Interactions; Oversight; Conduct of Operations; and Corrective Action Systems.

In assessing management and organization LANL derived performance objectives and supporting criteria from a comparison of two documents: "Recommended Management Performance Objectives and Criteria for Tiger Team Management Assessments," dated June 14, 1990; and "Draft Tiger Team Management and Organization Appraisal, Volume 2: Performance Objectives and Criteria," dated January 7, 1991

The 1990 Areas of Inquiry identify several functional areas which are not addressed separately in the LANL Self-Assessment Report: ES&H Criteria/policy/procedures; Directive Process; Organizational Conflict of Interest; and Incident Reporting and Trend Analysis.

The functional areas, Conduct of Operations and Management Systems, included in the LANL Self-Assessment Report address ES&H Criteria/Policy/Procedures and the Directive Process. Organizational Conflict of Interest and Incident Reporting and Trend Analysis are not specifically addressed. However, there are performance objectives established within the functional areas LANL has derived which partially apply to these two remaining areas.

The management and organization assessment was carried out in several stages. ES&H Coordination Center staff reviewed existing internal and external appraisals; a management consultant firm performed an external appraisal of LANL management to provide an outside perspective; a Laboratory Assessment Team composed of Deputy Associate Directors and other high-level managers reviewed preliminary findings; and an even higher level group, including the Laboratory Director and the Associate Directors, did a final review and refinement of the assessment results.

2. Appropriate Mix of Assessment Methodology

Although the methodology used in assessing environmental, safety and health, and management and organization areas varied somewhat, generally the assessment methodology applied to all three assessment areas constitutes a sufficiently varied approach to conducting a self-assessment. The safety and health assessment reflects a thoroughly varied approach in terms both of the types of methodology used and the levels of personnel involved. The environmental and management and organization assessment methodologies were more limited.

As indicated in the discussion of the first performance objective, all three assessments relied on an analysis of past appraisal and audit documents; performance was measured against stated performance objectives; and preliminary findings were reviewed by at least two levels of senior management. The safety and health assessment and the management and organization assessment also relied on appraisals by outside consultants and on internal assessments by line organizations using graded TSA criteria. The types of interviews and other methodology used for the line organization self-assessments varied from organization to organization. Copies of completed division self-assessments are maintained in the ES&H Coordination Center Library.

Interviews with and assistance from subject-matter experts and a 100 percent OSHA-type inspection were also a part of the safety and health assessment. The findings of these inspections are tracked on a database system ("FIXIT").

3. Qualifications of Assessment Personnel

Assessments were conducted and reviewed by personnel considered subject experts based on work experience and program affiliation.

Each Division Leader was responsible for conducting a self assessment for his or her division.

Reviews of preliminary findings and preliminary root cause analysis were conducted by two levels of senior management working as groups. Because these two groups included individuals in all LANL directorates, they reflect the involvement of personnel not directly responsible for the activities being assessed. The middle phase of the three-phase 100 percent OSHA-type inspection of all LANL facilities was performed by teams of LANL-trained inspectors under the direction of the ES&H Coordination Center staff, which again reflects independence from the activity being assessed.

Although outside consultant expertise was utilized in two areas of the assessment, it did not dominate the assessment. A management consultant performed an external assessment of LANL management and some of its findings were incorporated into the Report. Another consultant performed the first phase of the OSHA-type safety and health audit, covering 65 percent of LANL space. Contractors were also used as "coordinators" in consolidating, typing, and editing existing assessment information.

4. Participation by Senior Management

The Laboratory Assessment Team (LAT), headed by Deputy Associate Directors and composed of other high-level managers, consolidated information from the first phase of the self-assessment, completed the analysis by evaluating identified findings, defining new findings and re-writing as necessary. The Associate Directors and the Director then approved the report produced by LAT. The three LAT subcommittees (Environment, Safety and Health, and Management and Organization) compiled 770 ES&H findings resulting in 17 key findings and 4 root causes (as determined by the Laboratory Director and the LAT co-chairmen and reviewed by LAO).

The ES&H Coordination Center is currently staffed with varying levels of management (i.e., Division Leader, Associate Director, Deputy Associate Director); hence, identifying management involvement in all stages of the assessment.

5. Integration of Assessment Results

Not evaluated.

6. Management Findings Based on Functional Appraisal Findings

The management and organization assessment was initiated by the ES&H Coordination Center staff examining existing internal and external appraisals. Findings were also derived from the line organization graded TSA assessments. This process was augmented by a management consultant firm contracted to perform an external appraisal of LANL management. The findings of the external consultant appraisal were examined by LANL and many were incorporated into the management and organization assessment. Discussions with LAO staff indicate that management findings in current independent internal assessments are based on functional appraisal findings; however, it does not appear that the management findings in the LANL Self-Assessment Report are derived from functional, as opposed to management, appraisal findings. Management and organization assessment findings were found to be derived from previous functional appraisals performed.

7. Identification of Key Findings

The LANL Self-Assessment Report identifies 17 key findings from the 770 findings identified in all three assessment areas (170 environmental findings; 540 safety and health findings; and 60 management and organization findings). The 17 key findings derive from generic issues that were present in several categories of findings and provide a good understanding of LANL's ES&H status.

8. Root Cause Analysis

The process used to determine root causes is described in Section 2.0 of the LANL Self-Assessment Report. It was an exhaustive process that involved many iterations and many levels of management. The exact methodology used to perform the initial root cause analysis is not described in the Report. However, conversations with LAO staff indicate that a modified MORT analysis was used. The Report indicates that in the final stages of the process a cause/effect analysis of the key findings was used to develop reworked root causes. This cause/effect analysis is not explained.

The four root causes identified are basic and candid. Because corrective action plans have not yet been completed, it is not possible to determine whether corrective action measures can be applied to eliminate these root causes.

9. Corrective Actions Plans

Not evaluated.

10. Recognition of Good Performance

Although the introductory sections of the LANL Self-Assessment Report describe progress to date and programs in place, the assessment of functional areas does not recognize areas of good performance in any significant way. The Report does not give credit for partial compliance to a requirement; only 100 percent compliance avoided the identification of a finding.

11. Candor, Openness and Foresight of Report

The LANL Self-Assessment Report exhibits candor and openness in identifying all possible areas of deficiency. The Report also reflects foresight in focusing on the application of best management practices in many functional areas.

12. User-Friendliness of Report

The Report is well organized, thorough, and consistent. The report is divided into sections which allow the reader to proceed directly to the area of interest. In these respects, it was determined to be user friendly.

QUALIFICATIONS OF TEAM MEMBERS

Team Leader.

JOYCE HESTER LAESER. Experience: Counsel, LAAO, 6 years; Staff Attorney, LAAO, 7 years; 8 years experience in environmental law and M&O contract administration; Tiger Team Training, 1989; Member, Management Subteam, Brookhaven Tiger Team, Spring 1990; Detail to DP-3 and EH-25, Summer, 1991. Education: J.D., UNM School of Law, 1978; M.A. Spanish, UW-Madison, 1968; B.A. Spanish, UNC-Greensboro; 1964.

Evaluation of LANL's Self-Assessment Program Team.

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TABLE 1
CROSS REFERENCE - SECRETARY'S GUIDANCE ON ENVIRONMENT, SAFETY, AND HEALTH SELF-ASSESSMENT

AREA	SELF ASSESSMENT REFERENCE
Air	Part 1 - Environmental Oversight
Soil	Part 1 - Environmental Oversight
Sediment	Part 1 - Environmental Oversight
Biota	Part 1 - Environmental Oversight
Surface Water	Part 1 - Environmental Oversight
Groundwater	Part 1 - Environmental Oversight
Solid, hazardous, radioactive, and mixed waste mgmt	Part 1 - Environmental Oversight
Toxic and hazardous materials management	Part 1 - Environmental Oversight
Radiation and radiological materials management	Part 1 - Environmental Oversight
Quality assurance	Part 1 - Environmental Oversight
Inactive waste sites and releases	Part 1 - Environmental Oversight
Environmental monitoring	Part 1 - Environmental Oversight
Emergency Preparedness/Community right-to-know	Part 2 - Safety Safety Oversight
National Environmental Policy Act implementation	Part 1 - Environmental Oversight

TABLE 2
CROSS REFERENCE - SECRETARY'S GUIDANCE ON ENVIRONMENT, SAFETY, AND HEALTH SELF-ASSESSMENT

Areas of Inquiry - Safety and Health

AREA	SELF ASSESSMENT REFERENCE
Organization/administration	Part 3 - Management Organization and Administration
Maintenance	Part 2 - Safety Safety Oversight
Auxiliary systems	Part 2 - Safety Safety Oversight
Technical support	Part 2 - Safety Safety Oversight
Experimental activities	Part 2 - Safety Safety Oversight
Nuclear criticality safety	Part 2 - Safety Safety Oversight
Packaging and transportation	Part 2 - Safety Safety Oversight
Personnel protection	Part 2 - Safety Health Oversight
Medical services	Part 2 - Safety Safety Oversight
Firearm safety	Part 2 - Safety Safety Oversight
Fire protection	Part 2 - Safety Safety Oversight
Explosive safety	Part 2 - Safety Safety Oversight
Operations	Part 2 - Safety Safety Oversight
Training and certification	Part 2 - Safety Safety Oversight

Emergency preparedness	Part 2 - Safety Safety Oversight
Security/safety interface	Part 2 - Safety Safety Oversight
Site/facility safety review	Part 2 - Safety Safety Oversight
Radiological protection	Part 2 - Safety Safety Oversight
Quality verification	Part 2 - Safety Safety Oversight
Aviation safety	Part 2 - Safety Safety Oversight
Occupational safety	Part 2 - Safety Safety Oversight
Worker safety compliance (OSHA)	Part 2 - Safety Safety Oversight
Industrial hygiene	Part 2 - Safety Health Oversight

TABLE 3
CROSS REFERENCE - SECRETARY'S GUIDANCE ON ENVIRONMENT, SAFETY, AND HEALTH SELF-ASSESSMENT

Areas of Inquiry - Management and Organization

AREA	SELF ASSESSMENT REFERENCE
Organization and administration	Part 3 - Management and Organization Organization and Administration
Resources	Part 3 - Management and Organization Staffing
Management systems	Part 3 - Management and Organization Management Systems
ES&H criteria/policy/procedures	Part 3 - Management and Organization Policy Dissemination
Directive process	Part 3 - Management and Organization Policy Dissemination
Planning and budgeting	Part 3 - Management and Organization Staffing - Training
Self-assessment/corrective action	Part 3 - Management and Organization Management Systems
Organizational conflict of interest	Part 3 - Management and Organization Organization and Administration
Management qualification, involvement, and commitment	Part 3 - Management and Organization Organization and Administration
Communication	Part 3 - Management and Organization Communication
Mission	Part 3 - Management and Organization Organization and Administration
Oversight	Refer to Key Findings Parts 1,2,3
Incident reporting and trend analysis	Part 3 - Management and Organization Management Systems

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Los Alamos National Laboratory ES&H Self-Assessment Report

Los Alamos
NATIONAL LABORATORY

August 26, 1991

The Los Alamos National Laboratory ES&H Self-Assessment Report is hereby submitted for approval

Roger B. Perkins	Michael G. Stevenson

The Los Alamos National Laboratory ES&H Self-Assessment Report is hereby approved.

S. S. Hecker, Director

James F. Jackson, Deputy Director

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1.0 Introduction

1.1 Laboratory's Response to 10-Point Initiative

On June 27, 1989, James D. Watkins, Secretary of Energy, announced a 10-point initiative to strengthen safety, environmental protection, and waste management activities at Department of Energy (DOE) production, research, and testing facilities. The 10 points of the initiative were

- resetting of priorities to weight environment, safety, and health (ES&H) more heavily than production
- modifying the criteria for awarding contractor fees to reflect increased emphasis on ES&H
- establishing independent Tiger Teams to assess environmental compliance
- improving the way in which DOE complies with the National Environmental Policy Act (NEPA) and coordinating its activities with the governors of the states that host DOE facilities
- establishing an entirely new management team within the DOE's Office of Defense Programs to emphasize safety over production
- strengthening the ES&H technical capabilities of line managers within the DOE organizational structure
- appointing an independent panel to help restructure the DOE's epidemiology program, with restructuring to include the creation of a new standing committee by the National Academy of Sciences to oversee epidemiologic research requests
- establishing a comprehensive repository of epidemiological data containing information on past and present DOE workers that may be used by any qualified researcher
- requiring that milestones to achieve full compliance with Occupational Safety and Health Administration (OSHA) standards be included in the Defense Facilities Modernization Five-Year Plan now under development
- accelerating the cleanup of DOE facilities through the allocation of an additional $300 million for FY 1990 activities consistent with the Environmental Restoration and Waste Management Five-Year Plan.

In support of the 10-point initiative, the Secretary established independent Tiger Teams to assess ES&H compliance at DOE facilities. The assessments are independent reviews of ES&H programs to ensure compliance with applicable federal, state, and local regulations; permit requirements; agreements and consent decrees; and DOE orders and directives. In addition, Tiger Teams assess DOE operations for conformance with applicable "best" and "accepted" industry practices and assess the adequacy of DOE and site contractor management programs. A Tiger Team assessment will be conducted at the Los Alamos National Laboratory (Laboratory) beginning in September 1991.

In response to Secretary Watkins' initiative, Dr. S. S. Hecker, Director of the Laboratory, established the ES&H Coordination Center (ES&H CC) in March 1990. The Coordination Center is coordinating the Laboratory-wide effort to assess, develop, and implement ES&H programs to meet the intent of the 10-point initiative. Major ES&H accomplishments by the Laboratory to date include the following:

- Built an OSHA program
  - -Inspected all Laboratory facilities; more than 45,000 OSHA deficiencies identified
  - -Instituted a computer data base to collect, prioritize, and track action on all deficiencies
  - -Trained more than 350 Laboratory and Johnson Controls World Services Inc. employees in OSHA requirements for general industry and construction safety as a basis for ongoing OSHA inspections

- Developed graded approach to conduct self-assessments based on the DOE Technical Safety Appraisal performance objectives and criteria

- Initiated an employee concerns program
  - -Established an ES&H Hotline in April 1990; more than 40 calls received
  - -Distributed ES&H deficiency tickets to all employees, contractors, and affiliates in August 1990; more than 700 tickets received

- Formulated an institutional process to identify, develop, review, and prioritize corrective action plans based on a cost/risk/benefit analysis

- Instituted a landlord/Building Manager Program

- Developed and received DOE approval on the FY 1992 Five-Year Plan for environmental restoration, waste management, and corrective action

- Published *Los Alamos Guide to ES&H Management Structure*

- Established an organization to coordinate and facilitate the development and maintenance of safety analysis reports for the Laboratory

- Established a central office for quality operations and completed a draft quality assurance plan for the Laboratory

- Conducted an institutional Cleanup, Storage, and Space Project

- Issued Laboratory Director's *ES&H Policy, Vision, Goal, Objectives, and Strategies* for fiscal year 1991 and fiscal year 1992

- Trained Laboratory managers on conduct of operations, including field exercises on how to "walk the spaces"

- Instituted a process for developing a centralized, hierarchical system of policies, plans, and procedures for ES&H and quality

These ES&H programs represent ongoing efforts that are integrated into the overall research, development, and operations activities of the Laboratory. In 1987 the Laboratory began a full-scale technical appraisal of selected Technical Areas (TAs), including TA-55 (the plutonium facility), the Tritium Systems Test Assembly, and the Omega West Reactor. As a result of this appraisal effort, ES&H problems were identified and actions were taken to upgrade the sites. Individual divisions and groups participated in appraisals and upgrades of their work areas. The Laboratory has continued its localized appraisals and upgrades.

1.2 Laboratory Policy and Existing Programs

The policy of the Laboratory is to provide a safe and healthful working environment for its employees, the employees of its subcontractors, participating guests, and visitors and to prevent any harm to these individuals, the public, or the environment as a result of the Laboratory's activities. The purpose of the current self-assessment is to evaluate the effectiveness of the Laboratory's programs in achieving its goals.

The Laboratory addresses environmental issues, DOE orders and directives, and applicable federal, state, and local regulations through lines of management responsibility now reflected in the *Los Alamos Guide to Environment, Safety, and Health (ES&H) Management Structure* (*GEMS*). Environmental and safety requirements are disseminated through divisional lines of responsibility and are embodied as policies and procedures in *The Laboratory Manual, Chapter 1, Environment, Safety, and Health (ES&H Manual).*

The Laboratory Director has ultimate responsibility and authority for ES&H activities at the Laboratory, ensures that the Laboratory maintains a safe and healthful work place and does not affect adversely the environment or the public, and ensures that the Laboratory complies with all applicable ES&H statutes. The Director has responsibility for the establishment and administration of Laboratory policies. The Director has delegated the responsibility and authority necessary to implement the Laboratory's policies to line management, has established an independent oversight organization, and uses outside review to confirm compliance.

The various levels of line management are responsible for ensuring that the Laboratory's ES&H policies are followed within their own divisions.

1.3 Self-Assessment Process

The Laboratory began the current self-assessment process in early 1990 with the establishment of the ES&H Coordination Center. The goal is to assess the current status of Laboratory sites and operations and develop action plans to address findings.

The self-assessment has focused on three areas: environment, health and safety, and management and organization. The process varied for each area, but each included a review of past audits, involvement of Laboratory technical experts and managers, and reviews by consultants.

The environmental self-assessment began with a review of past audits, inspections, and appraisals. Environmental professionals used these reviews and auditing tools to identify findings and areas of concern.

The safety and health self-assessment included reviews of past appraisals, an OSHA-type inspection performed by consultants, interviews with safety and health experts, self-assessments by divisions, and reviews by outside experts and organizations.

The management and organization assessment was conducted in each division using past appraisals on file at the Laboratory Assessment Office, along with the results of a management appraisal conducted by management consultants. This information was compiled in relation to the performance objectives. The management and organization section was then reviewed by a committee of senior-level managers.

Senior management then formed a Laboratory Assessment Team of high-level managers to produce a comprehensive self-assessment report. After an intense review of findings, data, and analyses, the group identified key findings and root causes and presented them to Associate Directors and the Laboratory Director for final review and approval.

1.4 Purpose and Scope of Report

The purpose of this *ES&H Self-Assessment Report* is to establish where we are now and identify what we need to do to accomplish our ES&H objectives. This self-assessment is the first of the comprehensive annual self-assessment reports that the Laboratory intends to produce in response to the DOE initiative. Deficiencies identified by external audits and appraisals (e.g., DOE, Environmental Protection Agency, and New Mexico Environment Department), internal audits (e.g., internal assessment programs, line management self-assessments, quality assurance audits, and OSHA-type audits), program and policy reviews, and independent contracted assessments are all addressed in the *ES&H Self-Assessment Report*. Programs required to meet the ES&H objectives have been identified, and initial actions to develop and implement those programs have begun, but much work remains.

1.5 Organization and Content of Report

The *ES&H Self-Assessment Report* includes five sections. Section 1.0 provides background on

DOE's and the Laboratory's ES&H initiatives; purpose, scope, organization, and content; and a description of the Laboratory organizations responsible for ES&H management. Section 2.0 describes the root causes and key findings identified in our self-assessment. Section 3.0 explains our findings and assessments related to the environment. Section 4.0 covers our findings and assessments related to safety and health. In Section 5.0 we describe findings and assessments related to management and organization. Appendix A presents the Laboratory site, organizations, and facilities in detail. Appendix B explains acronyms and abbreviations; Appendix C lists DOE orders.

1.6 Site and Organization Description

1.6.1 Mission

The Laboratory's primary mission is nuclear weapons research, development, and testing to help ensure the nation's nuclear deterrent. Using our core competencies, we also make contributions in technical assistance to the DOE's weapons complex, work for other federal agencies, cooperative ventures with U.S. industry, and basic research.

The Laboratory has received a number of specific research and development (R&D) assignments, ranging from nonnuclear strategic defense and conventional munitions R&D to environmental and energy R&D. The Laboratory has also been charged with helping to ensure a continuous supply of technical personnel for DOE programs. We therefore support science and engineering education at all levels through local outreach programs and programs targeted at undergraduates, graduate students, and university faculty.

The National Competitiveness and Technology Transfer Act of 1989 specifically included technology transfer in the missions of the Laboratory. We maintain active collaborations with industry to commercialize new technologies, promote personnel exchanges, and operate many user facilities.

1.6.2 Technical Areas

The Laboratory consists of 50 Technical Areas. The main Technical Area of the Laboratory, TA-3, contains 50 percent of the Laboratory's population and almost half its square footage. The main functions that occur at TA-3 are administrative and technical support functions, theoretical and computational science, and mixed-use experimental science.

Other major sites are TA-35, where laser R&D, fusion, and nuclear safeguards work takes place; TA-53, dedicated to accelerator-related science; TA-55, dedicated to special nuclear materials R&D; and TA-59, which includes ES&H-related technical services. (For a more complete description of TAs, see Appendix A.)

1.6.3 Organizations

The University of California manages the Laboratory for the DOE. Although the Laboratory reports to both the University and the DOE, the Laboratory Director is ultimately responsible for all Laboratory activities. He delegates some administrative and technical responsibility and authority to the five technical directorates and a directorate for support activities. Associate Directors guide the major organizational units, or divisions, which are further divided into groups.

The Laboratory Director has primary responsibility for ES&H management. Line managers have responsibility for ES&H in their areas. Several organizations provide ES&H support for line managers. In 1991 senior management reorganized the divisions responsible for ES&H tasks to clarify areas of authority and increase efficiency. (For a detailed description of these organizations, see the Appendix A.)

The Director's primary oversight and policy-setting organization for ES&H matters is the ES&H Council. The Council recommends policy, monitors the effectiveness of the Laboratory's ES&H program, periodically visits Laboratory sites, and ensures that senior managers are fully engaged in the ES&H management process.

Three divisions and two offices also have major ES&H responsibilities. The Health and Safety Division initiates and promotes a comprehensive program in areas of radiation protection, occupational medicine, industrial safety, industrial hygiene, nuclear criticality safety, and health and safety quality assurance. The division helps define policy and communicate policy to employees. The Environmental Management Division initiates and promotes a comprehensive program for environmental protection, manages waste management and environmental restoration programs, and provides appropriate environmental training. The Facilities Engineering Division is responsible for all facilities and infrastructure at the Laboratory and manages portions of the Laboratory's quality assurance programs.

The Laboratory Assessment Office is responsible for an independent internal ES&H appraisal program. Key activities include conducting independent internal assessments, coordinating and supporting all external assessments, tracking action plans, supporting line managers, analyzing findings, and identifying lessons learned. The Quality Operations Office is responsible for developing and implementing an overall quality assurance program. It secures resources, assesses qualifications and training needs, monitors programs, and assures appropriate documentation.

2.0 Root Causes and Key Findings

The objective of this self-assessment was to arrive at a set of root causes, which if addressed would correct, mitigate, or otherwise prevent the recurrence of our findings in environment, safety and health (ES&H). The process of developing these root causes occurred in two phases.

In the first phase, a strawman self-assessment document was produced, including draft key findings and root causes. The multiple sources of input included inspections by ES&H Coordination Center Sector Leaders, Occupational Safety and Health Administration (OSHA) inspections, external appraisals/audits, independent internal assessments, environmental audits, subject-matter experts, and others. Additionally, the ES&H Coordination Center requested that Laboratory organizations conduct self-assessments using a graded Technical Safety Appraisal (TSA) approach. The ES&H Coordination Center and Environment Management staff reviewed this feedback to evaluate the extent of the findings and to compile them into Laboratory-wide findings. Members of the Laboratory Assessment Office (LAO) reviewed and analyzed the findings, developed preliminary key findings, and performed the initial root cause analysis.

The second phase commenced when the Senior Management Group (SMG) formed a task force headed by Deputy Associate Directors and composed of other high-level managers, including one from Johnson Controls World Services Inc. (JCI). This task force, called the Laboratory Assessment Team (LAT), was charged with consolidating earlier work, completing the analysis, and producing a report for review and approval by the Associate Directors and the Director. Three subcommittees were formed: Environment, Safety and Health, and Management and Organization.

The LAT subcommittees evaluated all the previously identified findings and defined new findings based upon their collective knowledge of the Laboratory and its operations. The bases for these evaluations and development of findings consisted of recommended performance objectives and criteria; applicable state, federal, and local regulations; Department of Energy (DOE) orders and directives; best management practices; interviews; subcommittee reviews and others. At this point the subcommittees drafted discussions of approximately 770 ES&H findings. The SMG then reviewed and commented on the draft findings and discussions.

Each subcommittee also prepared a set of key findings that captured the more significant ES&H issues facing the Laboratory. These were consolidated into a single set of key findings and compared with the key findings presented in the strawman document to assure that all identified key findings were represented. A cross reference has been made to assure that the key findings reflect all the findings. The SMG met to evaluate the key findings and form its opinion of the root causes that led to them.

The LAT co-chairmen and the Director then used these key findings as the bases for their root cause analysis. Along with the input from the SMG and the root causes contained in the strawman document, the co-chairmen used a cause/effect analysis of the key findings to develop reworked root causes. The LAO reviewed these root causes to assure that they logically proceed from the key findings, which in turn, proceed from the findings. The Director then did a final reworking of the root causes as they are given below. These and the following key findings were then approved by the Director and the remainder of the SMG.

2.1 Root Causes

Root Causes/RC.1: Nearly 50 years of successful technical operations have resulted in the Laboratory's over-familiarity and arrogance, i.e., thinking there was little to learn, in regard to handling hazardous materials and executing hazardous operations. This over-familiarity and arrogance have led to complacency towards ES&H.

> **Discussion:** The Laboratory has handled hazardous materials and executed hazardous operations for almost 50 years. Many employees have been around for much of that history. Familiarity with such materials and operations and a generally good safety record, along with the arrogance that derives from an extended period of excellent technical accomplishments, have led to complacency about ES&H issues. There has been a general feeling among our managers and employees that we do things safely, and that is good enough.

Root Cause/RC.2: Ignorance of what constitutes ES&H excellence and insensitivity toward formality of operations have led to the lack of a "safety culture" at the Laboratory.

> **Discussion:** Ignorance of new standards, i.e. knowing what is right, and slowness to learn from others have resulted in the Laboratory's living in isolation from dramatically changing public attitudes and standards for ES&H. Laboratory management did not question the DOE policies that allowed us to be sheltered from state and federal regulations until the late 1980s. Where DOE policies changed, the Laboratory was slow to respond because ignorance and insensitivity had not fostered a safety culture at the Laboratory. Consequently, today we are "playing catch-up" at a pace that is bewildering and enormously taxing. A system of prioritization, i.e., a graded approach, must be developed to put us on the road to ES&H excellence.

Root Cause/RC.3: The Laboratory's preoccupation with science and the tradition of placing scientific and individual values above institutional values have created a lack of institutional accountability.

> **Discussion:** The education and training of Laboratory managers and staff members have a strong scientific bias and generally pay inadequate attention to the social obligations of the by-products of science, such as environmental effects. This preoccupation with science, combined with arrogance based on many years of scientific achievements, has led to a lack of general curiosity and inquisitiveness in matters such as ES&H. The Laboratory has largely continued in its historic tradition of decentralized autonomy, which has focused on meeting unique challenges with exceptionally competent and specialized people. The Laboratory's decentralized culture values the individual more than the institution. Most individuals feel more loyalty to their local unit, their group, than to the

Laboratory. This loyalty to individual units and the lack of inquisitiveness in areas such as ES&H have made the Laboratory slow to respond to its institutional responsibilities and have led to a lack of institutional accountability.

The Laboratory now recognizes its three-fold responsibility in fulfilling its social contract: 1) to produce something of value — for us that is science and technology;
2) to minimize the negative impact of our operations on the public and the environment; and 3) to treat our employees and the public with a sense of fairness, justice, and human rights. We are dedicated to these goals.

Root Cause/RC.4: Trusting that someone else would take care of facilities and of ES&H has led Laboratory staff to ignore ownership of ES&H problems and of their own facilities and laboratories.

Discussion: Employees and technical managers have typically been preoccupied with programmatic issues and have often ignored support and infrastructure needs with the tacit assumption that someone else was taking care of it. This behavior was reinforced by the perception that the ES&H and other support organizations had the sole responsibility in many facility and safety areas. (Locks on utility rooms and assignment of radiation monitoring to HS groups are two common examples.) We have trusted those around us to the point of not taking ownership of everything associated with our operations and facilities. This problem has been especially acute in facilities that house multiple organizations.

2.2 Key Findings

Key Finding/KF.1: The Laboratory Director did not, until recently, become sufficiently involved personally in ES&H issues to provide the necessary leadership for the Laboratory's ES&H initiatives.

Discussion: The Director has for some time stressed to senior management the need for full compliance with ES&H requirements and the need for a change in the way business is done at the Laboratory. He has presented this view to the Laboratory in Director's colloquia and the Laboratory's *Los Alamos Newsbulletin*. However, until recently, he has not become sufficiently involved personally in addressing ES&H issues, giving the appearance of not fully supporting ES&H initiatives. This appearance has led to some ambivalence in managers defining the ES&H expectations and priorities at the Laboratory. An additional consequence has been that conduct of operations training for Laboratory supervisors and managers was not commenced as soon as may have been appropriate. Another consequence has been the adoption of a wait-and-see attitude by some Laboratory managers and supervisors until they were convinced that the Director and the senior managers had fully embraced the DOE ES&H initiatives. Another consequence is that the Laboratory as a whole has been slow to respond to the changing ES&H requirements and the needs of its customers. Now the Laboratory is faced with "playing catch-up" and is facing enormous human and financial resource issues.

Key Finding/KF.2: Laboratory management has not applied the good business practice of "formality of operations" in its policies, processes, and daily operations.

> **Discussion:** The Laboratory lacks many elements of good business practices that fit under the label "formality of operations." Basic goals of formality of operations are to improve the way we do business and research, to emphasize accountability and individual responsibility, and to document and formalize all work at the Laboratory. For example, we have not had a framework of top-down policies leading to clear requirements, which are met through implementation of programs and specific procedures. Our safety envelope is incomplete, with inadequate risk assessments and safety documentation, so that not all of our managers and employees fully understand the risks they encounter, accept, and must be able to explain. Configuration management of our facilities and infrastructure has been inadequate, and as a result we encounter surprises and the need to make corrections in the field as we make changes to our facilities. Our quality assurance program is not comprehensive and consistent, and we do not have a quality management program leading to continuous improvement of our process and products.

Key Finding/KF.3: The Laboratory has not yet implemented a formal system in which ES&H responsibilities are clearly identified and requirements are implemented through policy, programs, and procedures.

> **Discussion:** The Laboratory has not yet fully implemented sufficient formality of operations to establish clear ES&H responsibilities and requirements. The Laboratory has no formal process for receiving and accepting new ES&H requirements or for developing Laboratory-wide policy, programs, and procedures designed to implement new requirements. Laboratory senior management must also communicate its expectations for meeting these requirements. The Laboratory has recently implemented a top-down process for developing ES&H policy. However, the lack of clear ES&H policies in the past has resulted in inconsistent, inefficient, and ineffective methods of managing the ES&H activities at the Laboratory. This situation has resulted, in part, from the consensus-style decision-making process that has been practiced in the Laboratory's technical programs. Operating the business aspects of the Laboratory must become more structured with crisp decision making and full accountability for actions.

Key Finding/KF.4: The Laboratory needs to apply risk management principles uniformly and consistently to all its facilities and operations.

> **Discussion:** The Laboratory lacks monitoring and enforcement of its stated requirements for establishing and maintaining safety envelopes for all its facilities and operations. Lower-level managers need formal guidance for determining whether estimated risk levels are acceptable and for determining when decisions must be elevated to the next management level. Requisite safety assessments and safety analysis reports are out-of-date for most moderate- and/or high-hazard facilities and have not been performed for some facilities. Because managers lack adequate risk assessments, some have not formally accepted the risks posed by their operations, have deferred continued-operation

decisions to the lowest levels of their organization, and have been unable to communicate to others the risks involved in their operations.

Key Finding/KF.5: The Laboratory has no process for comprehensive assessment of ES&H needs, no process for prioritizing the allocation of resources to meet those needs, and no integration of ES&H planning into overall Laboratory strategic planning.

Discussion: Although the Laboratory has a system for allocating funding and human resources, that system does not give adequate emphasis to the ES&H process. It does not assure that ES&H priorities are predominant and accounted for in the resource allocation process. The lack of Laboratory-wide ES&H prioritization as part of a strategic planning process has led to inefficient use of funding and human resources. Although ES&H needs have been identified by ES&H support organizations and line organizations, the Laboratory has not been able to provide sufficient resources to meet those needs nor, through a prioritization process, has it been able to maximize the benefits of allocated resources. The Laboratory has also not been sufficiently aggressive in asking DOE managers — particularly DOE Headquarters program managers — to adequately take into account ES&H needs, to support ES&H excellence, and to adequately address the effects of funding changes on ES&H compliance.

Key Finding/KF.6: Ownership of, management of, and accountability for achieving ES&H compliance of Laboratory facilities and sites, and responsibility for acquiring sufficient funding to achieve compliancy are insufficient. This situation is particularly true for buildings, facilities, and sites with multiple users and occupants.

Discussion: Laboratory buildings, facilities, and sites are generally not "owned" by their users, nor is there generally any single, identifiable owner. Equipment used for technical operations in buildings is owned by the occupants and users, but building equipment and general maintenance are the responsibility of ENG Division and Johnson Controls World Services Inc. The building manager, who usually reports to a user organization, has little authority to assure that needed maintenance and ES&H corrective actions are performed. The Laboratory's organizational structure and operational methodology are based on programs and people, not oriented toward facilities. Consequently, the facility-oriented ES&H issues (such as utilities, maintenance, emergency response, waste management, and radiation monitoring) receive insufficient attention and lack coordination. Having multiple user organizations in many facilities exacerbates this problem.

Key Finding/KF.7: The Laboratory needs to improve its internal assessment program and formalize its line management self-assessment program.

Discussion: A comprehensive and continuing Laboratory-wide ES&H self-assessment program has not been finalized. Uniform implementation of DOE requirements for line organizations' self-assessments has not been achieved. Internal independent ES&H appraisals and audits have not yet been performed for all Laboratory organizations, nor have those performed always been performed on the frequency required by DOE. Employees throughout the Laboratory must become familiar with the principles of conduct of operations through a vigorous training program. Only then will the self-assessments of individual organizations and facilities become meaningful guides for future actions. The Laboratory has recently trained more than 400 managers in conduct of operations. This training must be extended to appropriate staff.

Key Finding/KF.8: The Laboratory does not have a formal corrective action program.

Discussion: A Laboratory-wide reporting system has not been fully implemented to document all identified findings and to provide a formal process for evaluating what needs to be reported to off-site organizations such as the DOE, the Environmental Protection Agency (EPA), and the New Mexico Environment Department. A formal corrective action program that evaluates the identified findings against established performance standards, provides a method for performing detailed root cause analyses, and serves as the basis for a detailed trend analysis is not available on a Laboratory-wide basis. The Laboratory does not have a formal program that provides for the identification, review, authorization, funding, and staffing of improvement initiatives designed to take the current Laboratory ES&H activities beyond minimal compliance to a level of excellence. The Laboratory does not have a formal, functioning lessons-learned program. The Laboratory's occurrence reporting program under DOE Order 5000.3A, "Occurrence Reporting and Processing of Operations," is inadequate and is not yet tied to a corrective action program.

Key Finding/KF.9: The Laboratory does not have a formal quality program that includes quality assurance and continuous quality improvement. The ES&H program has been negatively affected as a result.

Discussion: Management has yet to implement a sound, comprehensive quality program that meets the requirements of DOE Order 5700.6B, "Quality Assurance," and that embraces and instills a program of continual improvement. Such a program would drive the Laboratory toward the desired goals of compliance with quality and other requirements, enhancement of our formality and conduct of operations, and reduction of costs across the entire spectrum of Laboratory activities, including ES&H. The Laboratory does not have a process in place that provides senior management with information related to the identification of quality problems, nor do processes exist to facilitate the identification, evaluation, and implementation of quality improvement initiatives. Past efforts to implement an effective quality program at the Laboratory have not always been well understood or strongly supported by the Laboratory's senior management.

Key Finding/KF.10: The ES&H training program is diffused and lacks validation.

Discussion: Laboratory management has only recently recognized the need for an integrated approach to Laboratory-wide comprehensive ES&H training. ES&H training for management, supervisors, and non-supervisory employees is incomplete. Training programs lack a validation component both to evaluate overall effectiveness and to validate that individuals have achieved a necessary level of training.

Key Finding/KF.11: A comprehensive configuration management and control program is not uniformly implemented at the Laboratory.

Discussion: The Laboratory has not uniformly implemented a configuration management program to assure that changes in facility configuration are reviewed, are coordinated with all concerned groups, and meet appropriate design and safety criteria. The configuration management program addresses physical configuration of facilities, process equipment, and experimental equipment. The program does not currently address auxiliary systems, operations, and management. The program should assure that design basis criteria and capability are maintained.

Key Finding/KF.12: The Laboratory needs to bring its radiation protection program into compliance with DOE Order 5480.11, "Radiation Protection for Occupational Workers."

Discussion: The radiological protection program needs significant modernization. The program is replete with multiple standards, conflicting direction, contamination control findings, and unnecessary complexity. Radiological protection responsibilities are diffused. There is non-uniform implementation and enforcement of radiological protection requirements more than two years after the publication of DOE Order 5480.11.

Key Finding/KF.13: The Laboratory does not have an adequate emergency preparedness program.

Discussion: Facility or Technical Area (TA) emergency plans have not been prepared for most facilities and TAs. An effective site-wide emergency plan is not in place. All training requirements have not been identified, and a graded training program for all employees has not been implemented. A well-documented drill and exercise program that periodically tests potential scenarios does not exist. Emergency facilities and equipment are not adequate to support emergency operations.

Key Finding/KF.14: The Laboratory program, facilities, and infrastructure for waste management are inadequate.

Discussion: The management of hazardous, radioactive, mixed, and nonradioactive wastes is not sufficiently well defined or formalized, and facilities are inadequate to ensure compliance with DOE orders and regulatory requirements. The responsibility for many waste management activities has been delegated to the line organizations but accountability and support are weak. In addition, neither adequate formal guidance nor an effective mechanism to track performance has been established. There are weaknesses in waste characterization, waste minimization, training, procedures, and storage. The lack of waste-generator accountability is a major problem. Waste management facilities and infrastructure, such as treatment plants, underground tanks, and piping, are aging, not up to current standards, and in need of replacement. Adequate facilities to store, treat, or dispose of recently defined wastes, such as mixed wastes, do not exist.

Key Finding/KF.15: The Laboratory programs for identifying, characterizing, monitoring, and controlling surface and ground water discharges and air emissions do not fully comply with DOE orders, regulatory requirements, and permits.

Discussion: Findings have been noted in a number of key areas including monitoring of liquid waste discharges, proper characterization of liquid waste streams and discharges, information on site area hydrogeology, ground-water monitoring, and establishment of comprehensive plans to comply with all DOE orders, regulatory requirements, and permits. Similarly, the Laboratory's air emissions and air quality monitoring programs are inadequate to confirm that the Laboratory meets all the requirements of DOE orders and New Mexico and federal air quality regulations.

Key Finding/KF.16: The Laboratory does not have a comprehensive OSHA compliance program.

Discussions: A recent OSHA-type self-assessment identified more than 45,000 findings, of which nearly 20,000 have been corrected. However, there is no ongoing Laboratory-wide OSHA program to assure compliance with 29 CFR 1910 and 1926 (OSHA). The Laboratory has no policy or program to prioritize needs and provide guidance on allocation of resources to assure compliance. Further, the Laboratory has not put in place a process to prevent findings from recurring.

Key Finding/KF.17: The Laboratory management has not mandated a maintenance program consistent with DOE Order 4330.4A, "Maintenance Management Program."

Discussion: No single Laboratory organization has been responsible for oversight of maintenance management policy, programs, and procedures. Maintenance of programmatic equipment (Class B equipment in the Laboratory's terms) has not been incorporated within formal maintenance plans. Responsibilities have not been delegated or sufficiently defined at management and supervisory levels. Goals, objectives, and indicators of maintenance performance are not formally established. Post-maintenance requirements are not clearly defined. Test requirements and quality acceptance criteria have not been established. Line and building managers in general have little control over maintenance of facilities they use, and, overall, maintenance of Laboratory buildings and systems has been inadequate.

LA-12200-MS

UC-902 and UC-907
Issued: August 1991

Los Alamos National Laboratory ES&H Self-Assessment Report

Los Alamos
NATIONAL LABORATORY

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OUTLINE OF EVALUATION GUIDANCE
FOR SELF-ASSESSMENT REPORTS

1. **The scope of the report is comprehensive.**
   - all ES&H functional areas and management issues are fully addressed
   - all facilities, buildings, sites and ES&H activities are covered
   - As a minimum, the "Areas of Inquiry" in the July 31, 1990, Secretary of Energy memo are addressed
   - In the case of DOE, the report covers Headquarters, the Operations Office, the Site(s) or Area Office(s), the site contractor's activities, and the site contractor's self-assessment report
   - There is broad organizational and individual participation in the execution of the assessment and in the preparation of the Report

2. **The assessment methodology includes an appropriate mix of:**
   - survey questionnaires
   - documentation review
   - personal interviews
   - field observations
   - inspection and testing

3. **The assessment was conducted by qualified people.**
   - knowledgeable line management personnel performed assessments of their activities
   - independent internal assessments were performed by personnel who were not directly responsible for the activities being assessed
   - Assessments were not dominated by, or unduly dependent upon, outside consultant expertise

4. **Senior management of the organization was involved in all stages of the assessment and in the preparation of the report.**

5. **The assessment results have been integrated on an organizationwide basis.**
   - In the case of DOE, results regarding Headquarters, the Operations Office, and Site Area Office have been integrated

6. **Management findings and issues are derived from, and grounded in, functional appraisal findings.**

7. **Key findings are identified.**
   - key findings are not merely reiterations of the most important assessment findings
   - key findings address problems common to aggregates of assessment findings and capture the substance of these findings

8. **Root cause analysis has been performed.**
   - Each root cause is the most basic cause of the associated finding or group of findings (e.g., key findings) which, when eliminated or compensated for, will prevent recurrence

9. **The report embodies effective corrective action plans.**
   - Corrective action plans address all specific findings and issues
   - Corrective action plans address all root causes
   - In each instance, there is a full understanding of the problem and its requirements
   - Schedules are realistic, appropriately phased and sequenced, and include measurable milestones for accomplishment
   - Cost estimates are reasonable and identify realistic funding sources

10. **Both good performance as well as deficient performance are noted.**

11. **The report exhibits candor, openness and foresight.**

12. **The report is organized and presented in a "user-friendly" manner to facilitate understanding.**

3.2.1 Air

Los Alamos National Laboratory has an Air Pollution and Meteorology Program to ensure that sources of nonradioactive air emissions meet all applicable air quality regulatory requirements and that the dispersion of emissions can be estimated. Radioactive air emissions are covered in other sections of the report.

The Air Quality and Meteorology Section (AQMS) of the Environmental Protection Group (EM-8) is responsible for providing support to technical organizations. The AQMS's support includes reviewing new sources or modifications to existing sources to evaluate compliance, assisting in obtaining any necessary air quality permits, notifications of asbestos removal and demolition, and periodically inspecting and evaluating.

A Laboratory-wide inventory of emissions for nearly 700 different air contaminants is being developed. An estimated 1,200 sources, many with multiple air contaminants, will be included in this inventory. Line managers are required to review on an annual basis and update their emissions inventory.

The AQMS operates a monitoring network consisting of

- four meteorological towers to measure temperature, humidity, winds, solar radiation, pressure, and precipitation
- five additional rain gauges to supplement the tower network
- a National Atmospheric Deposition Program (NADP) monitoring site to measure the acidity of precipitation and the anionic and cationic deposition rates
- a visibility monitoring site in conjunction with the National Park Service
- an ambient air monitoring site where measurements are made for total suspended particulate matter, sulfur dioxide, ozone, PM_{10} (particles with an aerodynamic diameter less than or equal to 10 micrometers), and nitrogen dioxide

The meteorological data are used for a wide variety of activities, including emergency response, modeling ambient levels of pollutants from routine and accidental emissions, climate analysis, air permit applications, safety analysis reports, environmental assessments, and weather forecasting.

The NADP monitor, visibility monitor, and the ambient air monitoring site are used to measure background levels of air pollution, possible Laboratory effects on ambient levels, and attainment of New Mexico and federal National Ambient Air Quality Standards.

Air Quality measurement instrumentation for Laboratory sources of nonradioactive air pollutants regulated by state and federal air quality requirements indicate all Laboratory air emissions are in

3.0 Environmental Assessment

3.1. Background and Methodology

3.1.1 Performance Objectives

The environmental self-assessment is based on applicable state, federal, and local environmental acts and regulations; applicable Department of Energy (DOE) orders and directives; existing permits and compliance agreements; and Best Management Practices. The environmental areas assessed include air; soils, sediments, and biota; surface water; ground water; waste management; toxic and chemical materials; quality assurance; radiation; inactive waste sites; National Environmental Policy Act (NEPA); and management.

3.1.2 Existing Program

The Environmental Management (EM) Division is responsible for assisting the Laboratory to comply with environmental requirements and concerns within the divisional programs and for assisting in formulating Laboratory policy, implementing Laboratory-wide environmental programs, and monitoring Laboratory activities for compliance with applicable standards.

3.1.3 Self-Assessment Scope and Approach

The environmental self-assessment was carried out by knowledgeable individuals and groups. Environmental professionals reviewed past audits, inspections, and appraisals to help identify outstanding deficiencies and root causes. They also used DOE environmental audit check lists and other audit tools.

Deficiencies that were easily corrected or presented a hazard of imminent danger to the environment were corrected immediately. The Laboratory is committed to taking corrective actions for all remaining deficiencies. These corrective actions are being prioritized, scheduled, and administered.

3.2 Findings and Discussions

Detailed findings of the Laboratory's environmental assessment are discussed in this section. The findings are organized by the following environmental areas: air; soil, sediments, and biota; surface water; ground water; waste management; toxic and chemical materials; quality assurance; radiation; inactive waste; National Environmental Policy Act; natural resources; cultural resources; and environmental management. The findings are supported by a discussion of typical discrepancies and/or orders and regulations with which the Laboratory is not in full compliance.

near Bandelier National Monument, at a continuous air monitoring system operated by Laboratory staff and overseen by the New Mexico Environmental Division (NMED). Recognizing the need for air toxics ambient air monitoring data, the Laboratory undertook a short-term (one week) study of ambient concentrations of approximately 40 toxic contaminants in January 1991. Monitoring was performed for those toxic chemicals that the Laboratory's 1987 emissions inventory indicated were in widest use, and included organics, acid gases, and heavy metals. Although the findings suggest that the impacts of these pollutants on the surrounding environment are low, a one-time, short-term study does not provide the Laboratory an ongoing capability to detect problems before they become a threat. The Laboratory is installing two ambient air monitors for particulate matter. This deficiency has been identified by LAO as a Best Management Practice.

AQMS.3 Air Quality Program Quality Assurance

Performance Objective: The Laboratory should have in place a formal Quality Assurance Program (QAP) that addresses the following criteria: management program, personnel training and qualifications, quality improvement, documents and records, work procedures, design, procurement, self-assessment, and independent assessment (DOE Order 5700.6B, "Quality Assurance").

Finding/AQMS.3-1: The Laboratory does not have a formal QAP in place for the Air Quality Program as required by DOE Order 5700.6B.

Discussion: The formal approved QAP for the Air Quality Program is not established at this time. A draft plan has been written and will be approved in the very near future.

AQMS.4 Air Quality Inspection Program

Performance Objective: Regulated facilities should be evaluated systematically for compliance with applicable air quality regulations. Procedures should be in place to follow up on and resolve deficiencies (Best Management Practice) from inspections. (DOE Order 5000.3A, "Occurrence Reporting and Processing of Operational Information"; DOE Order 5480.17, "Site Safety Representatives"; DOE Order 5480.19, "Conduct of Operations Requirements for DOE Facilities"; and DOE Order 5700.6B for deficiency tracking and resolution.)

Finding/AQMS.4-1: The Laboratory does not have a formal internal compliance inspection program in place for its facilities regulated by NMED air quality control regulations.

Discussion: At present, the AQMS conducts routine inspections of high explosive (HE)-contaminated wood burning, asbestos, and beryllium operations; however, specific inspection check lists are available only for asbestos operations and HE-contaminated wood burning. No inspections are being conducted at other regulated facilities. These facilities include the asphalt plant, the TA-3 power plant, the two steam plants, and the TA-16 incinerator. As a Best Management Practice, such a program should be developed. Operation-specific inspection check lists and procedures are being developed for incorporation into the Air Quality QAP. Development and implementation of a formal compliance. These include

- the beryllium sources with New Mexico air quality permits
- the Technical Area (TA)-16 and TA-50 incinerators
- the asphalt batch plant
- Laboratory-wide asbestos demolition and renovation operations
- registration of existing sources of toxic air pollutants
- the TA-3, -16, and -21 steam and power plants

AQMS.1 Air Pollutant Emissions Measurements

Performance Objective: The Laboratory should have in place a program to measure significant air pollutant emissions from sources to demonstrate continuing compliance with DOE Order 5400.1, "General Environmental Protection Program," and New Mexico and federal air quality regulations.

Finding/AQMS.1-1: Routine releases of nonradioactive air pollutants are not monitored unless such monitoring is requested by regulatory officials to demonstrate compliance with New Mexico and federal air quality regulations (Best Management Practice).

> **Discussion:** The Laboratory operates facilities such as the asphalt plant, the TA-16 incinerator, the TA-3 power plant, and the two steam plants that operate below regulatory thresholds for emissions, thus not requiring continuous monitoring. However, these facilities have the capacity to operate above these regulatory thresholds. This deficiency has been identified by a Laboratory Assessment Office (LAO) audit as a Best Management Practice, which calls for the capability to perform routine monitoring for these sources.

AQMS.2 Ambient Air Quality Monitoring

Performance Objective: The Laboratory should have available sufficient nonradiological ambient air monitoring data to evaluate the effects of Laboratory operations on the environment and to identify problems before they become a threat to public health or the environment (DOE Order 5400.1).

Finding/AQMS.2-1: The Laboratory has not sufficiently evaluated nonradioactive air toxics releases to determine the ambient monitoring necessary to meet the DOE Order 5400.1 requirements (Best Management Practice).

> **Discussion:** The Laboratory does not have a formalized ongoing air toxics monitoring program. Additionally, criteria pollutants are only measured upwind of the Laboratory,

Laboratory is limited to the use of the radioactive air monitoring network, which has limited usefulness on nonradioactive material.

AQMS.7 Volatile Organic Compounds Minimization Programs

Performance Objective: The Laboratory should have a program in place to minimize releases of nonradioactive air contaminants as required by DOE Order 5480.19.

Finding/AQMS.7-1: There are no formal efforts to minimize releases of nonradioactive air contaminants except when needed to comply with air quality requirements.

> **Discussion:** The need for reducing releases of volatile organic compounds (VOC) at the Laboratory has been identified by a LAO audit as a Best Management Practice. A formal program to minimize emissions in addition to VOC is needed. An informal program to minimize emissions has been ongoing, however the effectiveness is unknown.

Finding/AQMS.7-2: Fugitive air emissions of VOC are not well controlled in the solvent reclaiming operation at Building 16-340, at the waste water conveyance system, and in solvent container storage areas throughout the Laboratory.

> **Discussion:** This deficiency was classified as a Best Management Practice in the LAO internal audit conducted in late 1990. Initial evaluation indicates that increased control of fugitive emissions from the solvent reclaiming operation may not be feasible. The existing solvent distillation scheme works well for certain compounds, but not for those that are azeotropes. The purpose of the waste water conveyance system is to promote volatilization of organics to meet the National Pollutant Discharge Elimination System (NPDES) chemical oxygen demand limits.

AQMS.8 Regulatory Notifications

Performance Objective: The Laboratory should provide timely notification to regulatory agencies for all activities that are regulated [Air Quality Control Regulations (AQCRs) 751 and 801; 40 Code of Federal Regulation (CFR) Part 61, Subpart M].

Finding/AQMS.8-1: The Laboratory does not always submit information on asbestos waste disposal to NMED within the time frame required by the state under 40 CFR Part 61, Subpart M (AQCR 751).

> **Discussion:** Under the asbestos National Emissions Standards for Hazardous Air Pollutants (NESHAP), notification pertaining to the final disposal of asbestos-containing material must be provided to the administering agency upon request. The state has requested the Laboratory to provide such notification within 30 days of disposal. The Laboratory has no formal procedure in place to ensure that such notification is provided within the requisite time period.

inspection program will provide a Best Management Practice to achieve compliance with NMED air quality regulations.

Finding/AQMS.4-2: The Laboratory does not have a formal program in place for tracking and resolving deficiencies (including performance of root cause analyses) noted in internal or external inspection findings. Such programs are required by DOE Orders 5000.3A, 5480.17, 5480.19, and 5700.6B.

Discussion: No formal tracking mechanism is in place at the Laboratory to meet the requirements of the cited DOE orders and directives for proper handling of air quality deficiencies. However, a program for resolving inspection deficiencies is being incorporated into the Air Quality QAP currently under draft.

AQMS.5 Air Quality Permitting Program

Performance Objective: The Laboratory should have a formal procedure in place to outline the technical approach for conducting new source reviews under the NMED permit regulations.

Finding/AQMS.5-1: The Laboratory does not have formal guidelines outlining the technical approach to be followed in conducting new source reviews (Best Management Practice).

Discussion: This deficiency has been identified by a LAO audit as a Best Management Practice. Guidelines are necessary to provide instructions for estimating air pollutant emissions from specific types of sources to ensure consistency in approach among the technical staff reviewing new projects. The AQMS conducts new source reviews in accordance with instructions outlined in the Laboratory Administrative Requirement (AR) 9-1. These instructions describe, for example, how AQMS is to be notified about projects requiring review, and they fulfill the requirements of DOE Order 5480.4, "Environmental Protection, Safety, and Health Protection Standards."

AQMS.6 Air Quality Monitoring in Emergency Response

Performance Objective: The Laboratory should have the capability to perform nonradiological ambient air sampling during emergency response operations to assess the consequences of emergency events (DOE Order 5500.3A, "Planning and Preparedness for Operational Emergencies").

Finding/AQMS.6-1: The Laboratory does not have the capability to perform nonradiological direct-reading monitoring or sampling of ambient air during emergency response operations as specified in DOE Order 5500.3A.

Discussion: DOE Order 5500.3A requires assessment of the actual or potential on-site and off-site consequences of an emergency. The Laboratory does not have adequate air monitoring capability to meet DOE Order 5500.3A requirements. The resources of the AQMS for emergency response operations are limited to its meteorological towers. The

AQMS.9 Air Pollutant Emissions Inventory

Performance Objective: A Laboratory-wide inventory of air pollutant emissions should be maintained to assess compliance with applicable regulations and to aid in development of pollutant reduction programs (Best Management Practice).

Finding/AQMS.9-1: Emission factors are not available to quantify air pollutant emissions from some operations (Best Management Practice).

> **Discussion:** The AQMS developed a Laboratory-wide emissions inventory in 1987 and is in the process of updating it in accordance with the requirements of the state-DOE agreement. Of approximately 40 types of operations conducted at the Laboratory, emission factors were identified through the Environmental Protection Agency (EPA) and other sources to quantify air pollutant emissions from about half. No appropriate emission factors are available for the remaining operations. For operations without emission factors, emissions are estimated using a mass balance approach. This deficiency has been identified by a LAO audit as a Best Management Practice.

AQMS.10 Pollution Control Equipment

Performance Objective: The Laboratory should minimize emissions of air contaminants to the atmosphere (DOE Order 5480.19).

Finding/AQMS.10-1: The Laboratory does not have a formal program in accordance with DOE Order 5480.19 to ensure that all air pollution control equipment is operated and maintained in accordance with manufacturers' recommended procedures.

> **Discussion:** The Laboratory does not have a formal program to train users on the capabilities, limitations, and correct operation and maintenance procedures for pollution control equipment. Improper operation and maintenance may lead to emissions of air pollutants that otherwise might have been prevented. Moreover, the Laboratory does not have a comprehensive program in place to periodically evaluate whether control equipment is operating in accordance with the manufacturers' specifications.

AQMS.11 Oversight of Contractor Activities

Performance Objective: The Laboratory should evaluate contractor activities regularly against a measurable set of performance objectives (DOE Order 5700.6B).

Finding/AQMS.11-1: The Laboratory does not have a formal program to evaluate the performance of contractors providing support to the AQMS (Best Management Practice).

> **Discussion:** Although no formal program exists to evaluate the technical quality of contractor services provided to the section, the AQMS leader or designated representative reviews all contractor-produced work products for compliance before they are finalized. In addition, the AQMS leader insists on compliance and is in direct day-to-day contact

with members of the contractor support team; this facilitates clarity in communication and allows for substantial oversight. This deficiency has been identified by a LAO audit as a Best Management Practice.

AQMS.12 Emergency Response (Meteorology)

Performance Objective: The Laboratory should maintain the personnel and other resources required to acquire, process, and interpret the data needed to evaluate the consequences of a release of hazardous material to the atmosphere. The Laboratory should establish and maintain the computer hardware and software systems capable of rapidly determining consequences and continually updating consequence assessment as an emergency evolves (DOE Order 5500.3A).

Finding/AQMS.12-1: Groups and individuals responsible for emergency response are not well coordinated or trained, and lines of responsibility are not well defined.

> **Discussion:** Assessing the consequence of a release of hazardous material depends on rapidly evaluating and interpreting data of several types, including source terms, meteorological conditions, and results of model calculations. Source term data for credible accidents are not readily available. Coordination between Emergency Management Office's modeling capability and that of AQMS is not established. To maintain a sufficient level of preparedness, management should insist on regular practice sessions. The Laboratory does not formally schedule personnel to ensure that a meteorologist is available at all times to provide emergency response support.

Finding/AQMS.12-2: Numerical modeling for emergency response is inadequate.

> **Discussion:** Consequence assessment depends to a large measure on numerical modeling of release rates, atmospheric transport and dispersion, and the interpretation and displaying of the results. These are all modeling deficiencies in emergency management operations that could seriously compromise the Laboratory's ability to respond to an emergency in a scientifically defensible manner.

AQMS.13 Meteorological Monitoring

Performance Objective: The Laboratory should acquire representative meteorological data to support environmental monitoring activities. Specifically, sufficient data should be available to characterize atmospheric transport and dispersion and other climatic conditions important to Laboratory operations. (DOE Order 5400.1 and DOE Order 5400.XY, "Radiological Effluent Monitoring and Environmental Surveillance")

Finding/AQMS.13-1: Adequate representative wind observations have not been performed in Los Alamos Canyon, near White Rock, and near the Clinton P. Anderson Meson Physics Facility (LAMPF).

> **Discussion:** Wind observations used to initialize models for transport and dispersion calculations must represent flow on an appropriate scale. To characterize the flow over

the Pajarito Plateau, observations should be made well above the surface to minimize small-scale effects. Although not out of compliance, the towers at TA-54, Area G and East Gate are too short for this purpose and taller towers have been installed and are being instrumented at both sites. Since the Laboratory operates two facilities in Los Alamos Canyon that are potential sources of radionuclides, it is also important to characterize canyon flow, which is often different than flow over the plateau.

AQMS.14 Meteorology Program Quality Assurance

Performance Objective: The Laboratory should have a formal Meteorology Program Quality Assurance (QA) Program in place that addresses the following: management program, personnel training and qualifications, quality improvement, documents and records, work procedures, design, procurement, self-assessment, and independent assessment (DOE Order 5700.6B).

Finding/AQMS.14-1: Computer codes are not tested and documented.

> **Discussion:** The Laboratory does not have evidence that the computer codes used in emergency response have been tested and verified. The Laboratory has no documentation describing code features, applicability, underlying assumptions, limitations, and use.

Finding/AQMS.14-2: Existing procedures for modeling, monitoring, data collection, and data analysis are, if present, outdated and disorganized.

> **Discussion:** Standards for modeling studies should be adopted, complete with justification for assumptions. Formal procedures, including how to respond to a power outage, recover from a hard disk crash, and retrieve meteorological data, must be made available.

Finding/AQMS.14-3: The Laboratory does not have a meteorological monitoring plan that meets the new requirements in DOE Orders 5400.1 and 5700.6B.

> **Discussion:** Although the "Quality Assurance Project Plan for Meteorological Monitoring" discusses the instrumental aspects of the program, a more comprehensive document addressing program rationale and data handling is needed.

Finding/AQMS.14-4: Quality control of data used to initialize dispersion calculations is not performed objectively and automatically (DOE Order 5700.6B).

> **Discussion:** Consequence assessment of a release of hazardous materials depends on automated data analysis using numerical modeling of atmospheric transport and dispersion. Model runs are initialized using meteorological conditions at the time of the release. The accuracy of the data analysis depends directly on the accuracy of the meteorological data input. The input data must be automatically checked for quality to guard against erroneous modeling results. This check can be accomplished by adding the appropriate algorithms to the modeling code.

3.2.2 Soils, Sediments, and Biota

As part of the routine Environmental Surveillance Program carried out by the Laboratory, soils, sediments, and biological materials are sampled at least annually. Sampling confirms both the Laboratory's understanding of the potential for transport and the accumulation of residual contaminants from Laboratory releases in various pathways that may result in exposure to the surrounding populace. Soils, sediments, and biological materials are sampled in three major groups: regional (at some distance from the Laboratory to establish typical background levels for northern New Mexico), perimeter (at or near the Laboratory boundary in the surrounding community and public lands), and on site. Biological materials include locally grown produce, bees and honey, and fish (from reservoirs upstream and downstream on the Rio Grande). Some of the soil, sediment, and foodstuff samples are collected on the lands of San Ildefonso Pueblo under terms of a special three-party Memorandum of Understanding signed by the Pueblo, the DOE, and the Bureau of Indian Affairs.

Soil samples can indicate accumulation of contaminants from airborne disposition and the potential for airborne resuspension of such contaminants. Sediments samples document the accumulation of contaminants from the release of effluents or from erosion and the potential or actual transport off site in surface water run-off. Foodstuff samples indicate the levels of contaminants that accumulate from either airborne or surface water pathways. In general, the results of such sampling documented in a two-decade series of annual environmental monitoring reports for Los Alamos indicate that small radiological doses ($<<1$ mrem annually) above the normal background may be received by subgroups of the surrounding populace from soils, sediments, or biota. Nevertheless, the existence of some residual contamination and the actual or potential off-site transport are of considerable importance from the standpoint of public perception.

The principal off-site transport of terrestrial contaminants is on sediments in the Pueblo-Los Alamos canyon system. This canyon system contains an estimated inventory of about 0.6 Curie of plutonium on sediments. This residual contamination resulted from discharge of both untreated (from 1944 to 1951) and then treated (from 1951 to 1964) effluents into a small tributary of Pueblo Canyon known as Acid Canyon at the location of former TA-45. About two-thirds of the inventory (about 0.4 Ci) has been deposited in the broad part of Pueblo Canyon on DOE property by the original effluent discharge and by periodic natural snowmelt or thunderstorm run-off. Most of the rest is on sediments remaining in Acid and upper Pueblo canyons (Los Alamos County land). Periodic sampling has shown that the smallest proportion (about 5 percent) occurs in lower Los Alamos Canyon (on San Ildefonso land), which is periodically flushed out into the Rio Grande by natural run-off. This canyon system has been monitored since the mid-1940s. The most extensive study was conducted in 1976-1977 and further characterized the extent of sediments having elevated radionuclide concentrations. An assessment based on this sampling data performed under the DOE's Formerly Utilized Sites Remedial Action Program indicated that the potential radiation dose to users of the canyon was within the DOE's radiation protection standards.

The sediment transport rate out of lower Pueblo Canyon and into lower Los Alamos Canyon has increased in the last year by about an order of magnitude because of increased discharge of effluents from the Los Alamos County Bayo Sewage Treatment Plant. The discharge enters Pueblo Canyon near the upstream boundary of the DOE land in lower Pueblo Canyon.

The second largest accumulation of sediment contamination at Los Alamos occurs in Mortandad Canyon, which receives the effluent from the Radioactive Liquid Waste Treatment Plant at TA-50. The sediments in Mortandad Canyon have accumulated most of the approximately 0.4 Curie of residual plutonium and americium that has been discharged from the plant since operation started in 1963. A small fraction of the contaminants has moved into the perched alluvial water in the bottom of Mortandad Canyon. Mortandad Canyon has a relatively small drainage and no surface run-off has gone far enough down the canyon to move any contaminated sediments off site. Three sediment traps dug in the canyon reduce the likelihood of any transport of sediments off site by run-off.

Documentation of various aspects of the environmental monitoring program requires improvement, especially in the area of QA efforts, to provide additional reliability and continuity to the programs. Some sampling efforts need upgrading to broaden coverage of nonradioactive constituents. The Environmental Monitoring Program should include the identification and assessment of the pollutant concentrations in selected biological resources at the Laboratory. In addition, assessment of the cumulative and long-term effects of the operations of the Laboratory on biological resources is a requirement for the Environmental Protection Program and the NEPA Program. Other than a few, isolated studies (e.g., swallows and the LAMPF lagoons, and gophers and the radioactive waste disposal site), this sampling and analysis has not been undertaken.

SSB.1 Environmental Monitoring

Performance Objective: Routine environmental monitoring of soil sediments, and biota for contamination from Laboratory operations should be implemented to address all issues and requirements of relevant DOE orders and directives (e.g., DOE Order 5400.1, DOE Order 5820.2A, "Radioactive Waste Management"; and DOE Order 5400.5, "Radiation Protection of the Environment"), including the requirements for complete procedural documentation.

Finding/SSB.1-1: The documentation of procedural aspects of the soil and sediment sampling component of the Environmental Surveillance Program does not completely meet the requirements of DOE Order 5400.1.

> Discussion: The overall soil and sediment sampling component of the routine Environmental Surveillance Program at the Laboratory is considered appropriate and in conformance with DOE guidance (e.g., DOE/EH-0173T and DOE/EP-0023). Documentation of procedural aspects is necessary for siting of sampling locations, sampling techniques, and data handling, and QA is incomplete in relation to the requirements of DOE Order 5400.1, Chapter IV, Secs. 4 and 8.d. These plans are required to be in place by November 9, 1991.

Finding/SSB.1-2: Foodstuff sampling does not include analyses for metals or other nonradiological constituents.

> **Discussion:** The Foodstuffs Monitoring Program was developed in response to concerns about radiological contamination from Laboratory operations. Biotic monitoring to date has consisted of radiological monitoring of foodstuffs such as fish, honey, and local produce. A regulatory requirement or other formal impetus has never existed for expanding the analyses to include nonradiological constituents. However, the Laboratory, particularly in the past, disseminated heavy metals from operations at the various firing sites. Additionally, heavy metals such as mercury are routinely used in Laboratory experiments. The state of New Mexico has collected fish from reservoirs throughout the state and found elevated levels of mercury in some samples. Best Management Practice for the Laboratory calls for heavy metal analyses of the foodstuffs to ascertain whether high levels of heavy metals exist in foodstuffs and to evaluate whether Laboratory operations may contribute to heavy metal contamination of foodstuffs.

Finding/SSB.1-3: The documentation of an Environmental Pollution Prevention Awareness Plan has not been prepared as required by DOE Order 5400.1.

> **Discussion:** The Environmental Protection Implementation Plan stated that an Environmental Pollution Prevention Awareness Plan would be prepared, but this has not been done.

Finding/SSB.1-4: Monitoring for presence of contaminants in biological resources has not been routinely undertaken, and analysis of potential cumulative or long-term effects of the Laboratory actions on biological resources has not been initiated.

> **Discussion:** Base-line information on biological resources has not routinely been gathered and compiled. Without such data, long-term impacts on biological systems cannot adequately be evaluated.

<u>SSB.2 Effluent Discharge</u>

Performance Objective: Effluent discharges to surface waters or natural stream channels should be controlled in accordance with the intent and requirements of DOE Order 5400.5.

Finding/SSB.2-1: Small amounts of radioactive contamination from previously contaminated sediments are continuing to be transported off-site because of surface water flow.

> **Discussion:** Natural run-off and increased discharges from the County Sewage Treatment Plant are increasing the rate at which small amounts of radionuclides in Pueblo Canyon are being transported off site. Because of the low radionuclide concentrations in these sediments, any resulting radiological impact is expected to be well within DOE public dose limits. The As Low As Reasonably Achievable (ALARA) policy, however, would reduce this off-site transport as much as practical. The Laboratory is assessing a wide

range of mitigation actions to determine which would be most effective in slowing the transport rate.

Finding/SSB.2-2: There may be a violation of DOE Order 5400.5 if it is determined that the continued discharge of effluents to Mortandad Canyon constitutes a discharge to an effective natural "soil column."

Discussion: Mortandad Canyon was selected in 1959 to receive effluent from the TA-50 Radioactive Liquid Waste Treatment Plant because of its hydrologic properties. Effluents in the canyon are retained on site through sorption into sediments and accumulation in the shallow perched aquifer or in the vadose zone beneath it. Small amounts of tritium have migrated at least 200 ft beneath the canyon floor in the unsaturated zone. The measured tritium concentration in moisture extracted from the tuff is less than 10 percent of the DOE's Derived Concentration Guide for Tritium in water. At this point, it is not known whether the requirements of DOE Order 5400.5, Chapter II, Secs. 3.b.(1) and (2) are applicable.

Finding/SSB.2-3: The existing sediment traps in Mortandad Canyon are inadequate to ensure containment of all sediment with residual contamination as required by the Resource Conservation and Recovery Act/Hazardous and Solid Waste Amendments of 1984 (RCRA/HSWA) Permit.

Discussion: Three sediment traps dug into Mortandad Canyon may be insufficient to ensure containment of all contaminated sediments in the canyon and prevent further transport downstream where they could eventually flow off site and onto the San Ildefonso Pueblo. A study is under way to estimate the likelihood of off-site transport for different probabilities of rainfall events that could generate extreme run-off flow conditions. While the resulting radiation impact of off-site transport is expected to be within DOE public dose limits, the ALARA policy would minimize the release of these materials to off-site areas. A decision will be made on what level of trap improvement or expansion will be required to increase the probability of containment to an acceptable level.

SSB.3 Annual Site Environmental Report

Performance Objective: The Laboratory should prepare an Annual Site Environmental Report (ASER) in accordance with DOE Order 5400.1. The purpose of the report is to characterize site environmental management performance, confirm compliance with environmental standards and requirements, and highlight significant programs and efforts.

Finding/SSB.3-1: The Laboratory ASER does not follow DOE Order 5400.1, Attachment II-1, Suggested Content and Format for Annual Site Environmental Reports.

Discussion: All subject matter required by DOE Order 5400.1 and DOE Order 5400.5 is included in a different format. EM-8's presentation of the information is by media (air, soil, water, foodstuff, etc.) instead of by radiological/ nonradiological constituents.

The compliance summary and executive summary were merged in the 1990 report. Although DOE Order 5400.1 suggests both summaries, the executive summaries in past Laboratory reports included all information required in the compliance summary.

Finding/SSB.3-2: Determination and documentation to ascertain compliance with commitments made in environmental impact statements, environmental assessments, and other official documents is not being done on a systematic basis, nor is it being documented in the annual Environmental Surveillance Report as required by DOE Order 5400.1, Chapter IV, Section 5.a (1)(b) and Environmental Regulatory Guide DOE EH-0173T, Section 5.3.1.

Discussion: The Laboratory does not have a comprehensive data base to inventory all such environmental commitments. The Laboratory does not have a program to review such commitments to determine whether they are being fulfilled. There is no documentation of such compliance verification in the annual Surveillance Report.

3.2.3 Surface Water

Surface water discharges are regulated under the Laboratory's NPDES Permit and under regulations of the New Mexico Water Quality Control Commission. The Laboratory's NPDES Permit includes 9 sanitary outfalls and 129 industrial outfalls. The industrial outfalls are grouped according to the following categories: boiler blowdown, treated cooling water, photo-processing, waste water, and high-explosives waste water. The industrial outfalls also include effluents from the TA-50 radioactive waste treatment plant, the TA-3 power plant, and the TA-22 printed circuit board operations.

Sampling frequency and the type of tests required for monitoring the NPDES Permit depend on the category under which the outfall is listed. Over the years, other waste streams have been piped into outfalls that are not permitted to receive such wastes.

The Laboratory is not in total compliance with its existing NPDES Permit in that all waste streams entering an outfall or treatment facility are not properly identified and characterized with respect to chemical constituents and flows. Waste stream identification and characterization have been initiated on an outfall basis to properly monitor and report effluent discharges. Routine testing of all Laboratory sanitary outfalls for radioactivity has been initiated. A sampling of all industrial outfalls for radioactivity is required to complement the Waste Stream Identification and Characterization Program.

The Laboratory is not in strict compliance with the Clean Water Act (CWA) in that potential discharges from backflow prevention devices, fire-flow test facilities, steam condensate sumps, and other facilities that discharge effluents to the environment are not included under the Laboratory's NPDES Permit. The Waste Stream Identification and Characterization Program includes a building-by-building survey of the Laboratory's technical areas for potential unpermitted discharges. The goal of the Laboratory is to cover each potential discharge under the NPDES Permit or under a generalized Notice of Intent to Discharge as specified by regulations of the New Mexico Quality Control Commission.

Violation of effluent limits have occurred at sanitary and industrial outfalls throughout the Laboratory because of operation and maintenance problems, and because of inadequate treatment facilities. Operating groups must assume responsibilities for their outfalls, and additional training in the operation and maintenance of treatment facilities is needed. Treatment facilities that have deteriorated and cannot meet current standards such as the TA-53 sanitary lagoons, the TA-21 sanitary treatment plant, and the high-explosives waste water sumps must be repaired or replaced. Construction has begun on a new sanitary waste water treatment facility to replace seven of the Laboratory's nine sanitary facilities to comply with present and anticipated future effluent limits. This project does not include the TA-53 sanitary lagoons or the TA-21 sanitary treatment plant.

The Laboratory has been issued a new draft NPDES Permit that includes more restrictive effluent limits at each outfall and requires more than twice the present number of tests for monitoring. The Laboratory is also subject to new toxicity monitoring requirements, storm water discharge regulations, and sludge disposal regulations. The Laboratory's current sampling, monitoring, reporting, and analytical resources are inadequate to support these new requirements.

Routine environmental monitoring of surface water for radioactive contamination from Laboratory operations is not adequate to meet current DOE orders and directives. Documentation concerning procedures for surface water sampling is insufficient. Sampling of surface run-off in Pueblo and Los Alamos canyons is inadequate to document accurately the amount of residual radioactivity from early Laboratory operations being transported off site onto San Ildefonso Pueblo and into the Rio Grande. A limited increase in sampling of sediment transport in Pueblo and Los Alamos canyons was incorporated into the routine Laboratory monitoring program in 1990. A special study of transport from snowmelt run-off from 1975 to 1986 was published in 1990. The U.S. Geological Survey has been contracted to install a new continuous-flow gaging and sampling station in Pueblo Canyon and reactivating one in Los Alamos Canyon.

SW.1 Quality Control Regulations

Performance Objective: The Laboratory must comply with the Laboratory's NPDES Permit and New Mexico Water Quality Control Commission Regulations related to surface water.

Finding/SW.1-1: All waste streams discharging into NPDES outfalls are not included in the proper category of the Laboratory's NPDES Permit and are not properly identified in the Laboratory NPDES 1986 Permit application.

> Discussion: The Laboratory is not in strict compliance with its existing NPDES Permit. Not all waste streams entering an outfall or treatment facility are properly characterized with respect to chemical constituents and flows. Waste stream identification and characterization are needed on an outfall basis to properly monitor and report effluent discharges. The Laboratory and DOE have consulted with the EPA and NMED on this deficiency and have initiated a Waste Stream Characterization Program. The schedule for Waste Stream Characterization is being included in an Administrative Order to be issued by EPA.

Finding/SW.1-2: The Laboratory has not included some potential point source discharges under the Laboratory's NPDES Permit.

> **Discussion:** Backflow prevention devices, fire-flow test facilities, steam condensate sumps, and other facilities that potentially discharge potable water, steam condensate, and other effluents to the environment are not included under the Laboratory's NPDES Permit. The Laboratory is in technical violation of its existing NPDES Permit because the permit does not include all potential discharges to the environment.
>
> The Laboratory and DOE have consulted with the EPA and NMED on this deficiency and have initiated a Waste Stream Characterization Program that includes a building by building survey of the Laboratory's technical areas for potential unpermitted discharges.
>
> The Laboratory has been reporting liquid releases of potable water, steam condensate, and other effluents from leaks and breaks in lines on an individual basis to EPA and NMED even though effluents from these sources are not considered to be a threat to health or the environment. The Laboratory has developed a generalized Notice of Intent to Discharge under the New Mexico Water Quality Control Commission Regulations to facilitate reporting of discharges of potable water, water used for disinfection of water mains, and steam condensate.

Finding/SW.1-3: Radioactive liquid waste lines and other waste water lines are not adequately monitored to detect leaks and overflows.

> **Discussion:** Many of the radioactive liquid waste lines are not double-walled and not monitored for leak detection. Other waste water lines, manholes, and lift stations are not routinely inspected for leaks or breaks. Many of the waste water collection systems have been modified over the years with noncompatible waste streams being tied into the systems that are permitted to receive only certain wastes. Accurate as-built drawings for many of these lines both inside and outside buildings are unavailable.
>
> An updated *Operation and Maintenance Manual* for the sanitary wastewater facilities at the Laboratory has been completed. Procedures for inspection, operation, and maintenance of the sanitary collection system are included in this manual.

Finding/SW.1-4: NPDES-Permit-related submittals, including information on planned changes, permit modifications, new outfalls, and administrative order quarterly reports, are not always submitted to EPA in a timely manner.

> **Discussion:** The Laboratory's NPDES Permit includes approximately 140 outfalls and is based on specific categories of effluents and includes sampling, monitoring, and reporting requirements. Outfalls and administrative order (AO) reports are sometimes late in being submitted to EPA.

Finding/SW.1-5: Sampling, monitoring, and reporting for the monthly NPDES discharge monitoring reports are being conducted in accordance with the Laboratory's NPDES Permit and guidance from the EPA, which technically conflicts with the requirements of the CWA.

Discussion: Verbal instructions on sampling, monitoring, and reporting have been given to the Water Quality and Toxics (WQ&T) Section of EM-8 by the EPA permit writer and EPA enforcement representative assigned to the Laboratory.

Finding/SW.1-6: Sampling, monitoring, and reporting for the NPDES 1990 Permit Reapplication was conducted in accordance with instructions and guidance from the EPA permit writer, which technically conflict with the requirements of the CWA.

Discussion: Verbal instructions on sampling, monitoring, and reporting have been given to the WQ&T Section of EM-8 by the EPA permit writer assigned to the Laboratory. EPA does not normally follow up with directions to permittees in writing. Follow-up letters summarizing discussions with the EPA permit writer have been initiated. EPA direction to the Laboratory on the NPDES Permit Reapplication is being formalized.

Finding/SW.1-7: The Laboratory does not have a clear identification of the ownership of NPDES outfalls nor accountability for violations.

Discussion: EM Division is responsible for maintaining the NPDES Permit Program, including sampling, monitoring, and reporting to EPA, and also advises operating groups on corrective activities. Operating groups are unsure of their responsibilities concerning identifying discharges into collection systems, identifying unpermitted discharges, and correcting violations of the Laboratory's NPDES Permit. Operating groups must assume landlord responsibility for their outfalls.

The Administrative Requirement (AR) concerning liquid discharges and NPDES Permit requirements has been revised.

Finding/SW.1-8: Inadequate operation and maintenance procedures and inadequate treatment facilities cause violations of the NPDES Permit.

Discussion: During 1990, the Laboratory had 9 violations out of 284 sanitary analyses and 44 violations out of 1,971 industrial analyses conducted on NPDES discharges at the Laboratory. Compliance for sanitary and industrial discharges averaged 96.8 percent and 97.8 percent, respectively.

Operation and maintenance problems continue to cause violations of the Laboratory's NPDES Permit. Assignment of responsibility and improved operating procedures and training are needed to prevent violations. Many waste water treatment facilities need upgrading or replacement.

The new Sanitary Wastewater Systems Consolidation (SWSC) Project is scheduled for completion in July 1992. These new facilities will replace seven of nine existing sanitary facilities at the Laboratory and will eliminate violations because of inadequate treatment.

Finding/SW.1-9: Sampling procedures, QA, and standard operating procedures (SOPs), including worker protection, are inadequate under the NPDES Program.

Discussion: Formal procedures for NPDES sampling and QA are required. Written SOPs for commonly performed activities such as reporting to regulatory agencies are also required. Formal procedures for NPDES Permit maintenance are also needed to properly document routine NPDES activities, including submittals of information on planned changes, permit modifications, new outfalls, and AO quarterly reports.

Finding/SW.1-10: The Laboratory does not have a Best Management Practice for operating the NPDES Permit Program.

Discussion: A written plan is necessary for maintaining continuity and a sustained effort in the NPDES Program.

Finding/SW.1-11: Present sampling, monitoring, and reporting are insufficient to support the Laboratory's new NPDES Permit and waste stream characterization.

Discussion: Additional activity is required to support the Laboratory's new NPDES Permit to be issued later in 1991. Additional reports and compliance schedules related to AOs and federal facilities compliance agreements will also be required. Toxicity testing using biomonitoring will also be required. New effluent limitations will result in increased violations requiring follow-up reports and compliance schedules. An expanded data base and reporting system is also required.

Finding/SW.1-12: Present sampling, monitoring, and reporting are insufficient to complete an application and to meet new NPDES storm water discharge regulations.

Discussion: EPA has adopted new regulations concerning permitting and monitoring of storm water run-off. Additional monitoring and testing of storm water are required to meet these regulations. The Laboratory has violated its existing NPDES Permit because of storm water run-off problems.

Finding/SW.1-13: Present sampling, monitoring, and reporting will not adequately meet new sanitary sludge disposal regulations effective the fall of 1991.

Discussion: Monitoring and testing of sludge from the Laboratory's sanitary treatment facilities are conducted to meet Toxicity Characteristic Leaching Procedure testing requirements for continued disposal at TA-54, Area G. Additional testing is required to meet new NPDES Permit requirements. Permitting of a new long-term sludge application area and/or landfill is also required in case TA-54, Area G is no longer available for sludge disposal under Laboratory or DOE policy.

Finding/SW.1-14: TA-53 sanitary lagoons do not comply with the Laboratory's NPDES Permit and RCRA Permit.

> **Discussion:** Low-level radioactive waste and sanitary wastes were previously discharged into three TA-53 lagoons. In 1989, all radioactive waste streams were rerouted to one of the three lagoons and all sanitary wastes to the other two lagoons.
>
> The lagoons are considered to hold mixed waste if any hazardous waste is contained in the sludge at the bottom of the lagoons. In January 1991, the three lagoons were classified as mixed waste and added to the Laboratory's RCRA Permit. Installation of a lift station and force main is required to eliminate the two sanitary lagoons and meet NPDES and RCRA Permit requirements. Plans and specifications for this project have been completed and funding has been identified through the Corrective Activities Program.

Finding/SW.1-15: The TA-21 sanitary treatment plant does not consistently comply with the Laboratory's NPDES Permit.

> **Discussion:** The existing facility, which is a package treatment plant, is in need of upgrading to ensure effluent limits are met. In 1990, effluent from the plant was rerouted through a sand filter for improved treatment. This final filtration process has been adequate to meet final effluent limits on a short-term basis, but additional improvements to the treatment plant are required if this use of TA-21 continues. This treatment plant is the only sanitary treatment facility at the Laboratory that is not planned to be replaced by the SWSC Project scheduled for completion in July 1992.

Finding/SW.1-16: The effluents from the present HE outfalls do not meet effluent limitations under the Laboratory's new NPDES Permit.

> **Discussion:** The existing settling sumps for HE waste water are inadequate to meet new effluent limitations, including biomonitoring under the Laboratory's new NPDES Permit. Additional treatment will be required to remove toxic pollutants. Additional sampling, monitoring, and reporting for toxic pollutants may also be required.

Finding/SW.1-17: The present pH neutralization system at the TA-3 power plant is inadequate to comply with the NPDES Permit.

> **Discussion:** On May 20, 1990, approximately 1,400 gallons of sulfuric acid was released to Sandia Canyon from the TA-3 power plant because of faulty operation and inadequate neutralization facilities. Operational and administrative improvements have been completed. Interim improvements to the existing neutralization system have also been completed. A new system is required to improve reliability and to further ensure against future acid releases. The preliminary design of a new system was found to be inadequate during the Laboratory's QA process and must be improved upon.

Finding/SW.1-18: Effluent quality at some industrial outfalls does not consistently meet the requirements of the NPDES Permit.

> **Discussion:** Other industrial discharges such as boiler blow-down-treated cooling water, printed circuit board discharges, and photo-processing discharges have violated NPDES Permit limitations. Corrective actions are required at the outfalls to meet effluent limits.

Finding/SW.1-19: The Laboratory does not have a systematic survey for radioactivity from industrial outfalls to properly document that unauthorized radioactive discharges are not occurring.

> **Discussion:** A survey of all NPDES industrial outfalls for radioactivity is needed. The Laboratory has initiated the Waste Stream Characterization Program to ensure that all waste streams are properly identified. A survey of all NPDES industrial outfalls for radioactivity is needed to supplement the Waste Stream Characterization Program and to further document that all radioactive waste streams are controlled. The Laboratory routinely samples the sanitary outfalls for radioactivity.

Finding/SW.1-20: The Laboratory does not have a toxicity identification and management program to ensure that all discharges are nontoxic to wildlife and meet the requirements of the CWA.

> **Discussion:** The Laboratory has initiated the Waste Stream Characterization Program to ensure that all waste streams are properly identified. A toxicity identification and management program is needed to supplement the Waste Stream Characterization Program and properly document that all discharges are nontoxic to wildlife and to meet biomonitoring requirements under the Laboratory's new NPDES Permit.

SW.2 Liquid-Waste Disposal Regulations

Performance Objective: The Laboratory must comply with New Mexico liquid waste disposal regulations.

Finding/SW.2-1: Overflows from sanitary holding tanks and septic tank systems violate the liquid waste disposal regulations and the CWA.

> **Discussion:** Johnson Controls World Services Inc. (JCI) pumps sanitary holding tanks on a routine basis. At times, a sink may be left running or a toilet float may stick causing an overflow of a holding tank. Septic tank systems are pumped on an as-needed basis to remove sludge, which could plug the drain field or seepage pit, from the bottom of the tanks.

Finding/SW.2-2: Permit applications for new or modified septic tank systems and holding tanks are not always submitted to NMED in a timely manner.

Discussion: The Laboratory sometimes completes septic tank systems and holding tanks before receiving NMED permits. Permit applications for septic tank systems and holding tanks must be coordinated with operating groups, the Facilities Engineering (ENG) Division, and EM Division.

Finding/SW.2-3: Pumping records for sanitary holding tanks are not signed by DOE or the designee as required.

Discussion: The New Mexico liquid waste disposal regulations require that records concerning pumping of holding tanks be signed by the owner. Forms have not yet been developed by NMED for this requirement. JCI pumps holding tanks and has signed pumping records. These records have been submitted to NMED but have not been signed by the facility owner, which is DOE. JCI must be authorized to sign the holding tank pumping records by DOE through the Laboratory.

Finding/SW.2-4: No formal procedures exist for operating the Septic Tank Program.

Discussion: Formal procedures are needed to describe how the Septic Tank Program is implemented at the Laboratory. For example, they would identify responsible parties for specific actions required. Without procedures, consistency in and continuity of the program cannot be ensured.

Finding/SW.2-5: A survey of all sanitary septic tank systems and holding tanks for radioactivity has not been done to document that no unauthorized radioactive discharges are occurring.

Discussion: A survey of all sanitary septic tank systems and holding tanks for radioactivity is needed to supplement the Waste Stream Characterization Program and must further document that all radioactive waste streams are controlled.

SW.3 Liquid Discharge Regulations

Performance Objective: The Laboratory must comply with the Laboratory's Spill Prevention Control and Countermeasure (SPCC) Plan and New Mexico Water Quality Control Commission regulations related to liquid discharges.

Finding/SW.3-1: The Laboratory does not have a formal agreement with NMED and DOE on reporting liquid releases.

Discussion: The Laboratory has received verbal direction from NMED, DOE, and EPA on reporting liquid releases; these verbal directions are inconsistent with each other. This results in uncertainty in what to report. Presently, the Laboratory is reporting all liquid releases including potable water releases and steam condensate leaks, regardless of whether or not they are a threat to health or environment.

Finding/SW.3-2: Reports of liquid releases are not being made by operating groups in a timely manner, which is in violation of New Mexico Water Quality Regulations.

Discussion: Procedures for ensuring that timely reports from operating groups do not exist. Although these reporting requirements are included in AR 9-4, Accidental Oil, Chemical, and Airborne Releases, and further information on reporting is included in the Laboratory's SPCC Plan, these documents have not proved to be effective communication tools.

Finding/SW.3-3: Secondary containment for drum storage is inadequate at some locations at the Laboratory.

Discussion: Drums containing liquids are stored at some Laboratory locations without containment pallets, curbing, or other secondary containment that would reduce the risk of a release to the environment. The Laboratory's SPCC Plan is not fully implemented regarding drum storage.

Finding/SW.3-4: Training for spill coordinators and other personnel at the Laboratory, which is needed to fully implement the Laboratory's SPCC Plan, has not been completed.

Discussion: Additional training is needed to ensure that spill controls are in place and to be able to respond to a spill if one does occur. Spill training is required under the Laboratory's SPCC Plan. An updated SPCC training program has been prepared. Under this program, spill coordinators are trained to ensure that proper containment is provided and that initial spill response and control is provided. Spill coordinators also ensure that complete and timely internal reporting of spills to EM-8 takes place.

SW.4 Environmental Monitoring of Surface Water

Performance Objective: Routine environmental monitoring of surface water for contamination from Laboratory operations should be implemented to address all issues and requirements of relevant DOE orders and directives (e.g., Order 5400.1, DOE Order 5820.2A, and DOE Order 5400.5), including the requirements for complete procedural documentation.

Finding/SW.4-1: The documentation of procedural aspects of the surface water sampling component of the Environmental Surveillance Program is not adequate.

Discussion: While the overall surface water sampling component of the routine Environmental Surveillance Program at the Laboratory is considered appropriate and in accordance with DOE guidance (e.g., DOE/EH-0173T and DOE/EP-0023), documentation of procedural aspects of siting of sampling locations, sampling techniques, data handling (including data bases), and QA are incomplete in relation to the requirements of DOE Order 5400.1, Chapter IV, Sec. 4 and 8.d. These plans are required to be in place by November 9, 1991. QA Program plans are being rewritten to conform with the requirements of DOE Order 5400.1 and are expected to be reviewed, approved by DOE, and in effect by the required DOE date of November 9, 1991.

Finding/SW.4-2: The sampling of surface run-off in Pueblo and Los Alamos canyons is inadequate to document accurately the amount of residual radionuclides being transported off site onto the San Ildefonso Pueblo and into the Rio Grande.

Discussion: Some residual radioactivity on sediments and in perched ground water in Pueblo and Los Alamos canyons from former Laboratory discharges has been identified and is being slowly moved by run-off off site onto the San Ildefonso Pueblo lands in Los Alamos Canyon, and ultimately into the Rio Grande by surface water flow resulting from snowmelt run-off, thunderstorm run-off, and sanitary sewage effluent (see SSB.2-1). An extensive study of this canyon system was conducted in 1976-1977, and further characterized the extent of sediments having residual radionuclide concentrations. An assessment based on this sampling data performed under the DOE's Formerly Utilized Sites Remedial Action Program indicated that the potential radiation dose to users of the canyon was within the DOE's radiation protection standards. Environmental monitoring of the run-off has been conducted with different frequency since at least 1945. During some periods a continuous gauging station was operated in Los Alamos Canyon. In recent years sampling had decreased to basically one set of water and sediments samples a year at the routine monitoring stations and several grab samples of snowmelt or storm run-off when practicable. Base flow [largely attributable to the County Sewage Treatment Plant effluent] and natural flows, including both snowmelt and storm run-off in both Pueblo and Los Alamos canyons, need to be monitored continuously. Sampling frequency must be increased to adequately document the off-site transport of residual plutonium and other residual radionuclides in water and on suspended and bed sediments.

A limited increase in sampling of sediment transport in Pueblo and Los Alamos canyons was incorporated into the routine monitoring program in 1990 and a special study of snowmelt run-off transport from 1975 to 1986 was published.

3.2.4 Ground Water

Ground water occurs in two principal subsurface regimes at Los Alamos: 1) perched water in relatively shallow (10-100 ft) alluvial canyon bottoms across the Laboratory or in basalts in the northeastern portion, and 2) the main aquifer in deep sediments (800-1200 ft below the mesa tops) underlying the more recent volcanic rocks that make up the entire Pajarito Plateau. The deep main aquifer is the source of the municipal and industrial water supply for the entire Laboratory and Los Alamos County.

The several hundred feet of dry volcanic rock provide protection for the main aquifer from surface infiltration or downward migration of moisture from the perched water in canyon alluvium. Extensive monitoring of the main aquifer since the late 1940s has never shown any contamination attributable to Laboratory operations. Not enough is yet known about the fundamental processes controlling movement of water or contaminants through the unsaturated zone to completely understand whether contamination could ever reach the main aquifer.

Several of the canyon-bottom shallow alluvial aquifers contain contamination, both radiological and nonradiological, from discharge of both untreated (during early years) and treated (continuing to present) Laboratory effluents. These situations have been and continue to be monitored by an ongoing routine surveillance program that has evolved from the initial monitoring provided to the US Atomic Energy Commission by the U.S. Geological Survey starting in 1946 and continuing until the early 1970s when taken over by Laboratory staff. The potential for recharge to the main aquifer from such alluvial perched water is not fully studied. Tritium contamination has been found to depths of about 200 ft (the greatest depth of core samples taken to date) in the unsaturated zone below Mortandad Canyon, the canyon that receives effluent from the radioactive liquid waste treatment plant at TA-50. The tritium concentration in moisture extracted from the tuff was less than 10 percent of the DOE's Derived Concentration Guide for Tritium in water. In addition, continued sampling of the water of the deep aquifer, located 950 feet beneath the canyon, has not detected any impact of Laboratory operations on water quality in the aquifer and with no resultant radiation dose to users of this water. New special studies being implemented under auspices of the Environmental Restoration (ER) Program are beginning to contribute significant additional understanding to mechanisms by which the main aquifer may be recharged by alluvial perched water.

In addition to the environmental quality aspects of contaminant migration, the main aquifer is also monitored for resource management as the source of water supply. Water levels, pumping drawdown, total production and pumping rates, and other hydrologic data related to well performance are documented and evaluated routinely. This evaluation provides the basis for determining requirements for well maintenance, sighting of new wells, and planning for the reliability of future water supply. The data also provide the basis for compliance reporting to the New Mexico State Engineer Office in relation to the legal water rights owned by DOE.

The major deficiency related to ground water is that there is not enough basic detailed information available to fully understand the complex hydrogeologic setting of the Pajarito Plateau on which the Laboratory is located. The deficiencies in understanding relate to both the water quality and resource management issues. The available information is inadequate to meet the requirements of DOE Order 5400.1 for the Ground Water Protection Management Program Plan. Fundamental research is necessary in basic geology, unsaturated zone geology and hydrology, and saturated zone geology and hydrology. An independent panel of experts is reviewing the current state of hydrogeologic knowledge to recommend research priorities for the Laboratory.

Ground water monitoring facilities, equipment, and documentation are inadequate and do not satisfy the Ground Water Protection Management Program Plan. No significant numerical modeling capability is in place to routinely model the unsaturated zone or saturated zone of the aquifers at the Laboratory.

The Laboratory has not prepared ground water discharge plans for discharges from existing facilities. A request for such plans is anticipated from NMED. These plans would be required within 120 days after a request by NMED, which is insufficient time for meeting this requirement. In addition, the Laboratory has not prepared a Notice of Intent to Discharge and a

Ground Water Discharge Plan for the new SWSC Project, which must be approved before discharge begins in July 1992.

DOE owns the water supply system for the Laboratory and Los Alamos County, including the wells, booster pump stations, transmission lines, and storage tanks. The Laboratory provides oversight of the water supply system. JCI provides the day-to-day operation and maintenance of the system. DOE sells water to Los Alamos County, which operates and maintains the distribution systems at Los Alamos Townsite and White Rock.

The Laboratory is responsible for meeting the monitoring and oversight requirements of the Safe Drinking Water Act (SDWA) for the system. Samples are collected by the Laboratory and tested for chemical quality and radioactivity by the state Scientific Laboratory Division (SLD). JCI collects and tests samples for bacteriological quality (coliform bacteria) in their laboratory, which is certified by the SLD. Sampling and test results for bacteriological and chemical quality, and for radioactivity, meet the requirements of the SDWA.

Programs to ensure that the water supply is not contaminated from external sources at the Laboratory are inadequate. A cross-connection control program inside buildings is needed to ensure against contamination of the potable supply from an industrial or waste water source. A survey of all water fountains and potable drinking water outlets for lead is needed to ensure that elevated levels of lead are not originating from lead-lined water fountains or building plumbing. A plan to improve the bacteriological quality of the water supply at the Laboratory along dead-end and stagnant lines is also needed. This plan would include control of noncoliform bacteria, which is recommended to ensure against contamination but is not required under the SDWA.

No mechanisms, legal or related to infrastructure, are yet in place to provide for additional water pumpage for reliable future water supply in conformance with regulations of the New Mexico State Engineer Office. Additional efforts are needed to ensure continuing adequate water supply for the Laboratory and Los Alamos County.

<u>GW.1 Quality Control Regulations</u>

Performance Objective: The Laboratory must comply with New Mexico Water Quality Control Commission Regulations related to ground water and other ground water requirements.

Finding/GW.1-1: The Laboratory is not in a position to provide a 120 day period response as required by NMED for preparation of a Laboratory-wide Ground Water Discharge Plan.

> Discussion: Under the regulations of the New Mexico Water Quality Control Commission, a Ground Water Discharge Plan may be requested at any time for the continued operation of any one or all of the 9 sanitary treatment facilities and over 100 industrial outfalls. A Ground Water Discharge Plan would be required within 120 days after notification from NMED. A Laboratory-wide Ground Water Discharge Plan is needed to meet New Mexico Water Quality Control Commission regulations in a timely manner.

Finding/GW.1-2: A Notice of Intent to Discharge and a Ground Water Discharge Plan have not been prepared to meet the July 1992 SWSC Project to allow for discharge from the new SWSC Project.

Discussion: The new SWSC sanitary treatment plant is included in the Laboratory's new NPDES Permit. A Notice of Intent to Discharge and a Ground Water Discharge Plan are needed as soon as possible to satisfy New Mexico Water Quality Control Commission Regulations. The WQ&T Section of EM-8 has collected ground water discharge information for the plan and a draft Notice of Intent has been prepared. The new SWSC Project will not begin operation until these items are completed.

Finding/GW.1-3: A Ground Water Discharge Plan regarding sanitary sludge disposal has not been initiated for TA-54, Area G in response to a potential request for such a plan by NMED.

Discussion: Under New Mexico Water Quality Control Commission regulations, a Ground Water Discharge Plan may be requested at any time by the NMED for continued disposal of sanitary sludge at TA-54, Area G. A Ground Water Discharge Plan would be required within 120 days after notification from NMED. A Ground Water Discharge Plan for TA-54, Area G relating to sanitary sludge disposal is needed to meet New Mexico Water Quality Control Commission regulations in a timely manner.

Finding/GW.1-4: A Ground Water Discharge Plan has not been initiated for the TA-53 lagoons in response to a potential request by NMED.

Discussion: Under the New Mexico Water Quality Control Commission regulations, a Ground Water Discharge Plan may be requested at any time by NMED for continued use of these lagoons. Liners do not exist for the two sanitary lagoons. The TA-53 lagoons were included in Part A (Mixed-Waste Section) of the Laboratory's RCRA Permit in January 1991. A Ground Water Discharge Plan for the TA-53 lagoons should be initiated to meet New Mexico Water Quality Control Commission regulations. The 120 day period allowed for preparation of a Ground Water Discharge Plan for the TA-53 lagoons is not adequate for completion of such a plan.

GW.2 Implementation of Ground Water Protection Programs

Performance Objective: The Laboratory should implement all provisions of the Ground Water Protection Management Program Plan (GWPMPP) as required by DOE Order 5400.1, and its implementation guidance provided by DOE.

Finding/GW.2-1: Sufficient detailed information is not available on the hydrogeology of the Pajarito Plateau to meet all the requirements of DOE Order 5400.1 and the GWPMPP guidance. Furthermore, a plan to acquire the necessary information does not exist.

Discussion: The large area encompassed by the Laboratory and its location on the very complex geologic setting of the Pajarito Plateau present an extremely challenging setting. A complete understanding of the sources, occurrence, and movement of water in both saturated and unsaturated conditions is essential to evaluating the present and potential impacts of waste management and water resources for water supply purposes. Fundamental information is not available on the basic geology and hydrology to adequately address the requirements of the DOE GWPMPP guidance or the requirements of RCRA Corrective Action studies.

Major deficiencies in information can be found in the following areas taken from the DOE GWPMPP guidance and the DOE ground water check list in Section 11 of the DOE *Environmental Audit Manual*:

- Basic Geology: Basic geology of the Laboratory area includes structural features, stratigraphy, fracture and fault zones (knowledge of both the Pajarito fault zone on the western margin of the plateau and the plateau itself where faults and fractures may control erosional patterns and potential infiltration zones are crucial to understanding ground water recharge), geomorphology, seismic history, and geochemistry.

- Saturated Zone Geology and Hydrology: Information on recharge of the main aquifer and lithology is incomplete; knowledge of the upper surface of the main aquifer, especially toward the west, is incomplete; temporal variation of the ground water surface is not well described; information is lacking on vertical and horizontal permeability variation, horizontal and vertical pore-water velocities, pore-water flow gradients, the extent of phreatic versus confined zones, geologic structure beneath the Bandelier tuff, spatial variations of natural ground water quality, and areal continuity of data.

- Unsaturated or Vadose Zone Geology and Hydrology: The areal variation in lithology is incompletely described; infiltration rate and vertical permeability are known only for a few select locations, the geologic structure and thickness of strata lack detail, unsaturated moisture characteristics have been measured for only two basic locations (TA-54 and Mortandad Canyon) within the Laboratory; unsaturated hydrologic property measurements are lacking for the Otowi and Guaje Members of the Bandelier tuff, the Chino Mesa Basalts, the Puye Conglomerate, and the unsaturated portions of the Santa Fe Group sediments.

Finding/GW.2-2: Ground water monitoring facilities, equipment, documentation, and procedural improvements needed to satisfy the GWPMPP guidance have not been completed.

Discussion: A large number of improvements need to be made in the Laboratory ground water monitoring for compliance with the recommendations of the DOE GWPMPP guidance. The following paragraphs highlight the most important items:

- Additional ground water monitoring wells to the main aquifer are needed to provide better areal coverage, especially in the western and southeastern portions of the Laboratory. All possible test wells to the main aquifer need to be equipped with access tubes or transducers to provide more extensive capability to measure the piezometric surface. Water-level measurements need to be made at least annually, and in some areas possibly more frequently to establish the appropriate interval for detecting significant changes in gradient. Annual potentiometric surface maps need to be prepared.

- The complete inventory and comprehensive map of all known monitoring and production wells, including all known abandoned holes and "similar holes in the ground," need to be completed. The inventory needs to identify availability of as-built and development records and the existence or availability of geologic and geophysical logs.

- Procedures and methodology need to be more completely documented. Such things as purging methods, water-level measurement protocols, well maintenance, pump tests, well abandonment, well security, details of sampling protocols (frequency, custody records, and analytes for each well), details of interpretation (data base, statistical comparisons, and trends) need to be specified appropriately for specific Laboratory conditions.

- All monitoring wells, test wells, and test holes (in addition to those used as part of the routine monitoring program) need to be equipped with locking security caps, marked with permanent stamped labels, and surveyed to 0.01 ft elevation and 0.5 ft New Mexico State Plane coordinates to permit mapping on the Laboratory graphic information system.

<u>GW.3 Ground Water Monitoring Program</u>

Performance Objective: The Laboratory should be conducting a comprehensive ground water monitoring program in accordance with the provisions for ground water monitoring as required by DOE Order 5400.1, and the General Environmental Protection Program, including the requirements for procedural documentation. Routine environmental monitoring of ground water for contamination from Laboratory operations should be implemented to address all issues and requirements of relevant DOE orders and directives (e.g., DOE Order 5400.1, DOE Order 5820.2A, and DOE Order 5400.5), including the requirements for complete procedural documentation.

Finding/GW.3-1: The documentation of procedural aspects of the ground water monitoring component of the Environmental Monitoring Program is not adequate, and the Ground Water Monitoring Plan required by DOE Order 5400.1 is not completed or implemented.

Discussion: While the overall ground water sampling component of the routine Environmental Surveillance Program at the Laboratory is considered appropriate and in accordance with DOE guidance (e.g. DOE/EH-0173T, and DOE/EP-0023), documentation of procedural aspects for siting of sampling locations, sampling techniques, data handling (including data basing) and QA are incomplete in relation to the requirements of DOE Order 5400.1 (Chapter IV Secs. 4 and 9.a and 9.b). The general Environmental Monitoring Plan (EMP) and the separately identifiable Ground Water

Monitoring Plan (which becomes a component of both the EMP and the GWPMPP) are required to be in place by November 9, 1991. The existing QA program plans do not completely meet the requirements of the more recent DOE orders and directives for extent of documentation and do not fully address QA aspects.

Finding/GW.3-2: No significant numerical modeling capability is in place to routinely model either the unsaturated zone or saturated zone at the Laboratory.

Discussion: Inadequate physical data is available to support a comprehensive modeling effort. Basic physical processes are not fully understood. This includes both basic water movement as well as potential transport of contaminants.

The Laboratory has premier computing capabilities, and the Laboratory staff has developed state of the art general models, specifically TRACR3D, to address such problems under specific funding for other DOE programs, e.g., Yucca Mountain.

GW.4 Safe Drinking Water Regulations

Performance Objective: The Laboratory must comply with the SDWA and New Mexico regulations governing water supplies.

Finding/GW.4-1: The cross-connection control program, wellhead inspection program, and program for disinfection of lines after construction are not current and formalized for compliance with the SDWA.

Discussion: Formal procedures and QA for these programs are required to properly document that the work being performed by JCI Health, Safety, and Environment Department, in behalf of the WQ&T Section of EM-8, meets regulatory requirements and environmental standards.

Finding/GW.4-2: Sampling procedures, QA, and SOPs, including worker protection, are not current for the SDWA Program.

Discussion: Formal procedures for SDWA sampling and QA are required. Formal procedures for SDWA record keeping are also needed to properly document routine SDWA activities. These activities include sampling and testing, as well as programs required to protect the water supply such as cross-connection controls, wellhead inspection, and disinfection of lines. A formalized notification procedure for violations of the SDWA is also needed.

Finding/GW.4-3: No plan exists for improved microbiological quality of the Los Alamos water supply system.

Discussion: Growths of biofilms of flavobacterium and other noncoliform bacteria have been experienced in the Los Alamos water system. These growths represent a deterioration of microbiological water quality in sections of the system in which flows are limited. Preparation of a plan to improve microbiological water quality at the wellheads and throughout the system is needed to control potential contamination and potential growths of disease-causing organisms.

Finding/GW.4-4: There has not been a Laboratory-wide survey of plumbing inside buildings to identify cross connections and to ensure against contamination.

Discussion: A survey of the potable water supply inside buildings for cross connections is needed to ensure against contamination. The New Mexico regulations governing water supply require the use of backflow prevention devices and stipulate that there shall be no piping arrangement or connection that allows an unsafe substance to enter a public water supply. A Backflow Prevention Device Test Program is in place at the Laboratory, but a formal cross-connection control survey inside buildings also is needed to ensure compliance with state regulations.

Finding/GW.4-5: A systematic survey to identify potential elevated levels of lead in drinking water from water fountains and other outlets has not been conducted.

Discussion: Certain models of water fountains were manufactured using lead solder and tanks. Lead from these sources can leach into the drinking water. A Laboratory-wide survey, which includes sampling, is needed to identify and remove older water fountains and other potable water outlets that could produce elevated levels of lead in drinking water.

Selected water fountains at the Laboratory have been sampled for lead and have been found to exceed proposed new lead limits for drinking water. Levels over the current drinking water standard for lead (0.05 mg/l) have not been found. A Laboratory-wide inventory and sampling of water fountains are needed to ensure against elevated levels of lead and to provide a data base for action when proposed new lead limits are implemented by EPA and NMED.

GW.5 New Mexico State Engineer Water Rights Regulations

Performance Objective: The Laboratory must operate and manage the water supply system in conformance with the New Mexico State Engineer Office (NMSEO) regulations on water rights.

Finding/GW.5-1: Under the permit for NMSEO, there are no mechanisms, legal or infrastructure, in place to provide for additional water pumpage when the demand increases above the legal water rights limit.

Discussion: The DOE-owned wellfields that supply water for the Laboratory and the community are being pumped at 95 percent to 98 percent of the annual legal water rights maximum under the permit from the NMSEO. Several possible approaches would permit either greater pumpage or use of the additional San Juan-Chama water that was contracted for by DOE. These include establishing return flow credits for effluents, and devising a method to divert the San Juan-Chama water from the Rio Grande when released from upstream reservoirs. Additionally, replacement wells are needed to ensure current capacity as older wells lose yield or fail. Lead times for providing such mechanisms may well be much longer than the potential demand increase that could result from a hot dry summer, for example. Higher priority efforts to ensure adequate water supply in future years are essential to meet commitments to Los Alamos County and the needs of the Laboratory.

3.2.5 Waste Management

The Laboratory manages liquid and solid wastes, generated by Laboratory operations, using state-of-the-art methods to prevent the release of radioactive and hazardous materials to the environment. Operations are administered, audited, and controlled in compliance with regulations, directives, and orders of DOE, EPA, the Occupational Safety and Health Administration (OSHA), the Department of Transportation (DOT), and NMED.

The Laboratory operates its waste management operations with the objective to collect all Laboratory-generated hazardous and radioactive wastes (liquid and solid) and manage them to provide continued protection to the health and safety of employees and the public and to the environment.

To improve Laboratory waste management operations, the Laboratory must perform a self-evaluation to ensure compliance of waste management with all ES&H requirements. Once self-evaluation is performed, the Laboratory must respond to findings, prioritize corrective action, and manage available resources to ensure compliance. The Laboratory is currently not in complete compliance with DOE Order 5700.6B, regarding a QAP; RCRA regulations regarding storage of mixed wastes; DOE Order 5820.2A, regarding radioactive waste management; DOE Order 5400.5, regarding radioactive discharge limits; and DOE Orders 5480.19, 5480.20, and 6430.1A, "General Design Criteria," regarding nonreactor nuclear waste management facilities.

Other waste management operations that need improvement include NEPA documentation, safety analysis reports (SARs) and safety assessments (SAs), the training program, the data-management system for tracking and documenting waste handling, the organization of waste management workers, leak detection of underground storage-tanks, and fugitive air emissions of VOC.

<u>WM.1 Waste Management Activities</u>

Performance Objective: Waste management activities should be conducted in a manner that achieves waste minimization in the Laboratory, creates and maintains a safe work place, minimizes the risk to the public and the environment, and operates in compliance with the letter and spirit of applicable environmental and safety statutes, regulations, and standards.

Finding/WM.1-1: The Laboratory does not have a system of self-evaluation to ensure compliance of waste management with all environment, safety, and health (ES&H) requirements.

Discussion: Waste management is subject to a multitude of ES&H requirements driven by Laboratory policies, DOE orders and directives, and environmental regulations. In the past, self-assessment has been limited to audits that concentrated on a narrow set of requirements. Response to audit findings has not been well tracked or managed.

A system has not been in place that allows an organized and detailed self-assessment of all requirements, tracking of findings, prioritizing of corrective action, and managing available resources to ensure compliance.

Finding/WM.1-2: The Laboratory does not have a waste management QAP that meets the requirements of DOE 5700.6B.

Discussion: Although QA plans exist in waste management, the plans are deficient relative to the requirements of DOE Order 5700.6B. Major deficiencies exist in document control, design control, and calibration. Consensus standards are not adequately addressed. Implementation of existing plans is spotty.

Inadequate QA has led to violations of RCRA for manifest and labeling deficiencies and to lack of control of operating documents such as SOPs and operating instructions.

Finding/WM.1-3: NEPA documentation of existing and planned waste management facilities is not adequate.

Discussion: Although existing facilities have been included in past NEPA documentation, that documentation is dated and does not address significant changes that have occurred since its preparation. An Environmental Impact Statement (EIS) is needed to address the cumulative affects of current and planned operations.

Finding/WM.1-4: SARs and SAs for waste-handling activities defined as nuclear facilities are not current and do not address cumulative effects.

Discussion: SARs for some existing nuclear facilities in waste management are outdated and do not comply with current DOE requirements. Existing SARs assess only the risk of individual operations and do not assess the cumulative impacts of waste-management operations near one another. More than 10 new waste treatment, storage, and handling facilities are to be constructed to support ongoing Laboratory waste-management programs and maintain compliance with all environmental requirements. No program exists to assess the cumulative effects of these added waste-management activities.

An SA has been prepared for TA-54, Area L and is undergoing Laboratory review.

Finding/WM.1-5: The training program for waste-management workers is inadequate.

Discussion: The training system does not systematically identify worker qualifications and training requirements or adequately document training as required by DOE Order 5480.20, "Personnel Selection, Qualification, Training, and Staffing Requirements at

DOE Reactor and Non-Reactor Nuclear Facilities." Worker qualifications and training are listed in the RCRA Permit, but not all aspects of required training are covered.

A Training Tracking Program has been developed and implemented that allows tracking of training and documents the completed training. The Training Tracking Program operates at the section level within waste management and allows transfer of training records to the Laboratory's data base. An initial training matrix has been prepared that identifies worker training needs.

Finding/WM.1-6: The Laboratory does not have an adequate and unified data-management system for EM-7 for tracking and documenting waste handling.

Discussion: Waste documentation systems are developed individually in each section of EM-7, and each system is specific to the waste forms handled in that section. Some systems have not been formalized, and QA is inadequate on most. There are inconsistencies in record keeping and in documentation used to transfer wastes between sections and waste streams.

Finding/WM.1-7: Some mixed wastes are stored for more than one year in violation of land disposal restrictions of the RCRA regulations.

Discussion: The Laboratory does not have adequate facilities for the treatment and disposal of all mixed wastes. Because of a lack of facilities in the DOE complex, EPA has given a two-year capacity extension for some mixed wastes. The wastes included in this variance (e.g., liquid mixed waste) are stored in compliance with RCRA requirements.

Even with aggressive schedules for incineration and treatment facilities, the Laboratory will be out of compliance when the variance expires. This problem is common to all DOE facilities.

Finding/WM.1-8: Secondary containment for liquid mixed wastes will not meet RCRA Permit requirements when the permit is granted.

Discussion: Liquid mixed wastes are stored at TA-54, Area L. The secondary containment is adequate to meet interim status requirements in effect, but will not meet the requirements of 40 CFR 264 that become effective when an operational permit is granted under RCRA. The Part B permit application is due this year, and there is no anticipated date for granting an operational permit for mixed wastes.

Current storage, secondary containment, inspection, and maintenance procedures for these wastes comply with current RCRA interim status requirements, and new storage areas will conform to 40 CFR 264.

Finding/WM.1-9: The organization of waste management and the duties of waste management workers are not clearly defined.

Discussion: EM-7 does not have a formal group-wide procedure for assigning duties; therefore, the duties of waste management personnel have not been documented. Tasks may be assigned without attention to the level of training required. Individual sections have established job definition and formal procedures for job assignments.

Finding/WM.1-10: The Laboratory does not have a Maintenance Management Program for programmatic (Class B) waste management equipment as required by DOE Order 4330.4A, "Maintenance Management Program."

Discussion: Waste management equipment is maintained on an as-needed basis. Preventive maintenance, maintenance control, and maintenance documentation must be instituted. (See MA.1-1.)

Finding/WM.1-11: Waste acceptance criteria are not supported by adequate implementation procedures as required by DOE 5820.2A, "Radioactive Waste Management."

Discussion: Waste acceptance criteria are presented as administrative requirements in *The Laboratory Manual, Chapter 1, Environment, Safety, and Health* (*ES&H Manual*). The criteria are adequate. With the exception of criteria for transuranic wastes, the waste acceptance criteria are not supported by certification plans and procedures, acceptance procedures, characterization plans, training procedures, or records systems.

Generators have waste management coordinators in each area. Training has been provided for the waste management coordinators. The Chemical and Mixed Waste Section of EM-7 has developed waste acceptance criteria that are undergoing internal Laboratory review. The Radioactive Waste Section of EM-7 has developed waste acceptance criteria for low-level waste disposal, and certification plans are under development.

Finding/WM.1-12: Old, underground concrete tanks in use at the Laboratory were designed and built in such a way that leaks of radioactive and other hazardous material may be undetected.

Discussion: Approximately 50 old concrete tanks are in use to store contaminated water. Best Management Practice indicates that the potential for leakage should be addressed. The Laboratory has no indication that there is any health risk to the public or Laboratory employees from any potential release from these tanks.

Finding/WM.1-13: The discharge of the radioactive waste water treatment plant does not meet the new NPDES discharge limits recently issued in draft form, and the discharge can not meet the desired discharge concentrations imposed by DOE Order 5400.5.

Discussion: The draft NPDES Permit issued to the Laboratory includes a requirement for biomonitoring. The salt content of the current discharge is too high to successfully pass the biomonitoring. EPA has deferred the NPDES Permit for 180 days so the discharge is not in violation, but violation of the permit is imminent. Desired radioactive concentrations on the discharge imposed by DOE Order 5400.5 cannot be met with the current plant facilities. Discharge limits will have to be determined by application of best available control technology.

Finding/WM.1-14: The Laboratory's nonreactor nuclear waste management facilities do not meet appropriate DOE orders and directives.

Discussion: EM-7 operates facilities classified as nonreactor nuclear facilities. These facilities were built 5 to 30 years ago. The operation and physical configuration of these facilities do not fully meet the requirement of DOE orders and directives that comprise formality of operations. An overall program that comprises formality of operations is not complete.

DOE Order 5480.19 defines requirements for conduct of operations. Examples of specific weaknesses include a lack of administrative procedures that define responsibilities, authority, and goals; lack of documented programs to control design changes; lack of formal guidance on proper operating configuration; lack of independent design verification; and lack of procedures for maintaining records and logs.

DOE Order 5480.20 defines requirements for personnel qualification, training, and staffing. Defined personnel selection criteria are lacking, and certification requirements have not been determined.

DOE Order 6430.1A, "General Design Criteria," provides design requirements for new facilities but does not specifically address requirements for existing facilities. However, failure to meet some of the design criteria given in the order adversely affects compliance with other DOE orders and directives. For example, some facilities do not have zoned ventilation systems; some systems do not have secondary and tertiary containment; and physical configurations do not allow for good entry control. The physical restraints impede compliance with other DOE orders and directives, such as DOE Order 5480.11, "Radiation Protection for Occupational Workers," which requires entry control and establishment of operating areas based on risk of radiation exposure.

Finding/WM.1-15: The Laboratory does not have a management plan for EM-7 that integrates current and long-term needs.

Discussion: Much of waste management activity is based on reaction to current needs resulting from violation or potential violation of regulations and from requirements imposed by DOE orders and directives and Laboratory policy. Planning of future facilities does not take an integrated approach to handling of different waste streams. Many of the facilities planned address only obvious needs. A project management system is being adopted for waste management to support the five-year plan (FYP), and the system is to be operational by October 1991.

3.2.6 Toxic and Chemical Materials

Use, storage, and disposal of polychlorinated biphenyls (PCBs) and PCB-contaminated equipment are regulated under the Toxic Substances Control Act. There are more than 80 PCB transformers and 400 capacitors still in use at the Laboratory. The Laboratory is managing a program to remove and replace PCB equipment from the Laboratory. PCB equipment being removed may represent an unacceptable level of risk because of potential PCB fires, spills, and cleanup costs. The Laboratory has replaced or retrofilled more than 65 PCB transformers and 3,000 PCB capacitors.

The Laboratory has not identified all of the PCB equipment used by operating groups. A survey of the Laboratory's electrical utility system for PCBs has been completed, but a more comprehensive survey of equipment used by operating groups is needed to ensure compliance. The Laboratory has loaned PCB equipment to universities and other institutions. This equipment must be recalled and disposed of by the Laboratory to avoid potential liability.

Violations of the Laboratory's RCRA Permit have occurred because of lack of experience in and knowledge of the disposal of hazardous waste. Violations include missing labels on hazardous waste containers, missing inspection logs, improper storage at satellite storage areas, and inadequate waste characterization. The Laboratory implemented a training program in 1990 and has trained more than 4,000 employees in the handling and disposal of hazardous waste. The Laboratory has also implemented a waste profile system whereby each waste is identified and documented before disposal.

The TA-53 lagoons do not comply with RCRA requirements. Evidence of tritium above background levels was detected in the subsurface near the lagoons. Plans and specifications for installation of a lift station and force main to eliminate the TA-53 sanitary lagoons have been completed. Planning is also under way to upgrade or eliminate the remaining radioactive waste lagoon. A subsurface monitoring system was installed in July 1991.

T&CM.1 Toxic Substances and Control Act Compliance

Performance Objective: The Laboratory must comply with the Toxic Substances Control Act and related requirements.

Finding/T&CM.1-1: The Laboratory has too much PCB equipment creating a significant level of risk.

> **Discussion:** PCB electrical equipment is in use at the Laboratory. The Laboratory presently has over 80 PCB transformers and over 400 PCB capacitors in use.
>
> Potential health risks because of PCB transformer fires can be significant. Nationwide experience has shown that cleanup costs associated with PCB fires in buildings have run into the millions of dollars.

Finding/T&CM.1-2: A systematic survey to identify all PCB-contaminated light ballasts, to be followed by subsequent replacement, does not exist at the Laboratory.

> **Discussion:** Rupture of PCB light ballasts at the Laboratory happens with some frequency. Operational downtime, risk of injury, and excessive cleanup costs result from rupture of these ballasts. A Laboratory-wide survey of all light ballasts would allow a systematic approach to correcting this deficiency.

Finding/T&CM.1-3: No systematic survey exists to ensure that all PCB equipment is included on the Laboratory's replacement priority list.

> **Discussion:** An inventory of PCB equipment has been made. The identification of additional PCB equipment occurs with some frequency.

Finding/T&CM.1-4: PCB cleanups and other related activities are not always completed in a timely manner. Cleanup procedures are also inadequate for effective regulatory compliance.

> **Discussion:** Regulatory requirements for most PCB spills require clean up to be initiated within 24 hours. PCB cleanups have been delayed because of poor planning, inadequate resources, and delay in providing analytical results. Inadequate cleanups cause unnecessary risks, employee exposures, operational downtime, and regulatory compliance problems.

Finding/T&CM.1-5: Analytical results from PCB samples to support cleanups and other activities are not always completed in a timely manner.

> **Discussion:** Present analytical services are inadequate to provide sampling results within regulatory and operational time constraints. Lack of timely analytical results has delayed PCB cleanups and preventive maintenance activities.

Finding/T&CM.1-6: The Laboratory has PCB equipment on loan to universities and other institutions.

> **Discussion:** During previous years, the Laboratory loaned electrical equipment to universities and other institutions for use in experiments and related operations. Some of this equipment has been found to contain PCBs. This equipment should be recalled and disposed of by the Laboratory.

Finding/T&CM.1-7: Sampling procedures, QA, and SOPs, including worker protection, for the PCB Program are not current.

> **Discussion:** Formal procedures for PCB sampling and QA are required. Formal procedures for PCB record keeping are also needed to properly document routine PCB activities, including electrical equipment replacement, cleanup, and testing. A formalized notification procedure for PCB spill reporting is also needed.

T&CM.2 Hazardous Waste Regulations

Performance Objective: Operators of treatment and storage units and other handlers of hazardous waste must comply with the New Mexico hazardous waste regulations and the federal RCRA.

Finding/T&CM.2-1: Some generators of hazardous waste are not in compliance with state and federal hazardous waste regulations.

> **Discussion:** In some cases, hazardous waste labels are missing from containers in accordance with 40 CFR 262.34 (a) (4) and (c) (1) (ii) and AR 10-3; labels are missing accumulation dates in accordance with 40 CFR 262.34 (a) (3) and 40 CFR 262.34 (c) (2); containers are not closed in accordance with 40 CFR 262.773 (a) and 265.173 (a); inspection logs are missing or are not properly filled out in accordance with 40 CFR 264.15 and 265.15; storage capacities are not in accordance with 40 CFR 262.34 (a) and (b); and containers are not in good condition in accordance with 40 CFR 264.171 and 265.171. In addition, some generators have not adequately characterized their waste in accordance with 40 CFR 262.11 and have not informed EM-8 of areas where hazardous waste is stored in accordance with 40 CFR 262 and AR 10-3.

Finding/T&CM.2-2: Manifests are prepared that contain an incorrect RCRA waste code.

> Discussion: In accordance with 40 CFR 262.20, a generator who transports or offers for transport hazardous waste for off-site treatment, storage, or disposal must prepare a manifest according to instructions given in the appendix to 40 CFR 262. One of these requirements is the use of the proper RCRA waste code. In a few cases, the Laboratory has not prepared manifests in accordance with the regulations.

Finding/T&CM.2-3: Land disposal restrictions (LDR) notification information is not maintained with the manifest copy in the operating records.

> Discussion: If a generator determines that restricted waste is being managed and it does not meet the treatment standard, the generator must notify the treatment, storage, or disposal facility in accordance with 40 CFR 268.7. LDR notification information is not kept with the manifest copy in the operating records, which indicates such information may not have been sent with the manifest. In a few cases, the Laboratory did not notify the treatment, storage, or disposal facility in accordance with the regulation.

Finding/T&CM.2-4: The TA-53 lagoons do not comply with the federal RCRA.

> Discussion: In January 1991, two sanitary lagoons and one radioactive waste lagoon into which radioactive wastes were discharged before 1990 were classified as mixed waste units. This classification was based on a 1987 DOE sampling survey indicating the presence of toluene in one impoundment and all were added to the Part A portion of the Laboratory's mixed waste permit application. In July 1991, the Part B portion of the mixed waste permit application was submitted for the three surface impoundments.

Evidence of tritium above background levels was detected in the subsurface near the impoundments.

Plans and specifications for installation of a lift station and force main to eliminate the two TA-53 sanitary lagoons have been completed. A subsurface monitoring system was installed in July 1991, consisting of six neutron moisture logging access holes, one with a cup lysimeter and one with a pore gas monitoring system.

Finding/T&CM.2-5: Residues that contain levels of plutonium above the economic discard limit and hazardous waste characteristics/constituents are not handled at TA-55 as radioactive mixed wastes in accordance with federal and state hazardous waste regulations.

Discussion: Residues at TA-55 are process wastes, whether or not plutonium levels are above an economic discard limit and residues are reprocessed to reclaim the plutonium. Therefore, if a residue contains a hazardous waste characteristic or constituent, the residue must be managed as a radioactive mixed waste before it is reprocessed, as well as the waste from the reprocessing activity (40 CFR 261.6). At TA-55, this means that residues that will be reprocessed must be stored in accordance with 40 CFR 264 or 265. However, these residues are not stored as wastes and therefore the storage areas were not included in the Laboratory's mixed waste Part A application. These areas also do not comply with other RCRA requirements, such as posting, inspection, and personnel training.

T&CM.3 Federal Insecticide, Fungicide, and Rodenticide Requirements

Performance Objective: The Laboratory must comply with the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) and related requirements.

Finding/T&CM.3-1: The Pest Control Policy for the Laboratory does not accurately reflect current operations.

Discussion: The Pest Control Policy is not current with regard to roles and responsibilities. The ENG Division through JCI is responsible for the operation of the Laboratory's Pest Control Program. The WQ&T Section of EM-8 reviews the Pest Control Policy to ensure compliance with FIFRA and related requirements.

Finding/T&CM.3-2: Plans, sampling procedures, QA, and SOPs, including worker protection, do not meet the current FIFRA Program requirements.

Discussion: Formal procedures for sampling and QA are required. Formal procedures for FIFRA record keeping are also needed to properly document routine activities.

3.2.7 Quality Assurance

The principal QA requirements for environmental programs at the Laboratory include DOE Order 5700.6B, Draft DOE Order 5700.6C "Quality Assurance", DOE Order 5400.1, the Los Alamos National Laboratory Quality Program Plan (March 29, 1989), and the EM Division Quality Program Plan (February 11, 1991). Additional sources of QA requirements arise through the conduct of specific programs in accordance with various federal and state regulations. Specific programs are discussed in detail elsewhere in this report.

Requirements such as those named above are not the sole basis for environmental QA; there are other reasons that the application of QA concepts is of interest to environmental efforts at the Laboratory. These reasons include the ability of the Laboratory to demonstrate compliance with various codes, standards, and regulations, as well as the need to provide data and input that can be successfully defended against technical and legal challenge. Key factors associated with these applications are sample collection and analysis and generation of the records associated with those tasks.

In general terms, none of the environmental programs pursued at the Laboratory can be shown to be in full compliance with all applicable QA requirements. The major issue associated with environmental QA is the successful integration with DOE, federal, state, and Laboratory QA requirements; better communications with DOE and the internal Laboratory rule-making processes will be major considerations in the outcome of those efforts. Also of interest to the Laboratory is the ability to balance the complexity of requirements and the subsequent rules against the ability to meet those requirements with the resources available.

<u>EQA.1 Quality Assurance Programs</u>

Performance Objective: Administrative programs and controls should be in place to ensure that policies concerning quality of environmental programs are administered for each facility throughout the Laboratory.

Finding/EQA.1-1: The Laboratory does not meet the requirements for implementation of QA programs for environmental activities.

Discussion: QA activities for EM groups are in various stages of implementation.

<u>EQA.2 Implementation of Environmental Guidance Documents</u>

Performance Objective: The scope and depth of environmental programs should be consistent with the nature and complexity of activities conducted.

Finding/EQA.2-1: Consistent guidance is not available to Laboratory operating organizations regarding the requirements, implementation, or compliance status of necessary environmental programs.

Discussion: The principal guidance to operating organizations is the Laboratory *ES&H Manual*. Section 9, Environmental Protection, and Section 10, Waste Management, are the major sources of guidance available to operating organizations. Changes to the manual are not timely and guidance is not current.

EQA.3 Environmental Monitoring

Performance Objective: Environmental monitoring programs should be conducted in a manner consistent with applicable federal regulations, DOE orders and directives, and commonly accepted best industry practices.

Finding/EQA.3-1: Documentation of Laboratory environmental monitoring is not adequate to ensure that these activities are conducted in accordance with applicable federal regulations, DOE orders and directives, and commonly accepted best industry practices.

Discussion: Procedures are not being reviewed and updated on a regular basis. A number of existing procedures governing the collection of samples for environmental monitoring were reviewed and found not to be current; documented evidence of interim review and/or updates was not available.

EQA.4 Environmental Analytical Quality Assurance

Performance Objective: Analytical practices for environmental monitoring should be capable of demonstrating the validity of data generated by the analytical laboratory.

Finding/EQA.4-1: A formal Laboratory-wide calibration program for important environmental instruments has not been fully implemented.

Discussion: The calibration plan has not been updated since 1986. A final draft revision has been prepared.

Finding/EQA.4-2: A process to ensure the conduct of formal audits and surveillances that verify the extent of conformance to established environmental programs has not been fully developed and implemented.

Discussion: The Laboratory does not conduct audits of QA aspects of environmental activities.

EQA.5 Records and Record Keeping

Performance Objective: Records of environmental monitoring activities (including collection and analysis of samples) should be specified, prepared, and maintained. Records should be protected against damage, deterioration, or loss. A system for management of records should be established and used.

Finding/EQA.5-1: Records of environmental activities are not stored and maintained in accordance with applicable requirements.

> **Discussion:** Many aspects of records management have not been adequately resolved for the Laboratory environmental programs. A fragmented approach to the generation, collection, and storage of records can be observed.

EQA.6 Personnel Qualifications

Performance Objective: Provisions should be made to ensure that personnel engaged in the conduct of environmental monitoring and surveillance programs are properly qualified. Qualifications should include such provisions as educational background, work experience, and on-the-job training.

Finding/EQA.6-1: The documentation of on-the-job training for environmental activities is inadequate.

> **Discussion:** The Laboratory does not document the completion of on-the-job training for environmental activities. The Employment Development System data base has been established to remediate this inadequacy, but not all employees are familiar with documentation requirements or the existence of this data base.

3.2.8 Radiation

The Laboratory's Environmental Protection group (EM-8) evaluates the radiation doses that members of the public may receive as a result of past and ongoing Laboratory operations. This evaluation is based on data collected by the Environmental Surveillance Program and Radioactive Effluent Monitoring Program.

The objectives of the programs are to monitor the effect of Laboratory operations on the surrounding communities and to ensure compliance with applicable DOE orders and EPA regulations governing radiation protection of the public.

Potential exposure pathways that are routinely evaluated are inhalation of airborne radioactivity released by Laboratory operations, exposure to external penetrating radiation released directly from Laboratory facilities or picked up from exposure to airborne radioactivity or material deposited on the ground, and ingestion of foodstuffs and consumption of drinking water. Each of these pathways is monitored, and potential radiation doses are calculated using the sampling results.

The Environmental Surveillance Program at the Laboratory includes

- continuous air sampling at 39 locations

- continuous monitoring of external penetrating radiation using thermoluminescent dosimeters at 155 locations

- sampling of foodstuffs at 29 locations

- sampling of surface and/or ground waters at 75 locations

- sampling soils and/or sediments at 66 locations

The Radioactive Effluent Monitoring Program includes

- monitoring airborne radioactive effluent at 87 release points

- monitoring liquid effluent discharge from the Laboratory's liquid waste treatment plant

In addition, atmospheric transport models are used to calculate potential radiation doses to members of the public from airborne releases of radioactive material. These models use annual airborne radionuclide emission rates and meteorological wind speed, wind direction, and stability class, as measured for each year as part of the ongoing Environmental Surveillance and Effluent Monitoring Program. Results of the modeling provide a separate, independent confirmation of the environmental monitoring results for the Laboratory's most important pathways.

The maximum effective dose equivalent received by an individual from Laboratory operations is typically in the range of 3 to 6 mrem (50-year dose commitment) per year of operation. These dose estimates are based on environmental measurements. A somewhat more conservative estimate of the dose made with the computer program AIRDOS-EPA is 8 to 9 mrem/year. Thus, the Laboratory is in compliance with the DOE's Public Dose Limit of 100 mrem per year to any member of the public from all pathways, and EPA's radiation limit of 10 mrem per year from the air pathway alone.

The largest contribution to the maximum individual dose comes from airborne emissions of short-lived air activation products from LAMPF. The LAMPF stack is scheduled to be replaced and moved during FY92, with an expected reduction in the off-site dose by a factor of six.

In addition to dose assessment, the Environmental Radiation Program is responsible for evaluating new construction or modification of Laboratory facilities that may emit airborne radioactivity. These projects are evaluated for the possible need to obtain approval from EPA before construction. This approval is required under 40 CFR Part 61, Subparts A and H, for qualifying facilities.

Past programmatic initiatives in the Environmental Monitoring Program have produced very positive results. An effluent dispersion study has led to a good understanding of the behavior of airborne effluent from LAMPF and how it can be modeled. A follow-up program calls for the development and installation of a high sensitivity, real-time external gamma radiation monitor at the location most affected by LAMPF to complete the current LAMPF off-site dose monitoring program. Other initiatives include programs to model sampling and sediment transport and to describe the movement and effect of past liquid waste discharges in the Los Alamos canyon systems.

A current program weakness is the Laboratory's inability to demonstrate compliance with EPA's monitoring requirements for airborne radioactive effluent. (See TS.5 for a discussion of this issue.) This weakness is being addressed in a compliance plan now being prepared for submittal to EPA Region 6. A second weakness is the inadequate documentation of many aspects of the sampling and dose evaluation programs.

RAD.1 Ambient Air Monitoring

Performance Objective: DOE Order 5400.1 requires environmental surveillance of DOE facilities including Ambient Air Monitoring. The implementation of that order is presented in DOE/EH-0173T.

Finding/RAD.1-1: The Laboratory AIRNET Ambient Air Monitoring Program is not in full compliance with DOE Order 5400.1 and DOE/EH-0173T, including the new provisions requiring increased documentation.

Discussion: The Laboratory's AIRNET Ambient Air Monitoring Program does not fully comply with DOE Order 5400.1 and DOE/EH-0173T for the following reasons:

- Analysis showing that some air samplers are located at the predicted maximum annual average ground-level locations must be better documented.

- Because of operational considerations, some air sample locations remain close to buildings and traffic areas. A review of the air sampling network, however, indicated that over 80 percent of the samplers are placed in locations that meet all the criteria listed above. Complete compliance with the criteria for all locations is not possible because of restrictions such as topography, demography, and available power in Los Alamos County in some areas.

- Air samples are collected monthly instead of biweekly as recommended in DOE/EH-0173T. Staffing of the AIRNET Program does not allow sample collection, processing, and analysis more frequently than once a month.

- Particle size distribution should be determined on an annual basis in areas of resuspension, specifically TA-54, Area G and Area AB.

  Cascade impactors have been purchased and particle size distribution determinations will be scheduled on an annual basis. TA-54, Area G and Area AB are controlled areas on Laboratory property closed to public access.

- As a Best Management Practice, samples for tritium gas (in addition to water vapor now being collected) should be made at appropriate locations surrounding tritium facilities. The incremental dose from tritium gas, however, is expected to be less than one percent of the dose from tritiated water vapor, so that this additional sampling will not increase the estimate of dose.

Tritium gas samplers are being purchased and should be operational by January 1, 1992.

- Data handling and statistical analysis of data are not formally documented.

  Both data handling and statistical analysis of data are being documented in the Environmental Monitoring Plan.

- Computer codes used for sample calculation and analysis are documented but have not been "certified."

  The AIRNET data handling and calculations are being upgraded using a data base management system (ORACLE).

- Sampling and analytical errors have not been propagated for the AIRNET Program.

- A formal quality control program to monitor the analytical Laboratory's performance has not been established. Less than 10% of the samples submitted for analysis are QC samples.

- The current AIRNET QA plan does not include all information required by DOE/EH-0173T or newly revised Laboratory or EM Division QA plans. The AIRNET QA plan is currently being modified to include this information.

RAD.2 Penetrating Radiation Monitoring

Performance Objective: DOE Order 5400.1 requires environmental surveillance of DOE facilities including monitoring penetrating radiation. The implementation of that order is presented in DOE/EH-0173T.

Finding/RAD.2-1: The Laboratory External Penetrating Radiation Monitoring Program is not in complete compliance with DOE Order 5400.1 and DOE/EH-0173T, principally with new provisions requiring increased documentation.

Discussion: The Laboratory's External Penetrating Radiation Monitoring Program is not in compliance with DOE Order 5400.1 and DOE/EH-0173T for the following reasons:

- The environmental thermoluminescent dosimeter (TLD) QA plan does not include all the information required by DOE/EH-0173T or newly revised Laboratory or EM Division QA plans. This QA plan is currently being modified to include this information.

- Data handling and statistical analysis of the data must have better documentation. This documentation is being developed in support of the EMP. Statistical analysis and handling of Laboratory external penetrating radiation monitoring data must be better documented.

- Computer codes for calculations and analysis must have better documentation, as well as be "certified."

- The environmental neutron monitoring method is not completely based on the anticipated flux and energy spectrum from individual Laboratory facilities that may emit neutrons.

- *In situ* measurements have not been completed and documented at all TLD locations. These measurements have been completed, however, for all off-site locations in the routine Environmental Surveillance Program, and will have been completed for all on-site routine stations by August 31, 1991.

- Some TLDs are placed in locations at which the altitude differences between control locations and indicator locations may be significant. This is related to the difficulty in choosing control locations matching the geology of the Los Alamos area.

<u>RAD.3 Environmental Surveillance Program</u>

Performance Objective: DOE Order 5400.1 requires an evaluation as a basis for establishing an Environmental Surveillance Program. The evaluation is to be formally documented. The implementation of that order is presented in DOE/EH-0173T.

Finding/RAD.3-1: The evaluation used for establishing an Environmental Surveillance Program in accordance with the requirements of DOE Order 5400.1 has not been formally documented.

> **Discussion:** The pathway analysis has been completed but not documented; the evaluation of needed monitoring methods based on the pathway analysis has not been documented and is not referenced in the Annual Site Environmental Report.

<u>RAD.4 Environmental Safety Documentation</u>

Performance Objective: DOE Order 5400.1 as implemented in DOE/EH-0173T requires complete documentation of models, input data, and computer programs that support the Annual Site Environmental Report and other functions for dose calculations. Other functions include Safety Analysis Reports, Environmental Assessments, and NESHAP Rad Air evaluations. Best Management Practice would dictate that the dose calculation methodology used in the group be formally documented in one report.

Finding/RAD.4-1: The EM-8 environmental dose calculation methods are not formally documented in one source.

Discussion: Formal documentation of the radiological assessment and dose calculation methodology used by EM-8 for all but NESHAP analysis (40 CFR 61) exists only in the Laboratory Annual Site Environmental Report. The methodology used for off-site radiological consequences evaluations for SARs is not consistently formally documented. Methods are only discussed in the document in which results are presented. The correspondence between modeled and measured parameters, such as radionuclide concentrations in foodstuffs, must be better documented. QA requirements for dose calculations must be incorporated in the QA Plan.

RAD.5 Environmental Surveillance of Inactive Waste Sites

Performance Objective: Environmental surveillance of inactive waste sites is required by DOE Order 5820.2A III-9. The above order requires compliance with DOE Order 5400.1, which is implemented by DOE/EH-0173T.

Finding/RAD.5-1: The Inactive Waste Site Environmental Surveillance Program is not fully in compliance with DOE Order 5820.2A III-9, DOE Order 5400.1, and DOE/EH-0173T.

Discussion: The Inactive Waste Site Environmental Surveillance Program is not in compliance for the following reasons:

- the radiological surveillance program for inactive waste sites is not documented
- sampling and surveillance activities (with the exception of air, penetrating radiation, and water) are not performed on a routine scheduled basis
- annual reports on the inactive waste site radiological monitoring have not been prepared for two years
- documentation of data handling and statistical analysis of data is incomplete
- critical pathway analysis for each site and radionuclide present has not been consistent from year to year
- sampling protocols and methods based on pathway analysis have not been formally documented

Finding/RAD.5-2: The performance assessment for TA-54, Area G has not been completed.

Discussion: DOE Order 5820.2A requires a performance assessment for low-level waste disposal sites. The performance assessment for TA-54, Area G has not been completed. Best Management Practice dictates that the performance assessment be completed as soon as possible.

RAD.6 Decontamination and Decommission Requirements

Performance Objective: DOE Order 5820.2A, Chapter V, lists requirements for Decontamination and Decommission (D&D) Programs.

Finding/RAD.6-1: The Laboratory D&D program is not in compliance with the requirements of DOE Order 5820.2A, Chapter V.

> **Discussion:** Staffing constraints have impacted compliance with DOE Order 5820.2A requirements. Increases in Laboratory staffing and budget have been authorized beginning October 1, 1991. This will enable additional Decontamination and Decommission Program emphasis.

3.2.9 Inactive Waste

In 1989, DOE created the DOE Office of Environmental Restoration and Waste Management (EM). The goal of the office is to implement the department's policy to ensure that its past, present, and future operations do not threaten human health and safety or the environment. The EM Office implements procedures to meet these goals through three associate directorates: ER, Waste Operations, and Technology Development. The ER Program within EM is responsible for assessing, cleaning up, decontaminating, and decommissioning sites at DOE facilities and sites formerly used by DOE.

Two primary laws govern ER activities at the Laboratory: the Comprehensive Environmental Response, Compensation, and Liability Act [CERCLA (Superfund)], and RCRA. The hazardous waste provisions of RCRA govern the day-to-day operations of hazardous waste treatment, storage, and disposal (TSD) facilities. The law established a permit system and set standards for all hazardous-waste-producing operations at a TSD facility. Under this law, the Laboratory qualifies as a treatment and storage facility and must have a permit to operate. In 1984, Congress amended RCRA by passing HSWA. Section 3004(u) (of RCRA as amended by HSWA) mandates that permits for TSD facilities include provisions for corrective action to mitigate releases from facilities in operation and to clean up contamination in areas designated as solid waste management units (SWMUs).

Congress conceived and passed CERCLA to clean up the nation's most hazardous abandoned waste sites. Under CERCLA, EPA ranks abandoned facilities that have hazardous waste sites according to their potential threat to human health and environment. The high-scoring sites are listed on the National Priorities List (NPL) and are cleaned up in accordance with CERCLA regulation. When EPA ranked the Laboratory, the agency determined that current environmental conditions do not pose an imminent threat to human health. Hence, the Laboratory is not listed on the NPL. The DOE/University of California (the University) RCRA Permit includes a section called the HSWA Module, which prescribes a specific corrective action program for the Laboratory. Because the Laboratory has not been listed on the NPL, the HSWA Module provides the primary guidance for the Laboratory's ER Program. However, the program must also meet the substantive requirements for CERCLA, as well as those of other environmental statutes.

The HSWA Module lays out a three-step process for addressing SWMUs at the Laboratory.

- The RCRA facility investigation (RFI) - The goal of this step is to identify the nature and extent of contamination at source points and in environmental pathways that could lead to exposure of humans and the environment. This step will be implemented by characterizing the extent of contamination in the detail necessary to determine what corrective measures, if any, need to be taken. The Laboratory will focus on answering only those questions relevant to deciding further actions.

- Corrective measures study (CMS) - If characterization indicates that corrective measures may be needed, this study will evaluate alternatives that might be reasonably implemented. Corrective measures will be evaluated based on their projected efficacy in reducing risks to human and environmental health and safety in a cost-effective manner.

- Corrective measures implementation - This step implements the chosen remedy, verifies its effectiveness, and establishes ongoing control and monitoring requirements.

The HSWA Module provides a schedule for addressing 603 SWMUs that the EPA has selected from those identified by DOE and the University. The schedule requires that all 603 SWMUs be addressed in RFI work plans by May 23, 1994, and that the CMS reports be complete by May 23, 2000. DOE and the University have aggregated all SWMUs into operable units (OUs) to be taken through the corrective action process. The OUs also contain all SWMUs and other areas of concern identified in the DOE Headquarters (HQ) Environmental Survey and the Laboratory's 1990 SWMU Report (approximately 2,300 potential sites). Thus, the permit schedule for completing the work plan will be met by submitting one RFI work plan for each of the 24 operable units (24 work plans by May 23, 1994).

Current risks from known SWMUs are low; hence, no OU or set of SWMUs has a priority for action over others based on health or environmental concerns. However, OUs near Laboratory boundaries and off site have been given higher priority. The order in which OUs will be addressed is therefore designed to meet the requirements of the HSWA Module. However, DOE and the University propose to extend the RFI process by an amount that will delay completion of the five final CMS reports to the year 2002. This extension of the schedule is necessary because the HSWA Module included only a subset of the SWMUs that the ER Program must address to meet all applicable environmental regulations (not just those of RCRA). In addition, the extended schedule allows the effort to be spread over a period compatible with the availability of national resources, including funding.

The HSWA Module of the RCRA Permit defines the principal requirements with which DOE and the University must comply in implementing the ER Program at the Laboratory. RCRA does not address several issues of concern at Los Alamos. For example, source material, by-products, and special nuclear material are exempt from the RCRA definition of solid waste and are not subject to the provisions of the HSWA Module. DOE and the University recognize that these radioactive constituents are of major concern and cannot be separated from concerns about hazardous waste. Thus, DOE and the University's ER Program addresses radioactive as well as other hazardous substances not regulated by RCRA. This approach is intended to implement a technically comprehensive program that covers potential liabilities associated with other environmental laws, such as CERCLA. The language in ER documents pertaining to subjects outside the scope of RCRA is understood not to be enforceable under the RCRA Permit.

The ER Program has remained in compliance with the HSWA Module, which was effective May 23, 1990.

IW.1 Environmental Statutes

Performance Objective: The Laboratory's ER Program must meet the requirements of all applicable environmental statutes; however, two primary laws, as amended, govern ER activities at the Laboratory: CERCLA of 1980 and RCRA of 1976, and HSWA to the RCRA.

Finding/IW.1-1: The Laboratory does not have adequate procedures in place to ensure that the ER Program is implemented in accordance with Laboratory, DOE, and regulatory requirements.

> **Discussion:** Additional administrative procedures are required to ensure that the Laboratory ER Program is implemented properly and in a cost-effective fashion. An example of a needed administrative procedure is the determination of need for and implementation of institutional interim actions for assessment and remedial activities.

Finding/IW.1-2: The Laboratory does not have a good management information system to support the ER FYP.

> **Discussion:** The Laboratory's ER Program is a major program that will last for decades. The Laboratory must implement a good management information system.

Finding/IW.1-3: The Laboratory does not provide timely reporting to DOE and EPA.

> **Discussion:** The reporting requirements stipulated in the RCRA/HSWA Permit have no time constraint, i.e., twelve monthly reports could be submitted at the end of the year. However, this does not satisfy the intent of monthly reporting and, without a regulatory driver, reporting has not been timely.

Finding/IW.1-4: The ER Program is not sufficiently integrated with Laboratory operations to avoid delay in planned activities.

> **Discussion:** The existence of SWMUs at the Laboratory presents design, facility siting, and operational concerns. Operational and construction activities do not always consider and address SWMU issues.

Finding/IW.1-5: The ER site-specific health and safety plans do not meet requirements of 29 CFR 1910.120 (OSHA).

Discussion: The Laboratory's health and safety plans are not adequate for institutional interim remedial measures. An audit is being conducted to document the extent of noncompliance with 29 CFR 1910.120 (OSHA).

Finding/IW.1-6: SOPs for ER activities are not in place.

Discussion: SOPs are needed to properly implement the ER Program. Draft SOPs have been prepared and were submitted to EPA.

3.2.10 National Environmental Policy Act

The NEPA requires that when federal projects are planned, consideration be given to environmental values. Before a decision is made to undertake a project or a program, possible adverse environmental impacts must be evaluated and, if necessary, mitigation measures to lessen the impact must be incorporated into the plans. As a federal agency, DOE is responsible for compliance with NEPA. DOE issued DOE Order 5440.1A, B (1982); C, "National Environmental Policy Act" (1985); and D, "National Environmental Policy Act Compliance Program" (1991), outlining implementation strategies for NEPA.

EM-8 implements NEPA at the Laboratory. The Laboratory's NEPA Program has been active since 1973, reviewing construction projects (such as line item and general plant projects) as well as any action with potentially significant environmental effect or any action likely to generate public concern. The Laboratory Environmental Review Committee, an upper-level management group, was established in 1975 to oversee all NEPA documents.

Until the issuance of Secretary of Energy Notice (SEN)-15-90 (February 5, 1990), EM-8 operated with authority to make categorical exclusion determinations and prepared Action Description Memorandum to document the potential environmental impacts of proposed major projects that were not appropriate for categorical exclusions. The group also prepared environmental assessments, if DOE determined that level of NEPA documentation to be appropriate for a particular action.

SEN-15-90 and DOE Order 5440.1D significantly altered the implementation of NEPA. The Laboratory program now provides only information on projects and activities; DOE makes all NEPA determinations. The Laboratory staff prepare DOE environmental check lists (DECs) as the initial information document, in accordance with Department of Energy/Albuquerque Office (DOE/AL) guidance. If an environmental assessment (EA) is determined to be appropriate for an action, the Laboratory staff prepares that document. If an EIS is deemed appropriate, DOE prepares the document to preclude conflict of interest.

The NEPA Program is the responsibility of the Environmental Assessments and Resource Evaluations Section of EM-8. NEPA provides additional protection for certain sensitive areas—the habitat of threatened and endangered species; floodplains and wetlands; and cultural resources. Programs for biological and cultural resources are also located in the section.

DOE made major changes in the implementation of NEPA with SEN-15-90 and DOE Order 5440.1D. Authority for NEPA determinations were centralized in HQ, with delegation of authority possible only to the Field Office manager. All activities, including paper studies and routine maintenance, were to be reviewed for a NEPA determination. A list of additional proposed categorical exclusions was prepared, but it is still not final.

SEN-15-90 was effective the day it was signed, with no time allowed for developing responses and implementation. The workload at the Laboratory increased by at least an order of magnitude. The workload for DOE field offices, HQ program offices, and the Office of NEPA Oversight all increased significantly. Guidance from DOE is still in preparation. As a result, many months pass before a project receives a NEPA determination. The Laboratory is striving for compliance but has yet to achieve full compliance. This is largely due to the significant changes in the requirements.

NEPA.1 DOE Program Requirements

Performance Objective: The Laboratory's NEPA Program implementation should meet DOE orders.

Finding/NEPA.1-1: The Laboratory's NEPA Program does not meet DOE requirements.

> Discussion: The Laboratory's NEPA program is not consistent with DOE Order 5440.1D and SEN-15-90. DOE proposed rule (10 CFR 1021) and implementing guidance have not been finalized.

NEPA.2 Environmental Impact Review and Approval

Performance Objective: All significant actions at the Laboratory are analyzed for environmental impacts in a NEPA document that is reviewed and approved by DOE before the action goes beyond the planning stage.

Finding/NEPA.2-1: The Laboratory's procedures do not ensure that all significant projects or programs are reviewed.

> Discussion: The NEPA Program prepares documentation for projects from the following set: line item projects, general plant projects, and all other projects assigned a Laboratory job number (LJ#) by the ENG Division. Information on projects is normally received through the ES&H questionnaire system, organized by EM-3 who reviews all projects assigned a LJ# and requests a questionnaire for the majority of the projects. In addition, the use of the questionnaire system has been initiated by some project leaders or ES&H personnel in operating divisions. However, the only set of projects that are routinely reviewed are those involved with construction or modifications to buildings. This deficiency was noted in a DOE/AL appraisal of November 1989, Recommendation (EP) 89-9.

The need to expand NEPA beyond construction-related projects was one reason for a revision in AR 9-2, issued March 1991. AR 9-2 states that NEPA review and documentation are required for all actions that have the potential for impact on the human environment. Line management is tasked with responsibility for initiating an ES&H questionnaire whenever a project appears to fit this descriptor. (See Finding NEPA.7-1 for a further discussion of this AR.) Nevertheless, this procedure has not been fully implemented.

Finding/NEPA.2-2: The Laboratory's NEPA Program does not review all activities (e.g., routine maintenance) as required by the DOE's NEPA Program.

Discussion: To be in complete compliance with the current NEPA proposed rule from DOE, all activities, including reimbursable projects, small job tickets, work orders, standing work orders for maintenance, etc., should be reviewed and DECs submitted.

Finding/NEPA.2-3: Projects that have been reviewed for NEPA have begun construction or operation before the NEPA document has been approved by DOE.

Discussion: A number of projects at the Laboratory have been constructed or have begun Title II Design without approved NEPA documentation.

AR 9-2, March 1991, states that line management is responsible for ensuring that NEPA documentation is complete before an activity is initiated or construction started. Since mid calendar year 1990, line managers have received formal notification of the progress of NEPA documentation.

Finding/NEPA.2-4: The Laboratory does not have a procedure to ensure that projects are reviewed at the earliest possible stage to incorporate NEPA into decision-making.

Discussion: The NEPA Program at the Laboratory needs to develop methods for reviewing projects earlier in the planning stage. The current method of reviewing projects at the point when a LJ# is assigned is frequently too late in the process for projects funded by current year operations money to allow adequate time for a NEPA document to be prepared and reviewed.

The NEPA Program at the Laboratory needs to develop a prioritization methodology for the preparation of DECs and EAs and communicate that methodology to management for approval.

Finding/NEPA.2-5: The Laboratory's NEPA Program does not have a consistent procedure to learn about proposed modifications in projects and activities that have been analyzed in a NEPA document.

Discussion: Proposed modifications in projects and activities are not routinely reviewed to determine whether the environmental impacts are bounded by those reported in the

NEPA document. AR 9-2 includes modifications as one of the types of actions for which line managers should contact the NEPA staff.

NEPA.3 Authority for NEPA Determinations

Performance Objective: The contractor should provide adequate information to support NEPA determinations.

Finding/NEPA.3-1: The Laboratory NEPA staff have made NEPA determinations without authority.

Discussion: Before SEN-15-90, the Laboratory NEPA Program had authority to make determinations for actions that fell below a *de minimus* level and for categorical exclusions. SEN-15-90 was issued without any implementation guidance and without any time period for adjusting to a new system. Initially, the Laboratory staff addressed the increase in workload by continuing to make some NEPA determinations internally. These determinations were limited to projects that appeared to fit the definition proposed by DOE in draft regulations to be categorically excluded "without documentation" because the activity could reasonably be expected to have no significant or cumulative environmental impact. This internal decision-making ("NEPA/ND") is in contradiction to the DOE order.

NEPA.4 Site-Wide EIS

Performance Objective: The site-wide EIS is used as a reference in other NEPA documents, if that document is adequate and recent.

Finding/NEPA.4-1: The Laboratory has used the 1979 site-wide EIS as a reference in other NEPA documents. The document is considered to be inadequate both by Council on Environmental Quality (CEQ) guidelines and the new DOE NEPA order.

Discussion: CEQ guidelines suggest a formal review of an EIS at least every five years. The Laboratory site-wide EIS was prepared in 1979, is now 12 years old, and has never been formally reviewed by DOE.

The Laboratory uses descriptions from the site-wide EIS in prepared NEPA documents. The reference is usually limited to descriptions that are considered accurate in the EIS and have not been superseded by more recent studies or analyses. The annual Environmental Surveillance Report, which provides a yearly summary of the environmental impacts of the operation of the facility, is referenced for other descriptions of the environmental setting in prepared EAs.

In addition, on several occasions the Laboratory has determined some activities as "ongoing" with impacts addressed in the site-wide EIS, and hence not needing additional NEPA documentation. This type of action by the Laboratory has been verbally approved by DOE/AL.

DOE has included a site-wide policy statement in the new NEPA order, proposing review of existing site-wide documents and revisions, as necessary. Preparation of a site-wide EIS is a DOE responsibility. The Laboratory is prepared to assist in any way possible.

NEPA.5 Tracking of Mitigations Proposed in NEPA Documents

Performance Objective: A complete NEPA Program tracks mitigations proposed in NEPA documents.

Finding/NEPA.5-1: The Laboratory's NEPA Program does not review projects to see if they are constructed or operated consistently with the commitments of a NEPA document and does not report on implementation of mitigative measures.

Discussion: The new DOE NEPA order calls for a documented program to track mitigations proposed in EAs and EISs. A formal tracking of commitments made in all NEPA documents is an important and necessary follow-up procedure that would ensure not only adherence to NEPA but would also assist in maintaining environmental compliance.

NEPA.6 Integration of NEPA Requirements

Performance Objective: NEPA requirements are integrated with the requirements of RCRA and CERCLA.

Finding/NEPA.6-1: The Laboratory program has not routinely integrated NEPA with RCRA and CERCLA.

Discussion: The issue of integrating RCRA and CERCLA and NEPA has been a matter of considerable controversy within DOE and between DOE and EPA. Guidance has been confusing and conflicting.

The Laboratory prepared NEPA documentation for some RCRA closures, but not all closures. NEPA documents are being prepared for the site investigation phase of operable units (collections of SWMUs), as defined by the ER Program. NEPA documents have not been systematically prepared for the site characterization phase of interim actions of ER.

NEPA.7 Management and NEPA Responsibilities

Performance Objective: The Laboratory line management is aware of and trained in its NEPA responsibilities.

Finding/NEPA.7-1: Line management is not sufficiently trained in its NEPA responsibilities.

Discussion: AR 9-2 outlines the general requirements of NEPA compliance. Line management has primary responsibility for initiating the NEPA process by the completion of an ES&H questionnaire and for ensuring that projects do not start without an approved NEPA document. The AR was designed to be generic to meet the needs of a NEPA Program in evolution at DOE.

NEPA.8 Procedures and Records

Performance Objective: The NEPA Program has formal procedures for program implementation and record keeping and uses these procedures so that NEPA records are complete.

Finding/NEPA.8-1: The NEPA Program does not have formal written procedures for program implementation or for record keeping.

Discussion: Although the NEPA staff routinely informs line managers on the status of NEPA documentation by formal memo, no formal written procedure has been developed outlining when these memos are generated.

The Laboratory NEPA staff makes "NEPA/Not Applicable" determinations (see above), but do not document the justification for that determination.

The Laboratory maintains a data base of NEPA documents and decisions that were noted by DOE/AL in November 1989 appraisal as

> "The Laboratory has created an effective computerized data base on all NEPA documentation and decisions. This data base has been effectively utilized by the Laboratory, Los Alamos Area Office (LAAO), and Albuquerque Field Office in performing information searches on previous decisions. The existence of this system not only makes for an easily auditable system, but also one that is quite useful in routine operations."

Although user manuals provide documentation and instruction for the use of the computerized data base, these manuals need to be integrated into broader, formalized written procedures to describe the entire NEPA record keeping system.

Finding/NEPA.8-2: The files containing official correspondence of transmittals of NEPA documents to DOE and DOE decisions are not complete.

Discussion: The NEPA Program files before the beginning of FY90 are not always complete. Some formal letters of transmittal of NEPA documents to DOE are missing. Some memos-to-file are missing. (See NR.5-2 and CR.5-3.)

3.2.11 Natural Resources

The protection of natural resources at the Laboratory focuses on compliance with the Endangered Species Act of 1973; Executive Order 11990, Protection of Wetlands, of 1977; and Executive

Order 11988, Floodplain Management, also of 1977. The Laboratory's program is implemented by EM-8.

The Endangered Species Act is intended to protect critical habitats of species that are listed by the state or the federal government as endangered, threatened, or sensitive. At the Laboratory, staff biologists review new projects to determine potential adverse effects on critical habitats. If any species is judged to be potentially affected, mitigation measures are developed to protect the habitat, and the relevant agency (US Fish and Wildlife or New Mexico Game and Fish) is consulted. Only one federally listed species has been determined to be present on DOE and Laboratory land -- the peregrine falcon. Other species, such as the spotted bat and the Jemez salamander, are state listed.

The executive orders require federal agencies to consider the effects of proposed action on floodplains and wetlands and to avoid adverse affects to the extent possible. In 1990 to 1991, maps of potential wetland areas within and adjacent to the boundaries of DOE and the Laboratory were mapped by the Fish and Wildlife as part of the National Wetland Inventory Program. In addition, maps of floodplains were developed. The Laboratory program reviews major new projects to determine if floodplains or wetlands are present and if adverse impacts are projected to develop mitigations or alternatives. Assessments are prepared, if appropriate, and either published in the Federal Register or in the NEPA document for the project.

DOE has been developing guidance for compliance with these laws and statutes since 1988 but has not issued any final guidance. Integrating the requirements of these biological laws with NEPA is still a subject of debate in DOE. The absence of definitive guidance presents the Laboratory with difficulties in ensuring compliance. The Laboratory is prepared to assist DOE in any way possible to resolve the difficulties.

<u>NR.1 Review of Proposed Actions for Effect on Biological Resources</u>

Performance Objective: The Laboratory's Natural Resources Program implementation should meet requirements of the Endangered Species Act (1073) and Executive Orders 11988 and 11990.

Finding/NR.1-1: The Laboratory's Biological Resource Program does not review all proposed actions that have potential to affect sensitive biological resources.

> Discussion: All proposed actions should be reviewed to determine the effect on sensitive biological resources and should not go beyond the planning stage until required documentation, consultation, and mitigation are completed.
>
> Sensitive biological resources defined in the National Environmental Policy Act and relevant to the Laboratory environs are critical habitats of threatened or endangered species, either federally or state listed; critical habitats of candidate species; critical habitats of raptors, migratory birds; wetlands; and floodplains.
>
> The Biological Resource Program reviews all projects within the Laboratory job number system (see Finding/NEPA.2-1 for a more detailed description of this system), all ES&H

questionnaires, and all sitings for new projects from the ENG Division. As discussed in the NEPA section, not all projects are captured by the LJ#/questionnaire system. The system does review those major projects most likely to affect biological resources--those involving construction or modification to buildings. However, many minor activities within the work order system (e.g., maintenance) have the possibility of impacting sensitive areas, particularly floodplains and wetlands.

Finding/NR.1-2: Not all sensitive biological resources are reviewed by the Laboratory's Biological Resources Program for impacts.

Discussion: Up to FY90, surveys were limited to one-time presence or absence determination of plants or raptors, as determined by expert consultants. All possible sensitive species were not identified in a survey for the area impacted by a proposed project, nor were multiseasonal multiyear surveys conducted.

Only one federally-listed threatened and endangered (T&E) species, the peregrine falcon, was monitored. Historic nest locations for the falcon were identified and formal consultations undertaken with US Fish and Wildlife.

NR.2 Biological Resource Program

Performance Objective: A Biological Resource Program includes identification of biological resources, cumulative impacts of Laboratory activities on biological resources, and a plan for the protection and management of resources.

Finding/NR.2-1: The Laboratory's Biological Resource Program does not include Laboratory-wide identification of biological resources to provide information for cumulative impacts.

Discussion: Base-line monitoring has not been undertaken at the Laboratory in any consistent manner. Identification and quantification of pollutant loadings in the biological resources have not been undertaken.

Finding/NR.2-2: The Laboratory's Biological Resource Program does not routinely include mitigations of adverse impacts to sensitive areas or track proposed mitigations.

Discussion: No regular procedure for requiring mitigations and their tracking has been developed.

Finding/NR.2-3: The Laboratory's Biological Resource Program does not include a plan for the protection/management of resources.

Discussion: The Laboratory's Biological Resource Program has not included the establishment of a base line of resources. Protection and management plans need base line data.

NR.3 Preoperational Appraisals

Performance Objective: Preoperational appraisals are conducted for projects that may have environmental impacts.

Finding/NR.3-1: The Laboratory does not undertake preoperational appraisals for all projects that may have environmental impact or for all biological resources.

> **Discussion:** Preoperational appraisals for environmental impact have been done only for base-line information on pollutant loadings (e.g., radioactivity). DOE Order 5400.1 requires that chemical, biological, and physical impacts be examined. Additionally, the order requires that the impacts be examined at least 2 years before "startup." In general, surveys to determine biological impacts have suffered from the same limitations as surveys noted above—one-time presence or absence determination, with concentration on plants. Procedures to determine which projects should have a preoperational appraisal need to be formalized.

NR.4 Management Responsibility and Biological Resources

Performance Objective: The Laboratory line management is aware of and trained in its responsibilities for biological resource protection and management.

Finding/NR.4-1: The Laboratory has not provided written procedures or formal training on biological protection and management responsibilities to line management.

> **Discussion:** No procedure has been prepared to date, nor has any training of line management in its responsibilities for protection of biological resources taken place. The program relies entirely on review of projects through ENG Division documents (sitings and Laboratory jobs). Briefings have been provided to the staff of the Project Management Group (ENG-1).

NR.5 Implementation and Documentation of Biological Resources

Perforamnce Objective: The Biological Resource Program should have formal procedures for program implementation and record keeping and implement these procedures.

Finding/NR.5-1: The Laboratory Biological Resource Program does not have formal procedures for program implementation and record keeping.

> **Discussion:** The Laboratory program only has draft protocols for surveys and identification of sensitive habitats.

Finding/NR.5-2: Official correspondence of transmittals of floodplain and wetland documents to DOE and DOE decisions are missing from the files.

Discussion: The Biological Resource Program's files are not complete before the beginning of FY90. Some formal letters of transmittal of floodplain and wetland assessments submitted to the Federal Register are missing. Some decisions made by DOE are not on file. Copies of the floodplain and wetland notices published in the Federal Register are not on file. (See NEPA.8-2 and CR.5-3.)

NR.6 DOE Program Requirements and Natural Resources

Performance Objective: The Laboratory's Biological Resource Program should be consistent with and meet DOE program requirements.

Finding/NR.6-1: The Laboratory's Biological Resource Program is not in compliance with the Endangered Species Act and the executive orders regarding protection of floodplains and wetlands.

Discussion: DOE issued draft guidance in 1988, addressing sensitive biological resources. No final guidance exists for the conduct of programs or for reporting information collected through T&E surveys, floodplain and wetland assessments, preoperational appraisals, and/or base-line monitoring. An adequate program requires clear implementing guidance and regulations.

3.2.12 Cultural Resources

The National Historic Preservation Act (NHPA) of 1966 requires federal agencies to inventory historic and archaeological resources on their lands. In addition, the act requires the agency to evaluate the impact of all agency actions (called undertakings) on these resources and to consult with the State Historic Preservation Officer (SHPO) and the Advisory Council on Native Americans. If adverse impacts cannot be avoided, mitigation can be achieved by excavation and data recovery (sometimes called scavenge archaeology). The Archaeologic Resources Protection Act of 1979 provides protection of archaeological and historic resources and sets penalties for the destruction or removal of such resources. The recent American Indian Religious Freedom Act provides for consultation with native American groups having claims of cultural patrimony to DOE lands in the identification, location, and protection of sacred places.

The Laboratory program in cultural resource identification and protection was initiated before the passage of any federal law. DOE and Laboratory lands contain many archaeological sites. Approximately 60 percent of the land has been surveyed and more than 1,000 sites have been identified. Historically, an archaeological consultant worked with construction project staff to relocate projects or to excavate if relocation was not possible. Since the mid-1980s the program has been the responsibility of EM-8.

The archaeologists at the Laboratory review projects to identify those actions that could be classified as "undertakings." Undertakings are typically activities outside buildings that disturb the ground. The Laboratory staff review all undertakings to determine if a cultural resource is affected and, if affected, whether the impact is adverse or not. Field surveys are conducted and the SHPO consulted.

A draft programmatic agreement among the SHPO, the Advisory Council, and DOE has been in revision by DOE since 1989. The programmatic agreement would streamline the SHPO consultation process. The Laboratory staff is using the procedures of the programmatic agreement, which was accepted by the SHPO and the Advisory Council, although the agreement is not yet final.

CR.1 Review of Proposed Actions for Effect on Cultural Resources

Performance Objective: All proposed actions are reviewed to determine the effect on cultural resources and do not go beyond the planning stage until required documentation, consultation, and mitigation are completed in compliance with the NHPA (1966).

Finding/CR.1-1: Official consultations with the SHPO have not been undertaken for all projects with the potential to affect cultural resources.

> **Discussion:** Reports have been submitted to the SHPO before construction if a cultural resource is located in the project area; however, the law also requires consultation and submittal of reports when no resources are located. At the beginning of FY91, a backlog of 11 reports existed; by the end of FY91, it is estimated that the backlog will increase to a total of at least 41 reports. This total does not include summary reports appropriate for the review of excavation permits or required reports for four completed mitigation projects. The cultural resources staff has relied on informal telephone approval from the SHPO, with a promise of a future report. Although the SHPO has not objected to the failure to submit reports to date, the program is deficient.
>
> A programmatic agreement among DOE, SHPO, and the Advisory Council on Historic Preservation (ACHP) has been drafted. This programmatic agreement will streamline the SHPO consultation process by allowing projects to proceed without SHPO consultation if no cultural resources are located within the project area. The draft programmatic agreement, which was accepted in 1989 by the SHPO, ACHP, the Laboratory, Sandia National Laboratories, and LAAO, is awaiting DOE/AL approval.

CR.2 Cultural Resource Inventory

Performance Objective: A cultural resource inventory has been conducted of the entire facility and eligible properties have been nominated to the National Register of Historic Places.

Finding/CR.2-1: The Laboratory does not have a formalized program for meeting a Laboratory-wide survey requirements.

> **Discussion:** The draft programmatic agreement calls for a Cultural Resource Management Plan, which will specify how the Laboratory will fulfill its Section 110

responsibility to inventory cultural resources and make appropriate nominations to the National Register.

Finding/CR.2-2: Adequate documentation for nominations to the National Register has not been submitted.

Discussion: National Register nominations had been prepared for three sites before 1985, but these were rejected by the Keeper of the Register because the documentation supplied was inadequate.

The eligibility and nomination of some Manhattan Project facilities was suggested by DOE/AL following an appraisal conducted in November 1989. Informal conversations in July 1990 between the Laboratory staff, the Laboratory archivist, the head of the Bradbury Science Museum, and a representative of the Advisory Council concluded that the only properties eligible for listing are located in the townsite and are now owned by the county. The Laboratory participation in a DOE-wide thematic nomination of Manhattan Project facilities was encouraged and should be coordinated through a centralized office, such as the DOE historian. This informal consultation with the Advisory Council should be formalized.

Finding/CR.2-3: Existing survey records do not meet current standards.

Discussion: Survey records do not meet Secretary of Interior standards. Updated records have not been submitted to the SHPO for inclusion in the required state-wide data base.

CR.3 Monitoring of Proposed Actions

Performance Objective: Actions proposed to SHPO to prevent potential adverse effects to a cultural resource are monitored.

Finding/CR.3-1: The Laboratory monitoring program does not provide adequate oversight of projects to ensure that the actions proposed to SHPO to prevent potential adverse impacts to a cultural resources are taken.

Discussion: The Laboratory does not have a formal program of monitoring the measures that were proposed to the SHPO to avoid an adverse effect to a cultural resource. These mitigation measures could include fencing a site so that activities associated with constructing and using a new building would not lead to site disturbance. Failure to comply with mitigation measures could seriously impair the working relationship with the SHPO and could strain the informal concurrence route accepted by SHPO.

CR.4 Management Responsibilities and Cultural Resources

Performance Objective: The Laboratory line management is aware of and trained in its responsibilities for cultural resource protection.

Finding/CR.4-1: The Laboratory line managers have not been trained in their responsibilities regarding the Cultural Resources Program.

> **Discussion:** AR 9-5 was revised and issued in March 1991. The AR places responsibility for ensuring that archaeological staff in EM-8 are consulted before any project with potential to effect a cultural resource is undertaken. Line management is also tasked with ensuring that artifacts are not disturbed. Training is required so that management can fulfill its responsibilities.

CR.5 Implementation and Documentation of Cultural Resources

Performance Objective: The Cultural Resources Program has formal written procedures for program implementation, including record keeping, and implements those procedures so that records are complete.

Finding/CR.5-1: The Laboratory Cultural Resources Program does not have formal documented procedures.

> **Discussion:** AR 9-5 is the only formal documentation of procedures for the review of projects and subsequent action. Implementing procedures, discussing the necessary steps for compliance with cultural resource requirements, are informal and not auditable.
>
> Although a computerized data base of cultural resource activities and surveys has existed since 1986, procedures for entering the data and an explanation of the entries do not exist.
>
> The cultural resource files are kept in two locations--official documentation with SHPO and the Advisory Council is filed in the NEPA files while archaeological field survey procedures and maps are kept separately. Neither record-keeping system has written procedures.

Finding/CR.5-2: Maps showing areas surveyed and cultural resources located in these areas have not been updated and adequate site forms have not been prepared for all known cultural resources.

> **Discussion:** Major survey areas have been entered on one set of field maps; these have not been permanently stored in computerized form. Smaller surveys have not been entered on these maps. Site forms have not been prepared for all known cultural resources; this backlog extends to 1980. More than 600 site forms prepared earlier than 1980 are now considered substandard and must be resubmitted to the SHPO.

Finding/CR.5-3: Official correspondence documenting SHPO and DOE consultations is missing from files.

Discussion: Official correspondence between DOE and SHPO is missing from files. Transmittal from DOE to the Laboratory and internal to the Laboratory is haphazard. (See NEPA.8-2 and NR.5-2.)

<u>**CR.6 Curatorship of Artifacts**</u>

Performance Objective: All artifacts removed from DOE land are appropriately curated and inventoried.

Finding/CR.6-1: Inventory of DOE-owned artifacts and inspections of repositories housing these artifacts are incomplete.

Discussion: Inventories of human remains have been completed, but artifact inventories and repository inspections are ongoing and require further funding. Documentation of these inventories is inadequate.

<u>**CR.7 Protection of Sacred Places**</u>

Performance Objective: Native American groups having claims of cultural patrimony to DOE lands are consulted as to the locations of sacred places and these places protected.

Finding/CR.7-1: Formal consultation concerning the locations of sacred places with all groups having claims of potential cultural patrimony to DOE land has not been initiated.

Discussion: No formal regulations implement American Indian Religious Freedom Act; however, Section 106 of NHPA requires that "interested parties" be given the opportunity to comment on all undertakings that may affect cultural resources. Bulletin 38 of the National Register directs agencies to locate traditional and cultural properties by interviewing people with claims of ancestral patrimony to their land.

<u>**CR.8 DOE Requirements for the Cultural Resource Program**</u>

Performance Objective: The Laboratory's Cultural Resources Program is consistent and meets DOE requirements.

Finding/CR.8-1: The Laboratory's Cultural Resources Program does not meet DOE requirements.

Discussion: The Laboratory's Cultural Resources Program does not meet DOE requirements. No standards or adequate implementing guidance has been provided.

3.2.13 Environmental Management

Following are the major organizations providing environmental management at Los Alamos National Laboratory:

- Environmental, Safety, and Health Council
- Environmental Management Division
- Environmental, Safety, and Health Coordination Center
- Environmental, Safety, and Health Directorate Support Teams
- Health and Safety Division
- Laboratory Assessment Office
- Laboratory Environmental Review Committee
- Program Director for Applied Environmental Technologies

The ES&H Council is the senior of these organizations and is co-chaired by the Laboratory's Director and Deputy Director. Members of the ES&H Council are the Associate Directors who comprise Laboratory's Senior Management Group. Additional information on the ES&H Council is found in 3.1.2, Existing Programs. The Appendix provides information on the council and other ES&H organizations.

EM.1 Clarity of Environmental Policies and Procedures

Performance Objective: Environmental policies and procedures should provide adequate guidance to line managers and employees so they can meet environmental compliance objectives.

Finding/EM.1-1: Environmental policies and procedures are sometimes nonexistent or unclear to line managers and employees.

> **Discussion:** Environmental procedures in the Laboratory's *ES&H Manual* follow a format that makes them inadequate for guiding line managers and employees. The complexity of the existing *ES&H Manual's* administrative requirements makes it difficult for line managers to determine how to achieve their objectives.

EM.2 Oversight of Environmental Programs

Performance Objective: Appropriate oversight should be provided of environmental programs.

Finding/EM.2-1: The University of California does not provide adequate oversight of the Laboratory environmental programs.

> **Discussion:** The University provides oversight of the Laboratory environmental programs through the University Health, Safety, and Environment Advisory Committee. This committee meets two to three times a year for two days at a time. It hears ES&H status briefings by the Laboratory, Lawrence Livermore National Laboratory, and Lawrence Berkeley Laboratory. Consequently, the University oversight of the Laboratory amounts to about three days a year, which we believe is inadequate. (See CM.1-1.)

Finding/EM.2-2: The Laboratory does not provide adequate oversight of environmental programs involving on-site major contractors.

Discussion: The Laboratory provides inadequate oversight of other contractors that come on site. No systematic program exists to ensure the contractors have appropriate training, have worker physical examinations, and are aware of the Laboratory's emergency response procedures.

EM.3 Employee Awareness of Environmental Goals and Responsibilities

Performance Objective: Environmental goals and responsibilities should be adequately communicated to employees.

Finding/EM.3-1: Environmental goals and responsibilities are not communicated to working-level employees.

Discussion: Because environmental policies and procedures are sometimes nonexistent or unclear, goals and responsibilities cannot be adequately communicated to employees. Furthermore, when information is communicated, it is sometimes misunderstood by lower-level employees, due to the slant given by their supervisors. (See EM.1-1.)

EM.4 Quality Assurance Plans

Performance Objective: All environmental programs should have appropriate QA plans.

Finding/EM.4-1: The Laboratory does not have adequate QA plans for environmental programs.

Discussion: Laboratory environmental programs have a spotty QA record. Some programs (e.g., Environmental Restoration) are implementing an excellent QA program, while others are lagging. Lack of a comprehensive QA approach by DOE is also a problem. Many DOE/HQ organizations take their own approach to QA, which results in a "crazy-quilt" QA program. Operational emphasis is on documentation and a paper trail, rather than in the quality of the end product, which is the ultimate objective of a QA program.

EM.5 Audits and Self-Assessments of Environmental Programs

Performance Objective: The Laboratory should have a program for tracking, trending, identifying root cause, and implementing lessons-learned for environmental programs, audits, and self-assessment.

Finding/EM.5-1: The Laboratory's environmental audit program is not sufficiently mature to identify root causes and implement lessons-learned.

Discussion: The Laboratory established an environmental audit program but it does not identify root causes or implement lessons-learned.

Finding/EM.5-2: The Laboratory has no formal program in place for tracking and resolving deficiencies (including performance of root cause analyses) noted in internal or external inspection findings. Such programs are required by DOE Orders 5000.3A, 5480.17, 5480.19, and 5700.6B.

Discussion: No formal tracking mechanism is in place at the Laboratory to meet the requirements of the cited DOE orders and directives for proper handling of deficiencies.

EM.6 Site-Wide Environmental Strategic Plan

Performance Objective: The Laboratory should have a site-wide environmental strategic plan.

Finding/EM.6-1: The Laboratory does not have a site-wide environmental strategic plan.

Discussion: The Laboratory has environmental programs in several organizations, including the EM Division, HS Division, ES&H Coordination Center, LAO (environmental audits), and line-management organizations. This approach has caused duplication and omission of environmental activities. A site-wide plan is necessary to focus all the Laboratory organizations. Such a plan would help provide improved fiscal management.

EM.7 Roles and Responsibilities for Environmental Programs

Performance Objective: Roles and responsibilities for environmental programs should be clearly defined.

Finding/EM.7-1: Roles and responsibilities for environmental programs are not clearly defined at the Laboratory.

Discussion: Multiple organizations are involved in implementing and maintaining the Laboratory's environmental programs. The roles and responsibilities of each organization should be better defined to improve effectiveness of the environmental programs and to minimize the potential for misinterpretation of the requirements (DOE, Federal, State regulations) and to optimize the funding process for environmental activities.

EM.8 Environmental Self-Assessment Program

Performance Objective: The Laboratory should have an organizational environmental self-assessment program.

Finding/EM.8-1: The Laboratory does not have an organizational environmental self-assessment program.

Discussion: The Laboratory has an institutional environmental audit program run by LAO. However, the Laboratory does not have policy and procedures for conducting organizational self-assessments. During 1991, line and program managers will be given direction through presentations of a conduct of operations course and the issue of a standard *Managers ES&H Status Book*.

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ABSTRACT

The Laboratory's Environment, Safety, and Health Self-Assessment was undertaken to address the Department of Energy's 10-point initiative for strengthening safety, environmental protection, and waste management activities at its facilities. This self-assessment report is divided into five sections. Section 1 includes information on the Laboratory's policies and existing programs; the purpose, scope, organization, and content of the report; and site and organization descriptions. Section 2 identifies the root causes and key findings. The final three sections contain the methodology, findings, and discussions in the three major areas: Environment, Section 3; Safety and Health, Section 4; and Management and Organization, Section 5. Appendix A provides additional information on the Laboratory's mission, organization, and geographic setting. Appendices B and C list acronyms and Department of Energy orders, respectively.

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EXECUTIVE SUMMARY

In response to the Secretary of Energy's 10-point initiatives announced in 1989 to strengthen safety, environmental protection, and waste management activities at its facilities, Los Alamos National Laboratory began an intensive site-wide assessment of its environment, safety, and health (ES&H) activities. This report is the first of the comprehensive self-assessment reports that we will update periodically as part of our response to the Secretary's 10-point initiative.

The major objective of this self-assessment was to identify a set of root causes, which when addressed would correct, mitigate, or otherwise prevent the recurrence of the ES&H findings. We identified the following four root causes:

1. Nearly 50 years of successful technical operations have resulted in the Laboratory's over-familiarity and arrogance, i.e., thinking there was little to learn, in regard to handling hazardous materials and executing hazardous operations. This over-familiarity and arrogance have led to complacency towards ES&H.

2. Ignorance of what constitutes ES&H excellence and insensitivity toward formality of operations have led to the lack of a "safety culture" at the Laboratory.

3. The Laboratory's preoccupation with science and the tradition of placing scientific and individual values above institutional values have created a lack of institutional accountability.

4. Trusting that someone else would take care of facilities and of ES&H has led Laboratory staff to ignore ownership of ES&H problems and of their own facilities and laboratories.

We identified these root causes after analyzing approximately 770 findings from across the Laboratory. These findings fell into three categories: environmental, health and safety, and management and organization. Using these findings, we identified 17 key findings. These include not only generic issues that occurred in two or three categories but also findings that were of major significance in one category. Our 17 key findings are

1. The Laboratory Director did not, until recently, become sufficiently involved personally in ES&H issues to provide the necessary leadership for the Laboratory's ES&H initiatives.

2. Laboratory management has not applied the good business practice of "formality of operations" in its policies, processes, and daily operations.

3. The Laboratory has not yet implemented a formal system in which ES&H responsibilities are clearly identified and requirements are implemented through policy, programs, and procedures.

4. The Laboratory needs to apply risk management principles uniformly and consistently to all its facilities and operations.

5. The Laboratory has no process for comprehensive assessment of ES&H needs, no process for prioritizing the allocation of resources to meet those needs, and no integration of ES&H planning into overall Laboratory strategic planning.

6. Ownership of, management of, and accountability for achieving ES&H compliance of Laboratory facilities and sites, and responsibility for acquiring sufficient funding to achieve compliancy are insufficient. This situation is particularly true for buildings, facilities, and sites with multiple users and occupants.

7. The Laboratory needs to improve its internal assessment program and formalize its line management self-assessment program.

8. The Laboratory does not have a formal corrective action program.

9. The Laboratory does not have a formal quality program that includes quality assurance and continuous quality improvement. The ES&H program has been negatively affected as a result.

10. The ES&H training program is diffused and lacks validation.

11. A comprehensive configuration management and control program is not uniformly implemented at the Laboratory.

12. The Laboratory needs to bring its radiation protection program into compliance with DOE Order 5480.11, "Radiation Protection for Occupational Workers."

13. The Laboratory does not have an adequate emergency preparedness program.

14. The Laboratory program, facilities, and infrastructure for waste management are inadequate.

15. The Laboratory programs for identifying, characterizing, monitoring, and controlling surface and ground water discharges and air emissions do not fully comply with DOE orders, regulatory requirements, and permits.

16. The Laboratory does not have a comprehensive OSHA compliance program.

17. The Laboratory management has not mandated a maintenance program consistent with DOE Order 4330.4A, "Maintenance Management Program."

In the environment category, we identified approximately 170 findings in 13 areas; the surface water area had 31 findings, the largest number.

In the safety and health category, we identified approximately 540 findings in 22 areas; radiation protection and emergency preparedness had 51 and 50 findings, respectively. Worker safety and organization and administration had 47 and 41, respectively.

In the management and organization category, we identified over 60 findings in 9 areas. Management systems and organization had 18 and 12 findings, respectively.

A Department of Energy Tiger Team will inspect the Laboratory, beginning in September 1991. Using findings identified by the Tiger Team and by this self-assessment, the Laboratory will prepare and implement action plans to address all findings.

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4.0 Safety and Health Assessment

4.1 Background and Methodology

4.1.1 Performance Objectives

The safety and health assessment was based on performance objectives and supporting criteria in the following Technical Safety Appraisal (TSA) disciplines:

- Organization and Administration (OA)
- Quality Verification (QV)
- Operations (OP)
- Maintenance (MA)
- Training and Certification (TC)
- Auxiliary Systems (AX)
- Emergency Preparedness (EP)
- Technical Support (TS)
- Packaging and Transportation (PT)
- Nuclear Criticality Safety (CS)
- Explosives Safety (ES)
- Security/Safety Interface (SS)
- Firearms Safety (FS)
- Experimental Activities (EA)
- Site/Facility Safety Review (FR)
- Radiological Protection (RP)
- Worker Safety and Health Compliance (WS)
- Industrial Hygiene (IH)
- Occupational Safety (OS)
- Fire Protection (FP)
- Aviation Safety (AS)
- Medical Services (MS)

Twenty of the TSA disciplines were drawn from DOE/EH-0135, *Performance Objectives and Supporting Criteria for Technical Safety Appraisals at Department of Energy Facilities and Sites (June 1990)*. The Laboratory has, in addition, incorporated two TSA disciplines in Explosives Safety and Firearms Safety using Department of Energy (DOE) draft objectives and criteria released in March 1991.

4.1.2 Existing Program

Management policies, procedures, and performance expectations for supervisors and employees are formalized through *The Laboratory Manual, Chapter 1, Environment, Safety, and Health (ES&H Manual)*, which embodies DOE Environment, Safety and Health (ES&H) orders.

Line Management

Each level of line management is responsible for ensuring that the Laboratory's safety and health policies are being followed within its own organization. Associate Directors, division leaders, and group leaders are responsible for establishing and coordinating formal internal operating and review requirements including quality assurance plans, operational safety procedures, self-assessments, training programs, personnel performance reviews, and other requirements as specified in the *ES&H Manual*.

Resources and Policy

The Health and Safety (HS) Division and the Environmental Management (EM) Division are responsible for supporting safety and health requirements and concerns within line programs, implementing Laboratory-wide safety and health programs, and monitoring Laboratory activities for compliance with applicable standards. Other organizations, such as the Facilities Engineering (ENG) Division, also provide critical support functions.

4.1.3 Self-Assessment Scope and Approach

The safety and health self-assessment included a comprehensive Occupational Safety and Health Administration (OSHA)-type inspection of Laboratory facilities and buildings, a review of past appraisals, interviews with individuals with expertise in the TSA disciplines, division-level graded TSA self-assessments, and reviews by knowledgeable individuals and organizations.

OSHA-Type Self Inspections

In May 1990, the Laboratory initiated a program to inspect all Laboratory facilities and buildings based on OSHA standards. This self-inspection program was developed in accordance with good management practices and Secretary Watkins' commitment to ES&H. The program also serves as the documented basis for Laboratory compliance with DOE Order 5483.1A, "Occupational Safety and Health Program for DOE Contractor Employees at Government-Owned Contractor-Operator Facilities."

The program has been conducted in three phases. During the initial phase, ICF Kaiser Engineers, Inc., as contracted through the ES&H Coordination Center (ES&H CC), conducted OSHA-type safety and health audits of approximately 65% of the 7.5 million square feet of Laboratory space. Concurrently, sector-led self-inspections were conducted by Laboratory personnel to facilitate the identification and correction of deficiencies. In addition, a program component was initiated to train Laboratory and Johnson Controls World Services Inc. (JCI) personnel as OSHA-type safety and health inspectors. Approximately 290 Laboratory and subcontractor personnel were trained as OSHA-type inspectors. In January 1991, ICF Kaiser inspectors completed their assignment. Inspections during the middle phase were accomplished by teams of Laboratory-trained inspectors, directed by the ES&H CC. These inspection teams continued the safety and health audits of all remaining spaces. By mid-June 1991, the Laboratory had completed its 100% inspection of 2,200 Laboratory buildings. In early July 1991, the final phase of institutionalizing the self-inspection process was initiated by transferring the Laboratory OSHA Inspection Program to the Safety and Risk Assessment Group (HS-3). Plans include a certification program for 350 Laboratory inspectors. Laboratory-certified inspectors performing quality inspections are an integral part of the proposed Los Alamos Voluntary Prevention Program.

To date, approximately 45,000 deficiencies have been identified, prioritized, categorized, indexed by major/minor category, and entered on a central data base. A unique identification number has been issued for each deficiency, facilitating tracking and cross-referencing to associated action plans. Approximately 45% of the deficiencies are electrical-safety related. The deficiencies are being corrected on a priority basis. Approximately 32% have been corrected.

Review of Past Appraisals

The Laboratory Assessment Office (LAO), charged with oversight of the Laboratory's self-assessment program, keeps records and tracks all Laboratory appraisal findings from internal and external appraisals. Information from all 1989, 1990, and 1991 appraisals on file at LAO was reviewed by ES&H Coordination Center personnel and incorporated in this safety and health assessment.

Subject Matter Experts

Individuals with expertise in various TSA disciplines were interviewed regarding Laboratory compliance in their area of specialty. They also identified deficiencies and helped write sections.

Division-Level Graded TSA Self-Assessments

Laboratory divisions conducted self-assessments of their operations based on a graded application of the DOE TSA performance objectives and criteria. Laboratory operations were divided into four categories, or levels, based on scale and degree of complexity, technological maturity, and hazard. Appropriate portions of the TSA performance objectives and criteria were extracted for each category to provide guidance for graded self-assessments. Category 1, comprising 15 nuclear and 2 reactor facilities, requires full TSA guidance. Category 2 includes 54 major nonnuclear facilities, which are defined as large-scale, complex, potentially hazardous activities not included in Category 1. Category 3 includes all other nonnuclear activities that are potentially hazardous and, as such, require Standard Operating Procedures (SOPs) and/or Special Work Permits (SWPs). The remaining Laboratory activities that are not potentially hazardous are contained in Category 4. Laboratory divisions conducted self-assessments based on the performance objectives and criteria for their operation and facilities based on the appropriate category.

Reviews

Reviews were conducted by individuals and groups to determine that the TSA self-assessment presented an accurate portrayal of the Laboratory's current status. Individuals were selected to review a section based on their knowledge of the subject matter of that section. Three tiers of group reviews were established. The first tier consisted of team leaders from LAO. LAO is responsible for conducting all internal audits at the Laboratory and coordinating external audits. The team leaders were familiar with the Laboratory's status in the ES&H area. The second tier consisted of a variety of personnel with broad knowledge of Laboratory operations including two Deputy Associate Directors, sector leaders from ES&H CC, ES&H coordinators from the associate directorate level, a DOE area office representative, and technical experts from the programmatic divisions. The third tier consisted of a group of senior Laboratory managers and a JCI manager. These managers reviewed the findings and consulted additional subject-matter experts to confirm and expand upon existing deficiencies and assist in the identification of new deficiencies. Many previously undocumented deficiencies were revealed during the concluding phase.

4.2 Findings and Discussions

Detailed findings determined in the Laboratory's safety and health assessment are discussed in this section. The findings are organized by TSA discipline and associated performance objective. The findings are supported with a discussion of typical discrepancies and/or orders and regulations with which the Laboratory is not in full compliance. Findings that were easily corrected or that presented a hazard of imminent danger were corrected immediately. The Laboratory is committed to taking corrective actions for all remaining findings. A complete set of action plans to address the deficiencies will be in a companion volume.

4.2.1 Organization and Administration (OA)

The Laboratory's health and safety programs are established for the protection of approximately 9,000 Laboratory employees and 3,000 DOE contractors and program-related personnel. Laboratory facilities occupy some 7.5 million gross square feet of floor space with most Laboratory functions concentrated in 50 technical areas (TAs) spread throughout the site. The Laboratory's responsibilities in health and safety are broad and encompass a wide range of activities.

The Director of the Laboratory has final responsibility for health and safety programs. The Director's ES&H Council, whose members are Laboratory senior managers, recommends policies to the Director and oversees policy implementation. The Laboratory's health and safety policies are implemented through Administrative Requirements (ARs) in the *ES&H Manual*. The Laboratory's objective is to provide the highest possible level of protection to its employees, the public, government property, and the environment from harm that could arise from Laboratory operations. To accomplish this objective, line management is responsible for conducting only those operations and activities that can be controlled safely. The Health and Safety (HS) Division maintains a comprehensive safety and health program to assist line management and to provide an overview of safety and health activities. Laboratory employees are required to observe the health and safety procedures and requirements specified by their supervisors. Safety and health responsibilities are also supported by other disciplines, such as engineering, quality management, and training.

OA.1 Site/Facility Organization

Performance Objective: Management should organize and manage the Laboratory's work, programs, and resources so that safety and health are an integral part of the personnel duties and requirements are consistently implemented.

Finding/OA.1-1: Management has not ensured effective flow of ES&H policies and requirements to all levels of the Laboratory.

> **Discussion:** A methodology for tracking implementation of policies and verifying their effectiveness is not specified in each policy. An audit and verification process within the Laboratory Quality Assurance Program does not exist. The process of ensuring that Laboratory policies are being effectively implemented lacks follow-through and formal verification of implementation and effectiveness. Policies have not been adequately documented and promulgated.

Finding/OA.1-2: Horizontal and vertical interfaces of directorates and divisions are neither well defined nor fully understood.

> **Discussion:** Although the *Los Alamos Guide to ES&H Management Structure (GEMS)* exists, a formally approved scope/interface document to provide the necessary definition and clarification of the interfaces of the organizations does not exist. Until recently, Associate Director offices and managers were focused on program responsibilities and were not generally engaged in ES&H operations. ES&H operations were, therefore, executed by divisions and their groups independently, resulting in insufficient Laboratory-wide coordination.

Finding/OA.1-3: Responsibilities and accountabilities of Laboratory personnel for ES&H are neither clearly defined nor effectively assigned.

> **Discussion:** ES&H responsibilities of personnel are confused where people are matrixed. Two areas affected are training and performance appraisals. The assignment of safety and health responsibility as an integral part of management duties is not clear. The Laboratory does not have consistent written policies to ensure safety for visitors. Some facilities and divisions do not have structured safety organizations. Safety roles and responsibilities are not defined or communicated. Organizationally approved safety positions do not have personnel assigned.

Finding/OA.1-4: Management has failed to provide position descriptions that clearly state ES&H responsibilities, authorities, or performance metrics.

> **Discussion:** Position descriptions have not been reviewed to ensure clear definition of ES&H responsibilities, authorities, and performance measurement criteria. Current position descriptions do not adequately address the changes in functional requirements brought about by implementing DOE orders, directives, and organizational changes. The lack of current position descriptions precludes the establishment of appropriate training,

especially in the area of professional development, that would provide individuals with sufficient qualifications to adequately perform their assigned jobs.

Finding/OA.1-5: Management has not provided sufficient oversight to assure effective implementation of safety and health policies throughout the Laboratory.

Discussion: The ES&H council provides senior management oversight of the Laboratory's environmental protection, safety, and health-related activities, but has not provided adequate direction or required sufficient reporting or accountability from the major safety committees and activities at the Laboratory. Self-assessment as a tool for providing assurance is not fully implemented Laboratory wide. (See OA.5.)

Finding/OA.1-6: Since line managers have not been held accountable for the success of ES&H activities and programs, they often devoted inadequate resources to ES&H.

Discussion: Management, at all levels, has not allocated sufficient resources for ES&H programs and activities at levels that ensure effective and credible programs. Traditionally, line managers have not committed enough attention or resources to ES&H programs and oversight activities to fulfill institutional responsibilities.

Finding OA.1-7: Responsibilities and authorities within the Building Manager Program are not clear.

Discussion: The recently implemented Building Manager Program has yet to ensure that necessary maintenance and ES&H functions are adequately carried out at individual buildings. Roles of line managers as landlords, users, and building managers are not well understood. The Building Manager Program is not consistently implemented Laboratory wide. Where multiple organizations occupy the same building, the manager has inadequate guidance and authority. The training program provided to building managers was inadequate, and not all building managers received the training.

Finding OA.1-8: The Laboratory lacks formal policy regarding the safety and health of employees for directed work off site.

Discussion: Laboratory employees assigned to work at other institutions do not have guidance for situations where safety and health standards differ from Laboratory standards.

OA.2 Administration

Performance Objective: Administrative programs and controls should be in place to ensure that policies concerning health and safety are administered throughout the facility.

Finding/OA.2-1: Laboratory safety and health policies are not uniformly implemented.

Discussion: A written Formality of Operations Policy that addresses implementation of health and safety practices does not exist at the Laboratory. Therefore, there is inadequate formal guidance addressing areas such as conduct of operations, training requirements, configuration management, document control, records management, standards of performance, and ES&H programs throughout the Laboratory.

Finding/OA.2-2: Procedural controls that ensure effective and appropriate safety and health analyses, generation of procedures, required reviews and sign-offs, and appropriate documentation have not been implemented uniformly.

Discussion: The Laboratory lacks standardization of ES&H procedural control. Because each organization makes its own interpretations of requirements, many procedures for accomplishing common tasks are quite different. Required procedures are either unavailable, out-of-date, or do not meet current requirements because of local interpretations. In addition, interviews with division leaders and group leaders indicate a lack of firm guidance on such matters as quality assurance, conduct of operations, hazardous waste management, training, emergency preparedness, and risk management with respect to the standards by which they would judge the risk acceptable. Schedules for periodic review and revisions are not established.

Finding/OA.2-3: The Laboratory Occurrence Reporting Implementation Plan is not fully functional; the Laboratory therefore does not fulfill the requirements of DOE Order 5000.3A, "Occurrence Reporting and Processing of Operations," and DOE Order 5484.1, "Environmental Protection, Safety, and Health Protection Information Reporting Requirements."

Discussion: The current system for internal reporting, categorization, and initial reporting to DOE is not governed by procedure. There is inconsistent definition of reporting requirements and a lack of enforcement to ensure that requirements are met. Responsibility for reporting, categorization, initial investigation, ten-day reports, final reports, report quality, corrective action plans, and development of lessons-learned is not clearly assigned. Reviews are not timely nor do they result in the issuance of quality products. (See also OA.5-3.)

Finding/OA.2-4: Administrative procedures do not ensure that changes in material hazards present in buildings are promptly communicated to building personnel.

Discussion: Laboratory policy does not require that the building manager be notified of the delivery of a hazardous material to his/her building, or of its movement within the building. The building manager's responsibility for informing emergency response personnel of unusual situations that may hamper their activities or endanger personnel is not formally established.

Finding/OA.2-5: The Laboratory lacks adequate administrative controls to prevent casual access to hazards.

Discussion: Some open areas at the Laboratory allow access by casual visitors (e.g., family and friends of Laboratory employees). Without formal hazard communication, such individuals could be at higher risk than employees. At some facilities, there are no access controls.

OA.3 Management Objectives

Performance Objective: Site/facility management objectives should ensure commitment to safe operation, including enforcement of approved work practices and procedures.

Finding/OA.3-1: Management has not established meaningful safety goals and incentive programs.

Discussion: The Laboratory does not have a Laboratory-wide methodology for establishing and quantifying safety goals. Line organizations have not published safety goals nor have they updated already published goals, as required. The Laboratory does not have incentive programs that recognize and reward outstanding safety-related performance.

Finding/OA.3-2: Management has inadequately defined objectives and programs to ensure compliance with applicable regulations.

Discussion: Basic guidance from senior Laboratory management is not recognized or is not available to support field implementation of directives, policies, and desired standards of operational conduct. A variety of policy directions to the field are provided in the field by the performing organizations. Therefore, Laboratory policy is not being developed and prescribed uniformly nor at an appropriate level.

Finding/OA.3-3: Training of Laboratory managers does not include adequate information concerning DOE orders and directives, applicable regulations, Laboratory policies, and their requirements.

Discussion: Over five hundred Laboratory managers and supervisors have taken one or more of the Laboratory's special management courses (Phases I, II, and III). Course curricula do not include subjects required by DOE Order 5480.20, "Personnel Selection, Qualification, Training, and Staffing Requirements at DOE Reactor and Non-Reactor Facilities," nor other subjects the Laboratory considers essential to safe operation.

Finding/OA.3-4: Management has not required a Laboratory-wide system to draw lessons learned from internal and external appraisals, reviews, and occurrences.

Discussion: The Laboratory currently has no Lessons Learned Program in place. (See CA.4-1)

OA.4 University of California Support

Performance Objective: The University's interest in and support for safe operation at Los Alamos should be evident. (Also see Section 5.0, Management and Organization Assessment.)

Finding/OA.4-1: The University's corporate commitment to safe operations at the Laboratory has not been adequately conveyed.

> **Discussion:** While the Office of the President has made known the University's commitment to safety in operations to Laboratory senior management, that commitment has not been effectively portrayed to the Laboratory as a whole. Laboratory employees are only vaguely, if at all, aware of the University Health, Safety, and Environment Advisory Council (HSEAC) and its role in providing advice to the President on Laboratory safety issues. Although HSEAC normally meets at Los Alamos once a year, little has been done to impress upon Laboratory employees the University's commitment to safety in operations.

OA.5 Management Assessment

Performance Objective: Management and supervisory personnel should monitor and assess facility activities to improve performance in all aspects of the operation.

Finding/OA.5-1: Management is not adequately engaged in assessing the ES&H performance of its facility operations or in developing appropriate policy and procedures.

> **Discussion:** The Director does not require audits by line management to assess implementation of policies concerning standards of operations or to assess the degree to which associate directors, division leaders, and group leaders monitor the performance of their managers and supervisors relative to ES&H.

Finding/OA.5-2: The Laboratory does not have sufficient independent oversight of line-organization operations to identify areas of concern.

> **Discussion:** The Laboratory has not adequately employed quality assurance audits or other independent assessment processes to identify operational problems.

Finding/OA.5-3: Occurrence reporting, as required by DOE Order 5000.3A, is not being used to assess and improve operational performance.

> **Discussion:** The Unusual Occurrence Reporting System at the Laboratory is not effectively capturing all unusual occurrences. It does not effectively implement DOE requirements for performance of a principal cause analysis of reported incidents. The current system for internal reporting, categorizing, and initial reporting to DOE is not governed by procedure. There is inconsistent definition of reporting requirements and a lack of enforcement to ensure that requirements are met. Responsibilities for reporting, categorizing, initially investigating, producing ten-day reports and final reports, assuring

report quality, producing corrective action plans, and developing lessons-learned are not clearly assigned.

The overall quality and timeliness of Laboratory reports have been poor because there has been an improper mix of technical and nontechnical information, little or no feedback from the Emergency Management Office and DOE Los Alamos Area Office (DOE/LAAO), and inadequate training of Laboratory personnel on root cause analysis.

Protocols for notifying Laboratory and DOE managers are not well formulated or disseminated. Line managers are easily bypassed.

The Laboratory has not established lines of responsibility for meeting the requirements of DOE Order 5000.3A. Lines of authority for implementing the programs to address DOE Order 5000.3A are poorly defined. Managers and employees are not adequately trained on the purpose, reporting guidelines, and mechanics of DOE Order 5000.3A.

Finding/OA.5-4: The Laboratory does not adequately follow up on facility- and operation-related deficiencies identified in internal and external appraisals, audits, and assessments.

Discussion: Since line managers have not been held accountable for ES&H matters in the same manner that they have been for programmatic responsibilities, they have not followed up adequately on ES&H deficiencies identified by external organizations.

Finding/OA.5-5: The Laboratory does not have a centralized or master commitment tracking system to assist in follow-up and closure of facility/operation deficiencies, corrective actions, and commitments.

Discussion: The Laboratory has numerous independent data bases tracking ES&H deficiency information. The result is scattered and incomplete data in each system. None of these systems provides complete information for use in tracking and analyzing Laboratory-wide deficiency trends, accessing individual deficiencies quickly and easily, and tracking other important information pertaining to deficiencies and problem areas. The new Laboratory Assessment Office has been tasked with developing and implementing a Laboratory self-assessment program. Laboratory management, until recently, has not required the collection of maintenance and surveillance data and minor incident information for trend analysis, subsequent prediction of potential problems, analysis for root causes, and identification and correction of incipient problems.

Finding/OA.5-6: The Quality Assurance Program does not provide needed management information on facility compliance status as required by DOE Order 5700.6B, "Quality Assurance."

Discussion: See QV.1-1.

Finding/OA.5-7: Procedures that implement policies for safe and consistent operation are not systematically developed and promulgated to employees.

Discussion: For example, policies and procedures contained in the *ES&H Manual* are not sufficiently distributed to employees below line management. Insufficient efforts are made to assure that those policies and procedures are communicated effectively to employees.

OA.6 Personnel Planning and Qualification

Performance Objective: Personnel programs should ensure that appropriate job qualification requirements or position descriptions are established for all positions that affect safe and reliable operation.

Finding/OA.6-1: Position descriptions have not adequately emphasized ES&H responsibilities and required knowledge.

Discussion: See OA.1-4.

Finding/OA.6-2: Programs for staff development, training, and certification do not ensure that well-qualified personnel are assigned to ES&H activities.

Discussion: ES&H training and certification requirements are not an integral part of the current career development process. The effectiveness of training and certification programs is not formally evaluated and documented. Some divisions do not have an ES&H needs assessment or training plan, nor have they identified the responsibility for training.

Finding/OA.6-3: The annual performance appraisal does not adequately address ES&H responsibilities.

Discussion: In contrast to technical assessments (e.g., technical accomplishments and professional service), the performance appraisal system does not call upon a manager or supervisor to evaluate ES&H other than in a cursory manner. Most organization guidelines have not emphasized ES&H considerations. This sends the message to both employees and supervisors that ES&H issues are not important. It was not until March 1991 that the Director of Human Resources notified all employees that ES&H responsibilities must be reflected in performance appraisals.

Finding/OA.6-4: Vacancies, including those for positions needed to ensure safe and reliable operations, are not filled in a timely manner.

Discussion: The normal elapsed time for filling a vacancy is three months if the person selected already works at the Laboratory and is cleared to perform the work. The normal hiring time is six months if the person is not a current employee but already has a clearance or is assigned to perform nonclassified work pending receipt of clearance. When an uncleared nonemployee is selected for a job involving classified work, the person selected must either wait well over one year to be hired or must spend that time performing other duties, pending approval of security clearance. These delays inhibit the timely placement of first-rate safety and health professionals into important jobs.

OA.7 Document Control

Performance Objective: Document control systems should provide correct, readily accessible information to support Laboratory operations.

Finding/OA.7-1: Current policies and procedures do not ensure compliance with DOE Order 5480.19, "Conduct of Operations Requirements for DOE Facilities," and DOE Order 5700.6B.

> **Discussion:** Instructions do not exist as to when written operating procedures are required. Also not addressed are how procedures are to be written, what procedures require document control processes, and how procedure updates are to be controlled. The format for procedures is not standardized by a Laboratory-wide procedure. Definitions are not clear, requirements are not easily understood, and responsibilities are ambiguously assigned. A standard writer's manual for procedures has not been adopted so that all Laboratory procedures at all levels would look the same and contain the same type of information in the same location.

Finding/OA.7-2: The Laboratory does not have a clearly articulated policy that specifies standards for procedure development, document control, and records management.

> **Discussion:** The Laboratory lacks a definitive records management policy. Laboratory-wide processes for the development, distribution, and control of procedures (including review, approval, and change) are not formally implemented. There is no function to adequately control the format, numbering system, or distribution; issue control documents needed for safety-related work; or manage the procedure review cycle and ensure that changes are properly issued and entered through issue of change receipts.

Finding/OA.7-3: There is no Laboratory-wide system in place to ensure that DOE policies and requirements are addressed by the appropriate personnel and that compliance with requirements is updated.

> **Discussion:** The lack of a Laboratory-wide system has resulted in scattered compliance with appropriate DOE orders and directives. For example, parts of the Reactor Quality Assurance Program do not meet Laboratory policy or DOE order requirements. Not all important activities at the Laboratory are covered, needed resources have not been assigned, and the required quality assurance audit functions have not been implemented. (See OA.5.)

Finding/OA.7-4: Many policies and procedures are informally communicated and not provided in written documentation.

> **Discussion:** The lack of a clearly articulated policy in this area is a contributing factor to the absence of a Laboratory-wide system to develop and control procedures and other

operational documents. The Laboratory does not have a system to receive incoming requirements, translate them into the appropriate Laboratory responses, generate the response requirements, and track response actions to completion. Also, as changes to requirements are received, the Laboratory lacks a method to ensure that all appropriate subordinate documents have been properly reviewed for compliance with the change so that all levels are working to current requirements.

Finding/OA.7-5: The Laboratory has not effectively ensured that organizational directives at all levels are current and in compliance with Laboratory requirements.

Discussion: Organization elements of the Laboratory (particularly at the division and group levels) have relied on ad hoc and informal arrangements to keep abreast of, for example, changing internal and external requirements. Document control has not been adequate to retrieve, in a timely manner, those existing records needed to ensure quality and safety. The Laboratory-wide distribution process for external accident/incident reports has been ineffective.

Finding OA.7-6: The system to ensure that Laboratory organizations properly control document receipt, control, and distribution is ineffective.

Discussion: There is a general lack of proper documentation or control of documentation throughout the Laboratory. Organizations lack general document control procedures for ES&H and Quality Assurance (QA) programs. The Laboratory documentation control system is not adequate to provide proper up-to-date procedures, documentation that shows compliance with technical specifications, and other needed records. Some organizations lack adequate documentation that shows completion of ES&H-related activities such as training, ES&H committee meetings, and committee action items.

Finding/OA.7-7: The Laboratory's program for receiving, updating, and implementing operating requirements is inadequate.

Discussion: Managers are not required to sign for receipt of new policies or procedures. Managers responsible for updating policies are not held accountable for updating them. Operating requirements are not consistently implemented.

Finding/OA.7-8: Laboratory manuals and staff instructions are not kept current.

Discussion: A system for document control is not in place. Organization and facility safety manuals are not kept up-to-date to reflect changes in organization, policy, and requirements. Superseded or voided documents are not promptly removed from use. The *ES&H Manual* ARs 9-1, 9-2, 9-4, and 9-5 have not been reviewed on a routine basis and contain outdated information. Laboratory records in this regard are outdated.

Finding/OA.7-9: Safety documentation is not being updated or approved in a timely manner.

Discussion: The Laboratory is not in compliance with DOE Order 5481.1B, "Safety Analysis and Review System," for the preparation of safety analysis documents from affected facilities. Safety Analysis Reports (SARs) do not meet the requirements of DOE Order 5480.5, "Safety of Nuclear Facilities," and DOE Order 5481.1B. Many SARs are out of date or not complete. The Laboratory does not consider SOPs to be controlled documents. Inconsistencies in SOP document lists and the reuse of numbers from obsolete and inactive SOPs indicate poor document control practices.

Organizations have policies for SOPs, SWPs, and Operations Procedures (OPs) that are inconsistent with good QA practices. SOPs are not being submitted to appropriate organizations, e.g., HS for technical content review, nor are they being reviewed annually in accordance with AR 1-3. Organizations have not implemented procedures for adequate documentation of receipt, review, and approval of SOPs. The SOP approval/renewal cycle is not well defined. Technicians and staff members are not part of the SOP development/revision process at some facilities where they could provide applicable expertise and experience. Review or approval of safety documentation by appropriate ES&H organizations takes too long.

Mechanisms are not in place for triggering and performing an update of appropriate documentation whenever additional analysis and facility changes occur. Available safety analysis records are generally out of date.

OA.8 Fitness For Duty

Performance Objective: A Fitness-For-Duty Program should be capable of identifying persons who are unfit for their assigned duties as a result of drug or alcohol use, or other physical or psychological conditions, and should provide procedures to remove them from such duty and from access to vital areas of the site or facility pending rehabilitation or remedial actions.

Finding/OA.8-1: Policies and procedures concerning the implementation of a fitness-for-duty program are not fully in place.

Discussion: Laboratory criteria for the fitness-for-duty program has not been fully developed to address assigned Laboratory activities or access to vital areas.

Finding/OA.8-2: Specific critical positions to which more stringent aspects of the fitness-for-duty program apply have not been identified.

Discussion: Emergency Operations Center personnel, persons on recall lists for off-hours emergencies at certain technical areas, security personnel on back-up assignments, and some senior management personnel, as well as personnel performing vital work or assigned to nuclear facilities, may require more stringent application of the fitness-for-duty criteria than do support personnel working a single shift.

Finding/OA.8-3: Not all managers and supervisors have been adequately trained or are aware of items of noncompliance relative to the existing substance abuse policy.

Discussion: Although a large number of Laboratory managers and supervisors have received specific training in substance abuse, the course was not made mandatory and some managers and supervisors remain untrained.

4.2.2 Quality Verification (QV)

The Laboratory's Quality Assurance (QA) organization resides within the Operations Directorate. The Quality Assurance Officer (QAO) reports to the Associate Director for Operations. The officer has primary responsibility for representing the Laboratory and for setting the tone and direction of the QA program.

In 1989, the QAO issued the Laboratory Quality Program Plan, which directed all Laboratory organizations to develop QA plans in general conformance with DOE Order 5700.6B and to name a Quality Assurance Representative (QAR). Although nearly every organization designated a QAR, and over eighty subordinate QA program plans were submitted, sound, well-rounded QA programs were the exception. A cursory review indicated major shortfalls in the overall Laboratory program and in the majority of the subordinate plans.

To strengthen the overall program, the Quality Operations Office (QOO) was formed in December of 1990. In early 1991, the QOO commissioned an independent external review of the program. This review confirmed that the implementation of quality assurance requirements on a Laboratory-wide basis was not being accomplished. A conceptual approach to building a valid QA program was developed and presented to each of the Associate Directors and to the Director's Office. A Laboratory-wide QA Program was initiated to provide the detail and specificity necessary to achieve compliance. The new program is currently under review. It has been written to draft DOE Order 5700.6C, "Quality Assurance," and incorporates a graded approach.

<u>QV.1 Quality Programs</u>

Performance Objective: Administrative programs and controls should be in place to ensure that policies concerning quality are administered for each facility throughout the site.

Finding/QV.1-1: Quality Assurance (QA) documentation and coordination do not exist in Laboratory Quality Program Plan (QPP) elements.

Discussion: Laboratory management has not provided detailed guidance for the implementation of a Laboratory-wide QA Program in accordance with DOE Order 5700.6B/NQA-1. Lack of management guidance adequate to facilitate coordination and standardization throughout the Laboratory has severely hampered individual organization and subcontractor QA program development efforts.

Finding/QV.1-2: Record and document review and acceptance procedures are often informal and inadequate to meet the requirements of DOE Order 5700.6B/NQA-1.

Discussion: Records and documents are generated in an informal fashion at the Laboratory, including those that are of sufficient significance to warrant formal review and acceptance or compliance with the QA record protection requirements as specified in DOE Order 5700.6B/NQA-1. No central record or document control program exists at the Laboratory.

Finding/QV.1-3: Nonconformances to QA specifications are not consistently documented, segregated, or controlled in such a manner as to ensure that they are corrected.

Discussion: A common format for reporting nonconformances and subsequent review actions does not exist. This finding is part of the larger historical issue of inadequate Laboratory-wide guidance. See QV.1-1.

Finding/QV.1-4: Formal procedures for configuration and design control are lacking.

Discussion: There is a general lack of discipline in carrying out existing procedures. Although the basic principles of design control are practiced by some organizations, documentation of the principles used does not adequately define them to provide evidence of compliance with DOE Order 5700.6B/NQA-1 requirements. A similar or poorer situation exists in most Laboratory organizations with design- or configuration-control responsibilities, particularly those related to short-term experimental setups or setups that change frequently. Responsibilities for design are generally not well defined, and consequently are not uniformly understood, particularly in the areas of design verification, design change, and configuration control.

Finding/QV.1-5: The Laboratory Quality Verification program does not address safety and personnel protection-related functions, verify that personnel are trained and qualified, or ensure that independent quality reviews are performed.

Discussion: The absence of a quality verification program complying with DOE Order 5700.6B/NQA-1 leads to major deficiencies in areas encompassed by that order. The Laboratory program does not address all safety and personnel protection-related functions, including operational, technical, and administrative functions. Few Laboratory personnel have formal training and/or certification in quality-related specialties; QA functions are frequently performed by personnel with formal training only in a scientific field. The absence of trained personnel coupled with limited management understanding and appreciation for the benefits of quality verification have led to an absence of independent quality reviews for Laboratory programs.

Finding/QV.1-6: ES&H issues are not explicitly addressed in Laboratory-wide QA policy or in most QA plans.

Discussion: Laboratory QA policy has failed to express requirements for increased formality commensurate with the risk or importance of activities. When combined with the absence of a definitive Laboratory-wide approach for quality and inadequate independent verification, activities important to the Laboratory ES&H program and status have been conducted without proper documentation or formality.

Finding/QV.1-7: A formal QA Program has not been implemented for the Laboratory extremity dosimetry program.

Discussion: The Laboratory external dosimetry program has been certified under the DOE Laboratory Accreditation Program (DOELAP), and many quality elements have been incorporated as a result of DOELAP requirements; however, QA procedures to address the Laboratory extremity dosimetry program do not exist.

QV.2 Procurement and Supplier Control

Performance Objective: Provisions should be established for the control of purchased material, equipment, and services; selection and control of suppliers; and assessment of adequate procurement activities.

Finding/QV.2-1: While existing procedures contain many quality elements, Laboratory procurement and supplier controls do not fully comply with the requirements of DOE Order 5700.6B/NQA-1.

Discussion: Procurement controls are not formally documented Laboratory wide. Procurement requisitions are not routinely reviewed by originating organizations to ensure that applicable QA and ES&H requirements are specified and to identify procurements where substitutions cannot be tolerated for ES&H reasons. Acceptance criteria are not clearly spelled out. Some organizations have not implemented programs to identify those items that should be reviewed for QA and ES&H considerations. Management policy for QA review of purchase requisitions does not exist. Vendor controls for verification and qualification do not exist. Qualified vendor lists are seldom based on a review of technical qualifications.

Finding/QV.2-2: The Laboratory does not have provisions for the control of purchases, suppliers, and procurement assessment.

Discussion: Procurement procedures for specific sole-sourced replacement items are not thoroughly understood throughout the Laboratory. High-priority purchases are not always segregated from more routine procurements. Procedures to develop centralized files covering the Laboratory's experiences with vendors and the quality of their products do not exist. Coordination of similar procurements depends on their assignment to a single buyer and on that buyer's memory to guide future purchases.

QV.3 Receiving and Pre-Installation Inspections

Performance Objective: Provisions should be established for the inspection of purchased material, equipment, and services in accordance with documented procedures by trained personnel.

Finding/QV.3-1: Procedures for receiving and pre-installation inspections do not meet the QA requirements of DOE Order 5700.6B/ NQA-1.

> **Discussion:** Receiving inspections are not documented adequately. Interactions with vendors during fabrication to verify procedures and performance occur only when required by the requesting Laboratory technical organization. Incoming inspection of routine or off-the-shelf items is very limited and is not governed by documented procedures (e.g., often only a shipping memo is available). Test and inspection, to the extent it is done, is usually performed by the end user without benefit of formal procedures to identify items requiring scrutiny from ES&H and/or system performance/impact criteria.

Finding/QV.3-2: The Laboratory does not require inspection or documentation for high-technology procured items and procured items that need installation before they can be tested.

> **Discussion:** The Laboratory receiving organization lacks inspection testing of high-technology equipment for acceptability. Such testing by the final Laboratory user is rarely governed by procedures within that organization. Frequently, testing depends on the individual's undocumented judgment of the impact of a defective component. Procedures identifying requirements for installed testing do not exist.

QV.4 Calibration Program

Performance Objective: Provisions should be made to ensure that tools, gages, instruments, and other measuring and testing devices are properly identified, controlled, calibrated, and adjusted at specified intervals.

Finding/QV.4-1: A comprehensive Laboratory calibration program does not exist.

> **Discussion:** The current program is not adequately or correctly supported by procedures that deal with the required processes and equipment used within the Laboratory. Update of the Laboratory calibration program is not complete. A comprehensive survey of Laboratory organizations to determine calibration needs is not complete. Identification of equipment requiring calibration is incomplete.

Finding/QV.4-2: Technicians assigned with instrumentation calibration responsibilities are not adequately trained.

Discussion: Technicians have frequently not been trained to perform calibration and maintenance responsibilities assigned them as required by DOE Order 5480.11, "Radiation Protection for Occupational Workers."

Finding/QV.4-3: Deficiencies exist in labeling equipment and instruments covered by the laboratory calibration program.

Discussion: Equipment, instruments, and meters exist throughout the Laboratory that have missing, expired, or improperly completed calibration labels. Some have not been incorporated into the appropriate calibration program/schedule. Quality procedures do not exist or are technically inadequate.

Finding/QV.4-4: Documentation and records to support the accurate calibration of instruments and equipment covered by the laboratory calibration program are incomplete or inadequate.

Discussion: Records are inadequate to determine what procedures were used to calibrate or extend the calibration of a specific item, and they do not meet either DOE Order 5700.6B/NQA-1 criteria or EPA's QA requirements. Frequently, documentation and records do not contain applicable safety requirements.

Finding/QV.4-5: The Laboratory does not calibrate equipment against recognized standards that have an accuracy of at least four times the required accuracy of the equipment being calibrated.

Discussion: The calibration of equipment may not be within the required tolerance, and this discrepancy may not be documented. Criteria for an acceptable calibration are not documented. The organization authorized to develop these criteria is not identified. Documentation to support standards accuracy is inadequate.

QV.5 Identification and Control of Hardware/Materials

Performance Objective: Provisions should be established to identify and control the use or disposition of hardware, materials, parts, and components as well as to ensure that incorrect/defective items are not used.

Finding/QV.5-1: Identification and control of hardware and materials suffers from a lack of procedures to identify and segregate hardware and materials adequately.

Discussion: Procedures are usually informal and vary significantly among Laboratory organizations. This finding is part of a larger historical issue of inadequate Laboratory-wide QA guidance. (See QV.1-1.)

Finding/QV.5-2: The Laboratory does not have a formal recall system to identify and control use or disposition of hardware, materials, parts, and components.

Discussion: The Laboratory does not have QA and/or other organizational responsibilities defined, including documentation of nonconformances; inspection of repaired items; analysis of nonconformance reports; control and identification of hardware items; segregation, identification, and controlled storage of safety-related parts; out-of-service tagging; etc.

QV.6 Inspections

Performance Objectives: Prerequisites should be provided in written inspection procedures with provisions for documenting and evaluating inspection results.

Finding/QV.6-1: Inspections for quality, when accomplished, are frequently done without benefit of formal inspection procedures, check lists, or procedures to document and evaluate inspection results.

Discussion: Items that would benefit from formal inspection programs are developed in many Laboratory organizations, but formalized inspection criteria and/or inspection programs exist in only a few organizations. A Laboratory-wide approach to inspections is not formalized in procedure, and centralized control of inspections does not exist. In some cases where inspections are used, inspections are not performed by personnel separate from the originating activity.

Finding/QV.6-2: Written inspection procedures with provisions for documenting and evaluating inspection results are not provided.

Discussion: In many cases within the Laboratory, inspection procedures are not well documented. Inspectors have scientific or technical credentials, but frequently have no training or certification in inspection methodologies. Qualifications for inspection personnel are not defined. Inspection results are frequently communicated verbally, are not documented, and are seldom formally archived in accordance with DOE Order 5700.6B/NQA-1.

QV.7 Control of Special Processes

Performance Objective: Provisions should be established to ensure the acceptability of special processes, such as welding, heat treating, nondestructive testing, and chemical cleaning, and that special processes are performed by qualified personnel using qualified procedures and equipment.

Finding/QV.7-1: Laboratory personnel assigned to perform special processes are not formally trained or qualified.

Discussion: This is part of the larger historical issue of the Laboratory's inadequate QA guidance and the simultaneous development of many of these special processes and skills of individuals using special processes at the Laboratory. Informality of Laboratory operations does not mandate either documentation of the process or the special skills needed for special processes. This concern is compounded by increasing retirement rates and the potential loss of key knowledge from the Laboratory in the absence of suitable transfer of skills to new employees. While special training programs exist for many of these special skills, a consistent Laboratory-wide approach to matching job requirements and needed training does not exist.

Finding/QV.7-2: No centralized control or knowledge of Laboratory special process capabilities is maintained at the Laboratory.

Discussion: In some instances, special process skills have developed in more than one Laboratory organization simply because each effort was independent of and unknown to the other. Current programs requiring access to these skills may also have difficulty locating the expertise. No central records or data base of such capabilities exist. Different procedures and standards for similar operations may have evolved without mechanisms for effective documentation, communications, and intercomparisons. No organization has been designated by management to promulgate internal standards.

4.2.3 Operations (OP)

The operation of some 2,200 Laboratory facilities and buildings is the responsibility of designated landlords. Line management is responsible for assuring that all operational and support activities are conducted in a safe and reliable manner. The landlord designates a building manager to be the point of contact for and coordinator of common areas and systems. Building managers also monitor the environment, safety, and health of operations within their assigned facilities.

Maintenance and operation of facility systems are the responsibility of the ENG Division. To accomplish these tasks, area coordinators from the Field Operations Groups (ENG-5) are assigned to one of twenty-three coordination areas that cover the fifty technical areas at the Laboratory. Area coordinators interface closely with individual building managers and serve as direct contacts with Laboratory groups requiring the services of ENG and/or Johnson Controls World Services Inc. (JCI), the support services subcontractor for the Laboratory. Typically, an area coordinator will arrange for limited scope facility modifications and repairs and maintenance to facilities and systems to be performed by JCI.

Routine scheduled facility and systems maintenance is performed by JCI. JCI maintains roads and grounds (including removing snow) and provides custodial support and waste removal. JCI also maintains and tests fire protection systems and elevators; and installs, operates, and maintains Laboratory-wide utility systems (except for the industrial waste and telephone communications systems). The Waste Management Group (EM-7) is responsible for waste management, while the Communications Group (C-4) handles telephone communications. Various groups from ENG manage and oversee JCI activities.

Fire protection is provided by the Los Alamos County Fire Department through a contract with DOE. The Fire Protection and Utilities Group (ENG-8) is the Laboratory interface with the fire department.

OP.1 Organization and Administration

Performance Objective: Operations organization and administration should ensure effective implementation and control of operations activities.

Finding/OP.1-1: Organizational relationships, responsibilities, and authorities for each management, supervisory, and staff position are not well defined and documented.

> **Discussion:** Formality of operations is not employed in most Laboratory facilities and organizations in areas such as administration, shift routine practices, definition of interfaces with supporting groups, lockout and tagout, documentation, operating procedures, equipment, and pipe labeling.

Finding/OP.1-2: Consistent Laboratory-wide procedures or documentation for shift turnovers do not exist.

> **Discussion:** Administrative controls have not been developed Laboratory wide to ensure that shift turnovers are in compliance with DOE Order 5480.19.

Finding/OP.1-3: Goals and performance indicators for ES&H are not established in some areas of the Laboratory.

> **Discussion:** Goals for ES&H and performance indicators have not been established. No data collection is available to aid in establishing goals and performance indicators or to indicate achievement of goals to management. No management system exists to establish goals or performance indicators that track achievement.

Finding/OP.1-4: Management has not provided comprehensive and formal facility policy or operating guidance for the conduct of hazardous activities.

> **Discussion:** For example, informality of operations can lead to employees conducting hazardous activities without proper control or authorization.

Finding OP.1-5: The criteria and process for reviewing and approving projects do not include the necessary administrative controls to assure ES&H compliance.

> **Discussion:** The Laboratory has no policy on configuration management, which includes facility and equipment configuration control, document control, and records management. Because no policy has been promulgated, supporting plans and Laboratory-wide procedures for the development, distribution, and control of procedures, and for facility and equipment configuration control (including review and approval of projects) have not been developed.

OP.2 Conduct of Operations

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

Finding/OP.2-1: Operational activities are not conducted in a manner that optimizes safe and reliable operation.

> **Discussion:** Some Operational Safety Requirements (OSRs) have not been prepared when required and, in some cases, have not been followed. There is inadequate documentation available to operators describing parameters and operating conditions. Supervisors are not formally required to monitor operations or furnish formal operational guidelines. Some control room operations are informal, unbusinesslike and unprofessional. No physical access controls exist on many of the control room or operation station areas at the Laboratory.
>
> Compensatory controls are not always established when safety systems are not in place. In some cases, operators have by-passed safety systems and functions without supervisory approval. No Laboratory-wide formal procedures exist for monitoring equipment or instrumentation.
>
> A formal Laboratory methodology does not exist for determining root cause and corrections before restart. Some shift logs are maintained; however, the data recorded are not always complete. Not all off-normal conditions are recorded. Formal procedures do not exist for shift turnovers during all operations. Interpretations of reportable items under DOE Order 5000.3A are not uniform.

Finding/OP.2-2: The Laboratory has not uniformly implemented SOPs.

> **Discussion:** Procedures have not been prepared that follow the promulgated policy and that apply information available from technical and regulatory sources. Procedures are not always based on accurate system drawings, technical specifications, and knowledge of the mechanisms involved. Procedures are not being validated by walk-throughs in the field. Procedures are not being developed in all cases by experienced and technically competent operating personnel.

OP.3 Operations Procedures and Documentation

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

Finding/OP.3-1: The Laboratory AR system does not provide sufficient guidance, direction, and procedure as to compliance requirements for operations.

Discussion: ARs are documents that attempt to provide pertinent information and general guidance for operations. The ARs place a burden of interpretation on line managers and supervisors. Compliance on the basis of ARs is difficult to measure or attain.

Finding/OP.3-2: Laboratory AR 1-3, requiring SOPs/SWPs for facilities, laboratories, experiments, or equipment representing significant hazards to personnel or property, is not consistently followed.

Discussion: SOPs and SWPs do not always conform to the prescribed review and approval process set forth in the requirements. Many SOPs have not been updated within the required period, and some operations do not have required SOPs. A system is in place to audit compliance with the requirement and to systematically initiate an annual updating process; however, this system has not been effective and is not universal. The requirement is not rigidly controlled through document control or audit assessment. The Laboratory does not formally document tests and configuration control.

Finding/OP.3-3: Laboratory AR 1-3 does not require documentation to track or monitor SOP compliance.

Discussion: SOPs are required, but once they are issued, there is no Laboratory requirement to monitor and document compliance.

Finding/OP.3-4: Documents, drawings, and other operator references are not readily available, authorized, updated, or properly controlled.

Discussion: Configuration control, including as-built drawings, is not current for most facilities. Material Safety Data Sheets (MSDSs), SOPs, and SWPs are not always readily available or current.

Finding/OP.3-5: The Laboratory has no near-miss recording and reporting procedure or requirement.

Discussion: Operating records do not always contain data for evaluating unusual occurrences and trends that could lead to procedure and equipment improvements. Few reviews are made of operating data for near-miss discovery.

OP.4 Facility Status Controls

Performance Objective: Operations personnel should know the status of the systems and equipment under their control and the effect of nonoperational systems and equipment on continued operations. They should ensure that systems and equipment are controlled in a manner that supports safe and reliable operation.

Finding/OP.4-1: Configuration control is not properly exercised.

Discussion: For safety-related systems, there is no means to ensure that the original design basis, design changes, as-built drawings, training, operating procedures, material used in maintenance, and modifications are all consistent with the current safety analysis. Changes may have been made that alter the design basis or make current training and operating procedures obsolete. Maintenance and modifications may have been performed without engineering input, thus material substitutions may occur and as-built drawings cannot be ensured correct.

Finding/OP.4-2: A fully implemented Laboratory-wide instrument calibration program is not in place.

Discussion: See QV.4-1.

Finding/OP.4-3: Lockout/tagout is not being consistently conducted at the Laboratory.

Discussion: See WS.4-10

Finding/OP.4-4: Operations personnel have no formal means to find or report the status of systems and equipment under their control and the effect of nonoperational systems and equipment on continued operations.

Discussion: Policies and procedures defining controls for determining site/facility status are not fully implemented. Operations personnel are not adequately prepared to ensure that systems and equipment are controlled in a manner that supports safe and reliable operation. The operating conditions of equipment are not effectively monitored; corrective action is not always taken when required. Check sheets are not always used to ensure that proper conditions are established for each mode of site/facility operation. Equipment status changes are not always appropriately documented and communicated to shift personnel. Activities affecting the status of installed systems and equipment are not always authorized by appropriate operations personnel.

Defective or out-of-tolerance instrumentation, alarms, and controls are not often identified, properly labeled, and corrected. Log keeping is often incomplete and not timely.

An independent verification of component position is not always performed for safety-related and other important systems and for equipment positioned after maintenance or testing. The sequence for conducting equipment line-ups is not specified and justified. Procedures are not implemented to control the placement, removal, and periodic review of temporary modifications. Personnel participating in tests are not briefed on current and projected testing activities and on status change.

Finding/OP.4-5: Warning indicators are not standard throughout the Laboratory.

Discussion: The Laboratory does not employ uniform conventions, signs, labels, and alarms.

OP.5 Operations Stations and Equipment

Performance Objective: Operation stations and facility equipment should effectively support facility operation.

Finding/OP.5-1: In many cases where significant risks exist, barricades, shields, doors, enclosures, containers, equipment, and piping are not adequately or consistently marked to convey their function or content.

Discussion: See WS.4-2.

Finding/OP.5-2: Equipment needed for safe operation of facilities is sometimes poorly maintained, inadequate, or otherwise unavailable.

Discussion: Numerous instances occur where a piece of equipment is poorly maintained or used incorrectly.

Finding/OP.5-3: General housekeeping is inadequate.

Discussion: See WS.1-7.

Finding/OP.5-4: Practices and procedures regarding the venting of gases and the use and maintenance of chemical hoods do not always effectively support facility operation.

Discussion: Inspections and testing of hoods are not always completed on a timely basis. Effluent monitoring systems are not always of an adequate design or appropriate to the nature of the work performed in the hood (e.g., use of highly toxic or flammable materials or radioactive materials). Safety procedures and safety analysis have not always been developed.

External exhaust vent lines are not always located above roof level, creating the possibility of exhaust re-entry into the building.

Finding/OP.5-5: The reliability and accessibility of communications equipment are inconsistent.

Discussion: Some communications equipment is not operational or does not provide proper coverage. Portable communications equipment is not always used by personnel who work outside the range of communications systems. Some equipment is not accessible for operation and monitoring.

Finding/OP.5-6: Certain facility equipment is not consistently reliable and accessible.

Discussion: Equipment is not always accessible for operation and monitoring. Fixed local area hoists, ladders, and work platforms are not always provided as needed.

OP.6 Operator Knowledge and Performance

Performance Objective: Operator knowledge and performance should support safe and reliable operation of the equipment and systems for which they are responsible.

Finding/OP.6-1: The Laboratory does not have a formal lessons-learned or near-miss program in place for employees to benefit from internal and external accidents, events, and ES&H concerns.

Discussion: While some elements of a formal lessons-learned program have been in place in some organizations at the Laboratory, no Laboratory policy exists to formally implement the lessons-learned components of DOE Order 5000.3A. (See OA.5-3 and CA.4-1.)

Finding/OP.6-2: Operator proficiency and performance, including procedure use and compliance, is not adequately monitored by all supervisors.

Discussion: See OP.2-1.

Finding/OP.6-3: The Laboratory has inadequate training programs, procedures, and documentation at many facilities to ensure that operator knowledge and performance support safe and reliable operation of the equipment and systems for which the operator is responsible.

Discussion: The Laboratory does not always train operators adequately, nor does it document training. Formal procedures are lacking.

OP.7 Shift Turnover

Performance Objective: Turnovers conducted for each shift station should ensure the effective and accurate transfer of information between shift personnel.

Finding/OP.7-1: The Laboratory does not have formal procedures or directives for shift turnover to ensure accurate and effective transfer of information.

Discussion: Although shift turnover procedures do exist at some facilities, shift turnover practices in other areas may be too informal to ensure that vital information is adequately transferred between personnel.

Finding/OP.7-2: Laboratory facilities do not prepare for and properly document abnormal conditions.

Discussion: Laboratory facilities conducting operations for any one shift per day do not always have an effective means to ensure that equipment is placed in a safe condition so that backshift security, custodial, and maintenance personnel can properly respond to abnormal conditions. Off-normal situations are not noted on a check sheet.

OP.8 Human Factors

Performance Objective: Human factors considerations should be incorporated in the design, layout, and operation of all Laboratory facilities in order to facilitate operator control, information processing, and the recognition and proper response to alarms, instruments, and other equipment.

Finding/OP.8-1: Human factors are not addressed by Laboratory standards, policies, and guidance.

Discussion: Human factors are not addressed in areas such as design of facilities, equipment procurements, and labeling conventions. Because some Laboratory facilities are older, they do not have controls in proximity to one another, coded status and alarm indicators, consistent labeling of controls and displays, adequate illumination levels, reliable communication systems, and/or user-friendly instructions and procedures. Some facilities lack easily reached controls and coding conventions, easily distinguishable multiple alarms, and adequately marked restricted clearances. Operational aids and special tools are not formally approved, tested, and controlled. A method has not been established for promptly replacing lost or damaged component labels. (See WS.4-2 and OP.4-1).

4.2.4 Maintenance (MA)

Maintenance at the Laboratory is performed by several organizations. Maintenance of real property and plant equipment (Class A) is the responsibility of ENG. Maintenance of programmatic equipment (Class B) is the responsibility of the operating organization to which it is assigned.

The Laboratory's real property consists of over 2,200 buildings with over 7,200,000 square feet of floor area, and 27,000 acres of mesas and canyons. Three groups within ENG share maintenance responsibilities: Field Operations (ENG-5), Maintenance (ENG-6), and Fire Protection and Utilities (ENG-8).

ENG-5 is comprised of area coordinators who represent specific geographical areas and who serve as the direct liaison between users and facility maintenance providers. ENG-5 is responsible for all painting and general building maintenance on doors, floors, windows, piping, and plumbing fixtures.

ENG-6 manages maintenance and repair for the majority of the Laboratory's real property. This includes 3,000,000 square feet of roofs, 85 miles of roads, and all building mechanical and electrical systems. ENG-6 also manages related services including custodial, water treatment, waste removal, and snow removal.

ENG-8 manages maintenance and repair of the fire protection and utility systems. The utility systems include steam generation and distribution, electrical distribution, water wells and distribution, natural gas distribution, sewage collection, and sewage treatment.

The majority of real property maintenance is performed by Johnson Controls World Services Inc. (JCI). JCI performs the maintenance of utilities and facilities, and provides custodial and snow removal services under the management direction of the Facilities Engineering Division. There is a formal work order system that controls all work performed by JCI, and a computerized maintenance management system for reporting and evaluation. JCI is also directly responsible for maintaining the facilities it uses on site.

The Laboratory's programmatic equipment includes reactors, accelerators, lasers, glove boxes, hot cells, process lines, computers, and office equipment. Maintenance is performed by Laboratory personnel, JCI, and other contract services. A Maintenance Management Office has been established within the Engineering Division to develop a Laboratory maintenance policy to provide guidance to ensure uniform maintenance practices for Class B equipment throughout the Laboratory.

MA.1 Organization and Administration

Performance Objective: Maintenance organization and administration should ensure effective implementation and control of maintenance activities.

Finding/MA.1-1: The Laboratory does not have a comprehensive program for planning, coordinating, implementing, and controlling maintenance and repair activities.

> **Discussion:** A documented maintenance management program that meets the full requirement of DOE/AL Order 4330.4A is not completely established and formalized. No single Laboratory organization is responsible for oversight of maintenance management policy and procedures. Maintenance of programmatic (Class B) equipment has not been incorporated within formal maintenance plans. Responsibilities have not been delegated or defined at management and supervisory levels. Goals, objectives, and indicators of maintenance performance are not formally established. Postmaintenance requirements are not clearly defined. Test requirements and quality acceptance criteria have not been established.

Finding/MA.1-2: The Laboratory does not adequately carry out its responsibilities under DOE orders and directives in corrective, preventive, and predictive maintenance areas, including backlog reduction.

> **Discussion:** A formal requirements-based budget is required to properly allocate fiscal resources. Maintenance responsibilities outlined in DOE Order 4330.4A, "Maintenance Management Program," must be prioritized within the budget process. The Laboratory

does not have a formal audit policy to ensure proper use of maintenance-allocated resources.

Finding/MA.1-3: **The Laboratory maintenance organization lacks sufficient formality of operations.**

Discussion: **A policy for defining a graded approach, administrative controls, and formality of operations for critical facilities is nonexistent.**

Finding/MA.1-4: **The maintenance organization is not a cohesive unit and fails to accomplish all maintenance functions in coordination with operations, safety, quality assurance, and other support organizations.**

Discussion: **Responsive and functional accountabilities have not been achieved, and interfaces are poorly defined.**

Finding/MA.1-5: **A comprehensive maintenance training and certification program does not exist.**

Discussion: Maintenance training programs and courses lack adequate formality. Maintenance management and supervision need closer involvement in personnel training. Course content, training schedules, and on-the-job-training (OJT) have not been formally established and documented. Testing for qualification and certification exist only in certain areas. OJT certification and training records are nonexistent. Task analysis to determine training or certification requirements is not performed.

MA.2 Conduct of Maintenance

Performance Objective: Maintenance should be conducted in a safe and effective manner to support each facility condition and operation on the site.

Finding/MA.2-1: In many cases, work is not properly authorized and controlled to ensure compliance with safety requirements.

Discussion: Detailed review of work orders and small job tickets (SJTs) has not been fully captured within formal work control procedures. Not all work is adequately reviewed by safety and quality organizations before being scheduled. A closed-loop system has not been fully implemented to properly control all work and to document completed work, including facility and equipment modifications.

Finding/MA.2-2: Laboratory-wide policies and programs for minimizing exposure of personnel to radioactive and hazardous materials are not adequate.

Discussion: Training, indoctrination, and protection of employees for safety and health concerns are not adequately planned and controlled. Procedures have not been developed to ensure dissemination of lessons-learned and safety-related information to maintenance personnel. Qualifications for maintenance supervisors are sometimes inadequately documented. Maintenance procedures do not ensure effective troubleshooting, documentation, safety, quality control, and conformance to current maintenance standards. Prejob and postjob briefings are not properly incorporated in maintenance documentation. Procedures do not include assurances that modifications or changes to facilities are performed with proper review and authorization.

Finding/MA.2-3: Procedures are not implemented consistently or updated periodically as required by the Laboratory and by DOE policy.

> **Discussion:** Maintenance and operating procedures used by maintenance personnel have not been fully implemented, and a consistent review and updating procedure is not in place. Maintenance personnel have not been thoroughly trained in the procedures, including quality control, safety, and reporting requirements. The requirement for postmaintenance tests and certification of completed work has not been included in maintenance procedures. The technical specifications, including environmental protect. system cleanliness, and configuration control as mandated by the system design and the system operator, have not been included in maintenance procedures. Modifications to facilities are not controlled and approved by a configuration control policy or procedure.

Finding/MA.2-4: Lockout and tagout procedures do not satisfy all requirements identified in 29 CFR 1910.177.

> **Discussion:** Lockout and tagout procedures in use do not include independent party verification of the lockout process. Procedures have not been updated. (See WS.4-10)

<u>MA.3 Maintenance Facilities, Equipment, and Material</u>

Performance Objective: Facilities, equipment, and material should effectively support the performance of maintenance activities.

Finding/MA.3-1: Policies or procedures do not exist for ensuring that proper tools, equipment, and consumable supplies are available to support maintenance activities.

> **Discussion:** Policies have not been fully incorporated into maintenance and operating procedures for control of tools, equipment, and supplies. Requirements for inspection, acceptance, storage, and nonconformance reporting have not been included in policies or procedures. Procedures for approval of procurement specifications and testing criteria by qualified personnel and for materials substitutions are not adequate. Tracking and control of materials through purchase order processing, receiving, warehousing, and end use are not adequately defined to ensure, where necessary, traceability from manufacturer to installation.

Finding/MA.3-2: Procedures are not adequate to ensure the quality of stored equipment, repair parts, and materials.

Discussion: Procedures have not been developed and implemented for the identification of special quality control requirements, for performing necessary maintenance and review of equipment parts and materials, and for establishing environmental and shelf-life controls. Restricted-use materials and safety-related parts are not adequately controlled and segregated to meet safety and code requirements. Materials are not properly stored and controlled between warehouse checkout and installation.

Finding/MA.3-3: The Laboratory has not effectively extended its standards calibration program to maintenance measurement and test equipment.

Discussion: A program for control and calibration of maintenance measuring and test equipment has not been fully implemented to effectively support the performance of maintenance activities.

Finding/MA.3-4: Maintenance shops and training facilities are not adequate to meet the needs of all maintenance personnel.

Discussion: Necessary improvements in maintenance shops and maintenance training facilities have not been fully implemented. Maintenance testing facilities are not adequate. Laydown and staging areas are not adequate to minimize personnel hazards in work areas. Storage for tools, supplies, and equipment is not adequate.

MA.4 Planning, Scheduling, and Work Control

Performance Objective: The planning, scheduling, and control of work should ensure that identified maintenance actions are properly completed in a safe, timely, and effective manner.

Finding/MA.4-1: The work-control system does not adequately provide for planning and status reporting on required maintenance work.

Discussion: Planning and scheduling of materials and equipment, work coordination, safety reviews, and quality control reviews are not adequate. Detailed scheduling of maintenance, including overall site coordination and support from other organizations, is not adequate. Work descriptions and scope on work orders are not adequate. Formal job plans and procedures for scheduled and unscheduled outages are not adequate.

Finding/MA.4-2: A comprehensive procedure for work packages is not provided to include detailed instructions for proper control of the job, the recording of data for measurements, hold points for quality control safety considerations, and review of completed work.

Discussion: Procedures do not exist to ensure that features needed for work management and control are provided to produce complete work packages. No Laboratory-wide program exists for recording problems and deficiencies in equipment and systems, or for tracking and completing the backlog of corrective maintenance work. Postmaintenance testing requirements are not adequately defined in formal maintenance procedures, including obtaining the necessary approvals and assessments, before a system is returned to service. Postoperation critiques are not documented by formal processes with appropriate reviews. Temporary repair procedures are lacking. Work packages are not adequately reviewed or analyzed for preventive maintenance (PM) impact. Worker safety considerations do not consistently include the concept of as-low-as-reasonably-achievable (ALARA).

Finding/MA.4-3: Current procedures do not consistently ensure that support subcontractor and nonfacility contractor personnel performing facility maintenance work are appropriately trained and qualified.

Discussion: Procurement specifications for maintenance subcontractors are inadequate to ensure that personnel working for contractors and subcontractors meet the same safety and performance criteria established for on-site maintenance personnel.

MA.5 Corrective Maintenance

Performance Objective: The material condition of components and equipment should be maintained to support safe and effective operation of all facilities on the site.

Finding/MA.5-1: A comprehensive program does not exist to assess the condition of components and equipment, identify problems, and correct deficiencies.

Discussion: Programs to determine the condition of facilities and equipment are not extended to all equipment, nor are they conducted with the frequency commensurate with safe operations. Facilities and systems not designed for seismic and other external loads are not evaluated for continuation of safe operation. Comprehensive site risk assessments are not performed to achieve the performance objective.

Failure analysis does not exist for all critical and safety-related equipment.

Deficiencies are not documented to ensure quality of corrective actions.

No program exists to ensure that standby, auxiliary, or redundant systems are maintained to original operating requirements.

MA.6 Preventive Maintenance

Performance Objective: Preventive maintenance should contribute to optimum performance and reliability of systems and equipment important to operations.

Finding/MA.6-1: The Preventive Maintenance Program is not implemented for all Laboratory equipment and does not effectively use available technologies and practices to assess equipment performance and reliability.

Discussion: Preventive maintenance programs, technologies, and practices do not exist for all Laboratory equipment and facilities. Vibration analysis inspections and trend analysis have not been extended to all required equipment. Functional tests of installed equipment and equipment fault systems are not formalized. Effectiveness of scheduled lubrication programs and relamping programs is not analyzed to establish optimum service intervals. Inspection programs are not evaluated to ensure maximum effectiveness of preventive maintenance.

Age-related degradation of facilities and equipment is not fully addressed within present preventive maintenance programs. For example, the periodic sealing of roadways to deter deterioration from the elements is not uniformly done.

MA.7 Predictive Maintenance

Performance Objective: Maintenance history evaluation and systematic root cause analyses should be used to support maintenance activities and to optimize equipment performance.

Finding/MA.7-1: The existing maintenance history system is inadequate and is not consistently applied.

Discussion: The maintenance system does not include all facilities and equipment requiring or benefiting from predictive maintenance, including trend analysis. Reliability-centered maintenance programs have not been incorporated into the maintenance system to eliminate unscheduled downtime of critical facilities and equipment. Cost analysis has not been applied. Programs for monitoring in-process equipment lack formality and consistency to establish optimum parameters for maintenance.

MA.8 Procedures and Documentation

Performance Objective: Maintenance procedures and related documents should provide appropriate directions and guidance for work and should be used to ensure that maintenance is performed safely and effectively.

Finding/MA.8-1: Policies and procedures that provide direction and guidance for all maintenance operations do not exist.

Discussion: Written procedures for all maintenance operations, including unusual equipment such as that found at the meson beam line or in the Laboratory Data Communication Center (LDCC), have not been formalized and reviewed for safety. Safety provisions have not been fully incorporated within written maintenance guidance. A Laboratory-wide policy for review and verification of maintenance procedures does not exist. Maintenance history has not been expanded to include programmatic equipment. Vendor manuals and other maintenance reference materials have not been updated and incorporated into maintenance procedures. Change control, quality control, hold points, and skill qualification do not have a formal review. Maintenance records are not retained and protected in accordance with DOE Order 1324.2A, "Records Disposition." Development and issuance of written maintenance procedures are not performed in a timely manner.

4.2.5 Training and Certification (TC)

The Laboratory training program is structured to ensure that personnel possess the knowledge and skills to perform their duties in a safe and environmentally sound manner. The program is designed to be auditable and to comply with DOE orders, directives, and regulatory requirements.

The Laboratory Training Office is a division-level office positioned within the Human Resources Directorate. The director of training reports technically and functionally to the director of human resources. Functional training organizations, under the authority of group leaders, section leaders, or training managers/supervisors, are accountable to line management and are matrixed to the Laboratory Training Office for implementation of:

- Training-related DOE orders and regulations, particularly DOE Order 5480.20, DOE Order 5840.19, and DOE Order 5840.18, "Accreditation of Performance-based Training for Category A Reactors and Nuclear Facilities"
- Laboratory training policies and procedures
- The Laboratory-wide employee development system (EDS)
- Laboratory training needs assessment, status evaluation, and tracking implementation

Each organization is required to have a training coordinator who is responsible for the general coordination and oversight of the organization's training function. A Training and Education Coordinators Committee (TECC), chaired by the Director of Training, meets on a bimonthly basis to define training policies and procedures and to support implementation of these procedures throughout the Laboratory. Training coordinators from the Laboratory's two major subcontractors, Johnson Controls World Services Inc. and Mason and Hanger-Silas Mason Co., Inc., serve as members of the TECC. A Deputy Associate Director-level Training Steering Council is being formed to review and approve training policy, priorities, and funding, and to assure implementation of DOE training compliance requirements.

<u>TC.1 Organization and Administration</u>

Performance Objective: The training organization and administration should ensure effective implementation and control of training activities.

Finding/TC.1-1: The Laboratory has not established a formal comprehensive training program.

> **Discussion:** Lack of formalized training procedures has resulted in training not being systematically implemented across Laboratory facilities as well as in a number of training deficiencies. For example, there are deficiencies in training needs identification based on job duty, inconsistent training exemption policies, uneven training performance measures,

documentation inconsistencies and gaps and inadequate on-the-job training design, delivery, and documentation approaches.

Finding/TC.1-2: Training records are not always maintained in a manner that is retrievable and consistent.

Discussion: Many facilities have their own training documentation system, and training record standards are not consistently applied. Training, particularly OJT, is often undocumented and course files are incomplete. Because of the lack of a centralized data base, organizations are not always able to ensure that all personnel are adequately trained. Retraining needs have not been fully addressed and a method of identifying all untrained personnel has not been implemented.

Finding/TC.1-3: The Laboratory has no methodology for determining training requirements.

Discussion: Job analyses are not done for all needed classifications at the Laboratory. Many job descriptions are inadequate. Therefore, training needs are not identified according to accurate job-task descriptions.

Finding/TC.1-4: The Laboratory does not have a well-defined and understood organizational structure that includes authorities, accountabilities, responsibilities, and interfaces for training.

Discussion: The training officer does not have adequate authority to control training activities. This suggests that the training program is not given high priority. Laboratory-wide training responsibilities reside in several organizations (HS, OS, HRD, C, are examples). Relationships among these organizations are evolving and being defined. Training coordinators have not been appointed for every organization.

Finding/TC.1-5: Insufficient priority is assigned to ES&H training requirements.

Discussion: The Laboratory has insufficient space, training, and personnel to meet competing requirements. While an additional allocation increased the number of contracted training specialists, more time is necessary to bring them up to Laboratory standards. Laboratory organizations continue to share facilities, but there are not enough and they are inadequately equipped (see TC.7). Training has not been given high priority in some technical organizations, i.e., some annual training activities are overdue.

Finding/TC.1-6: The Laboratory lacks a system to ensure that training activities are effectively implemented and controlled.

Discussion: Sufficient time is not provided for training before significant procedure changes or system modifications are put into effect. Classroom and individualized instruction might not be effectively presented, and instructor performance is not routinely evaluated. Training programs are not systematically evaluated and improved to ensure that trainees maintain the required skills and knowledge. Training requirements for temporary employees, contract personnel, and transient workers are not always established. Learning objectives are not always specified and measured. Methods of meeting training objectives and goals are not systematically pursued.

Finding/TC.1-7: Laboratory-wide standards are not available for on-the-job training.

Discussion: Existing guidance is not applied to OJT concerning evaluation of training requirements, documentation, testing, certification/qualification, and formality of operations.

Finding/TC.1-8: The Laboratory has not established a formal, comprehensive testing system as required by DOE 5480.20.

Discussion: Policies and procedures do not exist for test development, testing out, remediation (including retesting and time allowed), and testing as a condition of employment (termination for failure). Policies and procedures are inconsistently created and administered throughout the Laboratory.

Finding/TC.1-9: Some Laboratory organization-sponsored training is not being adequately reviewed for course content and quality.

Discussion: Certain organizations are not submitting course/lesson plans to the Training Office for review, comment, and/or approval.

TC.2 Reactor Operations

Performance Objective: The operator and reactor supervisor training and certification programs should be based on DOE Order 5480.6, Sec. 8.e., as applicable, and should develop and improve the knowledge and skills necessary to perform assigned job functions (reactors only).

Finding/TC.2-1: The Laboratory lacks a system to analyze jobs and determine appropriate initial, on-the-job, and continuing training for reactor operations personnel.

Discussion: Most work classifications have employed high-level educated and/or experienced personnel whose qualifications exceed minimum requirements. Most training is OJT or mentoring, working one-on-one. The primary documentation of these continual training activities is a completed check list at check-out or OJT qualification. Many training courses do not have lesson plans or learning objectives. Classroom training documentation ranges from overheads to lesson plans with learning objectives. Job analyses have not been completed. Training courses and objectives are not always based on a job analysis.

Finding/TC.2-2: Reactor operations training, including continuing training programs for supervisors, managers and technical personnel, does not consistently cover required content areas.

Discussion: Content is missing (budgeting and cost control, supervisory/management skills and practices, interfacing with external groups and organizations), and programs do not build on previous training and experience. Insufficient emphasis is placed on seldom-used or changing information.

Finding/TC.2-3: Facility-based certification exams are sometimes subjective and not comprehensive in scope.

Discussion: Certification exams in the Los Alamos Critical Experiments Facility (LACEF) are based on the expertise the examiner would like the trainee to exhibit. Oral exams in this facility are subjective, varying from trainee to trainee, and are based on what the expert sees as identified weaknesses in the written exam.

<u>TC.3 Nuclear Facility Operations other than Reactors</u>

Performance Objective: The nuclear facility operator and supervisor training and certification programs should be based on DOE Order 5480.5, as applicable, and should develop and improve the knowledge and skills necessary to perform assigned job functions (nuclear facilities only).

Finding/TC.3-1: The Laboratory lacks a system to analyze jobs and determine appropriate initial, OJT and continuing training for nuclear facility operations personnel.

Discussion: Most facilities have not completed a job analysis, and documentation of training is uneven. For example, learning objectives are not defined for all classes. Measures of employee performance are limited. OJT is not documented in all facilities and the use of OJT check lists to measure and verify employee performance is not consistent.

Finding/TC.3-2: Initial and continuing training qualification and requalification programs are not developed for most nuclear facilities and completed training is not systematically evaluated and documented.

Discussion: Requalification and testing standards are not developed for most facilities. Initial training qualification standards are based primarily on operating instructions and SOPs, for which training documentation and training beyond self-study are limited. Metrics for acceptable employee performance in most facilities have not been developed. Employee training files and course training files are not easily auditable.

Finding/TC.3-3: Nuclear-facility operations training, including continuing training programs for supervisors, managers and technical personnel, does not consistently cover required content areas.

Discussion: See TC.2-2.

TC.4 General Employee/Personnel Protection Training

Performance Objective: General employee and personnel protection training programs should ensure that site/facility personnel, subcontractors, and visitors have an understanding of their responsibilities and expected safe work practices and the knowledge and practical abilities necessary to effectively implement personnel protection practices associated with their work.

Finding/TC.4-1: General and facility-specific training programs have not been fully developed and implemented across all Laboratory facilities.

> **Discussion:** Line organizations do not always have mechanisms to delineate training responsibilities and to ensure that staff and visitors are adequately trained. Site-wide organizations and facilities lack appropriate training programs, and there is no Laboratory-wide policy to ensure that personnel have been trained and have completed examinations successfully prior to their being assigned to radiation-controlled areas. Some organizations do not provide formal mandatory radiation safety training for individuals who handle radioactive materials and work with radiation-generating devices. Hazards communication training has not been provided to all employees who require it.

Finding/TC.4-2: The Laboratory does not comprehensively identify and train employees who have potential for occupational exposure in radiation safety in accordance with DOE Order 5480.11.

> **Discussion:** The training requirements of DOE Order 5480.11 have not been addressed and implemented by some organizations. Radiation training requirements for all personnel with a potential for occupational exposure have not been fully planned or implemented. Some organizations do not provide formal mandatory radiation safety training for individuals who handle radioactive materials and work with radiation-generating devices. Some operators and supervisors do not receive adequate continuing training in site-specific radiological and hazards communications. Minimum training and testing requirements are not being met for radiation workers in some divisions and facilities.

Finding/TC.4-3: General employee and personnel protection training programs do not ensure evaluation of knowledge and practical abilities.

> **Discussion:** The Laboratory suffers from informality in training. Training is seldom documented. Evaluation of practical factors is inconsistent. The Laboratory does not have a policy regarding personnel who fail training examinations. Guidance is not provided for situations where personnel have language and/or reading difficulties.

TC.5 Maintenance Personnel

Performance Objective: The maintenance personnel training qualification programs should develop and improve the knowledge and skills necessary to perform assigned job functions.

Finding/TC.5-1: The Laboratory does not have a formal system to ensure that maintenance employees are advised of site-specific hazards.

> **Discussion:** For example, JCI employees provide service and craft support at many Laboratory locations at which special hazards exist. Job- or site-specific hazards are not systematically identified to employees before work starts.

Finding/TC.5-2: The Laboratory does not ensure that maintenance personnel training qualification programs meet DOE requirements.

> **Discussion:** The Laboratory does not have comprehensive policies or procedures for assuring that workers in designated positions have received specific training or professional certification.

Finding/TC.5-3: The Laboratory has not articulated initial and continuing training requirements for maintenance personnel.

> **Discussion:** Course, test, and individual records are incomplete. Retraining schedules are not maintained.

<u>TC.6 Criticality Safety</u>

Performance Objective: Personnel should receive training in nuclear criticality safety consistent with their assigned tasks (reactors and nuclear facilities only).

Finding/TC.6-1: Documentation does not always exist on personnel trained in criticality accident evacuation emergency procedures.

> **Discussion:** Not all areas of the Laboratory keep documentation on personnel working without escort in a facility on site that states they are trained in criticality accident evacuation emergency procedures.

Finding/TC.6-2: The Laboratory does not have a site-wide system to ensure that personnel receive training in nuclear criticality safety consistent with assigned tasks.

> **Discussion:** Individual facilities decide which personnel are required to receive the training. The subject matter expert trainer provides learning objectives upon line management request.

Finding/TC.6-3: Annual evacuation drills are not always conducted, documented, and critiqued.

> **Discussion:** Documentation and critiques are limited, even when drills are held. Records are sometimes held by organizations; in other cases, they are held by committees responsible for a multigroup site.

TC.7 Training Facilities and Equipment

Performance Objective: The training facilities, equipment, and materials should effectively support training activities.

Finding/TC.7-1: The Laboratory does not have adequate classroom facilities to handle the volume of required training.

> **Discussion:** The quality of all classroom facilities allows for effective group instruction; however, the amount of space and equipment is inadequate for ES&H training.

Finding/TC.7-2: Sufficient equipment, aids, references, and other training materials are not available to support needed training activities.

> **Discussion:** Training material development and training aids are not evenly supported throughout the Laboratory.

TC.8 Quality Control Inspector and Nondestructive Examination Technician

Performance Objective: The quality control (QC) inspector and nondestructive examination (NDE) technician training and qualification programs should develop and improve the knowledge and skills necessary to perform assigned job functions.

Finding/TC.8-1: Programs are not established and implemented for initial and continuing training.

> **Discussion:** There is one Laboratory site where technicians use nondestructive examination instruments. All training is on-the-job. There are no assurances that required content is covered or that on-the-job training requirements are identified, completed, and documented prior to assignment to tasks. Trainee competence is inconsistently verified.

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.

Finding/TC.9-1: The Laboratory does not have a radiological protection personnel training and qualification program in accordance with DOE Order 5480.11.

> **Discussion:** Initial training does not necessarily include classroom and on-the-job training, development of job-related knowledge and skills, and presentation of information required to perform a job safely. Continuing training does not maintain and improve job-related knowledge and skills because of inconsistent procedures for incorporating modified radiation protection regulations and/or

practices. On-the-job training requirements are not identified, completed, and documented before the employee is required to perform the tasks independently.

TC.10 Training for Supervisors, Managers, and Technical Staff

Performance Objective: Training programs for supervisors, managers, and the technical staff should broaden overall knowledge of processes and equipment, and develop supervisory and management skills.

Finding/TC.10-1: An effective program for training supervisors, managers, and technical staff has not been developed at the Laboratory or JCI.

Discussion: The following deficiencies from one Laboratory facility exemplify the weaknesses of the present training program: Operators and supervisors do not receive adequate continuing training on site-specific radiological and hazards communications; ES&H training for managers does not thoroughly identify responsibility for compliance with environmental statutes; the examination process does not adequately measure supervisor and operator knowledge in the subject areas required by DOE orders and directives and by the technical specifications; construction project managers and coordinators who are responsible for safety have not had safety training; and operator and supervisory training programs do not include instruction in the proper use, maintenance, and performance of control systems and procedures.

Finding/TC.10-2: Continuing training programs for supervisors, managers and technical personnel do not consistently cover required content areas.

Discussion: See TC.2-2.

TC.11 Simulator Training/Facility Exercises

Performance Objective: Simulator training and/or facility exercises should be conducted using methods and techniques that are effective in developing and maintaining team and individual knowledge and skills in responding to abnormal and emergency events, and in integrated operations (reactors and nuclear facilities only).

Performance Objective Note: The Laboratory does not have reactor or nuclear facility simulators.

Finding/TC.11-1: Annual evacuation drills are not always conducted, documented, and critiqued.

Discussion: See TC.6-3.

Finding/TC.11-2: Facility exercises are not consistently developed, documented, and implemented.

Discussion: Documentation is often limited to dates, names, events or exercises. Topics required are discussed in weekly facility operations meetings. These discussions include trainee-instructor interaction, but are not documented as training. Performance objectives are not always defined or measured. Facility exercises are often tied to emergency preparedness training.

4.2.6 Auxiliary Systems (AX)

The Laboratory operates its 17 nuclear facilities and some 2,200 nonnuclear facilities and buildings under the philosophy of defense-in-depth (multiple engineered safety systems) where one system may fail without endangering other systems. These systems are divided into two categories, systems important to safety and critical systems.

Systems important to safety are listed in the operational safety requirements (OSRs) of nearly 20 Laboratory facilities. If such a system fails, it must be repaired within a specified time or the entire facility must go into safe shutdown. These systems are identified by formal safety analyses and include emergency gas (tritium) cleanup, filtration, ventilation, emergency power, electrical power, compressed air (control air), vacuum, and fire protection.

Critical systems must be maintained on a regular schedule and are important to the safety of workers, the accomplishment of a mission, or the creation of a product. Critical systems include sewage treatment plants, power plants, and central steam plants, as well as systems important to safety (listed above) found in nonnuclear facilities.

Laboratory operating divisions are responsible for both types of systems through the Building Manager Program, which has designated more than 1,100 landlords and building managers. This program is supported by the ENG Division, the HS Division, and the Laboratory support services contractor, JCI.

ENG Division assigns area coordinators to oversee the operation of systems and the maintenance of key equipment. Facility (Class A) equipment is installed as part of the basic building construction; programmatic (Class B) equipment is used solely for programmatic purposes.

HS Division supports various auxiliary systems by providing such services as maintenance of radiation alarms (continuous air monitors (CAMs), alpha detectors, etc.), stack sampling for effluent stacks, and in-place testing of high-efficiency particulate air (HEPA) filters.

JCI provides skilled crafts and labor to evaluate, maintain, construct, and modify auxiliary systems and also operates central facilities such as steam plants and sewage treatment plants.

<u>AX.1 Systems Requirements</u>

Performance Objective: Auxiliary systems should be considered under the same functional criteria for design, engineering, operations, maintenance, and modifications as the structural, confinement, and primary process system of the facility.

Finding/AX.1-1: Not all Laboratory nuclear facilities have complete safety analyses; neither do some nonnuclear facilities.

> **Discussion:** The Laboratory requires Operational Safety Requirements (OSRs) or Technical Specifications (TSs) for appropriate facilities, but in some cases these requirements are not backed by comprehensive safety analyses.

Finding/AX.1-2: Surveillance and maintenance of auxiliary equipment are not being verified by facility operators and managers.

> **Discussion:** Surveillance and maintenance are usually provided by support organizations such as ENG and HS, but in some cases, facility operators are not aware when or if the action has been accomplished.

Finding/AX.1-3: OSRs are not being uniformly implemented throughout Laboratory nuclear facilities.

> **Discussion:** A recent DOE/AL/SPD assistance review found that compliance with OSRs was not effectively assured by organizations assigned responsibility for facility management. Logbooks were not being systematically maintained and some OSRs were not controlled documents.

Finding/AX.1-4: The Laboratory has not adequately applied Quality Assurance (QA) programs to user-provided/Class B equipment that is critical to safety.

> **Discussion:** Some Facility Managers do not fully understand the importance of assuring reliability of equipment that is critical to safety. Although some facilities do have QA programs that address the issue, the majority do not.

Finding/AX.1-5: The Laboratory has not uniformly implemented a configuration control program to ensure that changes are reviewed for unresolved safety questions (USQs) and that appropriate design and safety criteria are met.

> **Discussion:** Configuration control programs are required by DOE Order 5480.5, but they have been formally implemented in only a few nuclear facilities.

Finding/AX.1-6: The Laboratory has not transferred good management practices from nuclear facilities to nonnuclear facilities.

> **Discussion:** A graded adoption of nuclear-facility management practices has not been exercised by the Laboratory to balance resources and enhance nonnuclear safety. Examples of particular weaknesses noted for Laboratory facilities are configuration control programs, performance criteria, and OSRs for auxiliary systems.

AX.2 Effluent Holdup and Treatment

Performance Objective: Effluent holdup and treatment should ensure that the amount of hazardous substances released to the environment as escaping emissions and/or as effluent gaseous or liquid releases is less than DOE and Environmental Protection Agency (EPA) standards and is ALARA.

Finding/AX.2-1: Stack monitoring is inconsistently applied across Laboratory facilities.

> **Discussion: Different technologies and configurations are used for stack monitoring; many are not real-time monitors, while others are state-of-the-art systems. These systems are not being evaluated for adequacy for both normal and** off-normal conditions. **Continuous Air Monitor (CAM) alarms, which monitor the** exhaust of some buildings, are not always monitored at a location remote from the operating area. Alarms are not routed to a remote location where operators can monitor them.

Finding/AX.2-2: The Laboratory does not have adequate monitoring systems to ensure that low-level radioactive waste lines and tanks are not leaking.

> **Discussion:** See SW.1-3 and WM.1-12.

Finding/AX.2-3: The practice of holding, or delaying, the release of radioactive emissions to maximize radioactive decay has not been fully implemented.

> **Discussion:** Although LAMPF is not a nuclear facility, it releases the highest level of activity on site. Currently, filtration and short transit air times are used, but it has been determined that a longer delay would significantly reduce emissions.

Finding/AX.2-4: Nonradioactive waste systems are not always monitored at appropriate locations by installed and calibrated radiation detectors.

> **Discussion:** While waste streams are routinely monitored at the receiving area, this practice should be evaluated to assure suitability for all facilities. Monitors at the generator end may be appropriate in some cases. Calibration of such monitors, wherever located, is not periodically evaluated.

Finding/AX.2-5: Goals for minimization of effluent streams are not systematically set and evaluated.

> **Discussion:** Although effluent records are evaluated quarterly in the context of facility operations, Laboratory-wide goals for improvement and methodologies (changes in operations or improved procedures) to reach those goals are not being uniformly set.

AX.3 Solid Wastes

Performance Objective: Solid hazardous wastes (including radioactive wastes) should be controlled to minimize the volume generated, and handled in a manner that provides safe storage and transportation.

Finding/AX.3-1: Waste minimization programs have not been uniformly applied throughout the Laboratory.

> **Discussion:** Many facilities have not developed a waste minimization program, while others have programs at various stages of evolution. Only one transuranic (TRU) waste minimization program exists (TA-55).

Finding/AX.3-2: Annual goals for waste reduction have not been established Laboratory wide.

> **Discussion:** Waste Management provides facility management with regular reports on the amount of waste generated. Although waste management has developed a waste minimization program with goals, the Laboratory has not developed a goal-oriented program for waste generation and minimization.

Finding/AX.3-3: The Laboratory has not used below regulatory concern limits to screen waste for disposal at the Low-Level Radiation Waste Facility, Area G.

> **Discussion:** The Laboratory continues to use suspect waste as a criterion for waste to go to Area G. While this practice is conservative, it is not conducive to waste minimization.

Finding/AX.3-4: The Laboratory does not have a fully implemented waste management policy or program in accordance with DOE Order 5820.2A, "Radioactive Waste Management."

> **Discussion:** A Waste Management Committee was functional at the Laboratory in the late 1970s and early 1980s, but has since disbanded. The Committee, consisting of higher level management, oversaw institutional waste management. An implementation plan for DOE Order 5820.2A has been developed, but has yet to be accepted or acted upon by Laboratory management.

AX.4 Storage and Handling of Fissile Material

Performance Objective: Fissile material should be stored and handled in a manner that minimizes the chances of loss, contamination, release, or inadvertent criticality.

Finding/AX.4-1: Areas used for storage of fissile material have not been fully analyzed by safety analyses.

> **Discussion:** See AX.1-1.

Finding/AX.4-2: Some materials currently stored are not fully characterized.

Discussion: Previous practice allowed storage of unknowns. This practice is not acceptable. A formal program has not been developed to characterize and minimize such material.

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 ALARA.

Finding/AX.5-1: Methods to ensure that pressure zoning (airflow from clean to dirty) is working properly are not uniformly applied.

> **Discussion:** At many facilities, pressure zoning is accomplished with manual air balancing. Other facilities use various types of active air balancing controls. Safety analyses have not been performed to determine if current practices are acceptable.

Finding/AX.5-2: The Laboratory air balancing program is minimal.

> **Discussion:** Systems at the Laboratory are not routinely balanced to ensure proper airflow (both supply and exhaust). Recent upset conditions created situations where employee exposures or uncontrolled releases to the environment could have occurred.

Finding/AX.5-3: Not all HEPA filter systems are tested on an annual basis.

> **Discussion:** HEPA filters are routinely tested according to Industrial Hygiene Group (HS-5) test policy. Although the policy has defined test frequency based on contaminant, additional OSR requirements have not necessarily been incorporated or communicated to the service organization providing the testing. Facility management is also, in many instances, not verifying that tests are being conducted or evaluated.

Finding/AX.5-4: Exhaust monitoring equipment has not been sufficiently evaluated to demonstrate consistency with the guidance of ANSI-N13.1 and N42.18.

> **Discussion:** Some Laboratory monitoring equipment was installed several years ago, and its adherence to new guidance has not been evaluated.

AX.6 Vital Supply Systems

Performance Objective: The electric, water, and emergency power systems should reliably provide vital services as required by all facilities on the site.

Finding/AX.6-1: The Laboratory has not completed the required safety analyses for all facilities to develop a list of vital systems.

Discussion: Although power and water systems are necessary to ensure routine operations of a facility, they may not be vital in ensuring safe shutdown. Current safety analyses have not, in some cases, identified systems that are vital for safe operation of a facility.

Finding/AX.6-2: Risk evaluation and identification of appropriate remedial action, as requested by DOE/LAAO, has not been completed for the DOE-owned natural gas pipeline within the Los Alamos townsite.

Discussion: The Gas Company of New Mexico (the DOE gas line maintenance and operations contractor) is concerned that pit corrosion of pipeline walls necessitates replacement of the Los Alamos townsite pipeline section in the near future. Two pinhole wall leaks, detected and repaired in fiscal year 1990, and major corrosion identified in adjacent sections in recent years support this concern.

The DOE project management action plan recommends that the pipeline be visually inspected and that the wall thickness be determined at several places in accessible areas to determine the physical condition of the line.

The Laboratory has expressed its concern to DOE through a February 1991 submittal of a line item construction proposal for replacement of the Los Alamos townsite pipeline section. At the request of DOE/LAAO, the Laboratory is in the process of having an independent assessment of the pipeline section performed.

Finding/AX.6-3: Management does not uniformly assure, through a formal configuration control program, that design features of vital systems are maintained during routine and off-normal conditions.

Discussion: Safety analysis must identify the critical design features for vital systems. These data would provide input to a formal configuration control program, which is not presently implemented at the Laboratory.

Finding/AX.6-4: Preventive maintenance and routine testing are not uniformly conducted on systems supplying vital services in both normal and off-normal conditions.

Discussion: Instances have occurred where installed emergency power generators have failed to function when required because of inadequate oversight. Systems are not routinely exercised to ensure that vital systems are available and reliable.

AX.7 Heat Removal Systems

Performance Objective: The heat removal systems should reliably remove heat as required from the reactor or process and equipment important to safety.

No Findings.

AX.8 Engineered Safety Systems

Performance Objective: Engineered safety systems should be reliable and available to provide protection to the facility when required.

Finding/AX.8-1: The Laboratory has not fully implemented a graded approach for a preventive maintenance/in-service inspection program.

> **Discussion:** Such a program is presently limited to a few of the Laboratory's nuclear facilities that have developed maintenance and configuration control programs that meet the intent of DOE Order 5480.5.

Finding/AX.8-2: Safety analyses are not available for all facilities requiring them.

> **Discussion:** Comprehensive safety analyses to identify engineered safety systems and evaluate their contribution to facility protection are not available at some facilities.

Finding/AX.8-3: Some identified safety systems have not been evaluated to the required seismic criteria.

> **Discussion:** An evaluation of the need for Laboratory systems to operate during a design-basis earthquake has not been completed. An analysis will also be required to determine their survivability on a component-by-component basis.

AX.9 Coolant Cleanup Systems

Performance Objective: Recirculating coolants should be cleaned continuously or intermittently to minimize the build-up of contamination and to reduce corrosion.

No Findings.

4.2.7 Emergency Preparedness (EP)

The objective of the Laboratory's Emergency Preparedness program is to provide the final barrier of the defense-in-depth concept specified in the DOE 5500-series orders. These planning, preparedness, response, and reporting efforts are coordinated by the Emergency Management Office (EMO) of the HS Division. The EMO has oversight responsibility for coordinating the response capabilities of both internal and external organizations, such as HS, EM, ENG, OS, JCI, Mason and Hanger-Silas Mason, Inc. (M&H), and Los Alamos County Fire Department (LACFD). The office is structured to implement, direct, and oversee the Laboratory emergency management programs per DOE 5500 series orders and the occurrence reporting program per DOE Order 5000.3A.

The EMO emergency operations section is responsible for the Emergency Response Plan (ERP). Responsibilities include implementing procedures, initiating occurrence reporting, maintaining the

Emergency Operations Center (EOC) in a ready condition, providing a 24-hour on-call Emergency Management Coordinator, providing incident on-scene command and control using the Incident Command System structure, planning and conducting emergency drills and exercises, and establishing and conducting training for emergency response personnel.

The EMO Occurrence Reporting section is responsible for implementing and coordinating the requirements of DOE Order 5000.3A. The section is divided into two teams. The Occurrence Support Team works with facility managers in preparing reports, assisting in investigations, and performing final quality review of all reports prior to transmission. The Administrative and Program Analysis Team assists facility managers in transmitting reports via the Occurrence Reporting and Processing System (ORPS) and in tracking reports to ensure that suspense dates are met.

Building managers at the Laboratory are responsible for implementing Building Emergency Plans. Due to the physical size and variety of operations at the Laboratory, the emphasis for emergency response is on the field operational aspects. The Incident Command System and the Building Emergency Plans are the cornerstones of this approach. The EMO performs oversight and coordination to ensure that the plans, training, and exercises necessary to support a decentralized program are developed and implemented.

EMO has established a formal internal assessment process administered by the Laboratory Assessment Office (LAO). Annually, LAO coordinates a counterpart exchange assessment of EMO with Lawrence Livermore National Laboratory. The first of these exchange assessments was conducted in early 1991. Department of Energy/Albuquerque Office (DOE/AL) has conducted three appraisals of EMO, two of which have been within the last three years.

EP.1 Organization and Administration

Performance Objective: Emergency preparedness organization and administration should ensure effective planning for and implementation and control of site/facility emergency response.

Finding/EP.1-1: An emergency response organization has not been developed and trained for duties required by DOE Order 5500.3A, "Planning and Preparedness for Operational Emergencies," and by the Emergency Response Plan (ERP).

> Discussion: Personnel on the Laboratory's radiation and chemical hazardous materials response teams have not been designated by position and job description, nor has the Laboratory formally identified positions or personnel needing emergency management training. This failure results in an inability to provide 24-hour response.

Finding/EP.1-2: Implementation and documentation of agreements, arrangements, and understandings with off-site organizations responsible for emergency response are inadequate.

> Discussion: Several memoranda of understanding between DOE, the Laboratory, and other federal, state, and local agencies are outdated and do not reflect changes imposed by

recent laws and DOE orders and directives. Other agreements have not been initiated or finalized.

Finding/EP.1-3: **The internal audit component of the Laboratory Emergency Management Program is inadequate.**

Discussion: **The current emergency management audit program is not comprehensively applied throughout the Laboratory. The program does not have a formal system of self-evaluation or internal audit as required by DOE 5500-series orders.**

Finding/EP.1-4: **A system is not fully implemented to provide timely and effective tracking of emergency response deficiencies and their basic causes.**

Discussion: Timely tracking of deficiencies is not fully implemented for appraisals, assessments, exercises, and other reports.

EP.2 Emergency Plan and Implementing Procedures

Performance Objective: The emergency plan, the emergency plan implementing procedures, and their supporting documentation should provide for effective response to operational emergencies.

Finding/EP.2-1: Site-wide emergency planning and review are inadequate.

Discussion: Emergency plans have not been prepared for most facilities. Those facility emergency plans that do exist are often not prepared in accordance with the Laboratory Emergency Response Plan.

Finding/EP.2-2: Procedures do not exist for the timely evacuation of the Laboratory.

Discussion: Lack of an adequate public notification system, limited access to public roads, and failure to designate evacuation assembly points all contribute to the failure to develop a satisfactory site evacuation plan.

Finding/EP.2-3: Accountability policies for Laboratory personnel, support subcontractor personnel, and visitors are nonexistent; present systems are inadequate.

Discussion: Lack of policy has resulted in a variety of personnel accountability systems. Many systems described in facility plans do not deal explicitly with casual visitors. Guidance for personnel accountability is not explicit and does not recognize the need for different kinds of systems as a function of hazard, probability of need, etc. Present systems do not provide information to rescue teams. This may involve significant risk to team members if actual re-entry into a hazardous area is involved.

Finding/EP.2-4: Designation of personnel for the On-Scene Control Group (OSCG) and other field elements of the emergency response organization has not been implemented.

> **Discussion:** Implementing procedures have not been developed for these positions. The personnel to fill these positions have not been identified and trained.

Finding/EP.2-5: Laboratory AR 1-2 and Technical Bulletin (TB) 101 do not meet the requirements of DOE Order 5500.3A.

> **Discussion:** AR 1-2 and TB 101 are not consistent with DOE Order 5500.3A and the Laboratory Emergency Response Plan. In addition, there are internal inconsistencies related to the EM organization, terminology, and organizational responsibilities for emergency preparedness.

Finding/EP.2-6: Some facilities do not provide specific guidance for the protection of classified materials, source material, by-product material, and special nuclear materials (SNM) during emergency conditions.

> **Discussion:** DOE Order 5500.3A and the ERP require that guidance be included in emergency plans for classified materials, source and by-product material, and SNM during emergencies. No instructions regarding the control of classified materials and SNM are included in the facility safety manual. Although organizations have procedures to address this situation after evacuation, these procedures are not contained in site emergency plans.

Finding/EP.2-7: Many facilities have not posted emergency information as required.

> **Discussion:** Special emergency procedures for the type of emergency and other specialized emergency procedures applicable to many facilities do not exist, although the *ES&H Manual* and Technical Bulletin 101, Emergency Preparedness, require that emergency information be posted and include evacuation routes.

Finding/EP.2-8: The Laboratory has not developed a hazards assessment encompassing all facilities for incorporation into the ERP.

> **Discussion:** A program to review SARs and other applicable hazards assessment documents has not been developed.

Finding/EP.2-9: The Laboratory ERP has not identified emergency planning zones.

> **Discussion:** Emergency planning zones have not been identified for the various emergencies that could occur at the Laboratory. There has been a lack of guidance as to how to address the designation of such zones.

Finding/EP.2-10: Access control of evacuated areas is inadequate.

Discussion: Plans, procedures, and training of protective force personnel and Laboratory employees are insufficient to ensure adequate access control of evacuated areas.

Finding/EP.2-11: Emergency plans are not coordinated between DOE, Laboratory organizations, and other federal, state, and local emergency response groups as required by DOE Order 5500.3A.

Discussion: Procedures have not been developed by DOE/LAAO to coordinate Laboratory emergency plans with such local emergency response agencies as the fire department, police department, and search and rescue organizations. Additionally, there is no evidence that state agencies, which may be required by state law to respond to Laboratory emergencies, have approved or coordinated actions called out in the Laboratory ERP.

Finding/EP.2-12: The Laboratory ERP and implementing procedures are not updated or verified on an annual basis.

Discussion: No documentation of annual reviews exists. No procedures are in place that define the requirements of the annual review.

Finding/EP.2-13: The emergency response plans for supporting organizations have not been reviewed and updated on an annual basis.

Discussion: The plans from such organizations as HS, EM, ENG, OS, and JCI that support the Laboratory's ERP have not been developed and/or updated in a timely manner.

Finding/EP.2-14: There is no document control system that ensures that all copies of the emergency plan and implementing procedures are kept current.

Discussion: The ERP does not have a numbering system that shows individual assignment of emergency plans or instructions to ensure that revised pages are posted to the document and that superseded pages are destroyed as required.

Finding/EP.2-15: Many Standard Operating Procedures (SOPS) and Special Work Permits (SWPs) do not include emergency response procedures for accidents, spills, and releases.

Discussion: Many local SOPS and SWPs have not identified incidents that may occur during the operation being performed, and therefore have not identified the emergency equipment needed to be pre-positioned, the actions to be taken to lessen the effects of the emergency, and the actions to be taken to save life or prevent injury.

Finding/EP.2-16: Procedures to ensure that releases of reportable quantities of chemicals are quickly reported to the EMO have not been developed in most organizations, nor has the Laboratory implemented site-wide procedures ensuring that all related incidents covered by DOE Order 5000.3A are reported.

Discussion: Procedures at the operating group level have not been developed to rapidly report releases to the EMO as required by DOE Orders 5000.3A and 5500.3A (Also see EP.6-2.)

Finding/EP.2-17: Provisions for response to after-hours and holiday Hazardous Material (HAZMAT) incidents have not been developed as required by DOE Order 5500.3A.

Discussion: The ERP does not have provision for after-hours HAZMAT (toxic and radiation) emergency responses. An after-hours call system has not been developed. Callout procedures have not been established and personnel have not been designated. The equipment to facilitate a timely response has not been identified or installed.

EP.3 Emergency Response Training

Performance Objective: Emergency response training should develop and maintain the knowledge and skills necessary for emergency personnel to respond to and control an emergency effectively.

Finding/EP.3-1: Training requirements for emergency response managers and field personnel are incomplete.

Discussion: Formal training requirements have been established for each of the positions in the EOC and for other operational emergency positions, but they have not been approved. The following requirements have not been established: training and retraining requirements for initial responders, a training plan for the EOC and OSCG, and identification of training requirements for first responders.

Finding/EP.3-2: The Laboratory does not have centralized records of emergency preparedness training of general laboratory personnel.

Discussion: Training records are maintained at several locations and have not been centralized.

Finding/EP.3-3: Certain nuclear facilities and other facilities with operations that involve hazardous materials do not perform emergency response training that consists of classroom and hands-on activities.

Discussion: See TC.6-1, TC.9-1, and TC.11-1.

Finding/EP.3-4: Members of emergency response organizations are not being trained in accordance with DOE Order 5500.3A.

Discussion: At present, only the Hazardous Devices Response Team has been trained as required by DOE Order 5500.3A. Demonstration and documentation of required training and skills are not being accomplished for members of the Hazardous Materials Team, Emergency Operations Center, Incident Control Group, and other response elements of the Laboratory emergency response element.

Finding/EP.3-5: Not all members of the emergency response organization participate in drills on an annual basis or have attended annual retraining.

Discussion: DOE Order 5500.3A requires annual retraining and drill participation. Some units, such as the Radiation Response Element and JCI, do not participate in annual exercises.

Finding/EP.3-6: Not all members of the emergency response organization are evaluated during initial and continuing training as specifically required by DOE Order 5480.20.

Discussion: A formal program for performance-based testing has not been developed for initial and continuing training.

EP.4 Emergency Preparedness Drills and Exercises

Performance Objective: Emergency preparedness programs should include provisions for simulated emergency drills and exercises to develop and maintain the knowledge and skills for emergency personnel to respond to and control an emergency effectively.

Finding/EP.4-1: Emergency preparedness drills and exercises do not meet the requirements of DOE Order 5500.3A regarding scope and frequency.

Discussion: A document that shows the schedule of Laboratory drills and exercises to be held each year, the exercise objective, responsible Laboratory personnel, and other pertinent information relative to each exercise does not exist. Additional exercise requirements have not been published for organizations that must meet DOE Order 5500.3A.

Finding/EP.4-2: Laboratory-wide exercises are not being conducted at the required frequency.

Discussion: A five-year plan for drills and exercises has not been developed. A well-documented drill and exercise program that periodically tests potential scenarios does not exist.

Finding/EP.4-3: Critiques of Laboratory and facility emergency drills are inadequate.

Discussion: DOE Order 5500.3A requires that critiques and evaluations of emergency tests and exercises be documented and that appropriate changes be made to emergency plans and procedures to correct identified weaknesses and deficiencies.

Reviews of several facility Emergency Response Team (ERT) exercises failed to locate a formal written critique section that identifies lessons-learned, or items which may require additional training, changes in procedures, or changes in plans. Many of the critiques consist only of a summary of the actions that took place and who was present.

Finding/EP.4-4: Most nuclear facilities that require exercises under DOE Order 5500.3A do not develop scenarios that reflect the depth and breadth of the requirements.

Discussion: Many nuclear facilities that require annual exercises perform only evacuation drills of their personnel. The requirements of DOE Order 5500.3A are not addressed in the detail required. Such things as re-entry, recovery, sheltering of personnel, public affairs releases, etc., are not addressed.

Finding/EP.4-5: Trained evaluators are not assigned to monitor and document performance of the players (and controllers) to ensure that maximum benefit is derived from the drill or exercise.

Discussion: The Laboratory has not appointed emergency preparedness evaluators, nor trained them in the performance of their expected duties, nor developed a specific checklist of areas of special interest to ensure that all aspects of the exercise or drill are fully critiqued.

<u>EP.5 Emergency Facilities, Equipment, and Resources</u>

Performance Objective: Emergency facilities, equipment, and resources should adequately support site/facility emergency operations.

Finding/EP.5-1: Communication equipment for emergency response is inadequate.

Discussion: Although communication equipment required by the designated Emergency Response elements of the Laboratory is adequate, the equipment needed at various sites within the Laboratory is inadequate. This causes a major void in Laboratory-wide emergency communications capabilities.

Finding/EP.5-2: No program for the inventory, testing, and servicing of emergency response equipment has been developed.

Discussion: The Laboratory does not have a written program setting forth equipment parameters that should be routinely inventoried, tested, or evaluated. Logs showing routine testing and inventory of equipment do not exist.

Finding/EP.5-3: The current alarm system does not provide adequate facility or Laboratory-wide coverage.

Discussion: No Laboratory-wide alarm system exists. Criticality alarms annunciate only locally. Some facilities do not have alarms that warn occupants in nearby buildings of critical situations. Some alarms do not provide coverage throughout the affected facility.

Finding/EP.5-4: Monitoring instrumentation for all accident conditions, as required by DOE Order 6430.1A, "General Design Criteria," is not always provided.

Discussion: Monitoring of processes, plant systems, experiments, vital cooling systems, and engineered safety features is not provided under all accident conditions.

Finding/EP.5-5: There is no Laboratory standard for determining which facilities require Scanning and Alarm Monitoring (SCAM).

Discussion: The present Laboratory-wide SCAM system is inadequate. A recent example of inadequacy is an incident involving loss of power at a tritium facility.

Finding/EP.5-6: The Laboratory has no site-wide alerting system in the event of a major emergency.

Discussion: The Laboratory does not have a public address or siren system to notify the Laboratory, subcontractor, and visitor personnel of the need to take site-wide emergency actions. Notification to take emergency action is made by telephone. In the event that telephones are inoperative, loudspeaker systems on the protective force and fire department vehicle dispatched to outlying areas of the Laboratory are used.

Finding/EP.5-7: Criticality alarms are not necessarily monitored during nonduty hours.

Discussion: Criticality alarms currently terminate in the area subject to the criticality condition, or in the facility's control room. During nonduty hours, most of these alarms are not monitored by operating personnel. To ensure rapid and effective response to these areas during nonduty hours, and to provide additional notification during duty hours, best management practice dictates that such alarms be moved to a 24-hour-manned control center such as the Central Alarm Station (CAS).

Finding/EP.5-8: Controlled emergency preparedness documentation is not readily available to emergency response organizations.

Discussion: The Emergency Operations Center has not been provided all information required to respond to emergencies. Many informational elements are missing or outdated. Emergency plans and implementing procedures for some facilities are missing, photographs of layouts and facilities are outdated or missing, and drawings are outdated or nonexistent.

Finding/EP.5-9: Sufficient chemical protective clothing is not available at particular facilities for emergency teams to safely make entry and remove victims from an incident.

Discussion: Although sufficient emergency equipment is available to support site radiological emergencies, there is an insufficient number of Level-1 chemical suits to meet the minimum requirements of a major chemical release.

EP.6 Emergency Assessment and Notification

Performance Objective: Emergency assessment and notification procedures should enable the emergency response organization to correctly classify emergencies, assess the consequences, notify emergency response personnel, and recommend appropriate actions.

Finding/EP.6-1: Not all Laboratory personnel have been trained in the reporting criteria for emergencies, unusual occurrences, and off-normal events as described in DOE Order 5000.3A.

> **Discussion:** A Laboratory-wide graded training program for all employees has not been implemented. Operating groups have not developed internal operating procedures to ensure that employees are knowledgeable of the reporting requirements under DOE Order 5000.3A.

Finding/EP.6-2: The Laboratory does not maintain necessary references, such as hazard inventories, to effectively assess emergencies.

> **Discussion:** The Laboratory does not have hazard inventories and protective action guides to be used by emergency personnel for assessments. Procedures have not been developed for protective action guides.

Finding/EP.6-3: Event classifications have not been coordinated with local and state emergency response agencies.

> **Discussion:** No system has been developed and accepted to ensure that local and state emergency response agencies understand the meaning of the terms used in DOE Order 5500.2B, "Emergency Categories, Classes, and Notification and Reporting Requirements."

Finding/EP.6-4: Notification systems and procedures do not use preformatted messages.

> **Discussion:** A set of preformatted messages has not been developed for use by the Laboratory in conjunction with state and federal agencies in the event of a major emergency.

Finding/EP.6-5: Records and logs are not kept in a manner that would enable the reconstruction of actions taken during the emergency event.

> **Discussion:** Logs of activities developed at the scene of the emergency are not being collected and maintained as part of a permanent file.

EP.7 Personnel Protection

Performance Objective: Personnel protection procedures should control and minimize personnel exposure to hazardous materials during abnormalities, ensure that exposures are accurately determined and recorded, and ensure proper medical support.

Finding/EP.7-1: Protective action guides (PAGs) have not been developed for radiological or toxic releases.

> **Discussion:** DOE Order 5500.3A, "Planning and Preparedness for Operational Emergencies," requires that standards for personnel exposures be established for toxic material releases. A procedure to establish PAGs and implement them has not been developed.

Finding/EP.7-2: Sufficient quantities of calibrated instruments are not available to measure expected exposure rates for nonradiological releases.

> **Discussion:** Sufficient instrumentation is not available to cover the full range of chemicals that could be released into the work place. In addition, most instruments do not provide much more than gross indications of the concentration present for most organic compounds.

Finding/EP.7-3: Replenishment for respiratory equipment and supplies is inadequate.

> **Discussion:** No readily accessible method is available for recharging air bottles in a timely manner. During nonduty hours, personnel who are responsible for maintaining and repairing respiratory equipment are not available in a timely manner.

Finding/EP.7-4: Hazard identification signs specified by National Fire Protection Association (NFPA) standard 704 have not been posted on all facilities with operations that involve hazardous materials.

> **Discussion:** A readily recognized system of markings has not been implemented Laboratory wide.

4.2.8 Technical Support (TS)

At the Laboratory, facility managers, landlords, and building managers have primary responsibility for resolving ES&H issues, overseeing operations, and ensuring proper facility maintenance. In some cases, operating divisions have their own internal support staff. Additional support and service are also available from the Operations Directorate.

The Operations Directorate has four divisions that focus on ES&H concerns: the Environmental Management (EM) Division, which consists of the Waste Management (EM-7), Environmental Protection (EM-8), Environmental Chemistry (EM-9), and Environmental Restoration (EM-13) groups; the Facilities Engineering (ENG) Division, which has the Project Management (ENG-1), Planning (ENG-2), Design (ENG-3), Estimating (ENG-4), Field Operations (ENG-5), Maintenance (ENG-6), Records Management (ENG-7), and Fire Protection and Utilities (ENG-8) groups; the Health and Safety (HS) Division, which is made up of the Health Physics Operations (HS-1), Occupational Medicine (HS-2), Safety and Risk Assessment (HS-3), Health Physics Measurements (HS-4), Industrial Hygiene (HS-5), Nuclear Criticality Safety (HS-6), and Health

Physics Policy and Programs (HS-12) groups as well as the Emergency Management Office (EMO); and the Laboratory support services contractor, Johnson Controls World Services Inc. (JCI), which provides construction, maintenance, custodial, and utilities services to the Laboratory. Details of the services provided by each organization are covered in the *Los Alamos Guide to ES&H Management Structure (GEMS)* document.

Laboratory managers requiring specialized technical support can draw on various technical organizations that have such expertise; for example, the Engineering Design and Quality Assurance Group (MEE-9) and the Safety Assessment Group (N-6).

Several standing, chartered committees also provide technical ES&H support to Laboratory managers. Committee charters are published in the *ES&H Manual.* These committees include the Environment, Safety, and Health Council, the Animal Care and Use Committee, the Biosafety Committee, the Compressed and Liquefied Gas Safety Committee, the Electrical Safety Committee, the ES&H Questionnaire Committee, the Explosives Review Committee, the Firearms Safety Committee, the Laboratory Environmental Review Committee, the Nuclear Criticality Safety Committee, the Pressure Vessel and Piping Committee, and the Reactor Safety Committee. The committees are available to review projects, consult with scientists and engineers, and advise managers on technical questions related to their programmatic activities.

TS.1 Organization and Administration

Performance Objective: The technical support organization and administration should ensure effective implementation and control of technical support activities.

Finding/TS.1-1: Administrative controls are not in place to always ensure safe and reliable site/facility operations.

> **Discussion:** A system is not in place to review all construction and maintenance work for ES&H concerns. Field changes may be made without external review. The work deadlines established by operational personnel for programmatic reasons frequently do not take into consideration the time and resources required to adequately design, review, and construct the requested work package. Changes to processes can be made by user personnel without the benefit of a technical support review.

Finding/TS.1-2: Responsibilities and authorities for each management, supervisory, and professional technical support position are neither consistently well defined through written job descriptions nor annually appraised to assess and improve performance.

> **Discussion:** Preparation of job descriptions is a management responsibility that has not been consistently carried out. Many organizations lack written position descriptions, and some do not perform annual performance appraisals.

Finding/TS.1-3: Organizational interfaces sometimes interfere with solutions.

Discussion: The diversity of equipment and processes at some facilities requires expertise from multiple disciplines to assess problems within a single facility. Management interfaces among organizations contributing these disciplines are not always optimized to achieve rapid resolution of concerns.

TS.2 Procedures and Documents

Performance Objective: Technical support procedures and documents should provide appropriate direction, allow for adequate record generation and maintenance for important activities, and should be properly and effectively used to support safe operation of all facilities on the site.

Finding/TS.2-1: Not all Laboratory nuclear facilities have been evaluated consistent with DOE backfit policy to determine the need to meet current standards.

Discussion: As-built drawings are not available for all facilities. Many of the nuclear facilities were constructed before present-day standards and are not in compliance with seismic considerations, NQA-1, and present-day technical documentation requirements.

Finding/TS.2-2: Not all facilities have the required safety documentation, e.g., Safety Assessments (SAs) and SARs.

Discussion: The ES&H Questionnaire Committee has been reviewing all major projects and sending a check list to the user/owner itemizing the potential problem areas, including PHAs, SAs, and SARs. Written management policy requiring the user/owner to follow the check list recommendations is not in place. Procedures do not exist to prevent construction or modification when ES&H documentation is lacking.

Finding/TS.2-3: Formal policies do not adequately establish operating/support organization interfaces.

Discussion: Procedures do not exist to define a review process between operating organizations and technical support organizations. The lack of procedures delays completion of safety analysis reports, technical specifications, operation safety requirements, engineering work packages, and the determination of limiting operation conditions. In addition, lack of procedures results in a failure to transmit clear, concise information to update reference manuals, configuration control, drawings, etc., and to alert those affected by temporary facility changes.

Finding/TS.2-4: Document control procedures are lacking.

Discussion: See OA.2-1, OA.7-2, and OA.7-3.

Finding/TS.2-5: Some facilities lack procedures for updating or defining configuration controls or limiting conditions of operation with respect to Class A and Class B equipment interfaces.

Discussion: Operating and technical support organizations are not sufficiently aware of each other's operations to fully understand the impact of additional Class B equipment on facility utilities. Class B refers to user-furnished equipment, as opposed to Class A, which refers to real property and infrastrucure equipment. In some cases, Class B facility support equipment is procured for installation without the knowledge of the technical support organizations.

Finding/TS.2-6: Lockout and tagout requirements are not uniformly applied throughout the Laboratory.

Discussion: A comprehensive Laboratory lockout/tagout program has not been established to control hazardous systems, including electrical energy. Laboratory AR 8-6, Lockout and Tagging (August 1984), addresses lockout and tagout, but the implementation of these procedures is inconsistent and incomplete.

Finding/TS.2-7: The Laboratory does not have an adequate system to provide records on a timely basis for support services rendered at each facility.

Discussion: Some records are maintained on a central filing system or data base, which is not readily available to building managers. There is no formal requirement for record retention and storage location.

TS.3 Facility Modifications

Performance Objective: Technical support services required by each facility on the site to execute modifications should be carried out in accordance with sound engineering principles that should assure proper design, review, control, implementation, and documentation in a timely manner.

Finding/TS.3-1: The Laboratory does not have comprehensive guidance and/or specifications for evaluating and documenting modifications to Class B equipment.

Discussion: See WS.1-1 and MA.1-1.

Finding/TS.3-2: The Laboratory does not have a configuration control program.

Discussion: In some cases, configuration control is neglected for the sake of meeting schedule, budget, or programmatic requirements. Class B equipment may be installed to meet program requirements in a manner that voids UL approvals and/or does not meet codes and standards. In some cases, final acceptance of a project is completed before project documents have been approved.

Finding/TS.3-3: The Laboratory does not have a fully implemented As-Built Program.

Discussion: Many as-built drawings for most facilities are nonexistent. On some projects, funds were not available to complete as-built drawings. In some cases, modifications have been made by operations personnel, by-passing the engineering support organization's responsibility to modify facility drawings.

Finding/TS.3-4: The Laboratory does not have an adequate control program for all facility modifications.

> **Discussion:** Extensive facility modifications are sometimes made without formal design. In some cases, field changes on designed jobs are made at the discretion of field personnel without the review or approval of technical support professionals. Field supervisory personnel are not familiar with all applicable codes. No system is in place to ensure control compliance.

Finding/TS.3-5: Vendor training required by a procurement contract is not always completed before facility final acceptance.

> **Discussion:** In some cases, personnel are familiar with similar equipment located at other sites or are simply enthusiastic to gain some experience with a new facility or system before formal vendor training. Programmatic pressure can also lead to by-passing training opportunities.

Finding/TS.3-6: Modifications are not always coordinated with all concerned, and systems are at times operated without any testing and without the knowledge of the technical support personnel responsible for the systems.

> **Discussion:** User organizations have sometimes tied into or modified Class A systems without the review and consent of technical support personnel. There is no formal mechanism to keep user personnel from operating and/or adjusting Class A equipment, or of informing technical support that this is being done. At times, technical support personnel only learn of this once the equipment is damaged because of improper or untimely operation.

TS.4 Equipment Performance Testing and Monitoring

Performance Objective: Effective equipment performance testing and monitoring should be performed by technical support groups to ensure that equipment and system performance is within established safety parameters and limits.

Finding/TS.4-1: The Laboratory SCAM system does not include all appropriate operating facilities.

> **Discussion:** Some operating areas without SCAM alarms have no off-hours monitoring of critical equipment such as boilers, pumps, HVAC, or auxiliary systems.

Finding/TS.4-2: A program has not been developed to collect data that can be analyzed for specific equipment degradation (performance indicators).

Discussion: The Laboratory maintenance program does not identify specific trending analysis such as vibration, thermal, hydraulic, or other age-related degradation. The maintenance program plan is not adequate to describe the preventive maintenance activities or necessary replacement parts and/or effort. Equipment failures and degradation are not uniformly reported to standing safety committees such as the electrical safety or the pressure vessel committees.

Finding/TS.4-3: The Laboratory does not have procedures for independent auditing and verification of performance testing and monitoring activities.

Discussion: Policies and procedures are not in place to produce data and documentation suitable for independent audits. For example, documentation does not exist for performance monitoring programs in the industrial hygiene area.

Finding/TS.4-4: The Laboratory's nuclear facilities and hazardous material handling facilities do not have consistent procedures on technical support testing requirements.

Discussion: Laboratory procedures are inadequate to ensure that technical support organizations perform routine testing of Class B equipment.

Finding/TS.4-5: The Laboratory implementation of DOE 5000.3A, "Occurrence Reporting and Processing of Operations Information," is inadequate.

Discussion: See OA.2-3.

TS.5 Environmental Impact

Performance Objective: The impact on the environs from the operation of each facility on the site should be minimized.

Finding/TS.5-1: Not all points of potential release of radioactive air effluents to the environment are monitored in accordance with EPA requirement 40 Code of Federal Regulations (CFR) 61, Subpart H, and DOE Regulatory Guide DOE/EH-0173T (January 1991).

Discussion: The Laboratory measures and records data on a weekly basis for stacks currently monitored for radioactive particulate. The data are provided to meet EPA and DOE reporting requirements.

The Laboratory does not have a comprehensive site-wide inventory of emission points. In addition, airborne effluent sampling methods used at many emission points do not meet the requirements of 40 CFR 61, Subpart H, for sampling. These deficiencies include gas-stream characterization, location of sample extraction sites, sizing of sample extraction probes, documentation of sample transport line losses, verification of air flow measurements, and a Quality Assurance Program consistent with 40 CFR 61, Appendix B, Method 114, 4. "Quality Assurance Methods."

The Laboratory is preparing a tentative corrective action plan for the Radiological Air Effluent Monitoring Program. The tentative corrective action plan is to provide estimated timetables for development of procedures and actions and to document the major components of the program.

Finding/TS.5-2: Not all points of potential release of radioactive liquid waste to the environment are monitored sufficiently to provide assurance that the quantities and qualities of the releases are known.

Discussion: All liquid waste streams entering an outfall or treatment facility are not properly characterized with respect to chemical constituents and flows. A radioactivity survey of all National Pollutant Discharge Elimination System (NPDES) industrial outfalls and sanitary septic tank systems and holding tanks is also needed for documentation and control. The NPDES sanitary outfalls are routinely sampled for radioactivity.

Many of the radioactive liquid waste lines are not double-walled and are not monitored for leak detection. Other wastewater lines, manholes and lift stations are not routinely inspected for leaks or breaks. Many of the wastewater collection systems at the Laboratory have been modified over the years with incompatible waste streams being tied into systems permitted to receive only certain wastes.

Finding/TS.5-3: A comprehensive Laboratory-wide waste minimization program has not been implemented.

Discussion: See AX.2-5, AX.3-1, and AX.3-2.

Finding/TS.5-4: Formal programs to minimize release of nonradioactive materials to the environment, other than those needed to comply with specific regulatory requirements, are inadequate at the Laboratory.

Discussion: Some programs exist at the Laboratory for waste minimization and for maintaining radiation exposures and releases to ALARA; however, no similar efforts exist to minimize the release of hazardous or toxic materials to the atmosphere, soils, or water unless they are mandated by specific regulatory requirements. A program to characterize waste streams (both solid waste and liquid waste) is ongoing. Waste stream characterization is needed to ensure that all hazardous solid wastes are identified and handled properly, and to identify and control toxic constituents in liquid waste effluents. The need for reducing releases of volatile organic compounds (VOC) at the Laboratory has been identified, but has not yet been implemented.

Finding/TS.5-5: The Laboratory has inadequately implemented the requirements of DOE 5480.4, "Environmental Protection, Safety, and Health Protection Standards," and DOE Order 5480.18 for power plant and utility operations.

Discussion: Numerous violations of NPDES permit limits, acid discharges, lack of design follow-up, and inadequate training of field personnel have occurred in Laboratory utility operations. Management has failed to address the problems. Practices of both the Laboratory and the subcontractor are reactive rather than pro-active. Maintenance is lacking and repairs are often made without regard for original design requirements.

Finding/TS.5-6: The Laboratory has not formally defined, documented, or communicated the responsibilities for independent monitoring of site environs.

Discussion: Sampling and monitoring of the environs of the site and the region are conducted by the environmental protection group with analytical support from the health and environmental chemistry group. This includes analysis of samples of all significant pathways that could expose the public or the environment to radiation, radioactive materials, and toxic chemicals. The program includes external radiation measurements and both chemical and radiochemical analysis of air samples, foodstuffs, drinking water, ground and surface water, soil, and sediments. Limited ecological studies are also conducted. Formal documentation of organizational responsibilities for environmental monitoring, like other environmental programs, does not presently exist.

TS.6 Packaging and Transportation of Hazardous Materials

Performance Objective: Performance of the packaging and transportation (PT) functions should ensure conformance with existing standards and accepted practices as given in DOE 5480.3, and other DOE and Federal regulations.

Performance Objective Note: Because of the scope of Laboratory P&T responsibilities, this performance objective was appraised according to the more comprehensive Packaging and Transportation TSA discipline (see PT).

TS.7 Reactor Engineering

Performance Objective: Reactor engineering activities should ensure optimum nuclear reactor operations without compromising design, safety, or nuclear fuel limits (reactors only).

No Findings.

TS.8 Criticality Safety

Performance Objective: Specialized support for criticality safety issues should be fully integrated into the operation of the reactor, and the handling and storage of fuel by facility personnel (reactors only).

No Findings.

4.2.9 Packaging and Transportation (PT)

Some 50 groups in 16 divisions are involved in implementing the Laboratory's Hazardous Materials, Substances, and Wastes Packaging and Transportation Program, which is described in the *ES&H Manual*, and *The Laboratory Manual, Chapter 8, Materials Management*, as well as in the *Hazardous Materials Transportation Manual*, the *Hazardous Materials Packaging and Transportation Quality Assurance Manual*, and the *Nuclear Materials Control and Accountability Procedural Handbook*. Laboratory line managers are responsible for ensuring that this program is implemented.

The Safety and Risk Assessment Group (HS-3) provides guidance, radiation monitoring, quality assurance oversight, internal review, and training documentation for the program. HS-3 reviews more than 26,000 Radioactive Material Transfer Tags and Hazardous Materials Transfer Forms annually.

The Waste Management Group (EM-7) provides packaging, transportation, and storage of hazardous substances and wastes at the Laboratory. EM-7 handles more than 50,000 items annually.

The Property and Transportation Management Group (MAT-2) prepares shipping papers, provides packaging for hazardous materials, and ensures regulatory compliance for hazardous materials and substances shipped by commercial carriers. Nearly 1,200 hazardous materials shipments are handled by MAT-2 annually.

The Receiving Group (MAT-14) operates the Laboratory receiving and dispatch center for incoming hazardous materials shipped by commercial carriers. The receiving dock processes approximately 200,000 packages of all types per year.

The Material Control and Accountability Group (OS-2) coordinates on- and off-site shipments of special nuclear materials (SNM) and certain other hazardous materials listed in the *Nuclear Materials Control and Accountability Procedural Handbook*.

The Fabrication and Assembly Group (WX-3) packages and transports explosive materials both on and off site.

The Analysis and Testing Group (WX-11) designs packages and tests containers for transporting hazardous materials both on and off site. Packages are designed in compliance with applicable federal requirements.

The Quality Operations Office (QOO) has established a formal program for annual audits of the Hazardous Materials, Substances, and Wastes Packaging and Transportation Program. HS-3 administers this audit program in addition to conducting internal graded quality assurance audits of organizations involved in the packaging and transportation program.

PT.1 Organization and Administration

Performance Objective: Management should develop and implement a system of policies and directives that will provide for effective implementation of DOE orders and directives (particularly DOE Orders 5480.3, 1540.1, and 1540.2), federal and state regulations, and good industrial practices in operations involving packaging and transportation (PT) of hazardous materials.

Finding/PT.1-1: The Laboratory does not have a Hazardous Materials Substances and Wastes Packaging and Transportation (PT) Program that adequately addresses site-wide operations.

> **Discussion:** The program lacks clear Laboratory policy regarding PT compliance. The Laboratory has no comprehensive implementation plan to promptly reflect changes in regulatory guidance within Laboratory PT policy, procedure, and documentation. Documents and manuals have only recently incorporated direct correlations to DOE orders. The *On-Site Transportation Manual*, in contrast, is inconsistent with recent DOE guidance and definitions for on-site and off-site transportation. The program has no internal system to ensure that appropriate working levels are cognizant of regulatory changes, or that appropriate support and operating organizations and management levels have reviewed documentation. The program lacks guidance and provisions for facility-specific PT procedures.

Finding/PT.1-2: Safety directives and procedures are not available for many critical activities, and procedures that are available are not focused at the working level.

> **Discussion:** DOE Order 5480.3, "Safety Requirements for the Packaging and Transportation of Hazardous Materials, Hazardous Substances, and Hazardous Wastes," requires written procedures for the packaging and transportation of hazardous materials.

Finding/PT.1-3: The Laboratory does not have a coordinated and comprehensive system in place for the implementation of DOE Order 5480.19.

> **Discussion:** The administration and organization of a coordinated and comprehensive PT system is incomplete. The multiple organizations involved in P&T activities have inconsistently interpreted and implemented DOE, Department of Transportation (DOT), and Laboratory policies and directives. In addition to the various procedures in effect within these organizations (which may not be complete or similar), there are other Laboratory requirements on hazardous material PT that contribute to the fragmentation of procedural activities. These include the *ES&H Manual*, the *Materials Management Manual*, the *DOE Explosives Safety Manual*, and the Laboratory *MC&A Handbook*.

Finding/PT.1-4: The Laboratory has not adequately anticipated, identified, or documented which containers should be developed to ship hazardous material in compliance with 49 CFR.

Discussion: There is no plan addressing when a container list will be developed or what the impact will be on programs if containers are not developed.

PT.2 Training

Performance Objective: Personnel should be trained, qualified, and certified in handling hazardous materials as required by DOE Order 5480.3 and 49 CFR.

Finding/PT.2-1: The Laboratory has not established functional job qualifications and training requirements for all employees involved in hazardous materials packaging and transportation.

Discussion: DOE Order 5610.1, "Packaging and Transporting of Nuclear Explosives, Nuclear Components, and Special Assemblies," requires that "all personnel involved in the PT of nuclear explosives, nuclear components, and special assemblies must be knowledgeable and proficient....An appropriate training program approved by the field office manager should be maintained or implemented to assure this knowledge and proficiency." The Laboratory has no defined, documented, or DOE-approved PT training for nonsupervisors.

In some cases training exists, but there is no performance-based training or training plan. Some organizations have no training program for personnel performing PT activities associated with hazardous materials, hazardous substances, and hazardous waste. Many shippers have no certification to perform PT activities.

Finding/PT.2-2: The Laboratory does not ensure that PT training is adequate or properly implemented.

Discussion: There are no established standards for training required by individuals outside of HS-3. The Hazardous Material Packaging and Shipping (HAZPACT) Section has provided some general guidance to Laboratory organizations on appropriate basic training and has conducted some basic training classes on hazardous materials. Changes in regulatory requirements call for training classes offered by HS-3 to be revised, but resources are not yet available to complete these revisions. Personnel are not attending required training (e.g., RAMS) as frequently as required.

Finding/PT.2-3: There is no consistent program to define or identify qualifications for individuals who drive vehicles transporting hazardous materials.

Discussion: Driver qualification and training requirements for personnel who routinely or occasionally drive vehicles transporting hazardous materials do not exist at the Laboratory. There is no consistent, documented Laboratory-wide program to ensure that individuals assigned the responsibility of driving vehicles transporting hazardous materials meet applicable standards and DOT requirements or have received appropriate levels of training.

PT.3 Quality Assurance

Performance Objective: A system of checks and balances should exist that ensures that the QA requirements of the applicable DOE orders and directives, especially DOE Order 5700.6B and ANSI NQA-1-1989, are met.

Finding/PT.3-1: The Laboratory does not have a coordinated QA program to ensure that all PT activities are identified and that federal, state, and other regulations and requirements are met.

> **Discussion:** PT activities are fragmented among many organizations, resulting in duplication of work activities and operational interfaces, and creating overlapping responsibilities. Operating procedures are not properly established, controlled, or maintained per DOE orders and directives or NQA-1.
>
> Laboratory management has not provided detailed guidance for the implementation of a Laboratory-wide QA program consistent with DOE Order 5700.6B and NQA-1. Program policy, coordination, and QA plans are lacking; those in place are general and inconsistent. Many PT activities do not have approved quality program plans. Those activities that do have quality plans have not implemented them effectively.

Finding/PT.3-2: The PT program does not require a document control system for manuals and procedures.

> Discussion: There is no system of distribution control for manuals and procedures to ensure that appropriate personnel and organizations authorized to perform PT activities are using correct manual or procedure revisions. The policy for document control of the *On-Site Transportation Manual* is not in compliance with DOE Order AL 5700.6B, "General Operations Quality Assurance," or NQA-1. The manual's pages have no provision for revision control or review.

Finding/PT.3-3: The *Hazardous Materials Packaging and Transportation Quality Assurance (HAZPACT QA) Manual* does not meet all requirements of DOE Order 5700.6B.

> Discussion: The *HAZPACT QA Manual* does not fully comply with DOE Order 5700.6B. The manual contains some of the elements of NQA-1; however, no rationale is provided for NQA-1 elements that are missing. The full scope of requirements and identification of all organizations performing PT operations of hazardous materials, hazardous substances, and hazardous wastes is incomplete. The manual has limited coverage of waste operations and lacks compliance requirements for RCRA regulations and requirements.

Finding/PT.3-4: The Laboratory Procurement Program lacks quality elements for specification verification and product acceptance of hazardous-material packaging components.

Discussion: There is no effective quality assurance program to ensure that design specifications are reviewed and included in procurement documentation and that vendors comply with specifications. Packaging materials are accepted without documented review of specifications and thorough inspection by knowledgeable inspection personnel. Specifications are not always included in procurement documentation. The qualification program for vendors offering packaging and packaging components to the Laboratory is insufficient.

PT.4 Regulatory Compliance

Performance Objective: All PT operations involving hazardous materials should be conducted in compliance with the applicable State and Federal regulations, including those of Department of Transportation (DOT), Nuclear Regulatory Commission (NRC), Occupational Safety and Health Administration (OSHA), and Environmental Protection Agency (EPA).

Finding/PT.4-1: The Laboratory has no documented system to ensure and show where specific regulatory requirements must be implemented.

Discussion: There is no system implemented that ensures what, how, and where federal, state, and other regulations and requirements are monitored and/or where they must be addressed.

PT.5 Accidents and Incidents

Performance Objective: Accidents and incidents involving packaging and transportation of hazardous materials should be reported in a timely manner to DOE.

Finding/PT.5-1: The Laboratory does not have a single, 24-hour emergency telephone number to ensure that off-site shipments comply with 49 CFR 172.600

Discussion: The Laboratory currently uses three separate emergency telephone numbers to provide 24-hour coverage. The use of three telephone lines fails to ensure consistent or coordinated response to requests for assistance regarding Laboratory cargos involved in transportation incidents.

Finding/PT.5-2: Coordination of Laboratory PT organizations and emergency response organizations is not fully defined.

Discussion: Laboratory PT responsibilities are not well defined in distributed documents approved by Laboratory management.

Finding/PT.5-3: Procedures for reporting accidents and incidents involving packaging and transportation of hazardous materials are incomplete.

Discussion: There is no documented procedure for the preparation of an Unusual Occurrence Report, as required by DOE Order 5000.3A, in the event that a hazardous material shipment is received damaged to the extent that there is leakage or a substantial reduction in the effectiveness of the package. There is no documented system for reviewing incoming hazardous material shipments that are out-of-compliance, nor is there any documented system for preparing Off-Normal Occurrence Reports for on-site shipments or off-site intra-Laboratory shipments that are not prepared in compliance with applicable regulations and orders.

PT.6 Operations

Performance Objective: Site-wide operations involving packaging and transportation of hazardous materials should be conducted in a safe, consistent, and accountable manner, following approved procedures in conformance with applicable standards and accepted practices.

Finding/PT.6-1: Safety procedures are not available for all PT activities involving hazardous materials; available procedures are not always focused at the working level; and applicability, approval, and acceptance for use are inconsistent.

> **Discussion:** The Laboratory has no documented tie-down procedures available to guide personnel in securing transported cargo to prevent it from shifting or falling from vehicles. DOE Order 5480.3 requires preparation and use of written procedures for the PT of hazardous materials. Some activities required for certification of packaging are performed without approved procedures.

PT.7 Intra-Building Movements

Performance Objective: Intra-building movements and enroute storage operations should be conducted in a safe, consistent, and accountable manner, following approved procedures, in conformance with applicable standards and accepted practices.

Performance Objective Note: Laboratory intra-building movements are covered under OSHA guidelines (see WS).

No Findings.

PT.8 On-Site Transfers

Performance Objective: On-site transfers of hazardous materials should be conducted in a safe, consistent, and accountable manner, following approved procedures, in conformance with applicable standards and safety practices.

Finding/PT.8-1: TRU-waste, liquid radioactive materials, fissile liquid samples, and other Type B quantities of radioactive materials are routinely moved on site (intra-Laboratory) in containers that are not certified.

> **Discussion:** As a result of recent regulatory changes, interpretations, and guidance from the Technology Development Office in the DOE Office of

Environmental Restoration and Waste Management (DOE/EM 50.1), these movements are being made using road closure to attain compliance with DOT requirements (see DOT guidance dated April 23, 1991). Certified containers have been identified and are on order to reduce the number of road closures.

Finding/PT.8-2: Documentation supporting intra-Laboratory shipments is reviewed by subject matter experts only after the shipment has moved on site.

Discussion: Errors endangering compliance are not detected until after the shipment has been made. Quality review is not performed before shipment to ensure that shipments are being prepared in compliance with regulations.

PT.9 Off-Site Shipments

Performance Objective: Off-site shipments of hazardous materials should be conducted in a safe, consistent, and accountable manner, following approved procedures, in conformance with applicable regulations, standards, and accepted practices.

Finding/PT.9-1: The Laboratory cannot assure that all shipments of hazardous materials outside Laboratory boundaries are documented in full compliance with DOT requirements.

Discussion: Reviews of shipping papers have revealed discrepancies in shipping paper preparation for some shipments of hazardous materials and substances. Similar discrepancies have been observed on documentation for waste shipments. There is no independent DOT regulation compliance or engineering review of packages prior to release to carriers. Some people preparing and/or signing shipping documents for off-site shipments have not been trained or certified or are out-of-certification. Packaging construction and configuration is not verified for some waste and nonwaste shipments. Oversight of packaging and document preparation activities is not always performed by trained personnel.

PT.10 Records

Performance Objective: Records of hazardous materials movements, transfers, and shipments should be prepared and maintained to ensure compliance with DOE and other regulatory requirements and to provide an auditable trail of actions.

Finding/PT.10-1: Shipping documentation and records are not properly completed, routed, and reviewed.

Discussion: Errors made by operating groups on Certification of Packaging records have not been detected by the HAZPACT office, even though they were signed by the HS RAM shipping reviewer. Certification forms are sometimes inaccurately completed. Obsolete versions of the revised packaging certification form for the 2030-1 shipping container have been used. Review of completed certification forms indicates that shipments of plutonium in excess of the established gram quantity have been made. Nonconformance reports (NCRs) have not been generated, as required, for nonconforming items on Certification of Packaging shipping records.

Finding/PT.10-2: Procedures for maintenance, storage, and retention of PT and training records do not exist.

Discussion: Maintenance, storage, and retention of existing PT and training records are inconsistent. Records of driver training kept by some groups show limited training. There is no documentation in place that identifies record retention and archive requirements, i.e., which records are to be retained and for how long. Administrative documentation is lacking regarding shipping container certifications. Vehicle inspections are not performed at all or are not performed in compliance with DOE and DOT requirements.

Finding/PT.10-3: Some Laboratory shippers do not retain or maintain shipping records for each shipment of fissile material.

Discussion: Some Laboratory shippers do not comply with DOE requirements for off-site shipment manifests in identifying the 19-point manifest requirements. Some shipment records do not include the Dispatcher's Logbook, Radioactive Material Transfer Tags (RMTTs), and Transportation Services Request for Shipment Forms. The Dispatcher's Logbook record only acknowledges that a shipment and transfer has been made. RMTTs are only for material accountability. Transportation Services Request for Shipment Forms are also available. These items fail to satisfy DOT requirements for on-site and off-site shipments.

PT.11 Appraisals and Internal Audits

Performance Objective: Periodic PT safety appraisals of contractors by the Field Office and independent internal PT safety audits by each contractor, are required by DOE Order 5480.3, are conducted in accordance with DOE Order 5482.1B.

Finding/PT.11-1: The Laboratory internal audit program for packaging and transportation is inadequate.

Discussion: Some internal audits have been performed; however, the majority of the operating groups have not received independent QA reviews. The HS Quality Procedure for internal audits requires that each operating group be audited at least once every three years, yet some operating groups have not received or even been scheduled for reviews. There is no effective system to follow up appraisal findings.

Finding/PT.11-2: Independent oversight measures for PT operations, such as inspections, reviews, and assessments, have not been performed or are inconsistent and ineffective.

Discussion: Shipping manifests taken as evidence showed Reportable Quantity discrepancies and proper shipping name errors. There is no established documentation requiring independent oversight of manifested shipments. Shipping manifests were found to improperly represent the hazard class of asbestos waste. Proper implementation of new regulations, such as Land Disposal Restrictions (LDR) retention, and technical names in the manifest PSN field are not performed. There is no specific procedure written for Hazardous-Materials On-Site Transfer Form (tag) reviews. Shipping manifests and RMTTs are prepared for materials identified as suspect radioactive materials for which there are no provisions in DOT regulations.

PT.12 Packaging and Storage Procedures

Performance Objective: All packaging and storage procedures for hazardous material are in conformance with DOE 5480.3, 49 CFR, and 40 CFR.

Finding/PT.12-1: The Laboratory does not have a system or complete documentation that applies to the packaging and storage of hazardous materials in conformance with DOE 5480.3, 49 CFR, and 40 CFR.

Discussion: There is no system of documentation to support the Laboratory's construction and fabrication of DOT specification containers. The Laboratory fabricates these containers; however, there is no oversight inspection and no verification record of materials used or testing performed to ensure that construction is adequate and done according to specification. The packaging certifications used to document packaging activities for radioactive materials do not meet current requirements and do not include procedures currently in use. Some packages are built to specifications; however, certifications and testing are not performed, and there is no program established to implement them.

4.2.10 Nuclear Criticality Safety (CS)

Nuclear criticality safety is administered as recommended in American National Standard Institute/American Nuclear Society (ANSI/ANS)-8.1. Line management is responsible for overall compliance with appropriate requirements, notably DOE Orders 5480.3 and 5480.5, and the ANS-8 series of American National Standards. The Laboratory has two organizations that assist line management in complying with regulations and controlling criticality accident risks, the Nuclear Criticality Safety Committee (NCSC) and the HS-6 group.

The NCSC reports to the ES&H Council, promulgates broad policy, and provides independent appraisal on an annual basis for all groups and organizations that work with significant quantities of fissile material. The HS-6 group provides technical support in process evaluation and training, and reviews all operations and operating procedures.

Appraisals of groups that handle significant quantities of SNM are performed by the Nuclear Criticality Safety Committee on an annual basis. Nonroutine or unique activities are evaluated by the HS-6 group on a case-by-case basis. This technical guidance includes peer review within the HS-6 organization.

Areas that handle or have significant storage capacity for SNM include:

- TA-55 - Plutonium Processing
- TA-18 - Los Alamos Critical Experiments Facility
- TA-41 - SNM Storage
- TA-3 - CMR Building - Analytical Capability, SNM Storage
- TA-3 - Building 164 - SNM Storage

Laboratory documents that elaborate on these organizations and their functions are found in the *ES&H Manual*, particularly AR 4-1, the "Committee Charters" section, the "Support Services" section, and Technical Bulletin 401. Individual operating organizations also have documentation concerning nuclear criticality safety.

CS.1 Organization and Administration

Performance Objective: All operations with fissionable material should be conducted to provide effective nuclear criticality control during all activities.

No Findings.

CS.2 Use of Nuclear Criticality Safety Control Parameters

Performance Objective: Nuclear criticality safety should be achieved by controlling one or more specified parameters of the system within subcritical limits.

Finding/CS.2-1: Validation of calculational techniques for determining process limits is not documented per ANSI/ANS-8.1.

> Discussion: Documentation does not exist that details the validation of computer codes and cross sections used to determine process limits.

CS.3 Nuclear Criticality Safety Evaluations

Performance Objective: Nuclear criticality safety evaluations of the design and operation of process equipment should ensure that subcriticality is maintained under normal and credible abnormal operating conditions.

Finding/CS.3-1: Criticality safety calculations are not systematically and formally documented to communicate methodology, assumptions, and limitations.

> **Discussion:** HS-6 has the procedural requirement as specified in ANSI AN-8.1, Section 4.1.2, to determine criticality limits for nuclear operations. Documentation of methods, assumptions, and parameters used in the modeling and calculation of criticality limits is not always included with information returned to operating groups. Such documentation is necessary to ensure full understanding by operating groups for implementation of acceptable criticality safety margins.

<u>CS.4 Operating Procedures and Criticality Safety Limits</u>

Performance Objective: The approved written operating procedures should address criticality limits in providing effective guidance for all aspects of facility activities.

No Findings.

<u>CS.5 Criticality Alarm Systems and Emergency Procedures</u>

Performance Objective: All reasonable steps should be taken to mitigate the consequences of a nuclear criticality accident.

No Findings.

4.2.11 Explosives Safety (ES)

The high-explosives facilities occupy more than half of the Laboratory's 43 square miles. The facilities are numerous and vary in size from small laboratory rooms, where synthesis of new explosives molecules is done, to multi-acre sites used for testing of explosives and/or explosive devices. There is a facility dedicated to the development and testing of explosives-initiating systems. Another is dedicated to the formulation and processing of explosives. A large processing facility is maintained where finished products are produced by casting, pressing, and precision machining. Several test areas are devoted to reimbursable projects, most of which are Department of Defense (DoD) sponsored.

Operations of the explosives facilities are centralized in two divisions, WX Division (Design Engineering) and M Division (Dynamic Testing).

Both M and WX Divisions have formal procedures in place to assess the effectiveness of their ES&H programs. These procedures are performed on a regularly scheduled basis. A resident safety engineer from the Laboratory Safety Group participates. In addition, the DOE has periodically contracted with the Department of Defense Explosives Safety Board (DDESB) to conduct explosives safety appraisals. The most recent DDESB appraisal occurred in October 1988. DOE/AL also conducts periodic appraisals of selected operations.

All operations involving explosives are conducted in accordance with the *DOE Explosive Safety Manual* and with approved SOPs. Safety and health support is provided by professional Laboratory safety engineers, health physicists, industrial hygienists, and others.

ES.1 Organization and Administration

Performance Objective: Management organization and administration should ensure the effective implementation and control of the Explosives Safety Program.

Finding/ES.1-1: Uniform policy does not exist that defines authorities and responsibilities for all levels of personnel involved in explosives operations.

> **Discussion:** Although there are numerous informal policies among the various explosives operating entities, there is no uniform policy outlining authorities and responsibilities.

Finding/ES.1-2: Specific objectives have not been established for reducing explosives-operations-related incidents and accidents.

> **Discussion:** Although explosives incidents and accidents are reviewed by management and safety organizations and appropriate actions are taken, objectives for systematic reduction are not in place. Management has not provided such objectives, but does emphasize the primary safety goal of no explosives accidents.

Finding/ES.1-3: Laboratory-approved waivers have not been transmitted to DOE as required by DOE *Explosives Safety Manual* (DOE/EV/06194).

> **Discussion:** Explosives-safety-related waivers can be approved locally per DOE/EV/06194. An active file of such waivers is maintained. These waivers have not been transmitted to DOE as required by the DOE Explosives Safety Manual.

Finding/ES.1-4: Safety documents (SAs and SARs) are not current or do not exist for all explosives facilities and sites.

> **Discussion:** SARs are not current for explosives facilities requiring them. Safety Assessments for the remaining explosives facilities and sites are under way but not complete.

ES.2 Procedures and Documentation

Performance Objective: Procedures and documentation should provide appropriate direction, record generation, and support for the explosives safety program.

Finding/ES.2-1: Line managers and supervisors are not uniform in requiring and assuring strict adherence to explosives operations involving step-by-step procedures.

Discussion: Step-by-step procedures required for many explosives operations are not strictly followed. Certain written procedures may require more detail. Other detailed procedures need to be formalized, including those given verbally.

Finding/ES.2-2: The Laboratory does not distribute the *DOE Explosives Safety Manual* as a controlled document.

Discussion: Many managers, supervisors, and workers responsible for explosives operations do not have current copies of DOE/EV/06194.

Finding/ES.2-3: Root causes are not determined for all incidents and accidents involving explosives operations.

Discussion: Laboratory policy does not require root cause analysis of incidents and accidents. Operations and safety organizations are therefore not uniform in determining root causes for explosives-related incidents and accidents.

ES.3 Explosives Safety Appraisal Program

Performance Objective: Annual formal appraisals should be conducted by safety personnel responsible for explosives operations.

Finding/ES.3-1: Some versions of standard operating procedures (SOPs) used by and available to explosives-operations personnel are not current.

Discussion: Currency is difficult to maintain since not all SOPs are controlled documents. The Laboratory does not have a policy requiring SOPs to be controlled documents.

Finding/ES.3-2: Corrective actions are not uniformly verified, documented, or completed in a timely manner.

Discussion: Organizations conducting explosives operations are inconsistent in verifying and documenting corrective actions. Operating organizations also differ in prioritizing and scheduling corrective actions.

Finding/ES.3-3: Safety reviews of explosives-materials storage are inconsistent.

Discussion: Such reviews are currently performed as part of operational safety inspections; however, these reviews vary in quality and completeness.

ES.4 Explosives Safety Training

Performance Objective: Explosives safety training programs should be established and implemented to ensure compliance with DOE-prescribed standards.

Finding/ES.4-1: Testing is not used to validate the knowledge of explosives-operations personnel regarding procedures and safety practices.

> **Discussion:** Even though SOPs are required to be read annually, there is no uniform practice or requirement to assess employees' understanding of them.

Finding/ES.4-2: Lesson plans or learning objectives have not been used in explosives-safety training.

> **Discussion:** Few classes are presently available for explosives-safety training. These classes do not rely on lesson plans or objectives. Informal OJT and instruction for explosives are extensively given. Organization policy has not required the level of documentation necessary for compliance.

Finding/ES.4-3: Operating procedures for the conduct of explosives-operations training do not exist.

> **Discussion:** There are no procedures that include provisions for safety of participants, observers, and bystanders when conducting operations training.

Finding/ES.4-4: Laboratory policy has no provision for requalifying employees who perform infrequent tasks even though requalification is required by DOE/EV/06194.

> **Discussion:** Although some operating organizations do have requalifying procedures, no Laboratory policy exists that requires organizations to do this for infrequently done operations, and more specifically for explosives operations.

ES.5 Explosives Operations

Performance Objective: Explosives operations should be conducted in a manner that is both safe and reliable.

Finding/ES.5-1: Some processing and test equipment is not checked for proper operation before explosives-materials operations are introduced.

> **Discussion:** Equipment needing such checks is being identified and documentation systems are being established. Some firing sites do not routinely conduct dry runs with check lists before firing explosives; some machining operations do not employ dry runs before machining explosives; and some pressing operations do not use dry runs before introducing explosives.

Finding/ES.5-2: Some explosives-operations personnel do not believe they have the authority to stop activities.

Discussion: Actions taken by M Division and WX Division line managers at the operational level, and letters to all employees at the Director's level, have not been sufficient in gaining uniform acceptance of the stop work policy within explosives-operations organizations.

Finding/ES.5-3: Some storage magazines and operating buildings are not inventoried annually.

Discussion: Although large storage facilities and operating buildings are inventoried regularly and monitored on local data bases, small storage facilities and some limited operating buildings are not inventoried annually.

Finding/ES.5-4: Emergency exits in explosives-operating facilities are not uniformly clear of obstructions or checked for functionality.

Discussion: There is no procedure for ensuring that emergency exits are functioning and unobstructed. Some exit doors are difficult to open in winter, and in summer some are occasionally blocked by overgrown vegetation. Attempts to identify blocked exits and document findings have been limited to safety inspections.

ES.6 Laboratory Operations

Performance Objective: Laboratory operations should be conducted in an approved safe manner with all identified hazards analyzed and mitigated.

Finding/ES.6-1: Emergency announcements cannot be heard in some facilities where explosives operations are conducted.

Discussion: There are some problems with annunciator equipment in laboratories and some explosives-operations buildings. Public address systems used for emergency announcements cannot be heard because of noisy operations.

Finding/ES.6-2: Uniform standards of cleanliness and order have not been achieved for all laboratories conducting explosives operations.

Discussion: Housekeeping in the Laboratory's three explosives-operations laboratories, TA-9-21, TA-16-460, and TA-22-34, is in need of improvement.

Finding/ES.6-3: Implementation of a comprehensive calibration procedure, which identifies and schedules explosives-operations equipment, is not complete.

Discussion: Some operating organizations are not complying with the Laboratory Calibration Plan.

ES.7 Transportation, Handling, and Storage of Munitions

Performance Objective: The transportation, handling, and storage of explosives should conform to all DOE-prescribed safety standards.

Finding/ES.7-1: **The Laboratory does not comply with DoD Order 6055.9 as required by DOE/EV/01694 for the display of appropriate fire symbols, i.e., different symbols for different classes of hazards.**

Discussion: **Laboratory practice requires the use of a single fire-symbol on all magazines and buildings with explosives. The symbol exhibits the most hazardous class of explosives used in the Laboratory. The practice is employed to simplify warnings to diverse support personnel, such as maintenance, emergency, and fire department personnel.**

Finding/ES.7-2: **The requirement for marking explosives in storage according to the United Nations hazard classification system is not fully implemented.**

Discussion: **Although materials are classed and stored in accordance with the United Nations compatibility grouping, and the Laboratory is systematically proceeding with the re-marking of thousands of containers, this task is not yet complete.**

Finding/ES.7-3: **Line management has not designated a Storage Review Committee as required by DOE/EV/01694.**

Discussion: **The Laboratory Explosive Development Committee has yet to complete a draft policy and charter for a Storage Review Committee. The development of this policy and charter is a necessary first step in establishing such a Committee.**

4.2.12 Security/Safety Interface (SS)

Effective implementation of operational security and safeguards requirements at the Laboratory is a line management responsibility. The groups within the Operational Security and Safeguards Division (OS) support line management by defining DOE security and safeguards requirements and by assisting in and overseeing the implementation of these requirements. This includes protecting nuclear material (particularly special nuclear material and tritium), classified matter and information, and other government property.

Material Control and Accountability (OS-2) supports and oversees the control, accountability, and on-site movement of all nuclear materials throughout the Laboratory. These materials are located principally in 8 material access areas consisting of approximately 33 Category I and II material balance areas.

Security and Safeguards Support (OS-8) provides intrusion detection system support by maintaining and overseeing the Laboratory's basic rapid alarm security system (BRASS). This system includes approximately 35,000 individual alarms (security/fire/water/ES&H) and five protected area perimeter intrusion detection and assessment systems (PIDAS). OS-8 also provides computer system support for the material accountability and safeguards system (MASS) and the badge office system (BOS).

Physical Security and Safeguards Projects, Plans, and Policy (OS-10) supports and oversees the physical security, information security, Technical Surveillance Countermeasures (TSCM) Program, and protective force (PF) services at 27 security areas, 5 protected areas, and 8 material access areas.

Personnel Security (OS-12), along with managing the Laboratory's badge office, administers the Laboratory's badging and security clearance functions including foreign national visits and assignments.

SS.1 Safety of Improvements

Performance Objective: Security/safeguards improvements should not create or increase hazards that would impede the safe, reliable operation or shutdown of the facility in normal, abnormal, or emergency situations.

Finding/SS.1-1: Facilities and equipment may be modified without receiving a security/safety review that uses the same codes, standards, and criteria used in the original design.

> **Discussion:** Facility modifications may be made using a work order/job contract without HS or OS reviews. More formality is required in the design review and change control processes to ensure that the appropriate reviews are performed and documented.
>
> In a related example, heavy concrete manway covers in secure utility or communication conduit chases have been replaced with plywood covers at several locations. Replacement covers provided more convenient (i.e., less hazardous) service access.

Finding/SS.1-2: The Laboratory has no effective mechanism for resolving safety, health, and security conflicts.

> **Discussion:** Not all facility modifications are reviewed for safety, health (life safety code), and security before construction is commenced. There is also no effective mechanism for resolving concerns of individuals who review facility modifications for health, safety, and security concerns; therefore, facility modifications may have design deficiencies.

SS.2 Emergency Access and Egress

Performance Objective: Authorized facility and safety support personnel should not be denied access or exit in an emergency. Egress during emergencies should be conducted according to approved preplanning.

Finding/SS.2-1: Egress of visitors and handicapped individuals from some sites during emergency situations may be impaired.

Discussion: Because of the design of some entry/exit control portals at security areas, personnel who require a wheelchair for mobility, and visitors not entered into the badge-reader system, may be unable to exit through the normal control mechanism.

Finding/SS.2-2: Laboratory-wide procedures governing site-specific requirements for emergency access and egress by emergency vehicles are not in place.

Discussion: At several sites, entry controllers do not have written procedures describing how to deal with emergency vehicles. Minimum decontamination values have not been established locally for exiting emergency vehicles. Personnel are not briefed on procedures to use when a life-threatening situation requires an ambulance to enter or leave the area.

Finding/SS.2-3: Not all operations and emergency personnel have access to security compartments during emergencies.

Discussion: Access during emergencies by operations and emergency personnel to security compartments within facilities is not always preplanned or prearranged. Key facility-operations and safety-support personnel are not always provided special identification and security-escorted priority access to security compartments.

SS.3 Facility Planning and Security/Safeguards Emergencies

Performance Objective: Safety authorities and responsibilities for all types of security/safeguards emergencies should be clearly defined and understood by all parties involved.

Finding/SS.3-1: Analyses in accordance with DOE Order 5480.16, "Firearms Safety," are not always performed to determine the potential consequences associated with using weapons, vehicles, and other protective-force equipment in the vicinity of safeguarded systems.

Discussion: See SS.4-1.

SS.4 Safety of Security Activities

Performance Objective: Safety aspects of security activities involving the use of weapons and other protective-force equipment in the vicinity of safety systems and/or hazardous materials should be identified and understood by all parties involved.

Finding/SS.4-1: Security personnel have not received training in hazards and specific safety rules for each of the facilities with which they interact.

Discussion: Currently, security inspectors and supervisors have not received site-specific safety training. For security reasons, inspectors are routinely rotated throughout the Laboratory, are not regularly assigned to the same station, and do not know where they will be assigned in advance. An inspector can forseeably work at every duty station at the Laboratory. There is a lack of protective provisions for security forces during emergencies. Training for all security personnel does not always include general employee/personnel protection training including emergency response or chemical and radiological hazards, or the consequences of certain security measures (such as discharging a weapon) in certain areas or around certain equipment.

Finding/SS.4-2: Communication and coordination between emergency response teams, medical staff, and the protective force are not sufficient to provide protection for security force health and emergency contingency concerns.

Discussion: For example, auto emission levels, especially carbon monoxide concentrations, at protective force stations controlling vehicle entry/exit should be evaluated to determine corrective action. The Laboratory has not determined conclusively that personnel exposure to carbon monoxide at all stations is within the established OSHA limit.

4.2.13 Firearms Safety (FS)

Firearms operations are focused in two organizations: the Mason and Hanger (M&H) Protective Force (the Laboratory security services subcontractor) and the Laboratory's Explosive Applications Group (M-8) in the Dynamic Testing Division.

The M&H Protective Force is responsible for the protection of classified and unclassified documents, classified material, special nuclear material, and government property and facilities as required by the Laboratory and DOE. M&H provides armed security personnel for manning approximately 80 fixed stations and patrols. M&H currently employs about 300 security inspectors and about 100 other personnel. The Protective Force operates from the Central Guard Facility at TA-64. M&H conducts firearms training and testing at the Live Fire Range at TA-72. The M&H safety program is being revised to comply with DOE Order 5480.16 and DOE/AL Order 5480.16, "Firearms Safety." The Physical Security and Safeguards Group (OS-6) provides operations, oversight, and technical support to M&H. Contract administration is the responsibility of the Materials Management Division. A safety engineer assigned by HS-3 oversees the safety program. The Laboratory Firearms Safety Committee advises Laboratory management on the safe use of firearms and on the operations of the Live Fire Range. DOE, the Laboratory, and M&H periodically audit the M&H firearms safety program.

M-8 conducts research and development (R&D) activities using small arms at TA-14 (Q site) and at TA-36 (Kappa site). All firing operations are treated as explosives experiments and conducted remotely under approved SOPs and SWPs. Small arms used in research operations range from 0.177 caliber to 40 mm and are stored in a vault-type armory at TA-14-30. Ammunition is stored in an approved magazine at TA-14-45. Safety appraisals of R&D operations using small arms are conducted within explosives safety appraisals.

<u>FS.1 Organization and Administration</u>

Performance Objective: Security and safety organization and administration should ensure the effective implementation and control of the firearms safety program.

Finding/FS.1-1: Critical aspects of the M&H Protective Force safety program have not been fully implemented.

Discussion: A Hazard Communication Program is not fully implemented. The program is primarily deficient in the area of training requirements. Site-specific ES&H training has not been fully implemented.

Finding/FS.1-2: The M&H Protective Force safety program does not reflect current practices and procedures.

Discussion: The Safety Management Plan is currently being updated to reflect safety program status. For example, the current plan does not reflect annual reviews and updates as required by DOE Order 5481.6.

Finding/FS.1-3: Documentation of corrective actions for findings identified in M&H safety inspections and audits is inadequate.

Discussion: None.

Finding/FS.1-4: Numerous safety concerns from M&H self-assessments have not been closed out.

Discussion: Open safety concerns are primarily facility-type deficiencies related to aging and deteriorated guard stations that need to be replaced. Also, safety concerns associated with the Viking patrol vehicles remain open.

Finding/FS.1-5: Safety-related data submittals to the Laboratory have not been made by M&H in a timely manner.

Discussion: Data from accident reports for personal injuries and motor vehicle accidents have not been submitted in a timely manner for inclusion into the DOE computerized accident/incident reporting system.

Finding/FS.1-6: The Laboratory Firearms Safety Committee is not meeting its chartered requirements.

Discussion: The Firearms Safety Committee has been unable to comply with its meeting requirements because of member schedule conflicts and personnel changes. Official appointments have not been made nor requested in accordance with the Firearms Safety Committee charter.

FS.2 Procedures and Documentation

Performance Objective: Procedures and documentation should be formalized to provide appropriate direction, records, and support for the firearms safety program.

No Findings.

FS.3 Firearms Safety Appraisal Program

Performance Objective: Annual appraisals should cover procedures, responsibilities, and duty assignments within the Firearms Safety Program to ensure that overall objectives and performance criteria are being met.

Finding/FS.3-1: An internal annual firearms safety appraisal has not been conducted in calendar year (CY) 1990 or 1991 in accordance with DOE Order 5480.16.

> **Discussion:** The last internal firearms safety appraisal was conducted in calendar year 1989. Documentation on the status of the corrective action responses to the recommendations is less than adequate.

FS.4 Firearms Safety Training

Performance Objective: Firearms safety training programs have been established and implemented to ensure compliance with DOE-prescribed standards.

Finding/FS.4-1: Specific training on ES&H topics is not evident in site specific and hazard communication training.

> **Discussion:** The Protective Force has not received clear guidelines to address the issue of site-specific ES&H training. Because security inspectors rotate from site to site, they require training on a continuous basis.

FS.5 Range Operations and Procedures

Performance Objective: Firearms range operations and procedures are in compliance with DOE requirements.

No Findings.

FS.6 Exercises

Performance Objective: Exercises should be conducted in an approved manner with all identified safety hazards analyzed and mitigated.

Finding/FS.6-1: Safety plans for internal exercises are not being reviewed annually as required by DOE Order 5480.16.

> Discussion: None.

Finding/FS.6-2: An annual emergency response drill at the Live Fire Range has not been held in accordance with DOE Order 5480.16.

Discussion: Requests to participate in an annual emergency response drill were turned down by the Laboratory Fire Protection and Utilities Group (ENG-8).

<u>FS.7 Transportation, Handling, and Storage of Munitions</u>

Performance Objective: The transportation, handling, and storage of munitions should conform to all DOE-prescribed safety standards.

No Findings.

4.2.14 Experimental Activities (EA)

Safety of experimental activities is ensured through interrelated mechanisms. Umbrella evaluations such as Safety Assessments (SA) or Safety Analysis Reports (SAR) cover a class of experiments within a given facility. Often these include operation of a major research tool, for example, the Omega West Reactor or the Tritium Systems Test Assembly. Experiments conducted within the envelope of the umbrella document are controlled in more detail through experimental plans, standard operating procedures, or special work permits depending on the type, magnitude, and repetitiveness of the proposed experiment. Safety documentation from general to specific is reviewed by the appropriate ES&H specialists, line management, and other involved groups.

Experimental projects that involve construction or facility modification are evaluated through the ES&H Questionnaire Program. The questionnaire is filled out by the operational group and reviewed by the questionnaire committee. This process identifies the environmental, health, and safety compliance needs of the project and assures that proper documentation is prepared. All projects are compared to the operating envelope of the SA, SAR, or environmental impact statement where appropriate. This process assures that ES&H concerns are addressed early in the life of a project and that documentation needs, from a special work permit to a safety analysis report, are identified. Approximately 300 questionnaires are reviewed each year.

The ES&H Council oversees 12 committees that make recommendations regarding experimental issues in specific disciplines. These committees cover animal care and use, biosafety, compressed and liquefied gas safety, electrical safety, environmental compliance management, explosives development, firearms safety, human studies, laboratory environmental review, nuclear criticality safety, reactor safety, and specialized pressure vessel and piping. The Reactor Safety Committee, the Criticality Safety Committee, and the Laboratory Environmental Review Committee each have a major role in satisfying review requirements of DOE orders.

A special protocol is used for experiments conducted at the Nevada Test Site (NTS). A test director is appointed for each event. Within the test director's organization are all the ES&H discipline reviews required to conduct the test. The test director approves the event when all review requirements are satisfied.

EA.1 Interface with Experimenters

Performance Objective: Persons planning or conducting experiments in or with the facility should have their relationship to the operating group clearly defined.

Finding/EA.1-1: Safety/operator interfaces for the development of SOPs, experiment evaluation, and formality of operations in the conduct of experiments are inadequately defined in some cases.

> **Discussion:** The Laboratory has inadequate policy for ES&H review of proposed experiments.

EA.2 Experiment Categories

Performance Objective: All proposed experiments should be subjected to approval by an independent Safety Review Committee (SRC) before they are performed.

Finding/EA.2-1: The Laboratory has no comprehensive policy requiring independent safety reviews.

> **Discussion:** The Laboratory currently does not apply consistent policies that require ES&H review of proposed experiments. Experimental programs conduct a wide spectrum of safety review processes that are often informal. The Laboratory relies on an informal network of judgments by experimenters and management to decide the level of safety review needed.

Finding/EA.2-2: Standard Operating Procedures (SOPs) have not been written for all hazardous experiments and equipment; proper analysis to evaluate the hazards associated with an experiment is often not performed.

> **Discussion:** Many organizations do not have a systematic review procedure in place that can determine the need for SOPs for all new and existing operations.

EA.3 Experiment Proposals

Performance Objective: Sufficient information on a proposed experiment should be submitted to permit a safety evaluation to be made.

Finding/EA.3-1: The Laboratory has no formal policy for evaluating experiment proposals for safety concerns and disposal of residue.

> **Discussion:** Experiments are proposed and planned with clearly defined technical goals; however, inadequate emphasis has been placed on safety considerations, in large measure because experiment proposals did not receive proper review by the appropriate safety committee or organization. Experiment proposals often do not take into account safety concerns or the cost of cleanup.

Finding/EA.3-2: **Experimental conditions, facility operations, and personnel background and training are not always adequately reviewed before experiments are started.**

Discussion: **The interaction of experimental conditions and facility operations are not uniformly reviewed by facility management safety review committees. Personnel proposing an experiment do not always have adequate background and training to evaluate ES&H factors connected with the experiment.**

EA.4 Operation of Experiments

Performance Objective: **Experiments performed in any facility on the site should not present undue risk or significantly increase the risk previously evaluated for the facility or the site.**

Finding/EA.4-1: **Many experiments are conducted without risk analyses.**

Discussion: **Because of the large variety and associated risks of experiments conducted at the Laboratory, organizations have established their own policies and practices for conducting experiments. In general, the formality used is related to the nature and scale of the hazard. Bench-scale experiments usually have little formality other than the use of SOPs that cover general operations. More formality is used for experiments that involve radioactivity, high explosives, large energy sources, or large-scale systems. The Laboratory has no procedure requiring risk assessment and controlling documentation of experimental activities.**

4.2.15 Site/Facility Safety Review (FR)

Periodic safety reviews are mandated at the Laboratory by DOE Order 5480.5, DOE Order 5480.6, "Safety of Department of Energy-owned Nuclear Reactors," and/or DOE Order 5482.1B, "Environment, Safety, and Health Appraisal Program," depending on the type of facility under review. Several committees and programs exist to meet DOE requirements. These committees and programs provide safety reviews for 17 nuclear facilities and some 2,200 nonnuclear facilities and buildings at the Laboratory. The variety of operations performed at the Laboratory dictates the depth of review provided by these committees and programs.

The ES&H Council provides senior line management oversight of the Laboratory's environmental protection, safety, and health-related activities. The council advises the Laboratory Director on related policies and assures the effectiveness of programs to implement these policies.

Twelve chartered Laboratory committees report to the ES&H Council and review activities in various disciplines (such as electrical safety and biohazard control) and in specific facilities (reactors). Committee members are drawn from throughout the Laboratory; committee charters are published in the *ES&H Manual*.

ES&H committees, composed of technical experts from various organizations, exist in all Laboratory organizations. These committees provide operational reviews at directorate, divisional, and group levels. Other safety committees that review specific activities at the Laboratory include the Environment, Safety, and Health (ES&H) Questionnaire Committee, which helps managers anticipate and avoid ES&H problems that could arise during construction projects; the Laboratory Environmental Review Committee, which advises upper-level managers on new actions that require environmental assessments (EAs) or environmental impact statements (EISs); and the Design Review Board, which reviews new construction or modifications to existing facilities.

FR.1 Safety Review Committee

Performance Objective: A Safety Review Committee should be available to review safety questions and the safety impacts of experiments. This committee is part of the "Contractor Independent Review and Appraisal System" specified in DOE Order 5480.5, "Safety of Nuclear Facilities," or DOE Order 5480.6, "Safety of Department-of-Energy-Owned Nuclear Reactors," and/or DOE Order 5482.1B, "Environment, Safety, and Health Appraisal Program," Section 9.d.

Finding/FR.1-1: The Laboratory does not have comprehensive coverage of all its facilities and operations by an independent safety review system.

> **Discussion:** While the Laboratory has eleven discipline safety committees (e.g., Electrical Safety, Biohazard, and Nuclear Criticality) and one facility-specific committee (Reactor Safety) chartered by policy, not every facility has an independent committee to review its operations. Some organizations do have facility-specific committees, but not for all facilities within the organizations. The discipline safety committees that are chartered meet the performance criteria, with the exception that they are reactive rather than proactive. Review issues are normally brought to them by operations managers, except for the Reactor Safety Committee, which initiates its own reviews. There is no mechanism in place whereby a committee can assure that all experiments within its discipline receive reviews.

Finding/FR.1-2: Charters of safety review committees do not include proactive review of modifications to facilities, equipment, or experiments.

> **Discussion:** Laboratory discipline and facility safety committees primarily respond to incidents or problems. Review by committees is not adequately integrated into facility management to provide review and support beyond a reactive mode.

Finding/FR.1-3: Reviews by the Laboratory discipline safety committees are not consistent in their frequency or depth and breadth of review.

> **Discussion:** Charters for the discipline safety committees vary in frequency of review or appraisal of operations from six months (animal care and use) to only upon request (electrical safety). Many of the charters have no specific review/appraisal tasks (electrical safety), while others have comprehensive duties (reactor safety) that meet the TSA criteria. The scope of review varies from comprehensive program reviews (reactor safety) to only those operations requested by facility/operation managers (specialized pressure vessel and piping).

FR.2 Safety Review Topics

Performance Objective: Items that require review by the Safety Review Committee should be well defined and understood by facility management.

Finding/FR.2-1: A comprehensive evaluation of seismic hazards to Laboratory structures and utilities has not been made.

> **Discussion:** Following significant losses due to earthquakes at University facilities in California, the University HSEAC questioned the vulnerability of Laboratory structures. Preliminary studies indicate that a number of large buildings could reach design stresses of 0.04 to 0.06 g. These preliminary studies need to be expanded to provide a risk-based prioritization of structures and facilities requiring seismic analysis.

Finding/FR.2-2: Facility aging has not been appropriately reviewed.

> **Discussion:** There are no programs in place at the Laboratory to provide information or data on age-related phenomena such as maintenance costs, reliability, or performance deterioration. Without such information, facilities cannot be properly evaluated.

FR.3 Operation of Safety Review Committee

Performance Objective: Review of site/facility activities by the Safety Review Committee should ensure achievement of a high degree of safety.

Finding/FR.3-1: The Laboratory has no clear policy to guide line managers in issues requiring safety reviews.

> **Discussion:** Because many facilities do not have safety review committees for their operations, managers must identify discipline issues to bring forward for review. There is a wide range of performance by line managers in identifying the need for independent reviews.

Finding/FR.3-2: Recommendations by safety review committees are not submitted to senior-level management for review and/or approval.

> **Discussion:** Recommendations from reviews are normally sent to the manager requesting the review. Only if the committee chooses to elevate the issue, will senior-level management become involved.

Finding/FR.3-3: The reasons for management rejection of safety recommendations may not always be documented.

> **Discussion:** There is no policy requiring managers to document their decisions. Incorporation of a recommendation is left to the discretion of the facility manager. Chartered committees do make annual reports to the ES&H Council and to the HS division

leaders, who in turn may choose to inquire about the disposition of a committee's recommendation.

FR.4 Annual Facility Safety Review

Performance Objective: An annual operating review of the facility should be performed by a committee appointed by management as specified in DOE 5480.5, Safety of Nuclear Facilities, and DOE 5480.6, Safety of Department of Energy-owned Nuclear Reactors.

Finding/FR.4-1: Annual independent reviews of facility operations are not performed.

Discussion: Although the Reactor Safety and Nuclear Criticality Safety Committees perform reviews, there is no program in place for performing formal annual reviews of all facilities, operations, or incidents. Nuclear facilities undergo periodic appraisals; however, reviews of other facilities are ad hoc.

FR.5 Triennial Appraisal of Site/Facility Safety Review System

Performance Objective: A triennial appraisal of the safety review system should be performed by contractor management.

Finding/FR.5-1: The Laboratory does not review its safety activities and committees in a formal, documented manner.

Discussion: The Laboratory Assessment Office does not conduct appraisals of the Laboratory's safety committees. The ES&H Council and HS division leaders receive annual reports from the committees and have the opportunity to assess the performance of the committees. There is no requirement that such an appraisal be done.

FR.6 Operating Experience Review

Performance Objective: Operating experiences should be evaluated and appropriate actions should be undertaken to improve safety and reliability.

Finding/FR.6-1: Management does not use trending of incidents and events as a tool to improve safety and reliability.

Discussion: Although accident and incident trends and personnel dose trends are developed at the Laboratory, this information is not routinely incorporated into facility management decisions. Operating experience outside the Laboratory is not collected and evaluated for relevance to Laboratory operations, except in cases of major accidents or shutdowns.

Finding/FR.6-2: Age-related phenomena are not tracked or reviewed.

Discussion: Information regarding maintenance, reliability, or degraded performance is not collected in a consistent fashion. The information that is available is not tracked or reviewed to provide input for facility management decisions.

Finding/FR.6-3: Effective follow-up systems are not in place to ensure that timely actions are taken to correct deficiencies.

Discussion: The Laboratory program to implement DOE Order 5000.3A is new and has not fully matured. It is not completely integrated with other Laboratory programs that address maintenance and repair activities. Delays may occur at times for items that are not immediately dangerous to life or property.

Finding/FR.6-4: The Laboratory does not have an effective, formal Lessons Learned Program.

Discussion: As a follow-up to DOE Order 5000.3A, the Laboratory is defining a formal Lessons Learned Program. (See CA.4-1)

4.2.16 Radiological Protection (RP)

The health physics organizations in the HS Division support line management by defining the radiation protection program and by providing health physics services. ARs in Section 3 of the *ES&H Manual* provide an overview of the program. Program implementation is a line management responsibility.

HS-1 provides monitoring services for the Clinton P. Anderson Meson Physics Facility (LAMPF), the Chemistry and Metallurgy Research (CMR) building, TA-55, and nearly 500 other structures at Los Alamos. Monitoring requests exceed 120,000 per year and result in about 500,000 individual surveys or measurements each year. Work-space air is monitored through a system of 1,400 fixed-head samplers and 350 continuous air monitors (CAMs).

HS-4 provides dosimetry and in vivo measurements, smear and air sample analysis, special laboratory radiological analysis, and maintains, calibrates, and manages a pool of nearly 4,000 radiation monitoring instruments. Over 11,000 monthly thermoluminescent dosimeter (TLD) badges are issued, 400,000 individual samples are processed, and 1,800 in vivo measurements are made each year.

HS-12 supports the radiation protection program with training, program evaluation, radiological engineering, dose assessment, air emissions monitoring, radiological emergency assistance, x-ray surveys, and source control. HS-12 also provides all off-site health physics support, such as that for the NTS.

DOE Order 5480.11 promulgated certain prescriptions for contractor radiation protection programs. This has led to significant revisions of the Laboratory program. A complete description of the program, including areas of noncompliance, is found in the Laboratory's DOE Order 5480.11 implementation plan and related documents.

RP.1 Organization and Administration

Performance Objective: Site/facility organization and administration should ensure effective implementation and control of radiological protection activities on the site/facility.

Finding/RP.1-1: Formal implementation of DOE Order 5480.11 is not complete.

Discussion: Administrative requirements to implement DOE Order 5480.11 have been issued in the Laboratory's *ES&H Manual*; however, the training requirements of the order have not been incorporated into the *ES&H Manual*. Additionally, there has been inconsistent implementation of these administrative requirements. Major facilities, such as the plutonium facility and the CMR building, have implemented the requirements of the order. Other facilities, such as the waste management facility, are in various stages of implementation.

Finding/RP.1-2: Radiological protection performance objectives have not been established for all facilities.

Discussion: Line managers are not always aware of trends with regard to occupational radiation exposures, quantity and quality of solid and liquid radioactive waste, contamination and radiation levels, and the number and location of radiation and contaminated areas within the site/facility; however, line managers at major facilities such as the plutonium facility, and the CMR building, are aware of these trends.

A Laboratory-wide program for detailed tracking and trending indicators of radiological protection performance has not been established to enhance radiological protection program effectiveness; however, radiological protection performance indicator programs have been established at major facilities, such as the plutonium facility and the CMR building.

Finding/RP.1-3: Implementation of radiation protection safety policy and procedures is not consistent at the Laboratory.

Discussion: Radiation protection requirements are not consistently administered by line management and are not consistently adhered to by line organization personnel. The radiation protection program at the Laboratory is decentralized, which results in inconsistent implementation of radiation protection requirements.

Finding/RP.1-4: Personnel involved in the implementation and control of radiological protection activities do not understand their responsibilities and authorities.

Discussion: At some facilities, responsibilities and authorities for each radiological protection technician position and for responsible operations personnel are neither clearly defined nor sufficiently enforced to control work activities that protect employees.

Finding/RP.1-5: A radiation safety training program incorporating all requirements of DOE Order 5480.11 has not been fully implemented throughout the Laboratory.

Discussion: Not all employees within the Laboratory have received occupational worker radiation safety training as required by the order because an occupational worker training program has yet to be implemented.

A radiation worker training program meeting the requirements of DOE Order 5480.11 has been developed; however, some radiation workers within the Laboratory have not yet received this training.

Finding/RP.1-6: SOPs involving radiological hazards can be issued for work before completion of HS reviews.

Discussion: HS reviews all SOPs that involve a radiological hazard. However, the current SOP review system allows for the HS review to take place after the SOP has been issued for use in the field.

Finding/RP.1-7: Auditable reports of inspections, audits, and resulting corrective actions have not been maintained.

Discussion: Radiation protection problems are documented and evaluated by a variety of means. A Laboratory-wide data base has recently been developed to maintain information about audits, appraisals, and associated corrective actions. This data base has recently been implemented.

Finding/RP.1-8: Construction contracts that may involve radiological hazards are not always submitted for HS review.

Discussion: Contracts involving work with potential radiological hazards have been issued without the review or knowledge of the health physics organization. This results in delays, increased costs, and failure to follow radiological control procedures on the job.

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.

Finding/RP.2-1: The requirements of DOE Order 5000.3A have not been incorporated into the Laboratory's administrative requirements.

Discussion: A protection-specific procedure for the investigation and documentation of radiation protection-related accidents and incidents, AR 3-10, is still in draft form awaiting publication of the latest revision of AR 1-1, Incident/Accident Reporting.

Finding/RP.2-2: Action responses to internal audit findings are not supplied in the required time period.

Discussion: A review of internal audit reports showed that the corrective action responses to the audit findings were not being supplied to the auditor within the requested time period.

Finding/RP.2-3: Lessons-learned from radiological accidents and incidents are not effectively communicated to workers.

Discussion: There is no Laboratory program in place to keep employees informed of the types of accidents and incidents that are occurring to enhance their safety consciousness or awareness.

Finding/RP.2-4: Prejob planning and documentation are inadequate.

Discussion: Prejob planning to reduce or minimize the potential for an accident is not consistently implemented or documented.

Finding/RP.2-5: Laboratory facilities do not receive formal internal audits on a specified frequency.

Discussion: There is an approved formal audit program that addresses all elements (e.g., air sampling, posting) of the Laboratory-wide radiation protection program; however, not all facilities, organizations, and activities at the Laboratory receive approved formal radiation protection audits.

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.

Finding/RP.3-1: Many Laboratory areas have not been posted and labeled in accordance with DOE Order 5480.11.

Discussion: Major facilities, such as the plutonium facility, LAMPF, and the CMR building have been posted and labeled in accordance with the requirements of DOE Order 5480.11. Other facilities, such as the waste management facilities, are in various stages of implementation.

Finding/RP.3-2: Established procedures for moving potentially contaminated equipment out of radiologically controlled areas are not followed at all facilities.

Discussion: The need for controls necessary for removal of equipment from potentially contaminated areas has not been evaluated at some facilities; however, the equipment removal requirements of AR 3-7 have been implemented at major facilities, such as the plutonium facility and the CMR building.

Finding/RP.3-3: Radiation Work Permit (RWP) forms in use at the Laboratory do not include all necessary information to ensure appropriate job control.

Discussion: Laboratory facilities use several different work permits that have different formats. Current RWPs include no presurvey or postsurvey data, no evidence of prejob briefing with workers, no guidance on the types and levels of anticontamination clothing needed, and no guidance on the types and locations of special monitoring devices. RWPs can cover long periods of time, can have no completion dates, can have no indication of additional health physics reviews, and can be completed in pencil. Contamination data are requested in cpm instead of dpm.

Finding/RP.3-4: There is no hierarchical documentation system for Laboratory-wide radiation protection that provides tracing of DOE order requirements from Laboratory ARs to specific radiation protection procedures.

Discussion: The level of documentation of radiation protection procedures varied within the radiation protection groups prior to their recent reorganization into a single group, HS-4. Each group used a different format for procedures. Procedures had not been written for many of the functions performed; for example, how to set up a contamination control point.

A documented approval system for radiation protection procedures did not exist in some of the radiation protection groups. Intervals for review and/or revision of radiation protection procedures are not specified. There is no tracking scheme established to ensure that reviews are performed and that procedures are appropriately revised.

Radiation protection procedures are not maintained in a centralized historical file for a designated time period for some of the groups.

Finding/RP.3-5: The Laboratory has not uniformly implemented AR 3-4 to govern control of radioactive sources.

Discussion: The registration, inventorying, and leak-testing of radioactive sources is specified in AR 3-4; however, line organizations do not consistently implement this requirement.

RP.4 External Radiation Exposure Control Program

Performance Objective: External radiation exposure controls should minimize personnel radiation exposure.

Finding/RP.4-1: The Laboratory has not established a comprehensive administrative exposure control program.

Discussion: While the plutonium facility and LAMPF have established administrative exposure controls for certain phases of work at these facilities, the Laboratory has not established a comprehensive program for the real-time tracking of individual doses to ensure that administrative dose limits, which are set below DOE standards, are not exceeded. Except for certain phases of work at the plutonium facility and LAMPF, administrative dose limits have not been established for the Laboratory.

There is varied implementation of exposure trending and ALARA goal establishment from facility to facility. Exposure trending and ALARA goal establishment are performed at the larger facilities within the Laboratory, such as the plutonium facility; however, smaller facilities are not consistent with respect to implementing exposure trending and ALARA goal establishment. Some smaller facilities require personnel exposure report reviews without trending or establishment of ALARA goals.

High-dose commitments (the dose accumulated over a working lifetime) exist at some facilities despite adequate ALARA practices. At some facilities, the dose commitments to individuals are in the 2 to 3 rem/year range. A systematic design review should be initiated to evaluate the current overall system and practices at these facilities, and to identify needed upgrades to reduce the dose commitments to workers. The evaluation team should include health physicists, radiological engineers, design specialists, and production professionals.

Finding/RP.4-2: Proper controls (e.g., protective clothing and equipment) for minimizing exposure to skin and eyes are not specified in appropriate documents; therefore, these controls are not consistently implemented in the field.

Discussion: The use of glass-lensed spectacles for protection of the lens of the eye from beta particle fields is not specified in any radiation-protection administrative requirement; however, it is specified in Technical Bulletin 1201, Eye and Face Protection. The use of leather gloves when handling bare depleted uranium metal is not specified in any radiation protection document.

Finding/RP.4-3: Operating personnel are not always qualified or adequately trained to conduct exposure control surveys.

Discussion: Adequate controls are not in place at all facilities to ensure adequate training of personnel who use radiation survey instruments; however, controls are in place at some facilities, such as the plutonium facility.

Finding/RP.4-4: The Laboratory has not provided sufficient guidance for the use of temporary radiation shielding.

Discussion: The use of temporary shielding at the Laboratory is not, in some instances, in line with good health physics practices.

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.

Finding/RP.5-1: Some Laboratory employees do not turn in their dosimetry badges for timely reading/recording.

> **Discussion:** Some Laboratory personnel who work on site at NTS do not exchange their TLD badges in a timely manner. Consequently, exposure data may be affected by late reporting. The Laboratory has no policy dealing with late return of dosimeter badges.

Finding/RP.5-2: Not all radiological areas with the potential for skin dose and limiting doses to the lens of the eye (due to beta particle fields) have been evaluated with regard to the need for external dosimetry of the skin and lens of the eye.

> **Discussion:** Such an evaluation is necessary to upgrade the external dosimetry badge system in use at the Laboratory.

Finding/RP.5-3: Dosimetry calibration facilities are not adequate to cover the required range of exposures and energies.

> **Discussion:** Specifically, the neutron sources for calibration of dosimeters do not have the adequate energy range and yields to meet the current needs of the external dosimetry program of the Laboratory.

Finding/RP.5-4: Procedures for determining skin dose from nonuniform exposures (e.g., external contamination) are not in place.

> **Discussion:** The procedures for determining skin dose from non-uniform exposures as defined in DOE Order 5480.11, paragraph 9.f.(2), have not been documented.

Finding/RP.5-5: The Laboratory program for fixed nuclear accident dosimetry does not meet all requirements of DOE Order 5480.11 and ANSI N13.3 at all facilities.

> **Discussion:** A comprehensive program (e.g., determination of placement of dosimeters, required number, QA/QC, training, and remote retrieval procedures) is not documented, except at the plutonium facility.

Finding/RP.5-6: The dosimetry program for extremity monitoring is not adequate to cover the required range of exposures and energies.

> **Discussion:** Specifically, the extremity dosimetry system presently in use at the Laboratory does not meet the requirements of the draft DOE Laboratory Accreditation Program extremity badge standard.

RP.6 Internal Radiation Exposure Control Program

Performance Objective: Internal radiation exposure controls should minimize internal exposures.

Finding/RP.6-1: There is no Laboratory-wide procedure providing protection factors for respiratory protection.

Discussion: Laboratory-wide documents do not specify maximum protection factors of respiratory protection devices.

Finding/RP.6-2: Management enforcement of Laboratory policy regarding eating, drinking, smoking, and chewing in potentially contaminated areas is inconsistent.

Discussion: Controls for eating, drinking, smoking, and chewing in potentially contaminated areas are not uniformly enforced.

Finding/RP.6-3: Air sample data have not been consistently trended among the radiation protection groups.

Discussion: The air sample data have not been consistently evaluated by the radiation protection groups. One group, for example, specifically reviewed air sample data greater than 1 Derived Air Concentration (DAC).

RP.7 Internal Radiation Dosimetry

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

Finding/RP.7-1: The bioassay programs do not ensure that all appropriate personnel within the Laboratory are assigned to the proper program.

Discussion: The technical basis for determining who should participate in bioassay programs and the frequency of participation is not effectively communicated and uniformly applied throughout the Laboratory. At the present time, a check list, completed by a radiation protection technician in the field, is used to assist in determining whether a specific individual is required to participate in a bioassay program and in determining the frequency of the individual's participation. This method is partially based on the judgment of the radiation protection technician rather than on the application of a uniform technical or medical basis.

Finding RP.7-2: Bioassay programs do not ensure that all personnel within the Laboratory who work with radioactive materials are adequately monitored or restricted from work in the event of an accidental intake.

Discussion: Because check lists are not performed in a timely manner, not all personnel who perform work involving radioactive materials receive baseline bioassays before beginning this work.

A comprehensive QA plan for the bioassay program is not in place.

Trigger points to instigate an investigation of an intake or suspected intake for all radionuclides in use or expected to be in use at the Laboratory (except an investigation level based on dose) have not been comprehensively documented.

There is no documented policy on work restrictions resulting from a suspected or actual intake of radioactive materials, with the exception of intakes resulting from medical procedures.

The current In Vivo measurements laboratory may not be able to meet the criteria of DOE Order 5480.11 and the soon-to-be issued draft ANSI N13.30 standard, "Draft American National Standard for Performance Criteria for Radiobioassay," and therefore will require an upgrade of instrumentation and documented programs.

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.

Finding/RP.8-1: Calibration procedures and acceptance criteria do not comply with ANSI N323 standards.

Discussion: Not all radiation protection instruments are calibrated or acceptance tested in accordance with ANSI N323. CAM units do not receive a two-point calibration. Sources are not always available to check portable instrumentation as required by ANSI N323.

Acceptance criteria for performance testing of radiation protection instrumentation does not comply with ANSI N323 for all instruments.

Finding/RP.8-2: Radiation-monitoring instruments in some facilities have not been included in the calibration recall program.

Discussion: Several radiation monitoring instruments had calibration labels that indicated they had not been calibrated since 1985. A review of the HSE-1 calibration list maintained by the radiation instrument calibration laboratory indicated that these instruments had not been submitted for recalibration and therefore had not been added to the calibration recall list.

Finding/RP.8-3: The number of fixed and portable instruments is not sufficient to accomplish the mission of the radiation protection program.

Discussion: Some facilities have not been adequately evaluated for the types and quantity of radiation detection instruments necessary to measure the most limiting types of radioactive materials at accesses to contamination areas and at air discharge points.

Finding/RP.8-4: The instrument and dosimeter calibration facilities at the Laboratory are antiquated.

> **Discussion:** The calibration facility neutron range at SM-40 is not of sufficient intensity and energy range. Obsolete electromechanical drive mechanisms currently actuate the gamma sources at the SM-40 and SM-130 calibration facilities. These actuating devices have deteriorated to where the gamma sources get hung up in the drive mechanisms.
>
> The operator currently uses binoculars to verify that the Cs-137 and Co-60 sources are in the correct position at the SM-40 and SM-130 calibration facilities. This requires that the operator enter the calibration room while the source(s) is (are) exposed. This is not in conformance with ALARA requirements.
>
> During use of the filtered direct beam of the x-ray unit and the neutron and gamma sources, increased dose rates in the general area of the SM-130 compound are present. This area houses offices and is therefore not in conformance with ALARA requirements.

Finding/RP.8-5: The exact locations of fixed area dose rate instruments have not been documented for dose assessment purposes in all affected areas in the event of an accident.

> **Discussion:** The purpose, locations, and heights of fixed dose rate instruments are not consistently documented throughout the Laboratory.

<u>RP.9 Air Monitoring</u>

Performance Objective: Air monitoring systems through selection, location, calibration, and maintenance should ensure reliable estimates of air activity for radiological control purposes.

Finding/RP.9-1: Air sampling and monitoring of Laboratory work spaces has been inadequately documented and controlled.

> **Discussion:** A documented air sampling and monitoring program is only in place at the plutonium facility. Documentation of the air sampling and monitoring programs for all other affected facilities does not exist. A chain-of-custody program for the transfer and analysis of filters is not in place. The tracking, trending, and analysis of air sample data is not adequate. All areas with the potential to exceed 10% of a DAC have not been evaluated for placement of appropriate air sampling and monitoring equipment. In some instances, the type of CAMs in place are not adequate to measure the types of airborne contamination that may be present, e.g., only alpha CAMs are used when beta-gamma contamination is also present.

Finding/RP.9-2: The tritium stack effluent monitoring instruments at some facilities cannot adequately cover the range of potential tritium levels and tritium species that could be found.

> **Discussion:** See TS.5-1.

RP.10 Radiation Monitoring/Contamination Control

Performance Objective: The radiation monitoring and contamination control program should ensure worker protection from radiation exposures.

Finding/RP.10-1: Housekeeping in some radiological control areas is inadequate relative to health physics and industrial hygiene requirements.

Discussion: Housekeeping in many areas is generally poor. In many experimental areas, multiple groups are conducting experiments. This makes it difficult to control the overall housekeeping in the facility. Housekeeping and contamination control are directly related. A comprehensive policy and its implementation is needed for each facility to improve conditions.

Some structures and spaces occupied by more than one group are used for storage of miscellaneous equipment and materials, including some radioactively contaminated items.

Finding/RP.10-2: The contamination control program is not consistent with good health physics practices at the Laboratory.

Discussion: The Laboratory has not implemented a comprehensive contamination control program that meets the requirements of DOE Order 5480.11 or that represents good health physics practices as identified by DOE Order 5480.19.

Not all appropriate work areas have been consistently evaluated in accordance with DOE Order 5480.11 and AR 3-7 to determine the status of the area (e.g., uncontrolled, controlled, or radiological).

Procedures to ensure that routine dose rate and contamination surveys are conducted in a consistently repeatable manner (e.g., location, use of smears, instrument interpretation) are not always documented.

Tritium surface contamination limits for the release of equipment and materials from the radiological area and for posting purposes in AR 3-7 exceed the "Surface Radioactivity Guide for Beta-Gamma Emitters" in Attachment 2 of DOE Order 5480.11.

A system that ensures that equipment and materials removed from contaminated areas are not contaminated above release limits and are not mixed with clean items before final release has not been fully implemented at the Laboratory. Documentation addressing release criteria for personnel contamination and personal clothing and effects requires improvement.

Not all facilities in the Laboratory with contaminated areas have been posted with contamination levels and required protective measures. Protective clothing removal procedures are not posted at all contamination control points within the Laboratory. Procedures for the use of step-off pads are not in place at the entrances of all contaminated areas within the Laboratory.

Because of the interior arrangement of some aging facilities within the Laboratory, there is some commingling of personnel wearing monitored protective clothing with those wearing street clothing.

Personnel do not always perform required self-surveys for contamination when exiting contamination areas. Personnel-monitoring requirements vary from facility to facility for exiting the same types of areas. At some facilities, individuals are allowed to monitor themselves before leaving areas controlled for potential contamination; whereas, at other facilities, individuals must be monitored by Recirculation Point Tracking (RPT) before leaving a similar type of area.

Protective clothing requirements vary from facility to facility for the same types of operations and for the same levels of contamination and type of contamination.

Contamination levels in some buildings have not been adequately determined, and inappropriate activities (such as storage of uncontaminated items) are conducted in contaminated or potentially contaminated areas of buildings.

Finding/RP.10-3: Deficiencies exist in the characterization of the potential for radioactive releases to the environment.

Discussion: Building utility tunnels at some facilities are contaminated and subject to credible releases because of possible fire or flooding. In some instances, floor drains that discharge to local drain fields could cause the release of contaminated liquid under very unusual conditions.

Finding/RP.10-4: Laboratory-wide procedures on how to perform routine dose rate and contamination surveys are not in place.

Discussion: Radiation protection groups had developed and implemented their own procedures for dose rate and contamination surveys. This resulted in multiple procedures for the performance of the same task, which further resulted in different levels of detail.

Finding/RP.10-5: Counting equipment and procedures for smears are not adequate.

Discussion: An adequate number of instruments for smear counting is not available. Counting procedures are not available and are not followed by technicians at all facilities. Adequate records are not maintained to permit QA/QC verification of sample results. A chain-of-custody program for smear samples has not been developed and documented.

Finding/RP.10-6: Laboratory operations in some areas violate DOE Order 5480.11 regarding contamination control.

Discussion: Contaminated and noncontaminated pumps are repaired in the same room (i.e., TA-3, SM-30, Room W113B) with separation between the two. The contaminated work area is inadequately isolated from noncontrolled areas (such as office areas and hallways). Personnel radiation monitors are not available for contamination surveys upon exiting.

RP.11 ALARA Program

Performance Objective: A formally structured auditable program should be in place with established milestones to ensure that exposures are maintained as low as reasonably achievable (ALARA).

Finding/RP.11-1: An ALARA policy has not been implemented through a formally structured, auditable, Laboratory-wide ALARA program.

Discussion: No Laboratory-wide ALARA policy that reflects management commitment has been promulgated. The main approach currently used is trending of dose data. Many other activities are currently ongoing but have not been identified as a component of the ALARA program.

Quantitative or qualitative ALARA goals are not always established. Records of the ALARA program implementation have not been maintained to demonstrate adequacy of ALARA activities. ALARA data are not consistently used to identify operations that require the application of dose reduction techniques. In some cases, ALARA committees have been formed for individual facilities, and policies and programs have been initiated. Most facilities have not developed a formalized ALARA program and have not designated an ALARA coordinator. While the ALARA concept and general dose reduction techniques are presented in basic radiation worker training, the concept and specific techniques are not always presented in site/job specific radiation worker training. The Laboratory has not been extensively surveyed to locate all sources of nonproductive, low-level radiation exposure for the resultant elimination or reduction of these sources.

Finding/RP.11-2: ALARA reviews are not consistently performed before radiation work permits are issued.

Discussion: The Laboratory does not perform ALARA reviews before issuing radiation work permits. Meetings (e.g., prejob briefings) and/or dry runs are not consistently held to discuss work involving a high individual or cumulative radiation exposure potential.

RP.12 Records

Performance Objective: Records related to occupational radiation exposure should be maintained in a manner that permits easy retrievability, allows trend analysis, and aids in the protection of an individual and control of radiation exposure.

Finding/RP.12-1: Exposure records are not consistently used to document the effectiveness of ALARA programs.

Discussion: Due to the lack of a Laboratory-wide ALARA program, exposure records are not being used to measure the effectiveness of radiation exposure controls. The major facilities, such as the plutonium facility and LAMPF, are tracking and trending exposures for their facility ALARA programs.

Finding/RP.12-2: Radiation protection-related records are not always maintained in accordance with the requirements of DOE Order 1324.2A.

Discussion: Documented procedures for maintenance of records do not exist. Records are not always maintained in a centralized location and consistently protected from loss.

Finding/RP.12-3: Termination dosimetry reports are not consistently sent out within 90 days of termination.

Discussion: Records of exposure are not made available to terminated employees within 90 days of termination on a consistent basis.

4.2.17 Worker Safety and Health Compliance (WS)

Worker safety and health compliance is supported in the HS Division by HS-3 and HS-5. These organizations, working closely together, provide technical support assistance, guidance, and oversight to line organizations. Elements of the worker safety and health compliance program are specified in many of the ARs in the *ES&H Manual*. Compliance with worker safety and health orders is largely an interdisciplinary effort including HS-3, HS-5, ENG Division, the Materials Management (MAT) Division, and the operating divisions.

The following are examples of this interdisciplinary approach:

- HS-DO is working on standard signage
- HS-3 is responsible for identifying and evaluating occupational safety stresses and coordinating required environment, safety, and health (ES&H) training
- HS-5 is responsible for identifying and evaluating occupational health stresses and hazard communication
- ENG-DO is responsible for the Construction Safety Program
- MAT is responsible for contractual arrangements with subcontractors
- JCI and M&H are large subcontractors responsible to the Laboratory for maintaining their own worker safety and health programs, which are audited by the Laboratory
- HS-3 and HS-5 write ARs that describe procedures for compliance with various safety and health regulations

Recently, the HS-3 Operational Safety Section assumed responsibility for the OSHA inspection and compliance program. This program is under development and will involve safety engineers and industrial hygienists as lead inspectors. Other members of the inspection teams will be operating division personnel who have attended a four-day OSHA orientation course. Approximately fifty to 100 inspections will be performed annually and will be scheduled either upon request from operating division personnel or as required by a reinspection program.

The identification of stresses is made through the interaction of safety engineers and industrial hygienists with operating divisions. A carcinogen program, based on OSHA requirements, as well as hazard evaluations for additional carcinogens, is in place and underway. Air- and noise-sampling information is on computerized data bases that are easily accessed; however, historical data is not yet available electronically. Line managers are usually notified of air sampling results, especially if an overexposure occurs. The health hazard inventory will be used to prioritize hazards so that resources can be used effectively.

<u>WS.1 Management of Health and Safety Concerns</u>

Performance Objective: Chemical, physical, and/or other environmental stresses arising in the work place should be identified, evaluated, and controlled.

Finding/WS.1-1: The Laboratory does not have a formal program to identify and evaluate health and safety concerns.

> **Discussion:** The Laboratory has not used routine surveys and evaluations, or a hazards-based priority system.

Finding/WS.1-2: Workplace evaluations are not always provided to first-level supervisors.

> **Discussion:** The Laboratory identifies health and safety concerns using DOE orders, national consensus standards, or locally generated guidelines. However, unless there is a significant inadequacy, line managers are not generally provided the identified concerns. Written evaluations regarding the adequacy of workplace safety controls, ventilation systems, and monitoring data are not routinely sent to first-level supervisors and building managers.

Finding/WS.1-3: Hazard control methods incorporated into operations do not follow recommended or required hierarchy.

> **Discussion:** See OS.3-6.

Finding/WS.1-4: A periodic monitoring program as required by DOE Order 5480.10, "Contractor Industrial Hygiene Program," has not been completely implemented to ensure the continued effectiveness of controls for chemical, physical, and biological stresses.

> **Discussion:** Baseline sampling of all air contaminants, bioassays, noise surveys, and nonionizing radiation sources has not been performed to evaluate safety and health issues. Routine monitoring required by OSHA standards is not always performed.

Finding/WS.1-5: The Laboratory has no risk-management program.

Discussion: The Laboratory does not have a risk-management program that identifies and prioritizes a hierarchy of hazards posed by operational and construction activities. No program exists to define risk levels acceptable to management and to prioritize expenditures of resources within operating and support organizations. The Laboratory's SOPs, SWPs, access controls, and lockout/tagout programs are not under a clear central policy that ensures consistent, adequate risk reduction for all operations. Some hazards (e.g., explosives and radiation) are tightly controlled, while others (e.g., noise, electrical, and vehicle) are loosely controlled.

Finding/WS.1-6: Personnel protective equipment is not readily available in some areas of the Laboratory, nor is the use of such equipment strictly enforced.

Discussion: During walk-throughs, examples of poorly labeled, poorly accessed, insufficiently stocked, and improperly stored protective equipment were found. Posted signs often indicate requirements for safety shoes and/or goggles; however, employees, visitors, and other site workers regularly ignore these signs because of inadequate enforcement.

Finding/WS.1-7: Housekeeping practices throughout the Laboratory are inadequate, disorganized, and inconsistent.

Discussion: The Laboratory does not have an overall policy that establishes acceptable general housekeeping standards. Areas are sometimes cluttered, waste materials are left in hoods, and outside storage areas are not always clean and orderly. Debris is not disposed of in a timely manner; surplus equipment is not expeditiously salvaged. Items and materials are sometimes stored improperly. For example, materials may be stored too high and fire exits and electrical panels may be blocked by stored items. In many cases, buildings were not designed with adequate storage to support the operations for which they are used.

Finding/WS.1-8: Safety standards are not as diligently enforced for space leased by the Laboratory, resulting in potentially lower levels of protection of Laboratory employees and contractors occupying that space.

Discussion: HS-3 inspects leased space as required by DOE Order 5632.6. Results of these inspections are forwarded to MAT-9 which administers the leases. When an annual inspection coincides with a lease-renewal, findings are more diligently pursued because of written statements of acceptance. Findings from other inspections are less diligently pursued. Owners frequently contest the findings and attempt fixes in the cheapest way possible. This results in less than adequate fixes. Findings most frequently found are lack of safety information signs, tripping hazards, unsafe walking surfaces, improper or missing guardrails, inadequately marked exits, and poor emergency lighting.

WS.2 Surveillance of Health and Safety Concerns

Performance Objectives: Appropriate surveillance of activities should be conducted to measure safety and health performance and ensure the continued effectiveness of controls.

Finding/WS.2-1: Health and safety surveillance on major construction projects has been insufficient.

Discussion: A recent appraisal of construction safety by DOE/AL resulted in 70 findings. The responsibility for monitoring construction safety has been diffused in the past between contractors and the Laboratory ENG and HS divisions. Primary responsibility has recently been assigned to the ENG division, and their inspectors are being trained for monitoring construction safety.

Finding/WS.2-2: The Laboratory does not ensure proper surveillance and follow-up action for facility users, support subcontractor personnel, and construction contractor employees.

Discussion: Safety and health issues are not adequately addressed in prebid considerations, contract negotiations, safety plan reviews, and auditing activities. Accidents and incidents of subcontractors are not captured for investigation and record keeping.

Finding/WS.2-3: The Laboratory does not have a properly documented program for periodic monitoring of chemical, physical, and biological stresses to demonstrate proper control of workplace exposures as required by DOE Order 5480.10.

Discussion: See IH.3-1, IH.4-1, and MS.5-1.

Finding/WS.2-4: Comprehensive surveillance data are not being used to provide exposure estimates.

Discussion: Although sampling data for air contaminants, noise, and other stresses have been computerized in HS-5, historical information has not been integrated into the data base.

WS.3 Compliance With Occupational Health Standards for General Industry

Performance Objective: Site/facility operations should comply with DOE-prescribed standards for the evaluation and control of occupational safety and health hazards.

Finding/WS.3-1: Facility operations do not uniformly comply with DOE-prescribed standards for the evaluation and control of occupational health hazards.

Discussion: The Laboratory attempts to meet DOE standards, but the application of these standards by Laboratory programs is uneven and inconsistent.

Finding/WS.3-2: The Laboratory does not have an Asbestos Management Plan.

Discussion: The Laboratory does not have an accurate inventory on asbestos, a contingency plan for the disturbance of asbestos, or a facility management plan to minimize the potential for exposure to asbestos fibers. Asbestos is exposed on pipes and cable trays. Some asbestos insulation is not labeled.

Finding/WS.3-3: The Laboratory lacks effective policy for proper storage of chemicals and related materials.

Discussion: Chemicals and other materials are sometimes improperly and incompatibly stored in laboratories, hallways, cabinets, under sinks, and outside buildings. Some organizations do not maintain adequate preventive measures to ensure spill containment in areas where hazardous materials are stored and dispensed. Occasionally, chemicals are stored in eating areas, and food is occasionally stored in chemical areas.

Finding/WS.3-4: Although the Laboratory has a comprehensive laser safety training program (AR 5-2), compliance with ANSI Z136.1-1986 is not complete.

Discussion: The implementation of AR 5-2 is incomplete.

Finding/WS.3-5: Control of potential exposure to laser hazards is inconsistent.

Discussion: Although there is a program for evaluating and controlling laser exposures in accordance with ANSI-Z136.1-1986 and American Conference of Governmental Industrial Hygienists (ACGIH) limits, the enforcement of those requirements and the reporting of laser use to HS division by operating organizations are not uniform. There have been more problems with custom lasers than commercial off-the-shelf lasers.

Finding/WS.3-6: Central records listing all personnel working in regulated areas do not exist.

Discussion: Although records or lists of personnel allowed into or required to work in regulated areas (e.g., explosives or plutonium operations areas) are sometimes kept by individual organizations, no Laboratory-wide central file has been maintained.

WS.4 Compliance With Occupational Safety Standards For General Industry

Performance Objective: Work places should be free of uncontrolled physical hazards and be in compliance with DOE-prescribed occupational safety standards.

Finding/WS.4-1: The Laboratory is not in compliance with 29 CFR 1910, Subpart D, and does not have a program for code compliance enforcement.

Discussion: Load limits based on design reviews for mezzanines, balconies, supported floors, and platforms have been determined, but are not necessarily posted or enforced by the responsible organization. Ladders, guard rails, stairs, and protective barriers are not always properly designed and maintained. Walking surfaces throughout the Laboratory have deficiencies, such as holes in floors, deteriorated and damaged surfaces, improper or unmarked floor penetrations, or loose carpet and floor tiles.

Finding/WS.4-2: The Laboratory is not in compliance with 29 CFR 1910, Subpart E.

Discussion: The Laboratory does not have a formal policy for implementation of OSHA-mandated exit signs and lighting requirements. Emergency signs for exit routes, exits, nonexits, and emergency assistance communication numbers are inconsistent throughout the Laboratory. Emergency lights are not always located in areas that require lights during a power failure.

Finding/WS.4-3: Workers and managers are not uniformly sensitive to possible fire losses or dangers.

Discussion: Inspection reports continue to find oily rags on floors, flammable gas cylinders stored near oxidizers, and flammable liquids not properly stored in safety cans or safe cabinets. In some facilities, excessive amounts of combustible materials are stored.

Finding/WS.4-4: Some exits or egress paths are blocked.

Discussion: Most problems exist in office areas and complexes where copiers, supply cabinets, filing cabinets, facsimile machines, and open recycling collection boxes are placed in hallways or corridors. The minimum clearance of 44 inches is not always maintained.

Finding/WS.4-5: The Laboratory is not in compliance with the requirements of 29 CFR 1910, Subpart H.

Discussion: Inspections continue to document improperly stored and secured gas cylinders, missing valve caps, and co-storage of incompatible gases.

Finding/WS.4-6: Compressed and cryogenic gas equipment is improperly designed, used, and maintained.

Discussion: Worn and leaking air hoses continue to be used. Experiments, including use of cryogens, are being conducted using unrated compressed gas piping, valves, and manifolds.

Finding/WS.4-7: Laboratory policy on compressed gas cylinders is not uniformly implemented and enforced.

Discussion: Empty and unused cylinders have not been disposed of or returned to the appropriate organization. Additionally, the Laboratory has no process to optimize the use of cylinders and reduce their total number.

Finding/WS.4-8: Transport and storage of explosives within the Laboratory are not in full compliance with the DOE Explosives Safety Manual and 49 CFR (Transportation).

Discussion: The newest version of DOE's Explosives Safety Manual has changed the classification of storage compatibility groups. The Laboratory has not completed the required changes to its storage operations. (See ES.7-2.)

Finding/WS.4-9: The Laboratory is not in compliance with 29 CFR 1910, Subpart J.

Discussion: The Laboratory does not have a uniform policy for nonmandated safety-information signs and tags. Lack of policy contributes to untagged electrical switches, gas and water lines, and storage cabinets. Warning signs which indicate hazards such as load limits, controlled access areas, limited or "no" chemical use areas, and eating and drinking areas are not consistent throughout the Laboratory. There is no mechanism for sign update, replacement, or removal.

Finding/WS.4-10: The Laboratory does not have a uniform, consistent and comprehensive lockout/tagout program.

Discussion: Lockout/tagout procedures are inconsistent, incomplete, and sometimes violated. These procedures do not reflect all of the 29 CFR 1910.147 requirements. Laboratory employees are insufficiently trained in lockout/tagout procedures and are not familiar with new OSHA requirements.

Finding/WS.4-11: The Laboratory is not in compliance with 29 CFR 1910, Subpart K.

Discussion: Older safety showers are not in compliance with current standards. The program to annually test and maintain emergency safety showers does not comply with current standards, which require monthly testing.

Finding/WS.4-12: The Laboratory is not in full compliance with 29 CFR 1910, Subpart N.

Discussion: The Laboratory Crane Safety Program (AR 13-2) is not uniformly implemented; consequently, some cranes, hoists, and slings have been found to be deficient in installation, inspection, certification, labeling, and operation.

Finding/WS.4-13: The Laboratory does not consistently apply and enforce its rules and requirements for operation of motorized equipment.

Discussion: Although there is a requirement that forklift operators be trained and certified, not all organizations enforce this policy. The Laboratory has no system to ensure that operators of motor vehicles hold valid driver's licenses.

Finding/WS.4-14: The Laboratory is not in compliance with 29 CFR 1910, Subpart O.

Discussion: Unguarded and improperly guarded machinery exists. The Laboratory does not have a program to ensure that machinery is properly guarded.

Finding/WS.4-15: The Laboratory is not in compliance with 29 CFR 1910, Subpart P.

Discussion: The Laboratory has no formal program for the procurement, use, and maintenance of hand and portable power tools. Older equipment is not retired or upgraded to current requirements. Frayed cords and improperly grounded power tools have been found during inspections.

Finding/WS.4-16: The Laboratory is not in compliance with 29 CFR 1910, Subpart Q.

Discussion: Current Laboratory policy on welding, cutting, and brazing operations is concerned with fire prevention and does not address related health concerns, such as personal protective equipment and ventilation.

Finding/WS.4-17: The Laboratory is not in compliance with the National Electrical Code, 29 CFR 1910, Subpart S, and NFPA 7OE.

Discussion: Most Laboratory sites are not in compliance with the National Electrical Code (NEC), NFPA 70E, and OSHA electrical regulations. The recent Laboratory-wide OSHA self-inspection identified a preponderance of electrical code violations. An effective program, including quality control, routine inspections, and safe electrical work practices, does not exist. Lack of proper electrical system grounding is a severe problem in older facilities (e.g., CMR or SM-40). Adequate oversight of the electrical safety programs for both the Laboratory and its subcontractors is not provided. Compliance is not enforced, and appropriate personnel are not educated about codes, regulations, and the necessity of compliance.

The Laboratory Electrical Safety Program has not been comprehensive in training its personnel. There is no explicit policy requiring compliance with codes and standards for Class A and Class B equipment. Final authority on interpretations of codes and standards is not established.

Facility and experiment designs do not routinely receive compliance and safety engineering review before implementation or installation. This occasionally results in the improper installation and use of electrical equipment. Electrical incidents are not being investigated in a manner that identifies root causes and system-wide corrective actions. Variances for deviations from mandated practices are not formally requested if an installation is made in an experimental application or in a nonstandard application.

Finding/WS.4-18: Electrical raceways and conduits are used as means of mechanical support in violation of NEC 300.11.(b).

Discussion: Throughout the Laboratory, communication cables have been supported by strapping them to raceways or conduits.

Finding/WS.4-19: Some elevators are not in full compliance with ANSI A17.1 (Elevator Safety Code).

Discussion: Noncompliances with ANSI 17.1 include: no means of external communication from an elevator, no hour rating label on elevator equipment room doors, and elevator operating machinery not located within a separated, rated enclosure.

WS.5 Compliance With Occupational Safety and Health Standards for Construction Industry

Performance Objective: Construction activities should be free of uncontrolled physical and health hazards, and should be in compliance with DOE-prescribed occupational safety and health standards relating to construction.

Finding/WS.5-1: The Laboratory management and oversight program for construction safety and health is inadequate.

Discussion: Subcontractor and lower-tier subcontractor compliance with 29 CFR 1926 is inconsistent and inadequate. Contract management does not sufficiently stress compliance with Part 1926. All existing contracts have not been modified to include the most recent health and safety requirements. The Laboratory's formal procedure for approving subcontractor safety plans is not being adequately implemented. Health and safety hazards are not consistently addressed in all contracts. There is inadequate communication and understanding between the Laboratory, the subcontractor, and lower-tier subcontractors regarding training requirements and responsibilities of subcontractor personnel.

Finding/WS.5-2: Contractual safety and health matters between the Laboratory and construction contractors are often incomplete, causing delays in starting projects and misunderstandings about the requirements and responsibilities of both parties.

Discussion: Construction contracts do not require approval of access control plans before start of construction, nor do they adequately stress oversight of such plans during the construction phase. Contracts do not set performance goals. Contractual requirements to provide monthly summary reports needed for compilations of safety performance data on subcontractors are not met. The Laboratory does not provide adequate safety and health performance criteria for evaluation and selection of contractors. Bid invitation criteria do not include satisfactory safety/loss prevention performance.

Finding/WS.5-3: Safety and health hazards that the contractor may encounter at the job site are not adequately identified.

Discussion: The Laboratory does not provide subcontractors with safety and health information packages at pre-bidding conferences. The Laboratory fails to stress that bids need to include sufficient funds to cover safety requirements.

Finding/WS.5-4: Maintenance of contract and construction records is not centralized.

Discussion: Central files do not contain all related documents. Some contract documents, inspection reports, and safety plans could not be located.

Finding/WS.5-5: Construction activities are not in uniform compliance with 29 CFR 1926.

> **Discussion:** Examples of noncompliance include poor housekeeping, improper ladder extensions, insufficient guard rails at excavations and on roofs, defective handtools, improper rigging devices and cranes, compressed gas cylinders with incorrectly installed regulators, damaged gauges, incorrectly installed flash arresters, improper labeling, and unavailability of Material Safety Data Sheets (MSDSs).

WS.6 Personnel Communication Program

Performance Objective: Site/facility personnel should be adequately informed of chemical, physical, and biological stresses that may be encountered in their work environment.

Finding/WS.6-1: The Laboratory's personnel hazard communication program is incomplete.

> **Discussion:** Employees have not been provided adequate training on rights and responsibilities as required by DOE Order 5483.1A. Implementation of the hazard communication standard is still not complete. OSHA regulations are not readily available to all employees. The lack of an adequate signs and labels program, training program, and formality of operations contributes to personnel communication deficiencies at the Laboratory.

Finding/WS.6-2: The Laboratory does not have a consistent method for labeling hazardous chemicals.

> **Discussion:** A formal chemical labeling system has not been established or implemented. Chemical containers are sometimes unlabeled or mislabeled. Adequate hazard warnings are not present on all chemical containers.

Finding/WS.6-3: The system for obtaining and distributing MSDSs is inadequate and not sufficiently user oriented.

> **Discussion:** The Laboratory central computerized MSDS file is not complete. All employees do not have access to this system or are not trained in its use. Hard copies of MSDSs kept by some operating organizations may be out of date due to the lack of an updating program.

Finding/WS.6-4: Employees are not always provided the opportunity to participate in regular meetings on safety and health.

> **Discussion:** All operating organizations have not implemented a safety program that includes regular meetings and specific training regarding operational hazards. Documentation of safety meetings is inadequate.

Finding/WS.6-5: Employees are not routinely provided with written notification of monitoring results.

Discussion: The Laboratory does not routinely provide employees with written notification of monitoring results as required by applicable OSHA standards or whenever an employee's exposure exceeds permissible limits. Participation of the occupational medicine group in workplace stress evaluations is lacking.

4.2.18 Industrial Hygiene (IH)

The Industrial Hygiene Group (HS-5) within the Health and Safety Division assures implementation of DOE and OSHA requirements necessary to protect the health of employees and provides industrial hygiene support and oversight to the line organizations. ARs in the *ES&H Manual* provide an overview of the program.

The engineering and respiratory section of the industrial hygiene group conducts in-place testing of high-efficiency particulate air (HEPA) filtration systems and provides respirator fit-testing, training, and quality assurance. A comprehensive Asbestos Management Plan is presently being developed in conjunction with ENG Division.

Field services and technical support sections provide industrial hygiene support for the line organizations through training, participating in inspections, and performing air sampling for contaminants to which employees may be exposed. The section has recently established a health hazard inventory, as required by DOE Order 5480.10, which is now being refined to collect detailed information on chemical, physical, and biological hazards. This inventory will be used to prioritize operations that require further assessment, sampling, and possibly controls based on degree of hazard. There are approximately 15,000 different substances and mixtures in use at the Laboratory.

The toxicology and information services section provides and interprets toxicological information to Laboratory supervisors, employees, and physicians. This section also maintains the central repository of MSDSs for the Laboratory. At the present time, there are 10,400 MSDSs electronically available on the Information Management (INFORM) System, which is being added to on a monthly basis. The remaining MSDSs are available in hard copy as requested by line organizations. The reporting of SARA Title III and the Laboratory's central chemical inventory are maintained in this section through purchasing information.

<u>IH.1 Organization and Administration</u>

Performance Objective: Site and facility organization and administration should ensure effective implementation and control for the Industrial Hygiene Program.

Finding/IH.1-1: The Laboratory Industrial Hygiene Program has not been implemented in a manner that meets all requirements of DOE Order 5480.10.

Discussion: The Laboratory implementation of the Industrial Hygiene Program does not always include documented program requirements and the conveyance of those requirements to line management. Line management, in many instances, is not diligent in ensuring that employees are following the requirements of existing ARs. Laboratory policies address many industrial hygiene concerns; however, ARs are lacking for such programs as asbestos, eating and drinking in the workplace, chemical storage, hazardous waste, the chemical hygiene plan, and other OSHA requirements. Because Laboratory policies are lacking, the specific goals and objectives for reducing the frequency and severity of potential exposures to occupational health hazards are not defined. All required formal Industrial Hygiene Program elements are not established. A program to track the correction of identified deficiencies does not exist.

Finding/IH.1-2: The level of training of industrial hygiene personnel in OSHA hazard recognition is not adequate.

Discussion: Training has emphasized the technical aspects of industrial health rather than hazard recognition.

Finding/IH.1-3: There is no formal program to track the correction of identified industrial hygiene deficiencies.

Discussion: When industrial health deficiencies are identified, first- or second-line supervisors are notified; however, tracking or follow-up of corrective actions is not performed.

IH.2 Procedures and Documentation

Performance Objective: Procedures and documentation should provide appropriate direction, record generation, and support for the Industrial Hygiene Program.

Finding/IH.2-1: Procedures and documentation of the industrial hygiene group are not complete and do not provide appropriate or adequate direction and support for the program.

Discussion: The *Industrial Hygiene Operations Manual* is not up-to-date or complete. The various industrial hygiene programs have not been formally documented. Standard Operating Procedures (SOPs) prepared by line management for some industrial-hygiene-related hazardous operations do not require industrial hygiene staff review before commencement of operations.

Finding/IH.2-2: Written industrial hygiene requirements are not readily available to all organizational elements, are not periodically reviewed, are not kept current, and are not consistent.

Discussion: DOE Orders and OSHA standards are not always readily available. The industrial hygiene ARs for ventilation, noise, hazard communication, and welding are out-of-date. ARs have not been developed for all programs required by DOE Order 5480.10.

Finding/IH.2-3: Clear lines of authority in administering the Industrial Hygiene Program do not exist.

Discussion: Directives have not been issued, as required by DOE Order 5480.10, to "clearly specify the authority and responsibilities of the organizational staff administering the Industrial Hygiene Program."

Finding/IH.2-4: The industrial hygiene group does not have documented quality criteria.

Discussion: There are no formal procedures defining report distributions or sampling protocols.

IH.3 Management of Health Concerns

Performance Objective: Chemical, biological, physical, and/or other environmental stresses arising in the workplace should be identified, evaluated, and controlled.

Finding/IH.3-1: The Laboratory lacks a documented program for identifying existing and potential occupational safety and health concerns.

Discussion: Walk-around surveys are not routinely conducted in accordance with a specific procedure, purchase orders are not always reviewed, and the existing chemical inventory has not been completed; therefore, the systematic program for evaluating and controlling industrial hygiene concerns is also deficient. A periodic monitoring program, as required by DOE Order 5480.10, has not been completely implemented to ensure the continued effectiveness of controls for chemical, physical, or biological stresses.

Finding/IH.3-2: Programs for control systems use and monitoring are not complete.

Discussion: Not all engineered control systems are on a maintenance and inspection schedule to verify proper performance. Also, operator training programs have not been developed for all of the control systems in place.

IH.4 Surveillance of Health Concerns

Performance Objective: Appropriate surveillance of activities should be conducted to measure industrial hygiene performance and to ensure the continued effectiveness of controls.

Finding/IH.4-1: A comprehensive program does not exist to measure industrial hygiene performance and to ensure the effectiveness of controls.

Discussion: HS program controls over construction activities are not effective in ensuring that construction work conforms to the OSHA requirements in 29 CFR 1926. There is no documented program for the periodic monitoring of all controls or exposures. A data base to track exposures of significance and to identify trends or potential problem areas does not exist. Documented trend analyses or estimates of credible exposure are not completed for exposures, incidents, and events that resulted or could have resulted in occupational illness or death.

Finding/IH.4-2: Incidents are not always investigated to the extent that causes and preventive measures are identified.

> **Discussion:** There is no program in place to identify events and incidents that could have resulted in occupational illness or death and ensure appropriate levels of investigation. Involvement of the occupational medicine group is often not timely.

Finding/IH.4-3: Trend analysis is not applied to industrial hygiene monitoring data.

> **Discussion:** The Laboratory does not have a program to conduct trend analysis or predict potential problem areas from industrial hygiene monitoring data.

<u>IH.5 Compliance with Occupational Health Standards</u>

Performance Objective: Site/facility operations comply with DOE-prescribed standards for the evaluation and control of occupational health standards.

Finding/IH.5-1: The Laboratory has not developed the necessary programs to evaluate and control occupational health hazards consistent with DOE-prescribed standards.

> **Discussion:** Asbestos removal operations associated with remodeling and maintenance work are not always evaluated by the industrial hygiene staff. There is no documented asbestos control program that manages asbestos-related activities at the Laboratory. The Laboratory does not have a fully implemented program to control and document employee exposures to chemical carcinogens. Laboratory operations are not routinely surveyed to identify high-noise areas. The administrative requirement addressing confined spaces is not current and does not comply with 29 CFR 1910.146. The Laboratory's comprehensive laser safety program is not complete.
>
> The requirements presently used for air contaminants are Air Force standards rather than those contained in 29 CFR 1910. Laboratory operations have not been completely surveyed. An evaluation of exposure to heat stress is not always completed on operations at the Laboratory.

Finding/IH.5-2: The Laboratory does not have a documented respiratory protection program.

> **Discussion:** The Laboratory's respiratory protection program was designed around and is operated to be consistent with ANSI Z88.2; however, the program has not been formally documented.

Finding/IH.5-3: No comprehensive central record exists listing personnel that work in regulated areas.

> **Discussion:** See WS.3-6.

IH.6 Personnel Communication Program

Performance Objective: Site/facility personnel should be adequately informed of chemical and biological stresses that may be encountered in their work environment.

Finding/IH.6-1: The Laboratory has not implemented all elements for hazard communication.

> **Discussion:** The chemical tracking and labeling system is not yet implemented. Laboratory employees are not made aware of DOE resources available to resolve concerns about potential health hazards in their work environment. Job-specific hazard communication training has not been conducted throughout the Laboratory. Site/facility personnel are not adequately informed of chemical, physical, and biological stresses that may be encountered in their work environment. Required written procedures are not always available. Of those that are available, the quality is insufficient to comply with DOE-prescribed occupational safety and health standards.

4.2.19 Occupational Safety (OS)

The operating divisions at the Laboratory are responsible for conducting their own safety programs with support by the HS-3 Group. The operational safety section of HS-3 assigns 13 safety engineers to assist the operating divisions in developing safety programs; conducts and participates in several hundred annual inspections; reviews, revises, and writes more than 35 ARs and TBs annually for the *ES&H Manual*; investigates approximately 400 accidents annually and maintains accident statistics; reviews nearly 600 SOPs and SWPs annually; reviews new or modified facilities for ES&H concerns; and interprets DOE orders on occupational safety.

Recently, the HS-3 operational safety section assumed responsibility for the Laboratory OSHA Inspection Program. This program is under development and will involve safety engineers and industrial hygienists as lead inspectors. Other members of the inspection teams will be operating division personnel who have attended a four-day OSHA orientation course. Approximately 50 to 100 inspections will be performed annually and will be scheduled either upon request by operating division personnel or as required by a reinspection program.

Another Laboratory organization involved in occupational safety is the Laboratory Assessment Office (LAO). LAO conducts internal audits of the operating divisions' safety programs. Findings from these audits are used to develop action plans and schedules, which are tracked until completion.

Major subcontractors to the Laboratory, such as Johnson Controls World Services Inc. (JCI) and Mason and Hanger-Silas Mason, Inc. (M&H) provide their own occupational safety staff and programs. These programs are audited quarterly by HS-3 and annually by LAO.

OS.1 Organization and Administration

Performance Objective: Site and facility organization and administration should ensure effective implementation and control of the occupational safety program.

Finding/OS.1-1: The Occupational Safety Program does not employ internal operational formality.

> **Discussion:** Lack of formal internal procedures and performance criteria leads to inconsistent support to operating divisions. For example, accidents may be investigated using different procedures and criteria, SOPs may be researched with different levels of thoroughness, and the quality and quantity of documentation may vary. Formal lines of communication and information exchange between safety engineers and line managers vary considerably.

Finding/OS.1-2: Line management has not adequately ensured the effectiveness of occupational safety program elements.

> **Discussion:** After occupational safety programs are implemented, there is no validation of their effectiveness at the operational organization levels.
>
> Line management does not fully understand its responsibility to ensure the safety of its operations and does not always use the resources available from HS-3 to help in the assessment.
>
> Line management, in many instances, is not diligent in ensuring that employees comply with Laboratory or regulatory requirements regarding personnel protective equipment, such as using hard hats in areas that present a head-injury hazard.

Finding/OS.1-3: The safety engineering staff has limited expertise in OSHA standards.

> **Discussion:** Most of the staff in the operational safety section have some training in OSHA standards compliance, but they have not yet become proficient.

Finding/OS.1-4: New or changing regulatory requirements in occupational safety are not communicated to affected Laboratory personnel in a timely manner.

> **Discussion:** The HS-3 operational safety section does not always operate in a proactive mode to make operating organizations aware of new or changing regulatory requirements. As an example, the OSHA standard on lockout and tagout has been issued, but the revised AR has not been published. This requirement directly affects many of the organizations within the Laboratory, but has not been effectively communicated. In addition, there is no formal program within the operational safety section to monitor changing regulations to ensure timely implementation.

Finding/OS.1-5: Operating organizations do not always allocate the necessary resources to implement occupational safety program requirements.

> **Discussion:** Organizations regularly assign safety responsibility as an additional assignment to their staff. These personnel generally lack the time and background to administer these duties. There is usually no budget established for these activities.

Finding/OS.1-6: Operating organizations generally lack adequate goal setting for occupational safety and have no systems to control substandard performance.

> **Discussion:** Organizations typically limit safety goals to reduction of incident rates for personnel injuries. Changes in these results are seldom statistically significant and there is no methodology for corrective action if the results are substandard. There is usually no development of specific activities that would improve safety performance.

Finding/OS.1-7: The current appraisal program by LAO is inadequate to monitor occupational safety program implementation.

> **Discussion:** LAO appraisals are currently focused on nuclear facilities. Nonnuclear and functional appraisals have not been conducted for several years.

Finding/OS.1-8: Operating organizations do not always conduct self-assessments to ensure safety program implementation.

> **Discussion:** Organizations generally do not conduct self-assessments of their safety program implementation and do not have systems for monitoring ES&H performance.

Finding/OS.1-9: Safety responsibilities for the Los Alamos Airport are poorly defined.

> **Discussion:** There is confusion over safety responsibilities for the airport. The operational relationship among DOE, JCI, and the Laboratory is ill defined.

OS.2 Procedures and Documentation

Performance Objective: Procedures and documentation should provide appropriate direction, record generation, and support for the occupational safety program.

Finding/OS.2-1: No uniform Laboratory-wide system is in place to ensure that safety deficiencies are identified and corrected.

> **Discussion:** Administrative Requirements identify line management as being responsible for identification and correction of safety concerns. There are generally no systems in place to validate compliance with these requirements. The appraisal activities in LAO are limited at this time to nuclear facilities. Division activities are not being appraised except in conjunction with nuclear facilities.

Finding/OS.2-2: Safety policies, directives, and warnings do not consistently reach lower levels of management and affected personnel.

Discussion: Specific OSHA standards, which are required to be accessible in the workplace, are not always available where workers have easy access to them. Some levels of the Laboratory do not have ready access to the *ES&H Manual*.

Finding/OS.2-3: Authority and responsibility for safety is not clearly defined at each organizational level.

Discussion: Various levels of management do not have clearly defined levels of authority to accept risk or take corrective action. Policies and management directives do not clearly define authority and responsibility.

Finding/OS.2-4: Subcontractors do not have adequate safety programs.

Discussion: Contracts with subcontractors do not adequately address the details of required compliance with standards such as OSHA or penalties for failure to comply.

Finding/OS.2-5: Special work permits (SWPs) do not require operational safety review, except for operations involving explosives.

Discussion: SWPs, unlike SOPs, do not require review by the operational safety function in HS-3, except when special hazards, such as explosives, are present. Since SOPs and SWPs are similar in their goal of hazard control, their review requirements should be consistent.

Finding/OS.2-6: There is inadequate monitoring of safety performance.

Discussion: Monitoring of safety performance is generally limited to incidence rates for personnel injuries and property damage. Variations are seldom statistically significant and corrective action for substandard performance is seldom apparent. There are no monitoring systems in place, such as sampling of inspection findings or observation of behavior or attitude, that can be used to assess performance and provide trending.

Finding/OS.2-7: There is no internal policy on records management for safety records, except for accident/incident reports.

Discussion: There are no criteria or guidelines for retention of outdated SOPs, internal and external appraisals, records of follow-up, formal accident investigation reports, occurrence reports, working files, memos, etc.

Finding OS.2-8: Interpretations of codes, standards, and regulations are frequently inconsistent.

Discussion: Interpretation of ARs, OSHA standards, and DOE orders and directives is inconsistent, often resulting in conflicting interpretations of codes. This problem is particularly noticeable in the area of electrical safety and interpretation of the National Electrical Code. Some ARs are not consistent with standards.

Finding OS.2-9: Operating organizations frequently pay little attention to engineering standards and other industry-wide consensus standards.

Discussion: Operating organizations often do not use available standards that are applicable to the design and operation of their activities.

OS.3 Management of Safety Concerns

Performance Objective: Physical and/or other environmental stresses arising in the workplace should be identified, evaluated, and controlled.

Finding/OS.3-1: There is no program to identify safety concerns for proposed operations.

Discussion: The Laboratory does not have a program for identifying potential occupational safety concerns for proposed operations. There is no opportunity, except for personal contacts, for safety engineers or the occupational medicine group to review most operations while they are still in the proposal or design phase.

Finding/OS.3-2: Most operating organizations do not conduct internal reviews of proposed operations to identify safety concerns.

Discussion: There is no requirement for safety review of proposed operations in most organizations. The reviews that are conducted are informal, normally undocumented, and do not always involve personnel with the appropriate expertise.

Finding/OS.3-3: Line management generally does not conduct periodic walk-through surveys of its areas.

Discussion: Many organizations do not conduct routine self-inspections with participation by management and HS division personnel. When inspections are conducted, upper and middle management seldom participate and HSE participation may or may not be requested.

Finding/OS.3-4: Evaluation of safety concerns by HS-3 does not include development of guidelines.

Discussion: When solutions for problems not covered by code, standards, and regulations are developed, the solutions are not published for future reference and guidance.

Finding/OS.3-5: Corrective action taken on safety concerns does not include written evaluation of adequacy.

Discussion: There is generally no written assessment of the adequacy of implemented control measures. Problems identified and corrected through the SOP review process are reviewed for compliance, but there is no assessment of adequacy.

Finding/OS.3-6: Hazard control measures incorporated into operations do not follow recommended or required hierarchy.

Discussion: The following hierarchy of control measures is considered best practice:

Level 1 - design changes
Level 2 - engineering controls
Level 3 - administrative controls
Level 4 - personal protective equipment

Levels 2, 3 and 4 are required by some OSHA standards.

The Laboratory frequently fails to apply engineering controls or design changes to eliminate or mitigate hazards, and relies heavily on the use of administrative controls, such as procedures and personal protective equipment to safeguard personnel.

Finding/OS.3-7: Training in the use of some safety equipment is inadequate.

Discussion: There is no training for the proper use of some safety equipment, such as eyewashes, as required by the ANSI standard. The identification of training requirements in OSHA or other applicable standards is not complete.

Finding/OS.3-8: Poor housekeeping is a common problem.

Discussion: Poor housekeeping is a commonly identified problem during routine safety inspections. (See WS.1-7)

Finding/OS.3-9: Purchases of equipment are not always reviewed for compliance with safety requirements.

Discussion: While personnel protection equipment purchases are reviewed and approved by safety engineers, there is no formal program in place to identify equipment that may not be covered by Underwriter's Laboratory or SAE certification programs, which could affect the safety of employees. Purchases of machinery and equipment are not systematically reviewed to ensure proper machine guarding, noise control, and EME emissions controls.

OS.4 Surveillance of Safety Concerns

Performance Objective: Appropriate surveillance of activities should be conducted to measure safety performance and ensure the continued effectiveness of controls.

Finding/OS.4-1: The safety programs of small Laboratory subcontractors are not monitored and reviewed for adequacy by the Laboratory.

> **Discussion:** HS-3 does not review the safety programs of all small contractors and, except for construction, does not inspect their activities.

Finding/OS.4-2: Analysis of accident data is limited to CAIRS reporting criteria, without systematic trending or root cause determinations.

> **Discussion:** Accident data from the HS-3 CAIRS is limited to categories such as type of injury, body part involved, location, and group. There is little analysis of the underlying root causes to identify problems in safety management systems, and there is no trending or root cause analysis.

Finding/OS.4-3: Periodic monitoring and exposure survey programs are limited to health physics and industrial hygiene programs.

> **Discussion:** There are no exposure surveillance data bases for physical stresses other than the noise-exposure program included in the Industrial Hygiene Program. Other physical stresses, such as heat and cold, have not been evaluated as factors in workplace performance or safety at the Laboratory.

Finding/OS.4-4: Surveillance activities and safety performance evaluations are not being performed for all Laboratory employees, contractors, and subcontractors.

> **Discussion:** Many of the elements of the industrial safety program defined by DOE orders are not being implemented at the Laboratory. In particular, contract workers do not undergo the same pre-employment tests and examinations as do Laboratory employees, even though they work side by side. Contractor and subcontractor employees do not participate in the same surveillance programs as Laboratory employees (for example, laser worker eyesight monitoring).

OS.5 Personnel Communication Program

Performance Objective: Site/facility personnel should be adequately informed of physical stresses that may be encountered in their work environment.

Finding/OS.5-1: Programs for site-specific training vary throughout the Laboratory and are sometimes inadequate.

> **Discussion:** The level of site-specific training varies throughout the Laboratory and is not consistent with the level of hazard. Emphasis is often given to radiation hazards while occupational hazards, such as lasers, are not covered. There are no formal criteria establishing the frequency or content of safety meetings and other safety information exchange programs. These criteria should be based on workplace hazards, but are left entirely to the discretion of organizational management.

Finding/OS.5-2: There is a general lack of hazard recognition training by operating organizations and no training is offered by operational safety specialists.

> **Discussion:** Although there is a multitude of general, job-specific, and site-specific training, there is no formal training program for hazard recognition.

4.2.20 Fire Protection (FP)

Fire protection activities within the Laboratory are focused in the Fire Protection and Utilities Group (ENG-8) of the Facilities Engineering Division. Principal responsibilities of ENG-8 include fire protection engineering, technical expertise matters relating to fire protection and life safety, as well as management of maintenance and testing of fire protection systems performed by the Laboratory's support services subcontractor, Johnson Control World Services Inc. (JCI).

Fire protection engineers review engineering designs for new facilities as well as modifications to existing facilities. In addition, ENG-8 personnel represent the Laboratory during audits and reviews of fire protection systems and assist line managers in identifying and resolving fire protection and life safety issues.

The Laboratory's record of fire losses has been excellent. The largest single building fire loss in Laboratory history amounted to $125,000 and occurred in January 1945.

Facilities were inspected by Factory Mutual in 1989, and 21 of the 99 recommendations have been completed. ENG-8 participated in a Laboratory self-appraisal program that identified 58 deficiencies in 7 categories of the fire protection section of the TSA performance objectives. Twenty of the deficiencies from the self-appraisal are related to Los Alamos County Fire Department (LACFD) actions.

Until late 1989, LACFD was one of only two fire departments within DOE that were operated and staffed by DOE federal employees. No other Los Alamos city or county fire department had existed. LACFD is now operated and staffed by Los Alamos County, but DOE continues to own the six fire stations and their equipment as well as a newly constructed station near the airport. Fire protection and ambulance service for the Laboratory are provided by a contract between DOE and the County of Los Alamos. Over 900 Laboratory structures have alarm or extinguishing systems. All alarms in both the Laboratory and the Los Alamos community are handled through the central alarm facility, which is managed by Mason and Hanger-Silas Mason, Inc., the security services contractor at the Laboratory.

FP.1. Organization & Administration

Performance Objective: Fire protection organization and administration should ensure the effective implementation and control of fire protection equipment and activities.

Finding/FP.1-1: Policy, procedural guidance, and implementation responsibility for Laboratory fire protection is fragmented.

Discussion: Fire protection policies and procedures are distributed among several manuals and internal procedures. Implementing responsibility is divided among several organizations including ENG-8, the Laboratory support services subcontractor (JCI), the security services subcontractor (M&H), the County of Los Alamos, and DOE/LAAO.

Finding/FP.1-2: For fire emergencies accompanied by unusual technical or hazardous conditions, the issue of who is in charge between the fire department command and the emergency response on-scene commander has not been resolved.

Discussion: The Emergency Response Plan states that the Fire Department plays a major role in emergency planning and operations. The plan also specifies that the emergency response representative assumes control, as on-scene commander of all responding emergency elements. Separately, the Laboratory is implementing an incident command system developed by the National Fire Academy. For those emergencies where the principal aspect is fire, this appropriately places on-scene command with the senior fire department officer. The command problem (when unusual or technical conditions exist along with fire) has not been addressed with proper sensitivity. A clear definition of lead responsibility remains to be resolved.

FP.2 Life Protection

Performance Objective: All facilities on site should provide adequate life safety provisions against the effects of fire.

Finding/FP.2-1: In some Laboratory facilities, utility chases have unprotected vertical openings that aid the spread of fire.

Discussion: None.

Finding/FP.2-2: Some storage in hallways continues to be in violation of written Laboratory policy and procedure.

Discussion: Policies and procedures have been implemented, but full compliance has not been achieved.

Finding/FP.2-3: The fire door inspection and maintenance program is inadequate.

Discussion: Fire doors are blocked or defective at many facilities.

Finding/FP.2-4: A survey of all security portals (i.e., turnstiles, delayed opening doors, self-locking doors, and badge and palm readers) that may impede or block emergency egress has not been made.

Discussion: The overall effect of converting nonsecurity exists to security exits in various facilities has not been analyzed. Turnstiles and booths are inherently defective as emergency exits. Even though particular numbers and types of nonsecurity exits in a particular facility may be adequate per Life Safety Code Requirements, often the nonsecurity exits are removed, blocked, or replaced with new security exits, reducing safe exits below acceptable levels.

FP.3 Public Protection

Performance Objective: All facilities on site should provide adequate protection to prevent any added threat to the public as the result of an on-site fire causing the release of hazardous materials beyond the site (or facility) boundary.

Finding/FP.3-1: Not all facilities have been analyzed for the consequence of radioactive contamination spread by fire.

> **Discussion:** Only one SAR addresses the mitigation of the spread of radioactive contamination by fire. Operations are not routinely evaluated and optimized to reduce the spread of contamination.

FP.4 Impairment of Operations

Performance Objective: The site should not be vulnerable to being shut down for an unacceptable period as the result of a credible fire.

Finding/FP.4-1: There is no coordinated plan for redirecting priority computing to alternate sites in the event of a major loss of the computer facility.

> **Discussion:** The Laboratory computing capability and capacity is unique, thus the transfer of all computing is probably impossible. Nevertheless, no plan has been developed to prioritize computing requirements and to plan transfer of the highest priority computing.

Finding/FP.4-2: There is no coordinated plan for redirecting priority research and development activities.

> **Discussion:** Because of the specialized facilities at the Laboratory, much of the high-priority R&D work would be difficult to redirect. Nevertheless, no plan has been made to identify work that can be redirected or to provide impact assessments for work that cannot.

Finding/FP.4-3: Some lightning protection systems are improperly installed and maintained.

> **Discussion:** In some cases, stacks are not tied into building lightning protection systems, air terminals are loose or have fallen down, antenna wires are attached to air terminals, and lightning protection cables are disconnected. Grounding conductors attached to the outside of buildings are guarded by copper pipe that is not properly bonded. Grounding conductors in conjunction with personnel traffic are exposed and not properly installed.

Ground conductors are not protected from physical damage from snow-removal operations.

FP.5 Property Protection

Performance Objective: A maximum credible fire, as defined in DOE Order 5480.7, "Fire Protection," Section 6.f, should not result in unacceptable property loss.

Finding/FP.5-1: Some facilities have not been evaluated for compliance with DOE Order 5480.7.

Discussion: None.

FP.6 Fire Department Operations

Performance Objective: The fire department should have the capacity to promptly terminate and mitigate the effects of a fire in a safe and effective manner.

Finding/FR.6-1: A NFPA 1500 compliance plan has not been prepared by the Los Alamos County Fire Department, nor has it been forwarded to DOE or the Laboratory.

Discussion: Laboratory emergency planning is inhibited if fire department capabilities are not fully understood and incorporated in facility safety analysis reports and emergency planning. The Laboratory may be affected most by the minimum fire department staffing requirement for interior firefighting. For some conditions, the fire department response is below this level, and additional emergency planning and awareness by the Laboratory is needed to overcome this deficiency. For example, fire department apparatus is not manned with a minimum of four firefighters. If less than the required minimum firefighting personnel is available, operations may be inhibited and the Laboratory emergency plan will be less effective. Another example is that the new fire department ladder truck remains unused because of manning and training deficiencies.

Finding/FP.6-2: Fire department prefire planning is incomplete.

Discussion: As of the end of June 1991, only 31 plans had been reviewed and approved. Without such plans for each major facility or hazardous area, the fire department has diminished effectiveness. Training in the application of a prefire plan has not yet been carried out. After a prefire plan is prepared, it must be exercised if the working-level firefighter is to have an effective role.

Finding/FP.6-3: Facility familiarization tours are not being conducted, except in conjunction with prefire planning; further, there is no plan or schedule for initiating facility tours.

Discussion: If a prefire plan is not available, a familiarization tour by the fire department could support effective action in an emergency.

Finding/FP.6-4: Mutual aid agreements with Los Alamos county are inadequate to cover emergency medical and fire responses.

> **Discussion:** Forest Service agreements exist, but there are no mutual emergency medical aid agreements in effect.

Finding/FP.6-5: Fire department drills involving simulated fire or related emergencies have not been held at all major facilities.

> **Discussion:** The DOE/county contract calls for drills and exercises, but schedules are not finalized. There is no specific plan for individual facility drills.

<u>**FP.7 Program Implementation**</u>

Performance Objective: A fire protection engineering program should be in place to effectively provide and maintain an improved risk level of fire protection.

Finding/FP.7-1: Testing of fire hydrants and fire pumps has not met Laboratory requirements.

> **Discussion:** Although fire hydrant and fire pump failures have not occurred, annual tests in accordance with the required DOE standards to ensure full performance of this fire protection equipment have not been conducted. Some technical areas do not have current waterflow tests and some areas have no evidence of waterflow tests beyond fire department hydrant flushing. Deficiencies in some 1989 water tests by Factory Mutual have not yet been corrected.

Finding/FP.7-2: All protective equipment is not being tested in a manner and at a frequency prescribed by applicable standards so that effective performance can be assured.

> **Discussion:** Fire protection systems are tested less frequently than DOE requirements dictate.

Finding/FP.7-3: Access to fire protection systems is blocked by storage in many cases.

> **Discussion:** Although the Laboratory has defined conditions under which storage is acceptable, some violations are observed during facility inspections. Supplies and other materials are often stored in proximity to sprinklers, reducing sprinkler effectiveness.

Finding/FP.7-4: There is no ongoing program to review all doors in the Laboratory and provide standardized markings and inspection frequencies.

> **Discussion:** Some doors are inspected as fire doors when they are not required to be fire doors by code or by DOE practice. Without a review of the need for and extent of existing barriers, the deficiencies identified by the inspection program cannot be systematically corrected.

Finding/FP.7-5: Loss records remain inadequately administered.

> **Discussion:** Because all loss data are not systematically collected into a database, not all loss data were included in the annual fire protection summary for CY 1990. This inhibited calculation of loss ratios and property damage comparisons that are a required part of the annual summary to Department of Energy/Headquarters (DOE/HQ). Losses less than the reportable level of one thousand dollars are not tracked.

Finding/FP.7-6: Long-standing exemptions granted by the Atomic Energy Commission in the 1970s have not been analyzed for applicability to present conditions.

> **Discussion:** The current climate calls for refraining from asking for exemptions, and new exemption requests that should be made are not being prepared. Furthermore, there has not been any initiative to validate exemptions issued more than a decade ago.

Finding/FP.7-7: Some water supplies are insufficient.

> **Discussion:** There are a number of areas where additional or more reliable water supplies have been recommended by Factory Mutual or by Laboratory consultants. While not affecting the required supply for protection systems, additional supplies, as recommended, would improve the reliability of water to the areas concerned.

Finding/FP.7-8: There is no formal system of tracking and documenting completion of fire protection findings, recommendations, other items that result from fire protection engineering surveys, fire protection system inspections, and other audits and appraisals.

> **Discussion:** Lack of awareness of the status of previous items inhibits completion and follow-up planning.

Finding/FP.7-9: An overall internal independent evaluation of the fire protection program has not been made.

> **Discussion:** Independent appraisals of the fire protection program have not been scheduled.

Finding/FP.7-10: SARs are not routinely reviewed for currency and adequacy relative to fire safety.

> **Discussion:** Reviews of SARs are generally made only when updates are dictated by some other requirement. Furthermore, fire risk analysis is not routinely performed by fire protection engineers for input into SARs.

Finding/FP.7-11: Significant deficiencies from a 1989 Factory Mutual Research Corporation appraisal have yet to be corrected.

Discussion: The Los Alamos Site was evaluated by Factory Mutual Research Corporation in 1989. Ninety-nine recommendations resulted from this evaluation. Some outstanding items remain significant. As of February 1991, action was considered complete for fifteen items, was held in abeyance for one item, was in process for six items, was not yet initiated for sixty-five, and was not considered to be Laboratory responsibility for twelve items (pertaining to fire department operations).

4.2.21 Aviation Safety (AS)

The Los Alamos Airport (LAM), owned by the United States Government under the administrative jurisdiction of DOE, provides a facility for aviation transportation for official and public purposes. The Laboratory, a prime contractor to DOE, has contracted with JCI to manage, operate, and maintain the facility. The Field Operations Group (ENG-5) in the Facilities Engineering Division has budgetary responsibility for facility maintenance, safety response to meet regulatory requirements, and operational conditions to meet program needs.

The airport facility includes a terminal building, as well as a 5,550-foot-long runway and the land surrounding it. Safety and regulatory compliance verification is performed for 31 privately owned and maintained aircraft hangars, 35 spaces for aircraft tie-down parking, and a separately contracted fueling area and aircraft maintenance facility operated on the field. Contractual agreements for use of parking and servicing facilities for private aircraft are administered by DOE, Los Alamos Area Office. Each year the airport provides facility service for an average of 3,500 DOE-contract air carrier flights, 9,000 general aviation flights (both based and transient aircraft), and 35,000 passengers using the contract air carrier service. The Los Alamos Airport maintains records for the Pilot Permit Program and Prior Permission Requirement Program for authorized use of the facilities by qualified pilots.

The airport is certificated by the Federal Aviation Administration (FAA) under Federal Aviation Regulation (FAR) 14 CFR, Part 139. This certification requires additional compliance with FAR Part 107 regarding airport security and FAR Part 77 concerning maintaining conditions to allow for safe flight in areas above the runway and airport surfaces. The airport is operated in accordance with DOE/AL Order 4330.4A. Qualified facilities are inspected in accordance with National Fire Protection Association (NFPA) 407. An approved Airport Emergency Plan is included in the requirements of FAR Part 139. This plan is reviewed and formally exercised regularly. The plan includes procedures and programs for safe operations in emergency situations.

Facility inspections in accordance with regulatory standards for maintenance and safety are performed by JCI on a daily basis. The FAA performs an annual certification inspection; the most recent was conducted on August 8 and 9, 1991. The DOE conducts an aviation safety appraisal in accordance with its operating regulations. An annual condition survey of the facility is conducted as a joint effort by the Laboratory and JCI. Monthly safety, health, and fire inspections are performed by JCI. The Laboratory provides responses to all of these reviews.

The *Airport Certification Manual* includes procedures for hazardous material operations, and classified and security operations performed by the contract carrier and the Laboratory or DOE. Programs are under way to continue expansion of designated safety areas around the runway. This includes the addition of clean fill and the resolution of a Solid Waste Management Unit (SWMU) concern. Relocation of the existing private aviation fueling facility to reduce obstruction hazards and bring present underground fuel storage tanks into compliance with state environmental regulations is in progress. The in-house training program includes biweekly safety meetings for all personnel.

AS.1 Organization and Administration

Performance Objective: Organization, administration, and safety programs should ensure the provision of proper aircraft, facilities, and effective implementation and control of aviation and associated safety activities.

Finding/AS.1-1: Laboratory responsibilities and authorities for aviation safety of LAM operations are not clearly defined.

> **Discussion:** Concern has been expressed by DOE/LAAO, the Laboratory, and JCI personnel over the past several years regarding safety matters at LAM. Confusion exists on responsibilities and authorities relative to overall operation of LAM. The record indicates little effective or timely action in the resolution of issues. For example, private property located on airport premises is not routinely accessible to safety oversight personnel. Also, enforcement authority and the consequences of noncompliance are not clearly defined.

Finding/AS.1-2: A master plan, as defined by Federal Aviation Administration (FAA) Advisory Circular 150/5070-6A, has not been developed for LAM.

> **Discussion:** In July 1973, a supplemental report concerning study and analysis of Los Alamos Aircraft Operations was completed by R. Dixon Speas Associates, Aviation Consultants. This report recommended that "a master plan of modifications and development should be undertaken with regard to the Los Alamos Airport." This recommendation was further repeated in a report by Rhind and Smith in October 1974 and November 1975.
>
> A master plan has not been developed for LAM. An appropriate plan would conceptualize and provide guidelines for modifications and modernization that satisfy aviation demand in a safe and financially feasible manner, and would address environmental and socioeconomic issues within the community.

Finding/AS.1-3: The aviation safety program relating to fire protection in aircraft emergencies cannot be fully accomplished.

Discussion: The regulatory requirements for live fire training of Aircraft Rescue and Fire Fighting (ARFF) personnel cannot be met because of the lack of an approved training facility.

AS.2 Operations

Performance Objective: Operations should provide the administrative support, publications, equipment, and training to maintain knowledge and skills necessary to conduct the aviation mission safely in accordance with DOE and FAA standards.

Finding/AS.2-1: Aircraft using the fueling facility and aircraft parked on the south side of the runway are located within the runway safety area, or obstacle-free zone.

Discussion: The private aviation fueling facility is located directly next to the runway safety area. Location of this facility requires aircraft to temporarily park within the runway safety area while refueling. Aircraft on south tie-downs are located in the obstacle-free zone. These areas should be free of any obstacles or obstructions. In addition, to access these facilities, both private vehicles and pedestrians are required to cross the runway.

Finding/AS.2-2: LAM does not have a program to terminate leases and require removal of all objects within the runway obstacle-free zone.

Discussion: A group of hangars located at the northwest end of the field (which have been there for over 20 years) and aircraft parked on the southwest corner of the airport runway are within the runway obstacle-free zone. The hangars are privately owned and have had leases renewed recently by DOE. Nevertheless, they represent a hazard to safe aircraft operation, are a significant deviation from recommended airport standards, and should be removed. Hangar and aircraft tie-down leases are real estate contracts between private individuals and DOE; contracts are not under the administrative jurisdiction of the Laboratory.

Finding/AS.2-3: Takeoffs to the west by Ross Aviation are allowed.

Discussion: Takeoffs to the west are recognized as an abnormal situation constituting added risk. A westerly takeoff by Ross Aviation is permitted under procedures approved by the FAA and the DOE.

Finding/AS.2-4: The east-end runway safety area (RSA) improvement project has been delayed.

Discussion: Approximately four years ago, a project was initiated to bring the east-end RSA into conformance with the FAA Advisory Circular 150/5300-4B dimensional standards. This project has recently been delayed over questions related to SWMU concerns and the availability of thousands of cubic yards of certifiable clean fill material. Resolution of these concerns needs to be expedited.

Finding/AS.2-5: The east end of the LAM visual runway has markings indicative of a nonprecision runway, although it is currently used as a visual runway.

Discussion: The FAA Airport Master Record (FAA Form 5010) correctly identifies the runways at LAM as visual runways as defined by Federal Aviation Regulation (FAR) 77 categories. The east end of the LAM runway is marked as a nonprecision runway pending approval of a requested nonprecision approach for Ross Aviation by the FAA.

Finding/AS.2-6: An updated takeoff wind analysis for LAM has not been done.

Discussion: A takeoff wind analysis is a design criterion with trend data necessary for the definition of allowable flight under specified tailwind conditions. The last known analysis, conducted by the National Climatic Center in Asheville, North Carolina, based on 202,216 observations, was for the period 1941 to 1967.

Finding/AS.2-7: The Los Alamos AVGAS fueling facility does not meet state and federal regulations for underground fuel-storage tanks.

Discussion: Existing tanks were installed before current regulatory requirements. There are no provisions for secondary containment or for leakage monitoring.

Finding/AS.2-8: Evaluation of identified obstructions for potential hazards to air navigation has not been performed.

Discussion: In addition to obstructions identified in AS.2-1 and 2-2, other obstructions (i.e., trees, buildings, and towers) penetrate FAR 77 surfaces. A request by the FAA for a hazard analysis of these obstructions was denied based upon the FAA's classification of LAM as a private airport.

Finding/AS.2-9: Control of pedestrian and vehicle traffic inside fenced areas of the airfield is not adequate.

Discussion: Current procedures for airfield entry by pedestrians and private vehicles include written procedures posted in the sign in/out register and a nondocumented verbal briefing of appropriate access routes and activities. When pedestrians and vehicles are inside the fenced area, airport personnel have limited direct control over their movements.

AS.3 Maintenance

Performance Objective: Maintenance should ensure safe operations and control of maintenance activities, and that these activities are conducted in a safe, accountable manner following DOE and FAA standards, procedures, and accepted practices to support each facility condition and operation.

Finding/AS.3-1: The LAM operator has not taken action with owners to remove fuel cabinets, regulators, hoses, pumps, and associated equipment from the proximity of the runway.

Discussion: The privately owned and operated fuel servicing facility leased from DOE at the southwest end of the runway is a hazard and a significant deviation from recommended standards. When an aircraft is being refueled, the aircraft itself encroaches into the runway safety area. The fact that the majority of the fuel facility is technically outside of the obstacle-free zone is of little importance when the volatility of the obstacle is considered.

Finding/AS.3-2: The fuel-dispensing facilities at LAM are in violation of National Fire Protection Association (NFPA) Standard 407, Aircraft Fuel Servicing.

Discussion: Inspection of the Los Alamos AVGAS facility determined that records, as-built drawings, and design standards were not available. Maintenance and operations were not in compliance with several sections of standard NFPA 407 for in-ground tanks and fuel dispensing equipment. Hose certificates, hydrostatic pressure test certificates, monthly equipment inspection records, and filter inspection/ change records need to be inspected.

Finding/AS.3-3: Leasing arrangements between DOE and the aircraft maintenance services operator do not include adequate requirements for safety and fire protection.

Discussion: Under the lease between the DOE/LAAO and the owner/operator of aircraft maintenance services, one of the hangars at the northwest area of the LAM is used as an aircraft repair facility. This facility lacks adequate fire prevention, housekeeping, and fire protection.

AS.4 Life Support Equipment

Performance Objective: The life support program should provide the equipment and training necessary to ensure air crew members and passengers a safe flight environment, and afford the means to reliable descent, survival, and recovery in an emergency situation.

Performance Objective Note: Ross Aviation is responsible for compliance under 14-CFR, Part 121 relative to air crew members and passengers.

No Findings.

AS.5 Physical Security

Performance Objective: Physical security of equipment and facilities, including aircraft, aircraft maintenance areas, and access to administrative offices, should be included in all plans and policies.

Finding/AS.5.1: Areas of private property are located within the airfield boundary and are not routinely accessible to airport personnel.

Discussion: Privately owned hangars, the aircraft maintenance facility, the fueling facility, and county operated utilities are located within the perimeter of the airfield. These areas are not open for routine inspection or surveillance by LAM personnel. The leases and operating agreements for these areas are between the DOE and private individuals. Privately owned aircraft parked on leased tie-downs may be visible to airport personnel, but not all owners are known to airport personnel and potential intruders may not be identifiable. Additionally, a current listing of property owners is not available to the airport staff.

AS.6 Operating Experience

Performance Objective: Operating experience should be evaluated, and appropriate action taken to improve safety and reliability of aircraft and crew members.

Performance Objective Note: Safety and reliability of aircraft and crew members are the responsibility of owners based on interactions between owners and FAA. The airport does keep records of current medical certificates and pilot licenses for Los Alamos Airport pilot permit holders.

No Findings.

4.2.22 Medical Services (MS)

The HS-2 Group within the HS Division promotes the health and well-being of Laboratory employees, monitors employees to assess the effectiveness of health protection programs, identifies opportunities for improvement in those programs, and allows for timely intervention when illness is detected. HS-2 provides occupational medicine services for 8,100 Laboratory employees, 1,400 Johnson Controls World Services Inc. employees, 370 Mason and Hanger-Silas Mason, Inc. security guards, and 110 Los Alamos County firefighters. Administrative Requirements (ARs) and the occupational medicine support services sections of the *ES&H Manual* provide an overview of the Occupational Medicine Program and its related services. This program is in accordance with DOE Order 5480.8, "Contractor Occupational Medical Program," and includes the following:

- Medical evaluations (approximately 5,100 per year) as required for the maintenance of 9 regulated medical surveillance programs and 11 certification programs, and for the performance of periodic personal health assessments for early detection and intervention.

- Execution of the medical portions of DOE-imposed Human Reliability Programs (i.e., PAP, PSAP, Drug Free Workplace, and NEST/ARG).

- Managed care for job-incurred accidents and illnesses coordinated with workers' compensation and early-return-to-work specialists.

- Operation of one central clinic and three satellite outpatient clinics for the treatment of job-incurred illnesses and injuries, medical support for non-job-incurred medical problems, and emergency care as required (14,000 visits per year).
- Employee Assistance Program (EAP) for substance abuse rehabilitation and personal psychological counseling (approximately 1,300 patient visits per year).
- Health promotion programs, where feasible and appropriate.
- Maintenance and protection of approximately 10,000 active confidential medical records.

MS.1 Organization and Administration

Performance Objective: Site and facility organization and administration should ensure effective implementation and control of the medical services program.

Finding/MS.1-1: The medical director does not participate in ES&H issues at the policy making level as required by DOE Order 5480.8.

> **Discussion:** DOE Order 5480.8 requires that the "medical director shall report at a senior management level to assure program effectiveness." The medical director does not have input to and from the highest levels of management. The medical director is not a member of the ES&H Council for issues relating to occupational health, environment, and safety.

Finding/MS.1-2: The medical director has insufficient authority to deal on a Laboratory-wide basis with medical issues affecting worker health.

> **Discussion:** Decisions relating to work place controls that affect worker's health are made without the involvement of the medical director's staff (see Tuck letter of May 9, 1990). Because it has insufficient authority, the occupational medicine group is not able to obtain and integrate necessary health-related information from multiple sources to execute a complete occupational medicine program.

Finding/MS.1-3: Documentation systems for licensure, certification, and training of medical personnel are fragmented and poorly organized.

> **Discussion:** Licensure and certification documentation resides in group personnel files, while general Laboratory training documentation resides in both Laboratory and group office administrative files. Licensure, certification, and training needs are not integrated into an easily accessible format.

MS.2 Procedures and Documentation

Performance Objective: Procedures and documentation should provide appropriate direction, record generation, and support of the medical services for the facility and site.

Finding/MS.2-1: An occupational medicine plan, as required by DOE Order 5480.8, does not exist.

Discussion: Although medical service requirements are noted in the *ES&H Manual* and *Chapter 3*, of *The Laboratory Manual, Administrative Policies and Procedures*, no formal written plan exists.

Finding/MS.2-2: Quality assurance is not being applied to medical services in a comprehensive way.

Discussion: Although formal quality assurance programs are under development for individual components of medical services, an integrated, comprehensive QA plan has not been developed.

Finding/MS.2-3: Standing orders for clinical nursing activities are incomplete.

Discussion: Formal standing orders to cover nursing patient care activity, particularly at outlying clinic sites, are incomplete.

MS.3 Medical Treatment

Performance Objective: Medical treatment should be available and provided by qualified competent staff, and adequate facilities should be available.

Finding/MS.3-1: The Employee Assistance Program (EAP) is unable to provide adequate services.

Discussion: The EAP staff consists of one clinical psychologist and two counselors to service a population of approximately 10,000.

Finding/MS.3-2: The medical staff (physicians, physician assistants, and nurses) is not complying with all elements of an occupational medicine program as defined by DOE Order 5480.8.

Discussion: Increasing surveillance, certification, and regulatory demands tax available staff such that routine periodic examinations are not provided in a timely manner, site visitation and inspection are severely compromised, and health promotion programs are placed at risk.

MS.4 Review and Audit

Performance Objective: Policies, procedures, and practices for medical services should be reviewed and audited periodically to ensure continued effectiveness of medical services.

Finding/MS.4-1: Written policies and procedures for required medical surveillance and certification are informal and are not organized.

Discussion: Systematic documentation of requirements, policies, and procedures for medical surveillance/ certification are incomplete.

MS.5 Personnel Communication Program

Performance Objective: Site/facility personnel should be adequately informed of the medical hazards that may be encountered and of the medical services that are available.

Finding/MS.5-1: Hazards exposure data are not included with medical data.

Discussion: Personal medical data is available for study but can yield little information of clinical significance related to occupational toxicology without correlation to exposures. Industrial hygiene, radiation protection, and safety professionals have data on exposures. In order to be responsive to employee concerns, regulatory requirements, and legal challenges, exposure data needs to be related to individuals. Medical services personnel have individual radiation exposure data in the medical records department, but this data is not routinely placed in individual medical records. Site-specific industrial hygiene data is provided quarterly; however, as yet no mechanism for linkage to individual employees exists.

Finding/MS.5-2: Individual employee job descriptions and associated potential hazardous exposures or activities are not routinely available to the medical services staff.

Discussion: Current and accurate job descriptions, including descriptions of potential hazardous exposures and activities, are essential for the medical services staff to perform timely and accurate medical surveillance and certification assessments, perform fitness-for-duty evaluations, define appropriate work restrictions for medically disabled employees, and link periodic medical evaluation information to individual work activity and exposure. No formal mechanism presently exists to provide such information.

5.0 Management and Organization Assessment

5.1 Background and Methodology

5.1.1 Performance Objectives

The management and organization self-assessment was based largely on performance objectives and supporting criteria set forth in the *Recommended Management Performance Objectives and Criteria for Tiger Team Management Assessments*, dated June 14, 1990. Additional performance objectives and criteria were incorporated from the draft *Tiger Team Management and Organization Appraisal, Volume 2: Performance Objectives and Criteria*, dated January 7, 1991, to ensure that all areas of management were addressed in the self-assessment effort. A comparison of the two documents incorporated the performance objectives and criteria from both into the following topic areas: Commitment and Leadership; Organization; Planning; Human Resource Management; Management Systems; Public and Institutional Interactions; Oversight; Conduct of Operations; and Corrective Action Systems.

5.1.2 Existing Program

Contract No. W-7405-ENG-36 for the operation of the Laboratory specifically obligates the University of California to comply with all applicable health and safety requirements and regulations that the Department of Energy (DOE) communicates to it. As a practical matter, the University interprets this contractual obligation to include environment as well as health and safety, thereby requiring it to conform to all applicable DOE environmental, safety, and health (ES&H) orders and directives. The Laboratory Director is accountable to the President of the University for conformance with the ES&H requirements placed on the University by the contract, as well as being responsible for establishing and administering Laboratory ES&H policies. The President has delegated responsibility and authority to the Director for full compliance with ES&H requirements. Laboratory senior management implements ES&H and related requirements, as set forth in DOE orders and directives as well as applicable federal, state, and local laws and regulations, through the line management chain of command.

In 1980 the University chartered a Health, Safety, and Environment Advisory Committee (HSEAC) to assist the President and the Regents in carrying out their responsibilities for the operation of their DOE-funded laboratories. Specifically, HSEAC advises the President and the Regents on environmental and occupational health and safety conditions at the laboratories; seismic integrity of laboratory buildings and facilities; transportation and storage of radioactive materials; on-site emergency preparedness and coordination with off-site emergency planning and preparedness; public health implications of the laboratories' programs concerning the use and disposal of nuclear fuels for the generation of energy; and other health, safety, and environmental issues concerned with laboratory operation. The HSEAC visits the Laboratory and reviews its ES&H activities annually.

At present, ES&H policy is developed for the Director by the ES&H Coordination Center and the ES&H Council. In the near future, the top-level policy development function will be moved into the Director's Office. The Director has assigned implementation responsibilities for the Laboratory's policies regarding ES&H to line management. The Director established the ES&H Council in 1982 to provide senior management oversight of activities and to address ES&H management issues. The Laboratory Assessment Office (LAO) was established as the Operations Management (OM) Office in 1989 and recently moved to the Director's Office to provide independent internal assessments.

Associate Directors, who report to the Director, are responsible for ensuring that the Laboratory's ES&H policies are being followed in their own directorates. Associate Directors are responsible, within established Laboratory policies, for establishing internal operating and review requirements, including quality assurance (QA) plans, operational safety procedures, self-assessments, training programs, personnel performance reviews, and other requirements.

The ES&H Council is the Director's primary oversight organization for ES&H matters and is co-chaired by the Laboratory Director and the Deputy Director. Other members include the five technical Associate Directors, the Laboratory Counsel, the Director of Human Resources, the Controller, the Executive Staff Director, the Associate Director and Deputy Associate Director for Operations, and the Executive Secretary of the Council. Others routinely participating in Council meetings include the Health and Safety (HS), Environment Management (EM), and Facilities Engineering (ENG) Division Leaders; the LAO Director; the Quality Operations Office Director; the team leader of the ES&H Coordination Center; the University of California liaison representative; managers of the two largest on-site contractor organizations, Johnson Controls World Services Inc. (JCI) and Mason and Hanger; and the DOE Los Alamos Area Office Manager.

The ES&H Council is chartered to

- recommend to the Director ES&H policy for the Laboratory
- when appropriate, recommend that the Director establish special ES&H committees and review the activities of these committees
- monitor the effectiveness of the Laboratory's ES&H program by reviewing appraisals, accident and incident reports, and related activities
- ensure that senior managers are fully engaged in the ES&H process and provide them with relevant ES&H information (for example, trend and root cause analyses) on a timely basis
- periodically visit sites throughout the Laboratory to ensure the effectiveness of ES&H policies

The HS and EM Division Leaders, who report to the Associate Director for Operations, are responsible for supporting and promoting Laboratory-wide ES&H programs. They serve in an advisory capacity to ensure that the Laboratory's ES&H policies are appropriately interpreted. HS and EM divisions assist line management in the assessment of risks associated with their operations and provide guidance in the development of procedures to minimize the hazards. They also provide personnel on assignment to technical divisions and carry out specific tasks such as radiation protection services. Both divisions manage specific DOE ES&H programs at the Laboratory, such as the Environmental Restoration and Waste Management programs centered in EM Division.

The LAO is responsible for the independent internal ES&H appraisal program. These appraisals and environmental audits evaluate the effectiveness of the Laboratory's ES&H program. The LAO also conducts root cause analyses on findings and maintains an Appraisal Management Center. LAO prepares formal appraisal reports that are forwarded to line managers, who then develop action plans for changing practices that are inconsistent with ES&H requirements. LAO monitors and evaluates the status of action plans and milestones from both internal and external ES&H appraisals.

The ENG Division has responsibility for several ES&H supporting activities. These are maintenance management including corrective, preventive, and predictive maintenance programs; loss prevention including fire protection and emergency power systems; construction project management including construction safety; and the Drawing As-Built Program and archives.

The Laboratory's on-site prime contractor for facility infrastructure support including maintenance and janitorial services, JCI, conducts an ES&H program that is compatible with and integral to the Laboratory's overall ES&H program.

5.1.3 Self-Assessment Scope and Approach

This management and organization self-assessment was conducted at several levels within the Laboratory. The process started with ES&H Coordination Center personnel examining existing internal and external appraisals. It was further augmented by Laboratory organizations conducting an internal self-assessment of their organization using a graded Technical Safety Appraisal (TSA). A management consultant firm was employed to perform an external appraisal of Laboratory management and to assist the Laboratory in implementing several ES&H programs. These appraisal findings were examined and many were incorporated into this self-assessment report. The management consultants were used to bring an outside perspective to the process and also to provide technical expertise in selected areas. Although the consultants' contributions were valuable, the *ES&H Self-Assessment Report* is the Laboratory's.

Laboratory senior management then formed a Laboratory Assessment Team (LAT) of Deputy Associate Directors and other high-level managers to further review and contribute to the Laboratory *ES&H Self-Assessment Report*. The LAT performed an intense review of the self-assessment data base and findings and developed the final analysis of the Laboratory's performance relative to compliance with DOE orders and directives. The LAT evaluated all the identified findings, defined new findings, and identified the key findings in each evaluation category. These key findings were used to establish overall key findings and root causes. The results of this effort were presented to the Associate Directors and the Laboratory Director for concurrence. After a final reworking of the root causes by the Director, the Associate Directors and the Laboratory Director performed the final review and approved the report.

5.2 Findings and Discussions

In this section the detailed findings of our management and organization self-assessment are listed. We developed these findings, by analyzing the Laboratory's findings as they compared with the performance objectives for each area of the self-assessment. The findings are organized by area and the detailed performance objective is stated for that area. A discussion of typical findings and the requirements with which we are not in full compliance supports the findings.

Findings fall into various categories. Those findings that represented a hazard to personnel were corrected immediately. Also, many deficiencies that were easy to resolve have been corrected. Other findings require longer-term corrective action programs; schedules and priorities for these are not all completed. There is a backlog of findings that must still be evaluated, prioritized, funded, and scheduled; this process is on-going. The findings that remain unresolved will be folded into a deficiency correction program along with the Tiger Team assessment findings.

5.2.1 Commitment and Leadership

Since the early 1940s, the University of California has operated what is now the Los Alamos National Laboratory for the United States Government under the auspices of the Manhattan Engineer District of the Corps of Engineers, the Atomic Energy Commission, the Energy Research and Development Administration, and, currently, the Department of Energy. The University took on its management role in the public interest during a time of war and has steadfastly continued to view its management role as an important one for the country. Currently, the University has stated its intent to modify its management structure to ensure that the relationship of the University with its three federally owned Laboratories meets the current needs of the DOE and the public by increased emphasis on ES&H. The DOE has recently decided to negotiate an extension of the current contract with the University. The new contract is intended to strengthen the University's management role.

The University selects the Laboratory Director and approves the assignment of senior managers. The University vests the Director with full decision authority for most actions, within the context of the contract and the limitations of state and federal law and applicable DOE regulations. The Director is responsible for designing the organizational structure, selecting senior managers, establishing Laboratory policy, and setting priorities. He provides leadership and sets values for the work performed, the process used, and the protection of Laboratory personnel. He develops and expresses the Laboratory's goals in research and other programmatic work and in the values associated with our ES&H responsibility. The Director is the spokesman to the extended world--representing the Laboratory to the University, to the DOE, to Congress, to the public, and to the media.

Los Alamos has always strived to have a quality staff and to reward them accordingly. The staff is competent and highly motivated. The emphasis on scientific quality has led, however, to an attitude that the highest goals are research and program goals. A transition is under way to give equal priority to ES&H. Quality in our scientific and engineering work has always been our top goal; this goal is now being broadened to include all of our activities.

CM.1 University and Laboratory Policy and Culture

Performance Objective: Corporate policy should establish a strong commitment to ES&H excellence, a culture that reflects this commitment, and a mandate for full implementation of DOE's ES&H initiatives.

Finding/CM.1-1: Laboratory senior management has yet to implement a formal process for Laboratory ES&H policy development and hence lacks a full body of Director-issued policies to guide operational and management activities in a consistent fashion.

> **Discussion:** The University President has delegated complete responsibility to the Director for full compliance with ES&H requirements. With the exception of the HSEAC, the University has treated the responsibility for ES&H matters at the DOE-funded laboratories in a decentralized fashion, with the primary responsibility for setting ES&H policy placed on each laboratory's senior management. A formal process for setting policy has been slow to develop at the Laboratory and has only recently been implemented. As a result, operational and management activities have had to rely on *ad hoc* ES&H policy guidance.

CM.2 University Support to Site Management

Performance Objective: The corporation should provide timely, responsive, and effective support (e.g., technical, legal, management, financial, institutional) to site management as necessary to implement fully the ES&H programs.

NOTE: Specific findings related to the University Administration's support are not identified because this document provides the Laboratory's assessment of itself.

CM.3 Contractual Commitment

Performance Objective: The corporation accepts contractual terms and conditions that articulate a strong commitment to full implementation of DOE's ES&H initiatives.

Finding/CM.3-1: The present safety and health clause in contract No. W-7405-ENG-36 does not mention environment and is not sufficiently reflective of a strong commitment to full implementation of DOE's ES&H requirements.

> **Discussion:** Clause 29 of contract No. W-7405-ENG-36 addresses health and safety requirements. It obligates the University and the Laboratory to take all reasonable precautions to protect the safety and health of employees and the public and to comply

with all applicable safety and health regulations and requirements of the DOE." At the time the contract was renewed in 1987, neither the University nor the DOE made any attempt to include "environment" in clause 29. However, as a practical matter, the University interprets its contractual obligation under clause 29 to include environment as well as health and safety, thereby requiring it and the Laboratory to conform to all applicable DOE ES&H orders and directives. An effort is presently under way to document this interpretation to the satisfaction of DOE. However, even with this interpretation, the present language in clause 29 is perceived as failing to reflect a sufficiently strong commitment to full implementation of DOE's ES&H initiatives.

CM.4 Senior Executive

Performance Objective: The senior executive places high priority on ES&H performance.

Finding/CM.4-1: The Laboratory Director did not, until recently, become sufficiently involved personally in ES&H issues to provide the necessary leadership for the Laboratory's ES&H initiatives.

Discussion: The Director has for some time stressed to senior management the need for full compliance with ES&H requirements and the need for a change in the way business is done at the Laboratory. He has presented this view to the Laboratory in Director's colloquia and the Laboratory's *Los Alamos Newsbulletin*. However, until recently, he has not become sufficiently involved personally in addressing ES&H issues, giving the appearance of not fully supporting ES&H initiatives. This appearance has led to some ambivalence in managers defining the ES&H expectations and priorities at the Laboratory. An additional consequence has been that conduct of operations training for Laboratory supervisors and managers was not commenced as soon as may have been appropriate. Another consequence has been the adoption of a wait-and-see attitude by some Laboratory managers and supervisors until they were convinced that the Director and the senior managers had fully embraced the DOE ES&H initiatives.

CM.5 Staff and Work Force

Performance Objective: The attitudes, motivations, and morale of all personnel reflect a work-force commitment to an ongoing pursuit of excellence in operations.

Finding/CM.5-1: Laboratory personnel do not uniformly understand the importance of ES&H goals and objectives and do not always work enthusiastically and effectively to support them.

Discussion: Although employees are generally satisfied with their jobs and seek to provide a quality product, the change in attitude necessary to work enthusiastically to achieve ES&H excellence as a first priority is not uniformly in place. Historically, operating groups have been given full, independent responsibility for ensuring safety and worker health, generally because they were considered to be the most expert in safety and health impacts related to their operations. This arrangement reflects both reality, particularly in areas such as explosives safety and criticality safety, and also the decentralization of responsibility and authority that has characterized all operations at the Laboratory. Also, in the early decades of the Laboratory, environmental impacts did not receive sufficient attention. Despite a general recognition of changing requirements, some workers have yet to embrace the concept of ES&H excellence and still consider ES&H requirements a burden in performing their jobs. In the research setting of the Laboratory, workers maintain a results-first attitude that reflects a tradition of technical excellence combined with the competition for funding of research projects and inadequate planning for ES&H requirements in budgeting and funding decisions. To date, Laboratory management has not provided sufficient guidance to turn this attitude around.

Finding/CM.5-2: Some Laboratory personnel do not have the desired sense of personal ownership of ES&H goals and objectives.

Discussion: When employees do not have specific ES&H responsibilities, authority, and goals identified on an organizational and a personal basis, it is more difficult for them to accept ES&H performance as an integral part of their jobs. The Laboratory has a formal performance appraisal system that is designed to develop, motivate, and guide employees so that they can contribute to the Laboratory to the best of their abilities. It is intended to provide employees with a clear understanding of job responsibilities, including ES&H responsibilities. However, management has not yet uniformly applied it across all Laboratory organizations. The recently mandated inclusion of ES&H performance factors in job descriptions and performance appraisals will help drive the process of cultural change in the work force, but the effectiveness of this mandate across the Laboratory has not yet been established.

Finding/CM.5-3: A formal communications program has not been established to integrate the expectations of management in placing ES&H excellence on a level with technical excellence.

Discussion: The Laboratory has not established a formal process for communicating management expectations that employees will incorporate quality into all ES&H activities related to their work. Laboratory management has relied too heavily on the inherent quality consciousness of Laboratory personnel and has assumed that management's unwritten expectations were known and understood. An established quality management program would define management's expectations regarding application of basic quality principles to both research and programmatic interests where ES&H controls are required.

Finding/CM.5-4: A lack of clear job definition has led to misinterpretation of roles and responsibilities within and between work groups, particularly in the area of ES&H.

Discussion: Throughout the Laboratory and at all levels, people generally want to do the right thing, and they want their organization and the Laboratory to succeed. However, competing requirements, overlapping roles, and internal organizational competition have undermined the establishment of roles and responsibilities. The process of developing the *Los Alamos Guide to ES&H Management Structure (GEMS)* was an initial step in ameliorating this deficiency. That process consisted of a review of the organization, some associated reorganizations, definition of interfaces, and definition of responsibilities of divisions, groups, and individuals. *GEMS* has only recently been issued down to the division level, and most employees are not yet aware of its existence.

Finding/CM.5-5: Management has yet to put into place adequate positive incentives for individuals to pursue ES&H excellence.

Discussion: The requirements for rapidly achieving a higher level of ES&H performance have led to frustration among employees. The current assessment process, the changes required, and the rate at which the changes are needed are all contributing to employee frustration and a lack of satisfaction with their jobs. Positive incentives have not been put in place to help overcome this resistance to change; recognition has not always been given to those who have supported and continue to support ES&H excellence.

5.2.2 Organization

The Laboratory is organized to carry out large, complex, technology and science projects. The organizational climate encourages individual creativity, and there is a tradition of free inquiry and debate, which is essential to excellence in any scientific undertaking. Within this large multidisciplinary, multiprogram organization, we have been very successful at assembling teams of scientists and engineers to solve complex problems.

The Laboratory's organizational structure is fully discussed in the Appendix.

OR.1 Structure

Performance Objective: The organizational structure should provide a clear understanding of the function, responsibilities, authorities, and accountabilities of the site organization.

Finding/OR.1-1: The Laboratory has inadequate definition, communication, and implementation of ES&H functions, responsibilities, authorities, and accountabilities from the top down.

Discussion: The intent of the Laboratory's organizational structure and policy is to assign responsibilities and all necessary authority for ES&H performance to line management. However, the Laboratory has not placed sufficient emphasis on the ES&H portion of its mission in the past and has not provided a clear understanding of responsibilities, authorities, and accountability to its employees. Not all organizational elements have had ES&H prominently included in their mission statements, functions, objectives, and individual job descriptions.

Because of a lack of ES&H emphasis in the past and the evolving organizational culture and climate, a problem exists in the delineation of responsibilities between some line and support organizational elements. While the line organizations have responsibility for ES&H performance, achieving excellence in ES&H requires that ES&H support organizations be adequately empowered through clear definition of their responsibilities and authorities. Interface and functional relationships between the line organization and the support groups that provide ES&H support must be better defined and understood.

With the recent issuance of a top-level Laboratory ES&H policy, every employee is empowered to stop work that he or she believes is unsafe, based on knowledge and observations of an operation. Managers must ameliorate these concerns before work continues. However, inadequate efforts have been made to assure that this aspect of policy has been accepted by employees and is effectively used.

Inadequate efforts have been made to ensure that support organizations with monitoring and verification responsibilities have a sufficiently defined charter to be effective. Inadequate formal mechanisms exist for resolving conflict between line and support organizations in the ES&H arena, except at the ES&H Council level. With the Laboratory's independent internal assessment function now vested in the LAO, some ES&H support organizations are unsure of their role in supporting line programs, particularly in providing ES&H review support.

The split of the former Health, Safety, and Environment (HSE) Division into Health and Safety and Environment Management divisions was a positive step in resolving its span of control problem. However, establishing the adequacy of span of control in each organizational unit has not been completed.

Finding/OR.1-2: The Laboratory has inadequate mechanisms to assure that subcontractor ES&H programs effectively define, communicate, and implement requirements for ES&H compliance.

Discussion: The contractual terms with the subcontractors need to be reviewed to assure that requirements are in place for compliance with DOE requirements. Where interfaces exist, the subcontractor should comply with the policies and procedures of the Laboratory. The Laboratory then should maintain the authority and responsibility to inspect these programs to assure compliance. The need, frequency, and extent of the inspections would be dependent upon the assessed risk of the activity. The Laboratory should always retain this contractual right.

OR.2 Site Management

Performance Objective: Site managers and supervisors carry out the site mission in full compliance with DOE's ES&H initiatives.

Finding/OR.2-1: Laboratory senior management has not directed the development of clearly articulated policies that specify the direction and standards of the Laboratory for attaining full compliance and excellence in ES&H.

Discussion: There are approximately 90 separate DOE orders that contain specific requirements and provide detailed guidance to DOE facilities. Not all requirements and/or detailed guidance apply to a national research laboratory. It is the responsibility of senior management to determine the requirements that apply and communicate compliance expectations to the rest of the organization. This process ensures consistency in interpreting DOE orders, provides clear management endorsement, and establishes an overall sense of direction for the Laboratory. Past practices at the Laboratory allowed each manager and, in some cases, each individual to determine whether a DOE order applied to their operations, to establish their own interpretation of the requirement, and then to establish a process control tailored to their specific needs. This lack of top-down management control has resulted in significant duplication of effort, a wide variation in the interpretation of requirements, and process control systems that do not hold individuals or managers accountable for their actions.

Finding/OR.2-2: The Laboratory does not have a fully implemented system for formal review, approval, publication, and controlled distribution of Laboratory policies.

Discussion: Many policies and related guidance exist within the Laboratory, but these policies have not been reviewed for adequacy by a subject-matter expert or approved for issue by an authorized representative of the Laboratory. To ensure site-wide acceptance, policies must be developed by staff experts, reviewed and recommended for approval by the Associate Directors, and approved and issued by the Director's Office. To be effective, these policies must address the requirements imposed by DOE and provide clear guidance to line supervisors on senior management expectations. Centralized publication and controlled distribution are also necessary.

Finding/OR.2-3: Line managers have not fully accepted the need for, nor have they adequately implemented programs to reach compliance with ES&H requirements.

Discussion: Effective management requires good planning and control, which rely on having clear objectives and standards. Managers have not consistently established objectives for the ES&H component of their responsibilities nor set standards for determining their effectiveness. Often, the resource allocation for ES&H activities is not considered or provided when establishing the goals for new or modified projects. The Laboratory has not had a formal mechanism for looking at organizational ES&H effectiveness or ensuring that adequate resources are made available for ES&H activities.

Finding/OR.2-4: The Laboratory does not consistently use its performance appraisal and salary management systems as a means of providing incentives for attaining ES&H excellence.

Discussion: As also discussed in Finding CM.5-2, the process for salary management and performance evaluations frequently does not take into account ES&H performance nor reward excellence in the ES&H area. This strategy must be applied from the senior management level to the lowest levels in the organization if it is ultimately to be successful.

Finding/OR.2-5: Criteria and processes for approving new and continuing projects are not uniformly applied and do not explicitly include ES&H considerations.

Discussion: The Laboratory does not have a Laboratory-wide requirement that resources be considered or provided for ES&H programs. There is no consistent process for reviewing new programs or changes to existing programs so that resource allocation for ES&H activities is considered and provided. Technical program managers are under pressure to secure funding for and ensure performance in their programs; incentives to ensure adequate resources for ES&H have not been put in place.

Finding/OR.2-6: ES&H performance has not always received the attention of line managers and supervisors at a level equal to or greater than programmatic performance and financial problems.

Discussion: Managers need to be more involved in developing solutions to ES&H and quality problems and in following up on corrective actions. Poor definition and/or poor communication of priorities to managers and supervisors has contributed to a lack of sensitivity in these areas. A high level of commitment to quality and production exists, and it must continue to be emphasized that this commitment includes full compliance on ES&H quality issues.

Finding/OR.2-7: Management presence in the field or work place and the associated personal interfaces with workers concerning job expectations are not sufficient to communicate ES&H emphasis.

Discussion: The paucity of walk-around management has been and is a problem. Without "walking the space," the manager is not as easily able to convey expectations, priorities, emphasis, and commitment to the staff. The physical presence of a manager is an important means of vertical communication. More direct communication of requirements and proposed actions would alleviate worker anxiety and ensure coordinated actions.

OR.3 Communication

Performance Objective: Formal and informal channels of communication facilitate full implementation of ES&H programs.

Finding/OR.3-1: The Laboratory's formal process for the communication of new or revised ES&H requirements is incomplete and promotes inconsistent implementation in the line organizations.

Discussion: DOE requirements for ES&H planning and performance are communicated to divisions with little guidance about expectations and manner of implementation. In addition, technical support and coordination by ES&H support organizations have been inadequate. The result has been inconsistent implementation by line managers.

Finding/OR.3-2: Informal communication channels are not used as effectively as they should be to facilitate implementation of ES&H requirements.

Discussion: While formal systems are needed to clearly articulate policies and top-level plans for meeting various requirements, informal communications also can be used to significantly improve implementation of ES&H activities. Informal communications between line and support organizations can provide a mechanism to ensure faster and proper implementation of ES&H requirements. The Laboratory has not demonstrated widespread useful working relationships between line and support organizations so that they employ effective informal communications.

Finding/OR.3-3: Lacking are established programs and methods that communicate and promote ES&H goals and management's expectations so that ES&H receives the highest priority at all levels of the organization.

Discussion: Memoranda, newsletters, and the Laboratory's *Los Alamos Newsbulletin* have been used in an *ad hoc* manner to inform management and the organization of expectations, schedules, and accomplishments. This process has not yet been sufficiently formalized, and there is no integrated internal ES&H communication program.

5.2.3 Planning

Planning at the Laboratory is carried out in three distinct areas: strategic planning, budgetary/program planning, and institutional planning.

Strategic planning is initiated by the Senior Management Group (SMG) consisting of the Director and his Deputy, the Associate Directors, and other top management of the Laboratory. The SMG sets goals, strategies, and desired outcomes for the Laboratory as a whole. This guidance, provided in terms of several major technical areas and subordinate activity areas, is used to establish directions for major program initiatives and for the Laboratory Directed Research and Development Program, which encourages bottom-up innovation. The various directorates, divisions, and groups also develop strategic plans for their respective organizations, drawing upon the guidance provided by the SMG.

Program planning is carried out on a multi-year basis by the major program elements at the Laboratory. The Multi-Year Program Plans (MYPPs) contain detailed milestones, resource projections, and staffing and capital equipment needs. The MYPPs are updated annually and form the basis for programmatic reviews by sponsoring DOE organizations.

Budgetary planning is performed among Laboratory line and program managers and sponsoring program managers, based on the MYPPs. Tasks and associated costs, including costs for ES&H compliance, are combined to produce preliminary budgets that form the budget submittal to DOE. These budgets are folded into the DOE budgetary planning process and emerge as part of the President's budget submittal to Congress. As this budget is subject to change by the Congress, uncertainty in budgetary planning is typically a fact of life until rather close to the beginning of the fiscal year.

Institutional planning attempts to bring these two processes together in a coherent way. The institutional planning process is the principal DOE oversight process for the Laboratory, the process by which the Laboratory and the DOE come to closure on the future direction of the

Laboratory. Approval of the Institutional Plan, the product of this process, indicates that the plan presents appropriate mission assignments, program emphasis, external interactions, and work for others from the point of view of the DOE.

The Laboratory begins to prepare an Institutional Plan in the second quarter of the fiscal year with a compilation of program plans for existing programs and new initiatives. Resources available as a result of programmatic initiatives define, for the most part, the future direction of the Laboratory. Because these initiatives come in response to strategic planning, the Institutional Plan brings budgetary and program planning together with strategic planning. This plan includes a statement of the Laboratory's mission and strategic view; descriptions of existing programs and new initiatives under development; an estimate of the resources needed to carry out new and existing programs for the next five years; a description of the Laboratory's ES&H activities and the resources needed to fully fund these requirements; and a summary of the Laboratory's activities in technology transfer, mathematics and science education, human resources development, and site and facilities management.

In the third quarter of the fiscal year, a *Draft Institutional Plan* is submitted to DOE for approval. Review of this document, in conjunction with a site visit during the fourth quarter of the fiscal year, resolves differences between the *Draft Institutional Plan* and DOE guidance and management direction and settles issues that have arisen in the performance of the Laboratory's mission over the past year.

While the Institutional Plan is a formal plan in the sense that it is the result of agreement between the DOE and the Laboratory on present and future directions, it is not a detailed plan containing milestones and performance parameters. The nature of a multiprogram laboratory makes these difficult to define on a Laboratory-wide basis, but appropriate milestones and performance parameters are contained in the program plans discussed above. The Institutional Plan thus represents an annual snapshot of the position, direction, and rate of change of the Laboratory.

PL.1 Integrated Planning

Performance Objective: ES&H plans and programs are an integral part of the site-wide planning and budgeting process.

Finding/PL.1-1: There is no completed, Laboratory-wide strategic plan, with subordinate implementation plans, that addresses programmatic and ES&H activities on an integrated and prioritized basis.

> **Discussion:** Prioritization of findings according to ES&H risk (consequence x probability) has been initiated, and corrective action plans are being created and approved. Although this process involves ES&H support staff and the line organizations, it does not yet benefit from the guidance of a Laboratory-wide strategic plan balancing the ES&H needs and priorities with program needs, priorities, and directions.

Finding/PL.1-2: A Laboratory-wide process for addressing programmatic and ES&H activities on an integrated and prioritized basis is not part of the Laboratory's normal planning and budgeting process.

> **Discussion:** Because a self-assessment process has not been used Laboratory-wide, managers have been largely unaware of the magnitude of ES&H problems and associated costs. The process for estimating the resources needed for correction of ES&H findings and requirements is not emphasized in budgeting, and without an integrated process it is difficult to give uniform consideration to ES&H requirements in priority planning. Balancing ES&H risk, budget requirements, and programmatic risk (failure to perform programmatic functions because of ES&H concerns) is performed by line managers on a case-by-case basis. As a result, planning and budgeting decisions are not made on a Laboratory-wide prioritized basis.

5.2.4 Human Resource Management

The Laboratory has, in recent years, increased staff and emphasized technical qualifications for ES&H functions. The Laboratory is taking steps to ensure that personnel with ES&H responsibilities receive the training they need to perform effectively. The Laboratory is engaged in a major effort to formalize training programs for such people, to develop general employee training (GET), and to provide Laboratory-wide courses in specific areas such as quality assurance, occurrence reporting, and conduct of operations.

In addition to ensuring that employees are properly trained, the Laboratory has policies in place addressing substance abuse and an active program in employee assistance. The Laboratory plans to bring its somewhat fragmented policies for fitness-for-duty under one program; assign organizational responsibility for administration of the program; incorporate certain additional features that will bring the Laboratory into full compliance with DOE Order 5480.20, "Personnel Selection, Qualification, Training, and Staffing Requirements at DOE Reactor and Non-Reactor Nuclear Facilities"; and ensure that the appropriate actions are taken when employees have physical or mental problems that may affect job performance.

<u>HR.1 Human Resource Planning</u>

Performance Objective: The human resource requirements for full implementation of site-wide ES&H programs are identified and prioritized, and plans are developed to ensure that these resource requirements are met.

Finding/HR.1-1: There has been no Laboratory assessment of ES&H staffing needs, including an assessment of the adequacy of the current staff levels, and there is no integrated plan for assessing needs and meeting existing needs.

> **Discussion:** There are indications in the environment section and safety and health section of this self-assessment of an apparent need for additional ES&H staff. It is possible that as we correct inefficiencies created by inadequate policies and procedures,

define roles and responsibilities, and improve coordination between line and support organizations, we may find that current staff levels are sufficient. However, without an overall assessment taking these factors into account and without an overall ES&H staffing plan, staff buildup in both line organizations and ES&H support organizations is proceeding in an uncoordinated manner. Further, there has been no Laboratory-wide coordination in allocating staff to areas of highest ES&H priorities.

ES&H support teams from HS and EM divisions have been established in two line directorates. While these support teams have worked to improve communication and conserve resources, the support team concept has not yet been implemented across the Laboratory.

HR.2 Staff Development, Training, and Certification

Performance Objective: Formal site-wide programs for staff development, training, and certification ensure that only fully qualified personnel are assigned to ES&H programs.

Finding/HR.2-1: The staff development and training programs are not adequately formalized and do not relate adequately to job definition and performance. The Laboratory provides inadequate assurance that only fully qualified personnel are assigned to ES&H programs.

Discussion: Although a Laboratory-wide coordinated training program is being implemented, there has not been such a program in the past. The Laboratory's approach to implementing site-wide coordination and direction of the training program has not been communicated to all managers. Job-related training and validation functions have not been integrated and implemented Laboratory-wide. The organizational structure to administer centralized training functions is planned but not yet established.

Although training needs are sometimes indicated by line managers in performance evaluations, there is no requirement nor process for such indications to be communicated to the Laboratory-wide training program. Although some facilities have a formalized training program and ensure that only well-qualified personnel are assigned to operations, there is no centralized process for evaluating the effectiveness of ES&H training and certification. Policies and procedures for test development, demonstration of comprehension of the material, remediation (including retesting and time allowed), and testing as a condition of employment (termination for failure) do not exist. Policies and procedures are inconsistently created and administered throughout the Laboratory.

Finding/HR.2-2: Laboratory-wide training does not exist in such subjects as QA, event reporting, emergency preparedness, root cause analysis, GET, and visitor indoctrination.

Discussion: The Laboratory does not have a GET program covering such topics as radiation protection, security, emergency preparedness, and safety. The Laboratory is not in compliance with the specific requirements of DOE Order 5480.20 because it does not have a Laboratory-wide visitor indoctrination program.

Although facility managers have received training in DOE Order 5000.3A, "Occurrence Reporting and Processing of Operations Information," there is no Laboratory-wide program to provide other lead employees, such as group leaders and building managers, training in occurrence reporting. Also, no training exists for supervisors on how to conduct root cause analysis. Some project-oriented organizations have project-specific QA training activities, but there is no Laboratory-wide QA program nor are there plans for Laboratory-wide QA training to support such a program. Similarly, there is no general Laboratory-wide emergency preparedness training other than periodic emergency evacuation exercises for individual facilities.

HR.3 Employee Relations

Performance Objective: Employee relations programs enhance the management of contractor personnel in that contractors are able to attract and retain qualified staff and motivate them to achieve ES&H excellence.

Finding/HR.3-1: Despite its ability to attract and retain excellent staff in research and development (R&D) areas, the Laboratory has not yet developed incentives that motivate its R&D staff to place ES&H excellence as equal in importance to technical excellence.

Discussion: The Laboratory has programs, such as Laboratory Fellows and Distinguished Performance Awards, to reward outstanding scientific, programmatic, and support performance. Yet it has no site-wide award system for ES&H excellence, nor is ES&H excellence a major factor in existing award processes. Performance evaluations and salary management have not made ES&H excellence a key factor. Generally, positive recognition and positive rewards are lacking, while negative rewards for inadequate performance are inconsistently applied. There is no Laboratory-wide process, nor is there clear policy guidance, for disciplinary actions for unacceptable ES&H performance.

HR.4 Fitness For Duty

Performance Objective: A fitness-for-duty program identifies persons unfit for their assigned duties, removes them from such duty, and denies them access to vital site areas.

Finding/HR.4-1: The Laboratory does not have a comprehensive fitness-for-duty program that addresses all the DOE requirements contained in DOE Order 5480.20.

Discussion: The Laboratory has a written policy (AM 110) that addresses drug and alcohol abuse. The policy does not specifically address physical and psychological impairment. The policy requires managers to continually monitor the behavior of their employees and take action when employee performance indicates a potential problem. However, behavioral observation is not required to be documented on a periodic basis. The Laboratory and its major subcontractors have independent Employee Assistance Programs.

Finding/HR.4-2: The Laboratory does not have a full-scale fitness-for-duty program in place with a defined organizational entity responsible for it.

> **Discussion:** Although the Laboratory has almost all of the elements of a fitness-for-duty program in place, there is no centralized organizational entity that has responsibility for coordinating and pursuing a fitness-for-duty program as such. Consequently, there is no clear-cut mechanism for assuring that the Laboratory is consistently complying with all requirements of a fitness-for-duty program.

Finding/HR.4-3: Not all managers and supervisors are adequately trained nor aware of items of compliance relative to the existing substance abuse policy.

> **Discussion:** Laboratory managers and supervisors were required to attend mandatory training on substance abuse awareness in 1990. However, there is no method in place to provide such training to individuals appointed to temporary supervisory positions or to those appointed subsequent to the training. There is also no periodic refresher training.

5.2.5 Management Systems

The Laboratory has recently initiated several actions: development of Director's policies; an implementation plan for DOE Order 5480.19, "Conduct of Operations Requirements for DOE Facilities"; and the establishment of a long-term formality of operations program. The combined goal is to create a knowledgeable Laboratory population that sets rising standards of excellence, is technically self-sufficient, faces facts, respects even small amounts of radiation, receives training necessary to effectively perform their jobs, adheres to the concept of ownership, and develops the capacity to learn from experience. Staff involved in nuclear and other potential high-risk activities are working now from draft documents to bring this to fruition.

The Laboratory Director has recently directed the LAO to report directly to his office. LAO is responsible for the continuing Laboratory Self-Assessment Program, monitoring and ensuring the quality of division and group self-assessments, overseeing internal and external evaluations, and overseeing and managing the Laboratory's corrective action and commitment tracking system. Plans are being developed to also create a Policy and Quality Oversight Office within the Office of the Director. In the interim, the process of policy development is assigned to the Associate Director of Operations through the ES&H Coordination Center and a committee composed of ES&H representatives from each associate directorate.

MG.1 Compliance Management

Performance Objective: An integrated set of systems translates laws, regulations, DOE orders and directives, and other DOE requirements into site-specific operating procedures and ensures that all site activities are conducted in a fully compliant manner.

Finding/MG.1-1: The Laboratory system for translating laws, regulations, DOE orders and requirements into site-specific policies and procedures is inadequate.

Discussion: The Laboratory system for developing *The Laboratory Manual* (a nine-volume set containing Laboratory policy, including ES&H policy) has proved to be inadequate in ensuring that the Laboratory's policies, programs, and procedures fully reflect applicable laws, regulations, and DOE orders and guidelines. The Laboratory lacks a Laboratory-wide process that sets the standards and format for all Laboratory procedures. The Laboratory lacks an aggressive schedule to review and incorporate existing administrative requirements (ARs) into appropriate policies, programs, and procedures that provide guidance, direction, and support to all levels of the management organization.

Finding/MG.1-2: The Laboratory lacks a site-wide formal configuration control system.

Discussion: The Laboratory lacks a configuration management policy and the required supporting programs to integrate configuration control, document control, and records management on a Laboratory-wide basis.

Finding/MG.1-3: The currently approved Laboratory Emergency Plan does not meet the minimum guidelines of the DOE orders and directives and NUREG 0654, "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants."

Discussion: The Laboratory's emergency plans are not adequately integrated to cope with a major emergency. The requirements of the various ARs and technical bulletins that contain DOE guidelines have not been incorporated into the Laboratory Emergency Plan and procedures. The plan does not provide needed emergency planning direction for the entire Laboratory. The Laboratory has insufficient implementing procedures at the Laboratory, division, and group levels to enable the plan to be carried out effectively. The Laboratory has neither an off-site early notification system nor a DOE waiver for such a system. Most groups, buildings, and facilities lack the implementing procedures to meet their specific needs. The emergency management functions, including emergency management training, are too decentralized. This situation is especially true in the area of emergency response coordination with all of the off-site agencies that may be involved in any emergency. For those with emergency response responsibility, the Laboratory does not provide training that is meaningful and adequate for their specific roles in the emergency organization.

Finding/MG.1-4: The Laboratory's senior management has not defined the role and responsibilities of the Quality Operations Office (QOO).

Discussion: The lack of a clear definition of roles and responsibilities has forced the QOO and the LAO to work out their own interpretation of management expectations. The result is considerable confusion regarding integration of oversight responsibilities among QOO, LAO, and line self-assessments, compliance audits, improvement initiatives, Laboratory-wide tracking and trending of findings, corrective action and root cause analysis, operating experience program, lessons learned, quality training, etc.

Management expectations regarding integration of both the quality and the ES&H functions into the day-to-day operations of the Laboratory are not clear.

Finding/MG.1-5: The Laboratory does not have an effective, formal corrective action program that incorporates trend analyses and compliance status on a site-wide basis.

Discussion: The Laboratory lacks a Laboratory-wide procedure that clearly assigns all of the required responsibilities for a timely, effective, and meaningful occurrence-reporting system. There is no assigned, qualified group (i.e., people who possess both the technical expertise and training in events analysis, report writing, etc.) to investigate off-normal and occurrence events. Managers and supervisors have not been trained in effective methods for the analysis of compliance findings. Root causes have not been correctly identified in many of the Laboratory's occurrence reports. Corrective actions are frequently inadequate steps that address apparent symptoms, not the real problem.

Finding/MG.1-6: The Laboratory does not have a lessons-learned program, and managers and supervisors are not effective in the application of formal root cause techniques.

Discussion: The Laboratory does not have a formal or functioning lessons-learned program that is developed from root cause analyses of occurrence reports and Laboratory near-misses, Tiger Team appraisals, internal and external assessments and audits, and Laboratory self-assessments.

MG.2 Self-Assessment

Performance Objective: Managers and supervisors are directly and actively engaged in assessing the performance of their operations and are constantly striving to identify areas for improvement.

Finding/MG.2-1: The Laboratory has not had a regular self-assessment program that meets the DOE requirements.

Discussion: Most divisions do not carry out their own regular self-assessments. Oversight of environmental facilities and monitoring has been ineffective.

The Laboratory has recently taken steps to improve its self-assessment program. A conduct of operations training course was developed and presented to all managers from group leaders up. This course emphasized the need for self-assessments and "management by walking around." All Laboratory managers have been issued the "Managers ES&H Status Book," which provides detailed guidance on performing self-assessment.

Finding/MG.2-2: The Laboratory has not yet inculcated a culture in which all line managers are concerned with assessing their operations and continuously improving the ES&H aspects of their activities.

Discussion: Only recently has there been an effort made to assure that line organizations conduct formal self-assessments. For those divisions that have carried out self-assessments, there is no mechanism in place to determine if corrective actions have been developed and expeditiously carried out.

MG.3 Internal Independent Assessment

Performance Objective: Internal independent assessments are conducted on a formal and regular basis by personnel within the site or corporate organization who have no vested interest in the results of the assessments.

Finding/MG.3-1: The Laboratory's internal independent assessment program for ES&H activities is fragmented and limited to a few facilities.

Discussion: The assessments conducted by the LAO are comprehensive in their scope and depth of investigation. However, they are primarily of the nuclear facilities at the Laboratory. Other entities with responsibility for internal independent assessments exist. The Reactor Safety Committee and the Criticality Safety Committee have very narrowly focused missions, but their assessments lack formality. There is a need to integrate the internal independent assessment activities for consistency and to provide adequate resources so all the significant facilities at the Laboratory can be examined.

MG.4 External Assessment

Performance Objective: Managers and supervisors encourage and support ES&H assessments performed by external parties and ensure timely and effective follow-up by the cognizant line or support organization.

Finding/MG.4-1: Few Laboratory managers and supervisors have recognized the advantages and opportunities offered by external assessments of their operations.

Discussion: The Laboratory's culture has not evolved to the point that every manager recognizes the value of external assessments to identify and expeditiously correct ES&H findings. The Laboratory line managers and supervisors' understanding and acceptance of line responsibility for ES&H and compliance with DOE orders and directives have been inadequate. Preparation for the Tiger Team assessment has required a major education drive. The necessary combination of training and positively reinforced guidance to bring about change in the necessary time frame has been lacking.

Finding/MG.4-2: Support organizations receive inadequate independent peer review.

Discussion: In the scientific programs of the Laboratory and most other research centers, it is considered important to periodically invite distinguished colleagues to review the emphasis and progress of various activities. This review serves as a useful standard against which to measure technical capabilities and achievements, thereby ensuring that high-quality technical work is performed in an efficient and effective manner. In some cases, support functions at the Laboratory have also received this important kind of peer feedback, but that has been the exception rather than the rule. For example, all technical divisions have an External Advisory Committee. ES&H support organizations do not have any such external peer review groups.

Finding/MG.4-3: The Laboratory's overall ES&H program has not been reviewed by peers from industry.

Discussion: In the private sector an Industry Review Group is often used to provide an unbiased view of ES&H status compared with other similar industries (e.g. chemical plants, nuclear power plants, and so forth.) These review group members are not normally from the same regulatory environment or from the same type of facility. This blend of talents and experience provides important benchmarks through recognition of technical advancements and techniques in the industry.

MG.5 Performance Measurement System

Performance Objective: A performance measurement system is used by managers and supervisors to plan, budget, authorize, monitor, and control ES&H activities on a day-to-day basis.

Finding/MG.5-1: The Laboratory did not until recently have a Performance Indicator (PI) Program and has not established performance requirements for ES&H activities.

Discussion: The Laboratory did not have a formal PI Program that complies with draft DOE guidance or similar consensus standards until July 1991. A similar PI Program has been institutionalized by the Institute of Nuclear Power Operations and is used in the commercial nuclear industry. No Laboratory policy exists requiring such a program.

Because of the lack of a PI Program, line managers have not been required, nor able, to measure, track, trend, or otherwise report ES&H performance. They have not established meaningful goals for ES&H improvements in their organizations, have not developed plans accordingly, and have not budgeted the necessary resources.

MG.6 Quality Management Program

Performance Objective: A site-wide Quality Management Program that includes QA and Total Quality Management (TQM) is implemented by line and staff organizations and is applied to all levels in the organization.

Finding/MG.6-1: The Laboratory does not yet have a site-wide TQM program.

Discussion: The Laboratory Senior Management Group has appointed a TQM Steering Committee. This committee has evaluated and selected a model TQM program for implementation at the Laboratory beginning in January 1992.

Although excellence in research and programmatic work has always been a primary objective at the Laboratory, emphasis on continuous improvement and excellence in all areas and processes has never been articulated nor implemented. TQM begins with a commitment from the top management of any organization. This commitment is then translated into clearly stated continuous improvement goals and objectives for subordinate managers to use. This process does not exist at the Laboratory. Only a few divisions have mission statements that include tenets of TQM. Many employees have not accepted responsibility for quality in their organizations, and managers still focus corrective actions on individuals rather than processes.

Finding/MG.6-2: The Laboratory does not have a QA program for all of its operations.

Discussion: There is no formal site-wide QA program or a Laboratory policy addressing QA, required by DOE Order 5700.6B, "Quality Assurance," or NQA-1. Line management has interpreted and implemented QA functions as they saw fit. No routine, formalized QA orientation or training exists.

MG.7 Emergency Management

Performance Objective: The site-wide Emergency Preparedness Plan meets the requirements of DOE Orders 5500.10, "Emergency Readiness Assurance Program," and 5500.3A, "Planning and Preparedness for Operational Emergencies," and other related requirements.

Finding/MG.7-1: The Laboratory Emergency Plan does not meet the requirements of the DOE orders.

Discussion: The Laboratory's emergency plans are not adequately integrated to cope with a major emergency. The requirements of the various ARs and technical bulletins that incorporate the DOE guidelines have not been incorporated into the Laboratory Emergency Plan and procedures. The plan does not provide needed emergency-planning direction for the entire Laboratory. The Laboratory has insufficient implementing procedures at the Laboratory, division, and group levels to enable the plan to be carried out effectively. The Laboratory has neither an off-site early notification system nor a DOE waiver for such a system. Most groups, buildings, and facilities lack the implementing procedures to meet their specific needs. The emergency management functions, including emergency management training, are too decentralized. This situation is especially true in the area of emergency response coordination with all of the off-site agencies that may be involved in any emergency. For those with emergency response responsibility, the Laboratory does not provide adequate and meaningful training for their specific roles in the emergency organization.

Finding/MG.7-2: Due to the lack of a Laboratory Emergency Plan that meets the applicable DOE regulations and other related requirements, all employees do not recognize the importance of emergency management and understand their responsibilities in dealing with emergencies.

Discussion: The Laboratory Emergency Plan as currently developed and assembled is not a coherent document. The requirements of DOE Orders 5500.2B, "Emergency Categories, Classes and Notification and Reporting Requirements," and 5500.3A for form and content are not met. The current draft revision of the plan is a mixture of plan and procedures. The Laboratory employees cannot read the plan and thereby develop an understanding of the organization, the responsibilities of the individual positions involved, the chain of command and succession, the general requirements of classification and notification, the general relationships of supporting agencies, the communication facilities available, the facilities involved, the training required, and the general conduct of drills and exercises. Although chapters are listed that cover these areas, the chapter content is inadequate.

Finding/MG.7-3: Managers are unable to assure that all personnel and equipment are in a continual state of preparedness.

Discussion: Due to lack of an adequate overall Emergency Plan, managers are unable to develop implementation procedures necessary to carry out the associated requirements of the plan. Currently the building/facility emergency plans do not meet the requirements of the DOE orders. Without a Laboratory Emergency Plan and the associated building/facility plan, the managers are unable to assure preparedness.

5.2.6 Public and Institutional Interactions

The Public Affairs (PA) Office reports to the Laboratory Director and actively supports the mission of the Laboratory by providing accurate, compelling, and timely information to internal and external audiences. This information includes but is not limited to news releases, responses to media inquiries, publications, speeches, videos or films, and memoranda to Laboratory employees. PA informs the Laboratory population, the media, and other internal and external audiences of Laboratory research and development work that is of public interest, events that may affect the performance or reputation of the Laboratory, and incidents that may generate inquiries. The mission of PA involves anticipating and understanding public issues and fostering a sense of community within the Laboratory and throughout Northern New Mexico.

The office is organized into three groups: Public Information (PA-1), which communicates information on technical and non-technical issues in writing, through videotape, and orally to all of the Laboratory's internal and external audiences and provides all services to the media; Community Relations (PA-3), which promotes better understanding of the Laboratory by its neighbors in seven counties of Northern New Mexico and by area civic, special interest, and other groups; and Institutional Relations (PA-4), which handles interactions with government, business, industrial, academic, and other groups essential in developing new programs for the Laboratory.

The Laboratory has maintained a continuing relationship with the New Mexico Environment Department, which regulates most of our environmental activities. These interactions have occurred mostly at the level of middle and senior management in both organizations and have focused on how communication can be improved while we strive to reach full compliance. The Laboratory also hosts meetings of the New Mexico Senate Committee on Environmental Policy in which we attempt to inform legislators of the magnitude of our operational problems and how current and proposed regulations are affecting our work.

Attempts have also been made to create productive interfaces with federal regulators such as the regional office of the Environmental Protection Agency, and three- and four-party interfaces between the Laboratory and DOE, state, and federal representatives.

PI.1 Outreach and Media

Performance Objective: Corporate management, site management, and DOE cooperate in coordinated, proactive, and credible programs of outreach and media relations that fully and openly disclose and discuss ES&H issues and concerns related to site activities.

Finding/PI.1-1: The Laboratory has not always aggressively solicited advice about ES&H from the public and sought opportunities to communicate ES&H issues and progress to the public and the media.

> **Discussion:** As the emphasis on ES&H performance increased, the Laboratory failed to act quickly to foster public awareness of the Laboratory's environmental efforts such as its Environmental Restoration Program. The Laboratory did not consistently make ES&H issues at the Laboratory a routine component of information provided to special interest groups and the public at large. In some cases, outreach should have occurred earlier in the development of awareness about ES&H problems. Laboratory resources were not directed to the extent necessary to create a credible, proactive ES&H communications effort. DOE guidance needed to promote free and open ES&H outreach programs has also been inconsistent.

Finding/PI.1-2: An emergency public information program consistent with DOE Order 5500.4, "Public Affairs Policy and Planning for Requirements Emergencies," does not exist.

> **Discussion:** DOE Order 5500.3A, dated April 30, 1991, requires that an emergency public information program be established and integrated into the emergency management program. This has not yet been done in the Laboratory's Emergency Response Plan.

PI.2 Regulatory

Performance Objective: Managers, supervisors, and staff cooperate fully and openly with federal, state, and local regulatory agencies to facilitate compliance with ES&H law and regulations.

Finding/PI.2-1: The interaction between staffs of the Laboratory and regulatory agencies needs to improve.

Discussion: Whereas interaction at the management levels has been good, staff-level interaction has generally been in a reactive mode. More advance discussion is needed to lay the ground work for full and open cooperation between staffs. Arranging for full-time regulatory agency employees to work at the Laboratory would help the interaction with these agencies. It would facilitate the permit process and decrease response time for regulatory decisions.

Finding/PI.2-2: The Laboratory staff provides inadequate advance projection and notice of regulatory findings and deadlines to Laboratory middle and senior management.

Discussion: The staff often identifies problems at the last minute, creating problems for management and often requiring waivers or other relief from regulatory agencies. Lack of look-ahead and early warning, which implies lack of formality of operations, often creates a crisis for management and leads to less effective responses.

5.2.7 Oversight

The DOE ES&H oversight of Laboratory activities is exercised through the Albuquerque Field Office (AL). The AL Manager is responsible and accountable for all ES&H activities within AL and the facilities operated by its Management and Operations contractors. This responsibility is exercised through on-site area offices that report to the AL Manager and provide direct oversight of contractor operations and through AL staff responsible for supporting the AL Manager and the area offices. Primary responsibility for ES&H management within AL resides in area offices; Office of Energy and Special Programs; Office of Operations and Weapons (OOW); and Office of Environment, Safety and Health. To assure proper integration of the AL weapons mission and contractor ES&H operations, the Waste Management and Operational Surety Division within OOW provides institutional staff support to the manager and area offices for ES&H operations and management systems.

The *GEMS* sets forth the formal lines of authority and accountability for ES&H activities within the Laboratory. In all cases, the primary responsibility for ES&H resides with line managers, with the Director having ultimate authority and responsibility for ES&H activities. The ES&H Council is the Laboratory's primary oversight organization for ES&H matters. As directed by its charter, it recommends ES&H policy to the Director, monitors the effectiveness of the ES&H program, ensures that senior managers are fully engaged in the ES&H process, and periodically visits Laboratory sites to ensure compliance with ES&H policy.

The Operations Directorate administers institutional ES&H policy. Two of its divisions, EM and HS, define and recommend Laboratory policies necessary to comply with all applicable ES&H regulations, statutes, and directives. As a part of their responsibilities, they provide technical support and services, conduct institutional programs, and provide day-to-day assistance to help line managers comply with ES&H policy. ENG Division manages portions of the Laboratory's ES&H and QA programs, including ENG QA, Fire Protection, and Maintenance.

The OM Office (now LAO) is responsible for an independent, internal ES&H appraisal/audit program to assess compliance of Laboratory organizations with relevant statutes, orders and directives, and policies. It also evaluates the ES&H programs of the Laboratory's major subcontractors. In addition, a number of ES&H committees are formally chartered to provide oversight and advice in specialized areas of expertise.

For more information on Laboratory organizations with ES&H responsibilities, see Appendix A.

OV.1 DOE Oversight

Performance Objective: DOE managers and staff are actively and personally involved in oversight of their contractors to ensure that they comply fully with ES&H requirements established by law, regulation, and DOE policy.

NOTE: Specific findings related to DOE's oversight effectiveness are not given here because this document provides the Laboratory's assessment of itself.

OV.2 Line/Staff Oversight

Performance Objective: Oversight responsibilities for ES&H obligations and activities are clearly delineated within line and support organizations.

Finding/OV.2-1: The formal ES&H oversight roles of responsible support organizations and committees have yet to be properly and clearly delineated.

> **Discussion:** At present there is substantial confusion within the Laboratory concerning the exact roles and responsibilities assigned to support organizations and committees such as HS, EM, ENG, LAO, the Criticality Safety Committee, and the Reactor Safety Committee.
>
> HS, EM, and, to a lesser extent, ENG as well as LAO act as support safety organizations for the Laboratory's ES&H programs. Support is also provided by the Criticality and Reactor Safety Committees in the narrow areas of criticality and reactor safety. Both HS and EM view their roles as primarily advisory and supporting to line organizations and line management and as providing technical assistance and guidance where appropriate. The managers of these support organizations do not view themselves as having oversight responsibility to assure that line organizations conform to ES&H requirements. However, not all personnel in these two divisions have a clear idea of their roles in supporting ES&H performance and self-assessment in the line organizations. It is also not clear to many in these divisions what residual obligations remain with them to assure compliance with ES&H requirements at the Laboratory. Nor is line management clearly conversant with the roles of the support divisions with respect to operational, assessment, and compliance activities.
>
> Responsibility for an independent internal ES&H appraisal and audit program resides in LAO. Narrowly focused audit and appraisal responsibilities also reside with the

Criticality and Reactor Safety Committees. At present these appraisal and audit activities appear to proceed on parallel tracks, and these committees are not integrated with LAO activities. LAO provides formal independent appraisal and audit reports to line managers and tracks and evaluates the status of action plans and milestones associated therewith. It also monitors and supports the self-assessment programs of the line organizations, which appear to place it in conflict of interest with its independent audit and appraisal mission.

Finding/OV.2-2: Not all line managers fully accept their responsibilities with respect to ES&H activities arising out of the operations they manage.

Discussion: Laboratory policy expressly states that line managers are responsible for conforming to all ES&H requirements pertaining to their line operations. However, not all line managers participate in the oversight necessary to assure their operational compliance with applicable ES&H requirements and directives. There is also a tendency to shift responsibility or to seek less than full compliance because of budgetary or operational considerations. In short, the necessary full and complete acceptance by line management has yet to occur.

5.2.8 Conduct of Operations

In response to DOE Order 5480.19, the Laboratory has developed an implementation plan for the conduct of operations. This draft plan has been distributed to the Laboratory's nuclear facilities and to certain other high-hazard facilities. Information and suggestions from these facilities will be included in the draft implementation plan before it is made final and distributed across the Laboratory in early January 1992.

The Laboratory will implement conduct of operations in a graded manner, with application being most stringent for TSA Category 1 facilities and less stringent for TSA Category 3 facilities. Managers in low-hazard facilities will be directed to adopt the principles of conduct of operation for their activities wherever these principles can contribute to safer, more efficient operations.

In addition to preparing an implementation plan, the Laboratory is developing a strategy to ensure that operational procedures are written and controlled by a central organization. Although in the past Laboratory organizations have independently produced such documents, Laboratory managers recognize that such autonomy may be detrimental to achieving a comprehensive and consistent program for conduct of operations.

The ES&H Coordination Center, which is responsible for developing the conduct of operations plan, is also developing Laboratory-wide procedures that address the order.

During August 1991, the Laboratory is conducting a class entitled "ES&H Operations for Managers" that is required for division leaders, deputy division leaders, and group leaders. Although the class covers several ES&H issues, major emphasis is on conduct of operations. By August 23, more than 400 managers will have been trained. Many employees, including 15 senior-level managers, attended a course sponsored by the DOE on conduct of operations: "Fundamentals for DOE Operations."

The Laboratory is taking positive steps to address the requirements of DOE Order 5480.19. The goal is to achieve safe operations that are guided by Laboratory-wide policies and procedures that effectively implement the order.

CO.1 Conduct of Operations

Performance Objective: Well-defined, effectively administered policies and programs that govern the basic operations of the organization in accordance with DOE Order 5480.19 are in place, key operating activities are defined, performance standards of excellence are established, and active programs of improvement are established.

Finding/CO.1-1: The Laboratory has yet to fully implement a program for conduct of operations that is coordinated and monitored site-wide, that emphasizes the philosophy of standards of excellence and professionalism under which the Laboratory should be operated, and that clearly delineates lines of responsibility for normal and emergency conditions.

> **Discussion:** The Laboratory implementation plan for conduct of operations has been drafted. Specific direction and guidance are lacking. Concerns exist in the interpretation of the requirements of DOE Order 5480.19, how to reconcile the requirements, and how to implement the requirements. The results of individual strategies on the part of some divisions and groups to implement conduct of operations may cause duplication of effort and non-uniformity in the individual programs. Nevertheless, Laboratory organizations could be using the draft implementation plan that has been distributed for preplanning and indoctrination.

Finding/CO.1-2: The Laboratory has not provided adequate guidance and support for site-wide work controls systems such as document control, the issuing of new procedures, safety reviews, and configuration management.

> **Discussion:** The Laboratory does not have a clearly articulated policy that specifies the standards of the Laboratory for developing procedures, controlling documents, and managing records. The lack of a clear policy delivered from the top of the Laboratory organization in such a manner that detailed activities can be consistently planned and controlled creates a severe problem. Laboratory-wide procedures for the development, distribution and control, and implementation of procedures, including review, approval, and change are a necessary element in the implementation of formality of operations. Both document control and records management functions are required and should be integrated.

Finding/CO.1-3: The Laboratory does not use a management system to evaluate the risks, hazards, and vulnerabilities of all existing and proposed operations and activities.

Discussion: The Laboratory does not have a formal system or procedures to identify, evaluate, and assign weighted values for potential risks, hazards, and vulnerabilities to existing and proposed operations and activities. These operations and activities include the vulnerabilities identified by appraisals, audits, and assessments, which would allow management's comparison of both objective and subjective assessments of undertakings with higher than normal risk. Existing and proposed modifications to operations and activities related to ES&H are not evaluated for risks and vulnerabilities. Without this evaluation, management cannot prioritize operations based on risk considerations.

Finding/CO.1-4: Laboratory management has not promulgated formal Laboratory policies that specify the expectations of management with respect to key areas of operations, the goals associated with these areas, and the means expected to be used in the achievement of these goals and the implementation of the policies.

Discussion: Succinct, formal, and meaningful policies that define the requirements and expectations of management for the proper operations of the Laboratory are not in existence. This set of operations policies is needed as a base from which all future plans and procedures are to be built.

Finding/CO.1-5: The Laboratory does not have a Laboratory-wide system for managing and overseeing the development, control, revision, and authority for procedures.

Discussion: With no Laboratory-wide system in place for developing, controlling, revising, and authorizing procedures, managers often work without guidance in these areas. The result is inconsistent performance and expectations. A proposed plan includes establishing a central office to manage all activities related to policy and procedure development. This office would be responsible for developing Laboratory-wide policies and procedures and for overseeing the control of these documents, but it is not yet in place.

Finding/CO.1-6: ES&H-related items and activities have not been analyzed, and requirements for procedures have not been defined for critical items.

Discussion: Because a Laboratory-wide system for handling procedures (refer to Finding.CO.1-5) has not been implemented, the foundations of a conduct of operations program, including the review of activities to define need or the establishment of criteria that would dictate need, have not been established. In the Laboratory's proposed program to establish a Laboratory-wide system, these foundations will be major cornerstones of the process.

5.2.9 Corrective Action Systems

The Laboratory has developed a condition-reporting system that is designed to provide a formal mechanism for capturing failures, malfunctions, and conditions adverse to quality; however, it has not been fully implemented in the context of a comprehensive condition-reporting system.

The Laboratory's system has been designed around the requirements of DOE Order 5000.3A, for incidents and occurrences. In addition, findings noted during self-assessments, internal independent self-assessments, and external assessments by organizations such as the Tiger Team, are documented, evaluated formally, assigned for action, tracked to completion, and verified. Formal guidance in the form of documents including policy, plans, and procedures for the Laboratory Assessment Program are in final draft and will be submitted to DOE for approval by the end of September 1991. The reporting process, however, which would be necessary when such findings exceed the threshold for reporting under DOE Order 5000.3A, still lacks formalization and discipline.

Even though root cause analysis is performed by LAO on all findings captured through assessments conducted by organizations external to the Laboratory and through independent internal assessments, the process has not yet been implemented for all line management self-assessments or on all findings noted. A training program for management in root cause techniques has been developed. When all managers have completed the course, they will have the fundamental knowledge necessary to address this process for all findings. In addition, formal guidance directing such analysis is in final draft.

The PI Program directed by a Secretary of Energy notice (SEN-29) was implemented in June 1991, and a PI Program directed by DOE/AL was also implemented in late July 1991. However, neither program is mature enough yet, nor are there sufficient data to provide for meaningful results from an improvement initiatives program as yet.

Although significant work has been initiated in several of these areas, the Laboratory still needs to devote additional emphasis and development to fully implement all of them.

CA.1 Condition Reporting Systems

Performance Objective: Measures are established to assure that conditions adverse to quality, such as failures, malfunctions, findings, deviations, defective material and equipment, and nonconformances are promptly identified and corrected. These measures include, as appropriate, provisions for identification, documentation, segregation, disposition, and notification to affected organizations.

Finding/CA.1-1: A comprehensive condition-reporting system has not been established to document findings or provide a formal process for evaluating what should be reported to off-site organizations such as DOE, the Environmental Protection Agency, etc.

> **Discussion:** Findings noted during self-assessments, internal independent self-assessments, QA audits/surveillance, external assessments by organizations such as the DOE Tiger Team, management walk-throughs, and individual observations are not documented in a manner that allows for consistent evaluation, disposition, and reporting. A condition-reporting system exists that addresses the reporting requirements of DOE Order 5000.3A. However this system lacks discipline and is not governed by procedures. An occurrence-reporting data base has been established and needs to be expanded into a formal Laboratory-wide program.

CA.2 Root Cause Analysis

Performance Objective: A corrective action program, which incorporates root cause analyses, is used to eliminate compliance findings and recurring problems.

Finding/CA.2-1: A formal corrective action program that evaluates identified findings against established performance standards, provides a method for performing detailed root cause analyses, and serves as the basis for a detailed trend analysis is not available on a site-wide basis.

> **Discussion:** The need for a comprehensive corrective action program has been identified in internal independent assessments. Initial recommendations on the organization, charter, and staffing of a corrective action group were developed and submitted to Laboratory management for approval. The organizations were reviewed by appropriate committees and will be incorporated, as appropriate, in the comprehensive action plans being developed. The recommendations included a plan for identification, categorization, initial investigation, off-site reporting, and verification of corrective action. Data generated as a result of this program will feed into the lessons-learned program, the Operating Experience Program, and the Trend Analysis Program. The current corrective action program does not provide sufficient guidance on what constitutes a deficiency; findings identified to date are not categorized correctly and frequently do not address the causal factors that led to the deficiency; root causes are not correctly identified, and corrective action generally has not addressed the root causes of problems.

Finding/CA.2-2: Managers and supervisors are not trained in formal root cause analysis techniques. Therefore the techniques are not regularly used to identify root causes for compliance findings in their operations nor for the incorporation of the results in the formal corrective action system.

> **Discussion:** A formal training program in root cause analysis techniques has been developed, but all managers and supervisors have not completed the training. As an interim measure for DOE Order 5000.3A reports, a suggested root cause analysis is being forwarded to each facility manager after the completion of a notification report.

CA.3 Improvement Initiatives

Performance Objective: An improvement initiatives program is developed to provide the Laboratory with a process for taking ES&H implementation beyond compliance to a higher level of excellence.

Finding/CA.3-1: The Laboratory does not have a formal program that provides for the identification, review, authorization, funding, and staffing of improvement initiatives designed to take the current Laboratory ES&H activities to a level of excellence beyond strict regulatory compliance.

> Discussion: The Laboratory recognizes that ES&H compliance must be achieved before an effective improvement initiative program can be fully implemented. The recent

commitment to the principles of an effective conduct of operations program and the funding of a major hands-on training effort for Laboratory managers will result in a more meaningful self-assessment of Laboratory facilities by the established "owners" of those facilities. However, this effort primarily focuses on identifying and resolving ES&H issues that would improve the Laboratory's compliance. The Laboratory does not have a management improvement program that focuses on the quality of processes, identifies the opportunities to improve, evaluates these opportunities on a cost/benefit basis, reviews these opportunities at a management level capable of taking action, authorizes the initiative, and provides both funding and staff support necessary to perform the improvement.

CA.4 Lessons Learned

Performance Objective: A lessons-learned program provides for the distribution of relevant information on experience from the site, other DOE facilities, the commercial nuclear industry, chemical processing facilities, and research facilities.

Finding/CA.4-1: The Laboratory does not have a formal, functioning lessons-learned program.

Discussion: There is no structure, organization, or process to perform a comprehensive analysis of the various lessons-learned inputs available at the Laboratory and then to disseminate that information in a controlled manner. There are a number of organizational units generating lessons-learned information; however, the information is inconsistent and diffused. The organizations include HS-2, medical information; HS-3, accident investigations; the Emergency Management Office (DOE Order 5000.3A occurrence and near-miss reporting); LAO (self-assessments, independent internal assessments and performance indicators); and the QOO. Other inputs are received and disseminated sporadically or in a limited fashion, such as Tiger Team reports from other sites, external evaluations and audits of various Laboratory organizations, and the DOE's Occurrence Reporting and Processing System (ORPS) data base. All of these inputs need to be coordinated by a central organization that will provide constant analysis for relevance to Los Alamos, assign action items, and feed back results to management and the DOE.

Finding/CA.4-2: Events from other DOE facilities are not entered into a performance tracking system.

Discussion: While this information is available on the ORPS data base for Los Alamos National Laboratory facilities, not all facilities have been able to fully access the data.

Appendix A

SITE AND ORGANIZATION DESCRIPTION

A.1 History and Mission

A.1.1 Evolution of the Laboratory

In March 1943, a small group of scientists came to the Los Alamos Ranch School, located on a remote mesa high above the Rio Grande, northwest of Santa Fe. Project Y of the Manhattan Engineer District was charged with the specific responsibility to develop the world's first nuclear weapon. Originally, it was expected that the task could be completed by a hundred scientists. By 1945, when the first nuclear bomb was tested at Trinity Site in southern New Mexico, more than three thousand civilian and military personnel were working at Los Alamos.

After the end of World War II, Los Alamos became a permanent institution that is recognized as one of the finest scientific research laboratories in the world. A key factor in the Laboratory's excellence has been its management, since 1943, by the University of California. The University has maintained the tradition of free inquiry and debate that is essential to excellence in any scientific undertaking.

Today, the Laboratory is a vertically integrated research and development (R&D) institution of the Department of Energy (DOE). By vertical integration we mean the "research-to-retirement" responsibility that the weapons laboratories are assigned for nuclear warheads. We work with the production plants to ensure that designs can be manufactured and with the armed services to ensure that the weapons are safe, secure, and reliable during their life cycle before we help to ultimately dismantle them. We have a responsibility from beginning to end. The nuclear weapons program has provided challenge, flexibility, and a breadth of science and technology that has allowed us to contribute to many problems of national importance. We have developed expertise in solving large, complex technological problems for the nation, demonstrating that science makes a difference.

The overriding importance of the nuclear deterrence mission plus the DOE's success in carrying it out have encouraged the federal government over the years to invest resources in our institution. Today, they provide almost unmatched scientific and technical capabilities. The estimating operating cost of the Laboratory for fiscal year 1991 is $951 million, supported by close to $50 million in construction and capital equipment funds. Currently 54 percent of the operating budget supports our broad nuclear weapons technology responsibilities; 22 percent conventional and strategic defenses; and 24 percent civilian R&D, predominantly research and technology development and programs supported by the non-defense programs of DOE.

At Los Alamos we house the world's most powerful scientific computing facility with a computing power exceeding 65 of the original Cray 1 supercomputers. We develop and operate large lasers, accelerators, and pulsed neutron sources that push the state of the art. We operate reactors, tritium fuel systems, and critical assemblies. We engage in analytical environmental R&D, studies of high-explosive hydrodynamics, and testing of nuclear devices at the Nevada Test Site. We have characterization facilities housing the latest spectrographs, microscopes, and other sophisticated diagnostics. We have materials synthesis and processing facilities difficult to match at another single institution.

Most importantly, we continue to attract an outstanding scientific, engineering, and technical support staff. Our 3150 scientists and engineers represent virtually all disciplines and span the spectrum from the most basic science to applied technology. They work in an environment that not only fosters individual creativity but also encourages teamwork. Individuals can be rapidly assembled into teams to tackle the most challenging problems.

The broad science and technology base at Los Alamos provides a flexibility to address technological problems as they emerge on the national scene. Historically, these were associated primarily with nuclear energy, either for defense or commercial power. In the 1970s, the mission of the Laboratory was significantly expanded to deal with the energy crisis, as the Atomic Energy Commission evolved into, first, the Energy Research and Development Administration and, then, the Department of Energy. In the 1980s, Congress and the Executive Branch began emphasizing technology transfer, that is, expediting the application of federally funded research at the laboratories into the private sector. The National Competitiveness Technology Transfer Act of 1989 added technology transfer to the mission of the DOE laboratories.

Today, Los Alamos is a national resource helping to provide the scientific leadership for the challenges of the 1990s and the 21st century. Our purpose and guiding vision is to put science to work to make a positive difference in the world. Without weakening our commitment to our defense mission, we are turning some of our considerable expertise and resources to bear upon other problems that are foremost in the American public's mind.

A.1.2 Mission

Our primary mission is nuclear weapons research, development, and testing to help ensure the nation's nuclear deterrent. As a multiprogram laboratory, we also serve the nation by using our core competencies to make special contributions in such areas as

- Technical assistance to the DOE weapons complex
- Energy and environmental technologies with an emphasis on working with U.S. industry
- Basic research to underpin our programs and support the DOE research mission
- Work for other federal agencies including defense and intelligence

In pursuing this mission, the Laboratory will maintain a safe and healthful work place and will protect the environment. No activity or operation will be carried out at the Laboratory unless it can be performed in a manner designed to protect employees, the public, and the environment.

In performing its mission, the Laboratory has received a number of specific R&D assignments. These include

- Research, design, development, engineering, and testing of nuclear warhead concepts and new weapons capabilities; maintenance and enhancement of the technology base that is the foundation of the weapons program; maintenance of the Laboratory's capabilities for nuclear tests and the execution of such tests; and stockpile management of Laboratory-designed warheads to ensure a viable and reliable stockpile

- Research, development, and testing support for advanced nuclear directed-energy concepts

- R&D on inertial confinement fusion, including fusion target physics, laser-target interaction experiments, target design and fabrication, and high-energy laser development

- Nuclear materials R&D directly related to the nuclear weapons program, including research in materials science and materials development, process and fabrication development and transfer of technology to the DOE production complex, and plutonium recovery from scrap generated by the DOE complex

- Nonnuclear strategic defense R&D activities, including the neutral particle beam; free-electron laser; sensors; battle management, communication, command and control; high-velocity projectiles; advanced lasers; acquisition and tracking of targets; optics; beam propagation; high-power microwaves; and specific R&D support for the Strategic Defense Initiative (SDI) program

- Advanced conventional munitions, including computer code development and simulations; energetic and nonenergetic materials R&D; applications to armor/anti-armor, counterterrorism, and counternarcotics; and operations research and systems analysis

- Verification and safeguards R&D, including domestic and international safeguards, satellite- and earth-based detection and monitoring of nuclear tests, earth-based monitoring of nuclear weapons, and verification of chemical and biological warfare treaties

- Vulnerability, lethality, effects, and countermeasures including the technology areas of earth coupling, nuclear weapons environments, X-rays and neutrons, kinetic energy, lasers, microwaves, electromagnetic pulses, and particle beams

- Advanced defense technologies, including advanced weapon concepts, platforms, and defense systems (in addition to nuclear, SDI, and advanced conventional munitions); low-intensity conflict; chemical and biological warfare defense;

command, control, communications, computers, and intelligence; training analysis and support; and independent evaluations

- Intelligence activities sponsored by national intelligence organizations involving the areas of hardware, analysis, international technology transfer and technology security, and Laboratory intelligence support

- Systems studies in the areas of strategic and tactical nuclear weapons, directed-energy weapons, nonnuclear weapons, energy technology, and supporting technologies

- Magnetic fusion energy R&D, including the areas of fusion plasma physics, generic supporting technology such as the Tritium System Test Assembly, and applications of magnetic fusion to defense technologies

- Fission energy R&D, including space nuclear reactors, the safety and technology of both defense and commercial land-based reactors, and their associated fuel-cycle facilities

- Environmental R&D, including storing and managing radioactive waste, handling hazardous waste, and investigating new technologies to address problems associated with waste characterization and cleanup, environmental control technologies, global climate change, ozone depletion, clean air, and basic environmental science

- Non-nuclear energy activities, including renewable energy, conservation, and fossil energy

- Nondefense advanced technology that focuses on aerospace technology, biotechnology, artificial intelligence, and robotics

- International programs that in the interest of local economic development and U.S. national security help foreign countries by providing technical assistance, promoting cooperative R&D, and exchanging R&D information

- Human genome studies, including informatics, research, and associated technology

- Research on the health consequences associated with the production and use of energy and national security materials, including radio-isotope medicine, research on Acquired Immune Deficiency Syndrome (AIDS), structural biology, and the use of lasers in medicine

- Basic research in defense- and energy-related disciplines, including atomic and molecular physics, bioscience, chemistry, computational science and applied mathematics, geoscience, space science, astrophysics, materials science, nuclear and particle physics, plasma physics, fluids, particle beams, and applied science and engineering

Technological leadership by U.S. industry is essential to retaining a viable industrial economy, effectively competing in the world marketplace, and providing national security needs. The National Competitiveness and Technology Transfer Act of 1989 specifically included technology transfer activities in the mission of the Laboratory. The Laboratory provides leadership by an active program of technology transfer including

- Operating the Superconductivity Pilot Center and the Oil Recovery Technology Partnership as models for government/industry collaboration
- Negotiating cooperative R&D agreements with U.S. industry to develop and apply Laboratory technology for market applications
- Licensing Laboratory-developed technology to U.S. industrial companies
- Promoting personnel exchanges with U.S. industry
- Operating many user facilities open to U.S. industry
- Performing a limited amount of reimbursable work for U.S. industrial firms
- Providing technology maturation funding to attract industrial interest in commercializing new Laboratory technologies

The Laboratory has also been charged with helping to ensure a continuous and adequate supply of technical personnel to contribute to future DOE programs. The Laboratory is therefore working to support education at all levels by supporting

- graduate and undergraduate education through its university collaborations and student and faculty involvement programs
- local outreach programs for precollege students and teachers
- programs at the precollege, undergraduate, and graduate levels specifically designed for under-represented groups in science and engineering fields
- environmentally oriented programs at the precollege, undergraduate, and graduate levels

A.2 Organization

As an institution managed by the University for the DOE, the Laboratory is obligated to report both to the University and to the DOE. The Laboratory contract is administered through the Los Alamos Area Office (LAAO) and the Albuquerque Field Office (AL). The Laboratory Director is ultimately responsible for all Laboratory activities. However, technical and administrative responsibility and authority are delegated to directorates and support offices.

The Director is supported by a Deputy Director, six Associate Directors, three Associate Directors at Large, the Controller, the Laboratory Counsel, the Director of Human Resources, and an Executive Staff Director.

The Deputy Director acts for the Director with full responsibility and authority in his absence. The Executive Staff Director advises the Director on nontechnical issues and coordinates activities of the small staff attached to the Director's Office. One Associate Director at Large participates in the leadership of Laboratory activities in national security and arms control policy; another is responsible for Laboratory-directed R&D activities and for advising the Director on a variety of scientific issues that affect the Laboratory; the third is responsible for assessing technical programs and capabilities and for developing a corporate strategy for change-of-station assignments.

Laboratory activities are organized into three functional areas:

- discipline-based R&D
- programmatic functions
- facilities and service support

The Laboratory's R&D and programmatic functions are divided into five technical directorates, each managed by an Associate Director:

- Chemistry and Materials (ADCM)
- Defense Research and Applications (ADDRA)
- Energy and Technology (ADET)
- Nuclear Weapons Technology (ADNWT)
- Research (ADR)

The technical Associate Directors have both line and program management responsibility. Program management functions typically cross directorate lines.

A sixth directorate, Operations, headed by the Associate Director for Operations (ADO), is responsible for support activities, including those related to environment, safety and health (ES&H), quality assurance, facilities engineering, security, and mechanical and electronics support.

In addition to the directorates, five other organizations report directly to the Director's Office. The Controller's Office (CONT) oversees finances, procurement, commercial transportation, and administrative data processing functions. The Director of Human Resources (DHR) manages personnel and human resource development matters. The Laboratory Counsel (LC) provides legal advice to the Director, and the Public Affairs Office (PA) is responsible for the release of information to the media and for community and institutional relations. The Laboratory Assessment Office (LAO) is responsible for ES&H assessments at the Laboratory. Figure A-1 shows the formal lines of authority at the Director and Associate Director levels.

Associate Directors guide the efforts of major organizational units called divisions, which are further divided into groups. In some instances, these groups are divided into sections. This line management structure is shown in Figure A-2.

A.2.1 Organizations with Significant ES&H Responsibilities

The primary responsibility for ES&H management resides with the Laboratory Director, who has delegated responsibility and authority to line management as outlined in the previous section. A detailed description of the ES&H responsibilities of the line managers is given in the *Guide to ES&H Management Structure (GEMS)*. While all line managers have responsibility for ES&H performance, three divisions in the Operations directorate have major line responsibility for ES&H. Four other organizations provide ES&H support for line management (see Figure A-3). These organizations are described briefly here. Further information is available in the *GEMS* document.

A.2.1.1 ES&H Council

The ES&H Council is the Director's primary oversight and policy-setting organization for ES&H matters and is co-chaired by the Laboratory Director and the Deputy Director. Other members include the five technical Associate Directors, the Laboratory Counsel, the Director of Human Resources, the Controller, the Executive Staff Director, the Associate Director and the Deputy Associate Director for Operations, and the Executive Secretary of the Council. Others routinely attending Council meetings include the Health and Safety, Environmental Management, and Facilities Engineering Division Leaders; the Laboratory Assessment Office director; the Quality Operations Office director; the team leader of the ES&H Coordination Center; the University of California Liaison; representatives of managers of the two largest on-site contractor organizations, Johnson Controls World Services Inc. (JCI) and Mason and Hanger; and the Los Alamos Area Office Manager.

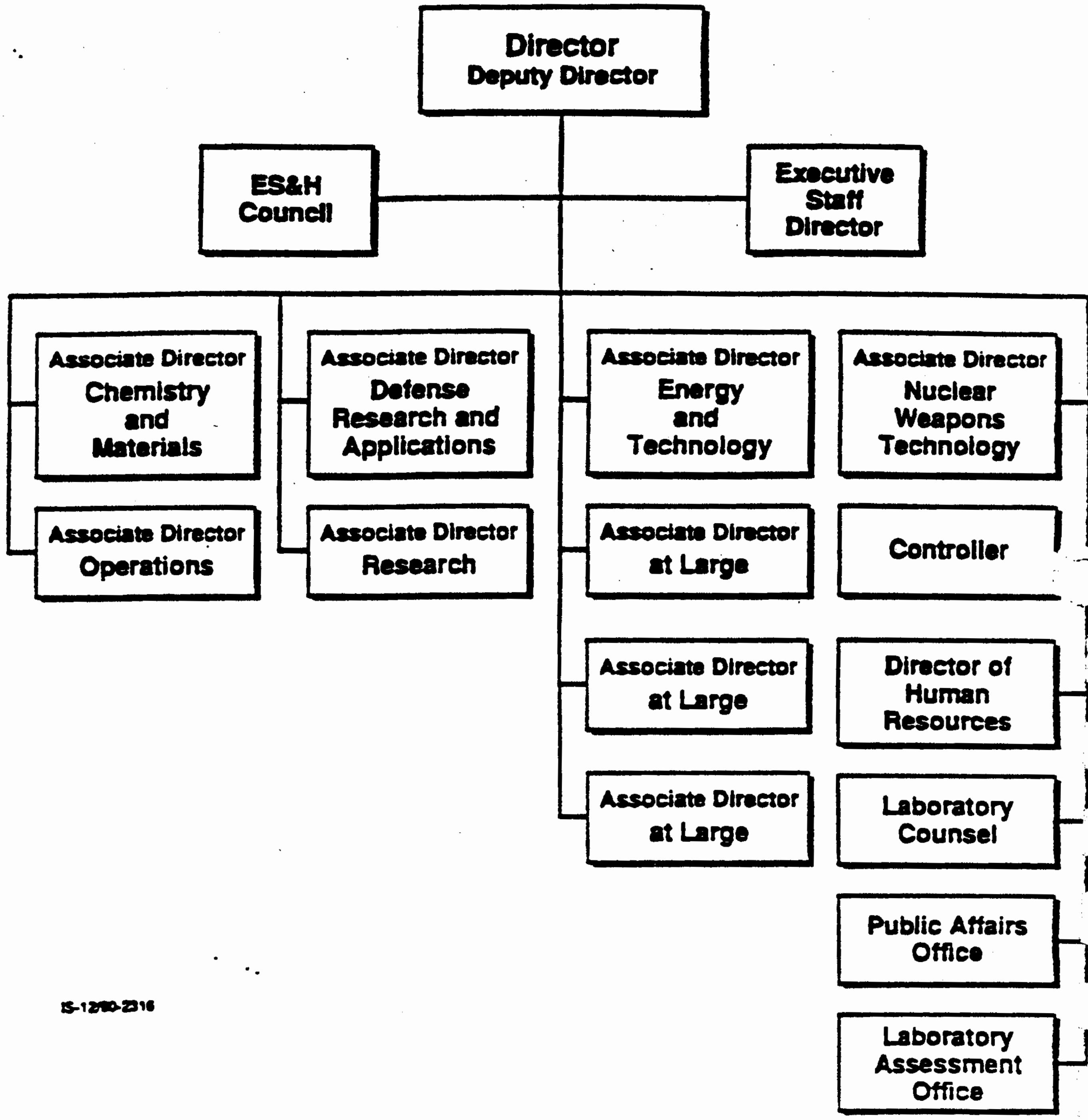


Figure A-1

Laboratory Organization at the Director and Associate Director Levels

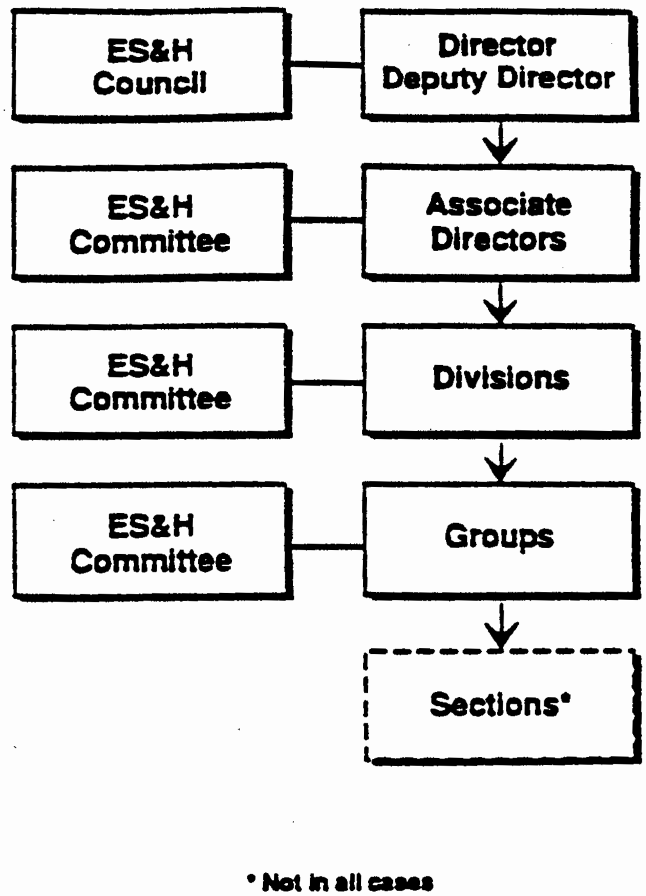


Figure A-2

Laboratory Line Organization

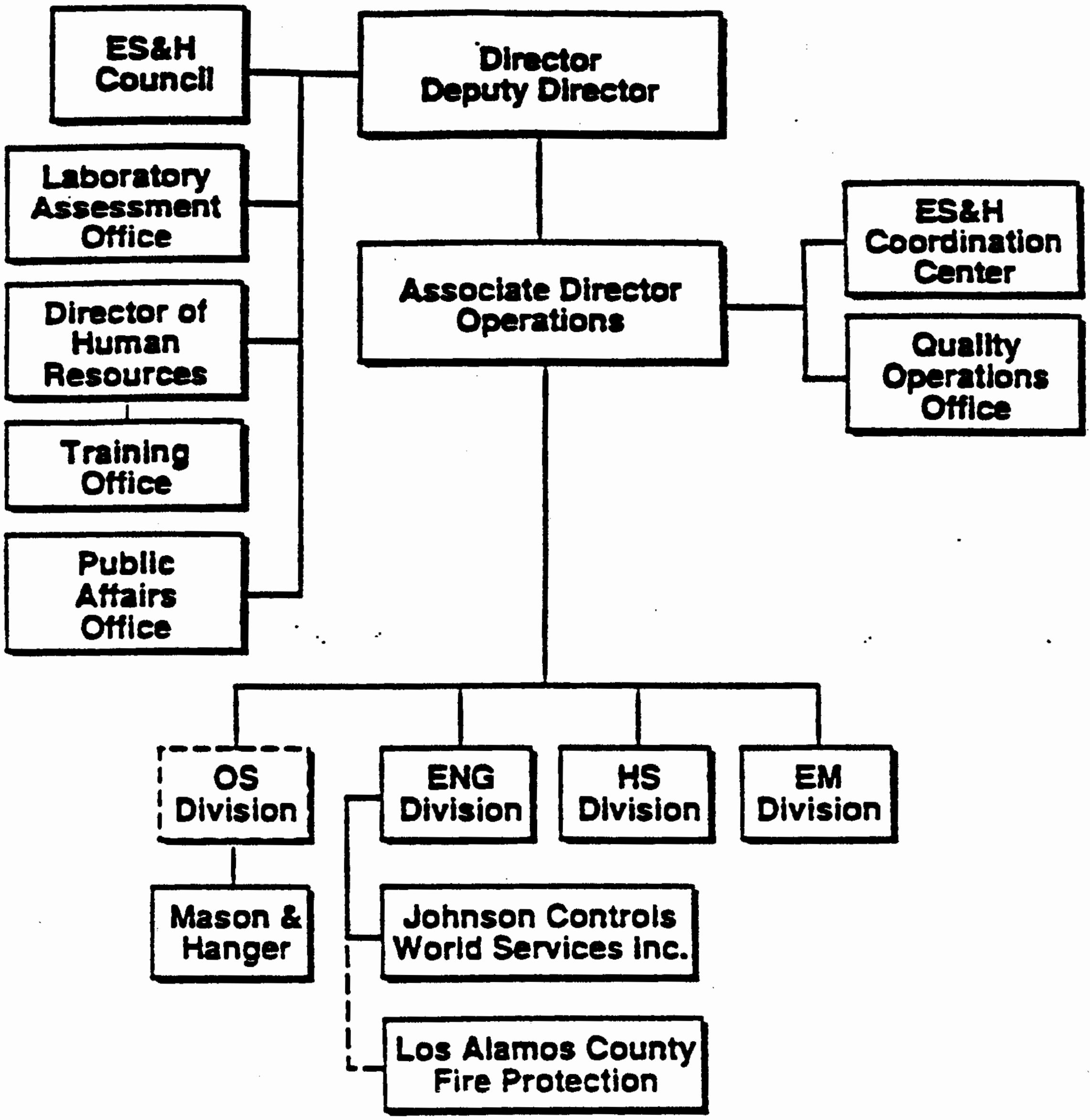


Figure A-3

Laboratory Organizations with Line-Management or Supporting Roles in ES&H

The charter of the ES&H Council provides that it

- recommend ES&H policy for the Laboratory
- when appropriate, recommend establishing special ES&H committees and review the activities of these committees
- monitor the effectiveness of the Laboratory's ES&H program by reviewing appraisals, accident and incident reports, and related activities
- ensure that senior managers are fully engaged in the ES&H management process and provide them with relevant ES&H information (for example, trend and root cause analysis) on a timely basis
- periodically visit sites throughout the Laboratory to ensure the effectiveness of ES&H policies

A.2.1.2 ES&H Coordination Center

Established in March 1990, the ES&H Coordination Center coordinates the Laboratory-wide effort to assess, develop, and implement ES&H programs in response to the Secretary of Energy's 10-point initiative. The center coordinated this self-assessment report, Occupational Safety and Health Administration inspections at all Laboratory facilities, and an employee concerns programs. It published the *GEMS*, instituted the Building Manager Program, and trained Laboratory managers on the conduct of operations. The center will be the focal point of support for the DOE Tiger Team, which will begin its inspection of the Laboratory in September 1991.

A.2.1.3 Laboratory Assessment Office

The Laboratory Assessment Office (LAO) is responsible for an independent internal ES&H appraisal program. LAO conducts appraisals and environmental audits to assess activities in relation to ES&H laws, DOE orders and directives, and Laboratory policy. LAO reports to the Deputy Director and is responsible for all ES&H assessments. Key activities include

- conducting independent internal assessments
- coordinating and supporting external assessments
- tracking action plans and follow-up to all assessments and appraisals
- supporting line managers in conducting their own self-assessments
- analyzing findings to determine root causes and trends

- identifying lessons learned

LAO forwards formal appraisal reports to line managers, who then develop the necessary action plans to improve ES&H practices. This office is also responsible for the Laboratory's lessons-learned program.

A.2.1.4 Quality Operations Office

The Laboratory Quality Operations Office (QOO) is responsible for developing and implementing an overall quality assurance (QA) program for the Laboratory. It secures the resources necessary to accomplish Laboratory QA goals, assesses QA personnel qualifications and training needs, monitors QA program development and implementation, and assures appropriate QA program documentation. The QOO is responsible for maintaining a QA awareness program and providing QA support for other organizations throughout the Laboratory. The QOO also develops and administers the Laboratory's centralized QA document management system.

A.2.1.5 Health and Safety Division

The Health and Safety Division (HS) initiates and promotes a comprehensive Laboratory program in the areas of radiation protection, occupational medicine, industrial safety, industrial hygiene, nuclear criticality safety, and health and safety quality assurance. It maintains a record of Laboratory documents related to safety and health matters and can provide Laboratory managers with data for analyzing trends and root causes. The division also provides line managers with assistance in all areas of health and safety including preparing and completing safety documentation such as Safety Analysis Reports (SARs) and Safety Assessments (SAs). HS Division also has management responsibility for DOE-funded programs in epidemiology, criticality safety, respirator development and testing, training, and radiological emergency response.

With assistance from the Laboratory Counsel and the ES&H Coordination Center, HS helps define and recommend Laboratory policies with regard to applicable health and safety regulations, laws, directives, DOE orders and directives, and state and federal regulations. HS helps communicate health and safety policies to employees and ensures that appropriate health and safety training programs are available.

A.2.1.6 Environmental Management Division

The Environmental Management Division (EM) initiates and promotes a comprehensive Laboratory program for environmental protection. It also manages the Laboratory's waste management, corrective action, environmental chemistry, environmental protection, and environmental restoration programs. It maintains a record of Laboratory documents related to environmental matters and can provide data to Laboratory managers for trend and root cause analysis The division provides line managers with assistance in preparing and completing environmental documentation such as reports required by the National Environmental Policy Act of 1969 (NEPA) and Resource Conservation and Recovery Act (RCRA).

With assistance from the Laboratory Counsel and the ES&H Coordination Center, EM helps to define and recommend Laboratory policies with regard to applicable environmental regulations, laws, directives, DOE orders and directives and state and federal regulations. EM helps communicate environmental policies to employees and ensures that appropriate environmental training programs are available.

A.2.1.7 Facilities Engineering Division

The Facilities Engineering Division (ENG) is responsible for the planning, construction, operations, and subsequent maintenance of all the facilities and infrastructure at the Laboratory. Facilities and infrastructures include buildings with their fixtures and systems, parking lots, roads, sidewalks, utilities, landscaping, fences, and other structures. ENG is responsible for coordination and direction of the Laboratory's primary on-site facilities and infrastructure subcontractor, Johnson Controls World Services Inc.

ENG also manages portions of the Laboratory's ES&H and QA programs, including quality assurance for engineering and facility programs, fire protection, and maintenance. The division determines special requirements for these programs, such as construction QA levels, design and construction documentation, fire protection for facilities and operations, water storage and flow for automatic and manual fire suppression, fire department service to Laboratory facilities, maintenance of infrastructure and special protective systems, and development of ES&H policy in these areas.

The division interprets DOE orders and directives and mandatory standards and guidelines in these areas for the Laboratory. It maintains appropriate records of design, construction, and maintenance history, including as-built drawings and space allocations, and provides field construction and maintenance support to help line managers discharge their ES&H responsibilities.

A.2.1.8 ES&H Committees

A number of committees with an ES&H emphasis advise Laboratory management and review the Laboratory's conduct in certain areas. Line organizations at the directorate, division, and group levels have ES&H committees that provide oversight for ES&H operations.

In addition, thirteen safety and environmental review committees advise Laboratory management and review the Laboratory's conduct in certain areas. Six of these review committees are required by statute or DOE order:

Animal Care and Use Committee
Biosafety Committee
Explosives Review Committee
Human Studies Review Committee

Nuclear Criticality Safety Committee
Reactor Safety Committee

Another six review committees were established by Laboratory management. They report to HS and EM divisions:

Compressed and Liquified Gas Safety Committee
Electrical Safety Committee
Firearms Safety Committee
Pressure Vessel and Piping Committee
ES&H Manual Review Committee
ES&H Questionnaire Committee

The last review committee, the Laboratory Environmental Review Committee, reports to the Associate Director for Operations.

A.2.2 Human Resources

The Laboratory is the largest employer in northern New Mexico with about 7,550 full-time-equivalent employees. More than 3,000 of these employees are technical staff members, more than 2,000 are technicians, and the remainder are administrative and general support personnel.

About 50 percent of the scientific staff have Ph.D. degrees, 26 percent have master's degrees, and 23 percent have bachelor's degrees. Approximately 33 percent of the technical staff are physicists, 33 percent are engineers, and 33 percent have degrees in chemistry, materials science, mathematics, bioscience, engineering, geoscience, and other disciplines.

Johnson Controls World Services Inc. is the primary subcontractor for support services and provides the crafts for construction, installation, alteration, waste removal, Nevada Test Site support, custodial services, and the operation of utility services. JCI employs about 1,400 people at Los Alamos.

Protective force services are provided by approximately 400 Mason and Hanger-Silas Mason, Inc. (Mason and Hanger) personnel under subcontract to the Laboratory. The DOE has contracted with the County of Los Alamos for fire services support. The Laboratory provides a technical representative who serves as the Laboratory's point of contact with the DOE and the county fire department. In the system established by the DOE, the county provides the people, and the DOE owns the equipment and the fire stations.

The Laboratory also has on-site many other subcontractor employees, visiting scientists, and, particularly in the summer, university faculty and student researchers. A substantial fraction of the guest researchers are not U.S. citizens.

A.2.3 Technical Areas

The Laboratory has 50 Technical Areas (TAs), serving many different functions and containing a wide variety of specialized facilities (Figure A-4).

TA-0 contains facilities or structures that are off site or outside the contiguous boundary of the Laboratory. Most are in or around the Los Alamos townsite. Typical facilities include utilities structures, fire stations, and lease office space.

TA-2 (Omega Site) is located in Omega Canyon and contains the Omega West Reactor.

TA-3 (South Mesa Site) is the main technical area of the Laboratory. TA-3 contains about 50 percent of the Laboratory's population and almost half of its total floor space. It serves as the central business district of the Laboratory. Functions that occur in TA-3 include administration and technical support; theoretical and computational science; and mixed-use experimental science, including materials science, earth science, space science and applied physics. The significant facilities in TA-3 include the Administration Building, the Otowi Building (used largely for administrative support), the Technical Shops Building, the Physics Building, the Chemistry and Metallurgy Research (CMR) Building, and the Sigma Building. The latter two buildings include materials science and nuclear materials chemistry. The CMR Building contains special nuclear materials (Categories 1 and 2). TA-3 also contains the Power Plant, other utility structures and buildings, and many public or corporate interface facilities like the Study Center and the University House.

TA-8 (Anchor Site West) is in the dynamic testing area and contains the Dynamic Testing Division Office, the Nuclear Weapons Technology Operational Surety Office, and nondestructive testing facilities. There are also some small magazines and obsolete buildings awaiting disposal.

TA-9 (Anchor Site East) is in the dynamic testing area and is used for the synthesis, formulation, and scale-up of explosives.

TA-11 (K Site) is in the weapons engineering area and contains a weapons environmental test complex, including the drop test facility.

TA-14 (Q Site) is in the dynamic testing area and includes test facilities for explosives characterization.

TA-15 (R Site) is in the dynamic testing area and is used for the hydrodynamic testing of weapons designs. TA-15 includes the Pulsed High-Energy Radiation Machine Emitting X-Rays (PHERMEX) Facility and the Dual Axis Radiographic Hydrodynamics Test (DARHT) Facility.

TA-16 (S Site) is in the weapons engineering area and contains the Design Engineering Division Office. TA-16 contains comprehensive facilities for pressing, casting, machining, and assembly of explosives.

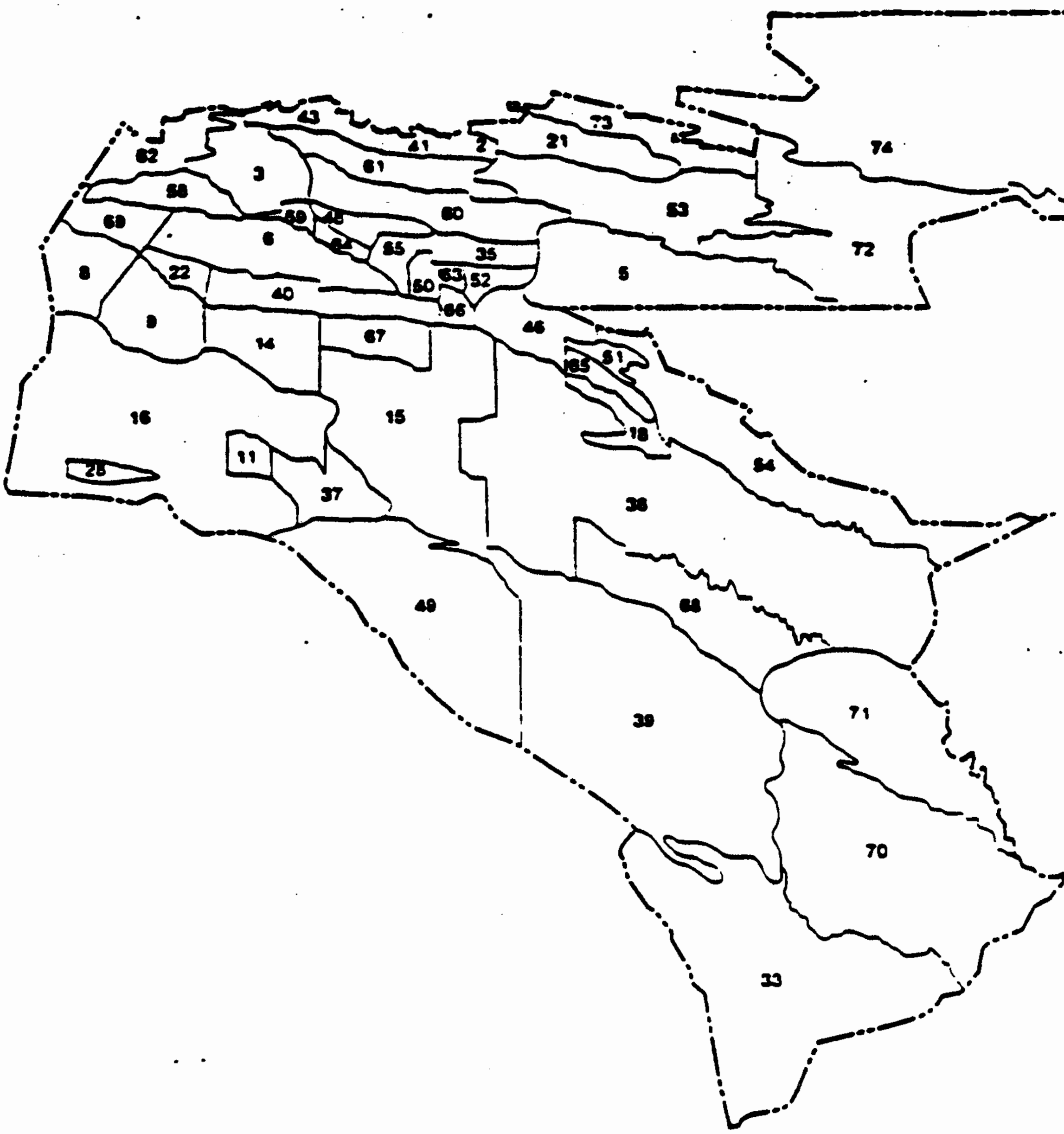


Figure A-4

Laboratory Technical Areas

TA-18 (Pajarito Site) contains the Los Alamos Critical Experiments Facility used for nuclear criticality research.

TA-21 (DP Site) is a former special nuclear materials processing facility. Current functions include nuclear chemistry R&D, the Tritium Systems Test Assembly (TSTA) Facility, and the Tritium Salt Facility. Much of the western part of TA-21 is in some stage of decontamination or decommissioning.

TA-22 (TD Site) is in the dynamic testing area and contains the Detonator Facility.

TA-28 (Magazine Area A) is in the weapons engineering area and is used for explosives storage.

TA-33 (HP Site) is a former explosives testing area. The area includes the Tritium High-Pressure Laboratory that is being phased out. Because of its isolation some technology assessment activities remain here. It is also an area designated for various types of antennas.

TA-35 (Ten Site) contains a mixture of experimental sciences that concentrate on laser-related research, inertial fusion, and nuclear safeguards. Significant facilities include the Target Fabrication Facility, the former Antares Laser Complex, a large rotating generator used for high magnetic field research, and the Nuclear Safeguards Laboratory.

TA-36 (Kappa Site) is in the dynamic testing area and is used for munitions and explosives applications.

TA-37 (Magazine Area C) is in the weapons engineering area and is used for explosives storage.

TA-39 (Ancho Canyon Site) is in the dynamic testing area and is used to study shock-wave phenomena and explosive-pulsed power applications.

TA-40 (DF Site) is in the dynamic testing area and is used to study the physics of explosives.

TA-41 (W Site) is in Omega Canyon and contains the Weapons Subsystems Laboratory used for the engineering design and development of nuclear components.

TA-43 (Health Research Laboratory) is dedicated to life-science research; the main facility is the Health Research Laboratory. TA-43 also contains the DOE Los Alamos Area Office.

TA-46 (WA Site) includes mixed-use experimental science such as chemistry and laser science and also mechanical and electrical engineering support functions.

TA-48 (Radiochemistry Site) is dedicated to radiochemistry functions and isotope and nuclear chemistry R&D.

TA-49 (Frijoles Mesa Site) is an isolated technical area which contains remote functions including the Hazardous Devices Team Training Facility and an Antenna Test Facility.

TA-50 (Waste Management Site) is dedicated to waste management functions, including radioactive waste and other hazardous wastes.

TA-51 (Radiation Exposure Facility) is dedicated to environmental research.

TA-52 (Reactor Development Site) contains theoretical and computational functions focusing in part on nuclear reactor safety technology. It also contains the Ultra High Temperature Reactor Experiment (UHTREX) Building, which has been decontaminated and decommissioned.

TA-53 (Meson Physics Facility) is a very large technical area dedicated to accelerator-related experimental science. It contains the Clinton P. Anderson Meson Physics Facility, the Manuel Lujan, Jr. Neutron Scattering Experiment, and the Ground Test Accelerator.

TA-54 (Waste Disposal Site) handles the management and disposal of radioactive solid and hazardous chemical wastes.

TA-55 (PF Site) is dedicated to special nuclear materials research and development, and it contains the Plutonium Facility.

TA-57 (Fenton Hill Site) is off site in the Jemez Mountains and is the location of the Hot Dry Rock Geothermal Project.

TA-59 (OH Site) contains many health, safety, and environment-related technical services.

TA-60 contains many physical support and infrastructure facilities and also contains the Rack Alignment and Assembly Complex used to outfit diagnostics for NTS tests.

TA-61 contains primarily physical support and infrastructure and also includes the Sanitary Landfill.

TA-63 contains physical support for sites along Pajarito Road.

TA-64 contains the Central Guard Facility.

TA-66 contains the Advanced Technology Assessment Center.

TA-72 contains the M&H Live Fire Range.

TA-73 contains the Los Alamos Airport.

TA-5, TA-6, TA-58, TA-62, TA-65, TA-67, TA-68, TA-69, TA-70, TA-71, and TA-74 are mostly undeveloped.

A.3 Geographic Setting

Los Alamos National Laboratory is located in Los Alamos County, north-central New Mexico, approximately 100 km (60 mi) by air north-northeast of Albuquerque and 40 km (25 mi) northwest of Santa Fe (Figure A-5). The 111-square-kilometer (43-square-mile) Laboratory site and adjacent communities of Los Alamos and White Rock are situated on the Pajarito Plateau, which consists of a series of fingerlike mesas separated by deep canyons running east to west and cut by intermittent streams. Mesa tops range in elevation from approximately 2400 m (7800 ft) on the flank of the Jemez Mountains to about 1900 m (6200 ft) at their eastern termination above the Rio Grande Valley.

Most Laboratory and community developments are confined to mesa tops although some significant sites are in the canyons. The surrounding land is largely undeveloped, with large tracts of land north, west, and south of the Laboratory site being held by the Santa Fe National Forest, Bureau of Land Management, Bandelier National Monument, General Services Administration, and Los Alamos County. The San Ildefonso Pueblo borders the Laboratory to the east (Figure A-6). Laboratory land, divided into Technical Areas, is used for building sites, experimental areas, waste disposal locations, roads, and utility rights-of-way (Figure A-4).

However, these uses account for only a small part of the total land area. Most land provides isolation for security and safety and is a reserve for future structure locations, if needed. The Laboratory's Long-Range Site-Development Plan assures adequate planning for the best possible future uses of available Laboratory lands. Limited access by the public is allowed in certain areas of the Laboratory reservation. An area north of Ancho Canyon between the Rio Grande and State Road 4 is open to hikers, rafters, and hunters, but woodcutting and vehicles are prohibited (Figure A-7). Portions of Mortandad and Pueblo canyons are also open to the public. An archaeological site (Otowi Tract), northwest of State Road 502 near the White Rock Y, is open to the public subject to restriction of cultural resource protection regulations.

The DOE controls the area within Laboratory boundaries and has the option to completely restrict access.

A.3.1 Geology

Most of the fingerlike mesas in the Laboratory area are found in Bandelier Tuff (Figure A-8). Ash fall, ash fall pumice, and rhyolite tuff form the surface of Pajarito Plateau. The tuff is over 300 m (1000 ft) thick in the western part of the plateau and thins to about 80 m (260 ft) eastward above the Rio Grande. It was deposited as a result of a major volcanic eruption in the Jemez Mountains 1.1 to 1.4 million years ago.

The tuffs overlap onto the Tschicoma Formation, which consists of older volcanics that form the Jemez Mountains. The tuff is underlain by the conglomerate of the Puye Formation in the central and eastern edge along the Rio Grande. Chino Mesa basalts interfinger with the

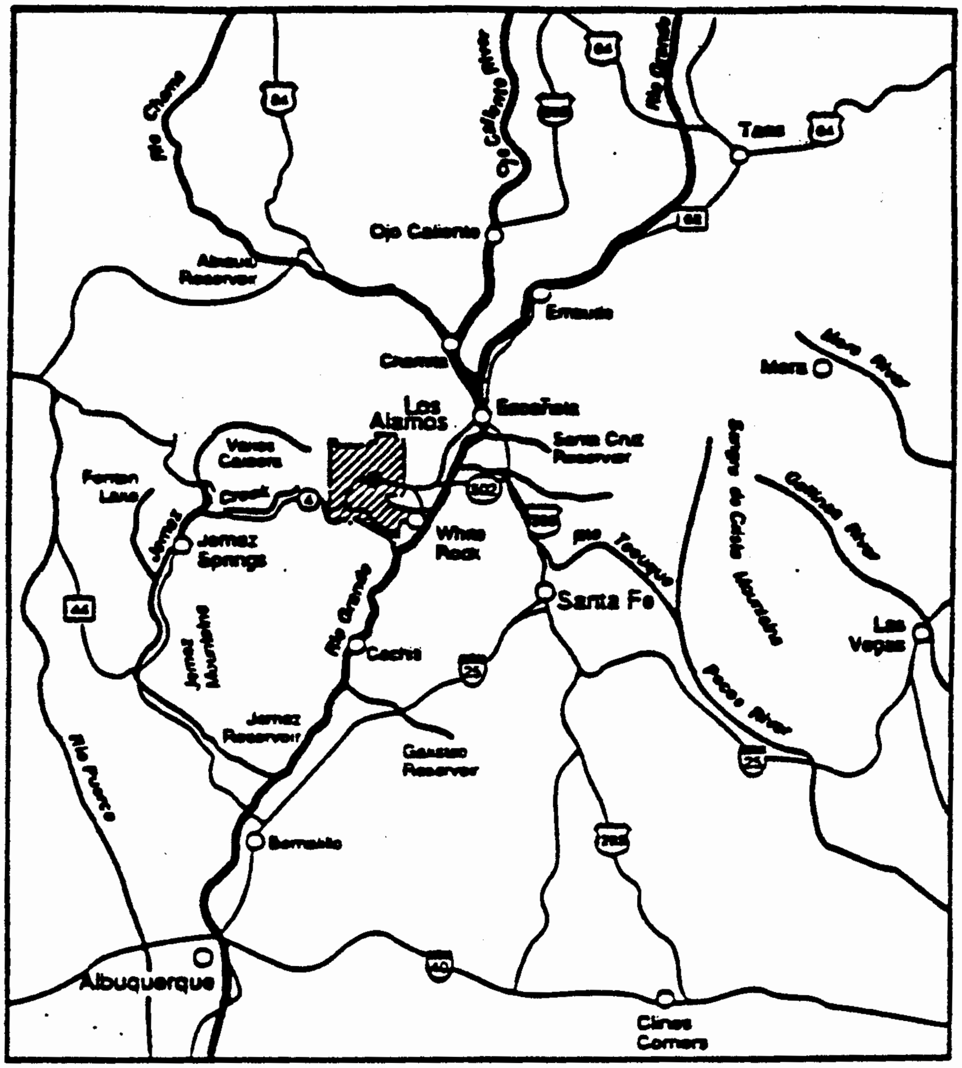


Figure A-5

Location of Los Alamos County

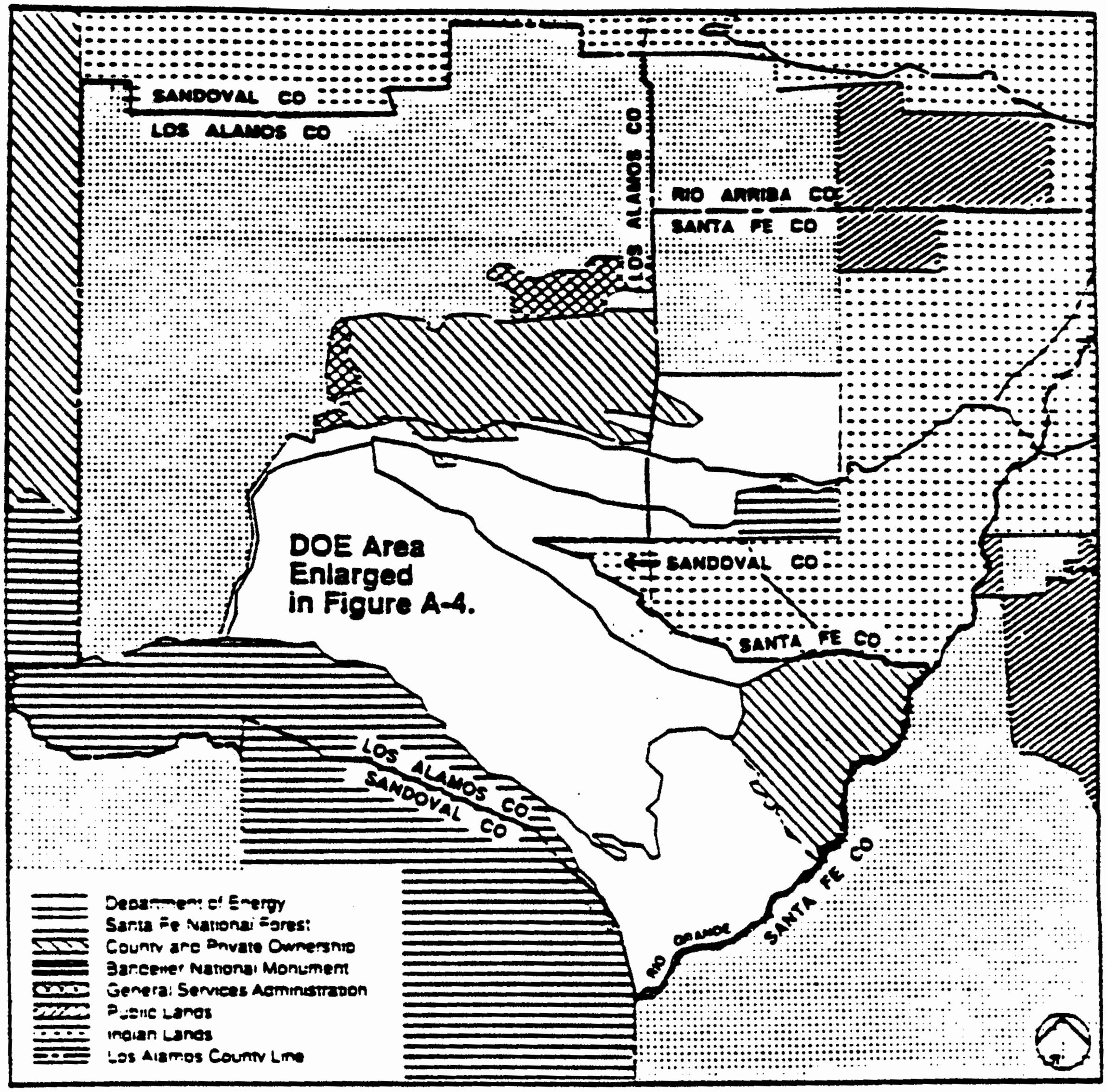


Figure A-6

Land Ownership in Los Alamos County

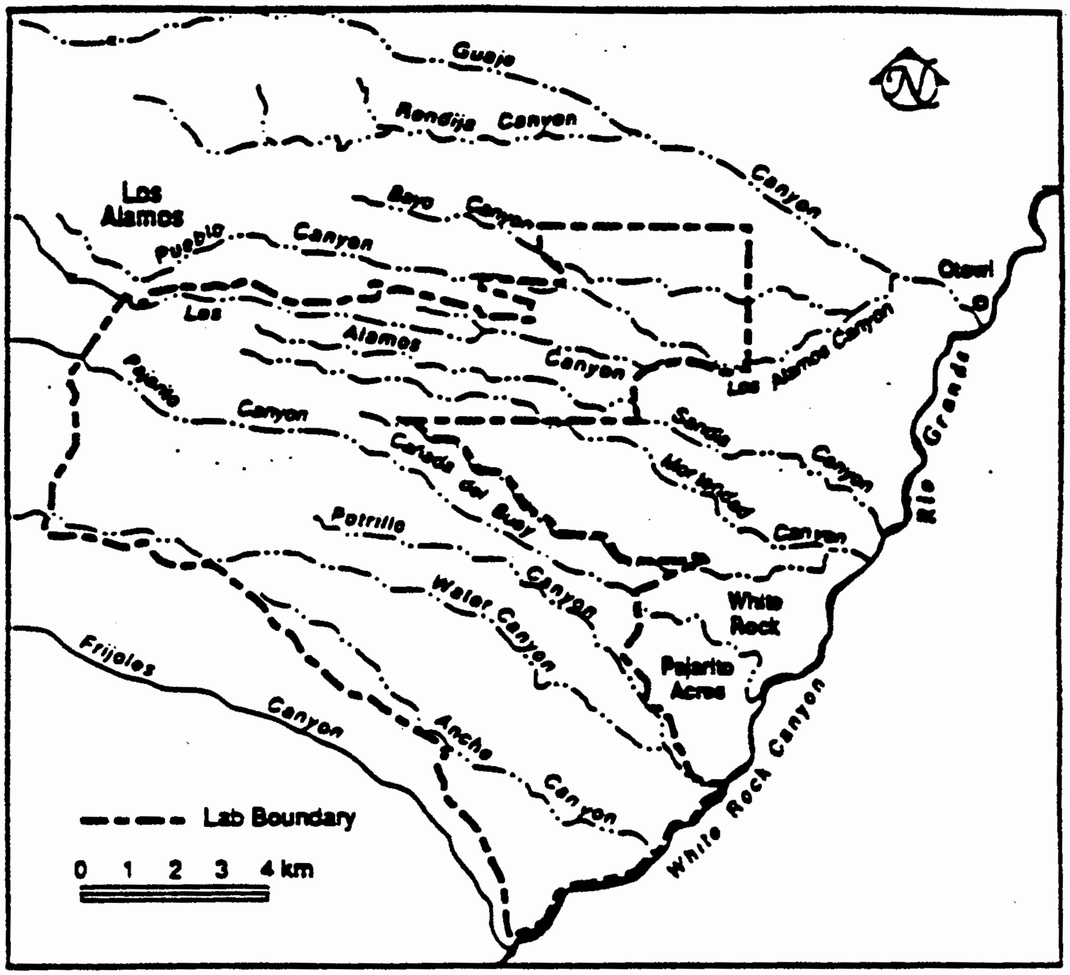
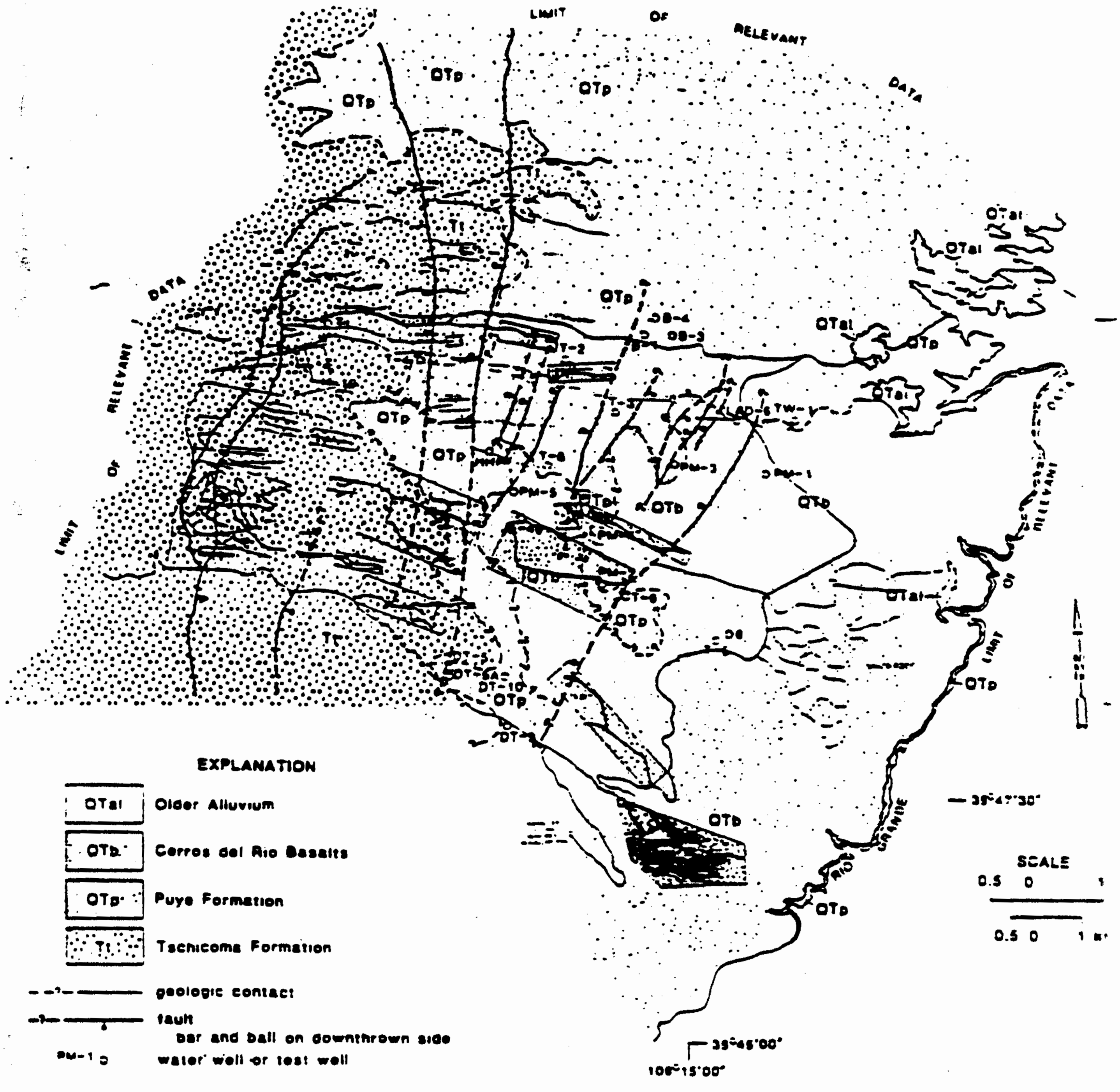


Figure A-7

Geographic Features of Los Alamos County



PALEOGEOLOGY OF THE PRE-BANDELIER TUFF SURFACE, PAJARITO PLATEAU

Figure A-8

Geologic Map of Pajarito Plateau

conglomerate along the river. These formations overlay the sediments of the Tesuque Formation, which extends across the Rio Grande Valley and is in excess of 1000 m (3300 ft) thick. The Laboratory is bordered on the east by the Rio Grande, the central feature of the Rio Grande Rift. Because the rift is slowly widening, the area experiences frequent but minor seismic disturbances. Fault lines are indicated on the map in Figure A-8.

A.3.2 Hydrology

Los Alamos area surface water occurs primarily as intermittent streams. Springs on the flanks of the Jemez Mountains supply base flow into upper reaches of some canyons, but the amount is insufficient to maintain surface flows across the Laboratory site before it is depleted by evaporation, transpiration, and infiltration. Run-off from heavy thunderstorms or heavy snowmelts reaches the Rio Grande several times a year in some drainages. Effluents from sanitary sewage, industrial waste treatment plants, and cooling-tower blowdown are released into some canyons at rates sufficient to maintain surface flows for varying distances.

Ground water occurs in three modes in the Los Alamos area: (1) water in shallow alluvium in canyons, (2) perched water (a ground water body above an impermeable layer that separates it from the underlying main body of ground water by an unsaturated zone), and (3) the main aquifer of the Los Alamos area.

Intermittent stream flows in canyons of the plateau have deposited alluvium that ranges from less than 1 m (3 ft) to as much as 30 m (100 ft) in thickness. The alluvium is permeable, in contrast to the underlying volcanic tuff and sediments. Intermittent run-off in canyons infiltrates the alluvium until its downward movement is impeded by the less permeable tuff and volcanic sediment. This impediment results in a shallow body of alluvial ground water that moves down gradient within the alluvium. As water in the alluvium moves down gradient, it is depleted by evapotranspiration and movement into underlying volcanics.

Perched water occurs in conglomerate and basalts beneath the alluvium in a limited area about 37 m (120 ft) deep in the midreach of Pueblo Canyon and in a second area about 45 to 60 m (150 to 200 ft) beneath the surface in lower Pueblo and Los Alamos canyons near their confluence. The second area is mainly in basalts and has one discharge point at Basalt Spring in Los Alamos Canyon.

The main aquifer of the Los Alamos area is the only aquifer in the area capable of serving as a municipal water supply. The surface of the aquifer rises westward from the Rio Grande within the Tesuque Formation into the lower part of the Puye Formation beneath the central and western part of the plateau. Depth of the aquifer decreases from 360 m (1200 ft) along the western margin of the plateau to about 180 m (600 ft) at the eastern margin. The main aquifer is isolated from alluvial and perched waters by about 110 to 190 m (350 to 620 ft) of dry tuff and volcanic sediments. Thus, there is little hydrologic connection or potential for recharge to the main aquifer from alluvial or perched water.

Water in the main aquifer is under water-table conditions in the western and central part of the plateau and under artesian conditions in the eastern part and along the Rio Grande. Major recharge to the main aquifer is from the intermountain basin of the Valles Caldera in the Jemez Mountains west of Los Alamos. The water table in the caldera is near land surface. The underlying lake sediment and volcanics are highly permeable and contribute to the recharge of the aquifer through the Tschicoma Formation interflow breccias (rock consisting of sharp fragments embedded in a fine-grained matrix) and the Tesuque Formation. The Rio Grande receives ground-water discharge from springs fed by the main aquifer. The 18.5-km (11.5 mi) reach of the river in White Rock Canyon between Otowi Bridge and the mouth of Rito de Los Frijoles receives an estimated 5.3 to 6.8 x 10^6 cubic meters (4300 to 5500 acre-ft) annually from the aquifer.

A.3.3 Climatology

Los Alamos has a semi-arid temperate mountain climate. Average annual precipitation is nearly 45 cm (18 in). Forty percent of the annual precipitation normally occurs during July and August from thunderstorms. Winter precipitation falls primarily as snow, with accumulations of about 130 cm (51 in) annually.

Summers are generally sunny with moderate, warm days and cool nights. Maximum daily temperatures are usually below 32°C (90°F). Afternoon and evening thunderstorms are common, especially in July and August. Many winter days are clear with light winds, so strong sunshine can make conditions comfortable even when air temperatures are cold. Snowstorms with accumulations exceeding 10 cm (4 in) are common in Los Alamos. Some storms can be associated with strong winds, frigid air, and dangerous wind chills.

Because of complex terrain, surface winds in Los Alamos often vary greatly with time of day and location. With light, large-scale winds and clear skies, a distinct daily wind cycle often exists: a light southeasterly to southerly upslope wind during the day and a light westerly to northwesterly drainage wind during the night. However, several miles to the east toward the edge of the Pajarito Plateau near the Rio Grande Valley, a different daily wind cycle is common: a moderate southwesterly up-valley wind during the day and either a light northwesterly to northerly drainage wind or moderate southwesterly wind at night. On the whole, the predominant winds are southerly to northwesterly over western Los Alamos County and southwesterly and northeasterly toward the Rio Grande Valley.

Historically, no tornadoes are reported to have touched down in Los Alamos County. Strong dust devils can produce winds up to 34 m/s (75 mph) at isolated spots in the county, especially at lower elevations. Strong winds with gusts exceeding 27 m/s (60 mph) are common and widespread during the spring.

Lightning is common over the Pajarito Plateau. There are 58 thunderstorm days during an average year, with most occurring during the summer. Lightning protection is an important design factor for most facilities at the Laboratory. Hail damage can also occur. Hailstones with diameters up to 0.64 cm (0.25 in) are common; 1.3-cm (0.5-in)-diameter hailstones are rare.

The irregular terrain at Los Alamos affects atmospheric turbulence and dispersion, sometimes favorably and sometimes unfavorably. Enhanced dispersion promotes greater dilution of contaminants released into the atmosphere. The complex terrain and forests create an aerodynamically rough surface, forcing increased horizontal and vertical dispersion. Dispersion generally decreases at lower elevations where the terrain becomes smoother and less vegetated. The frequent clear skies and light, large-scale winds cause good vertical, daytime dispersion, especially during the warm season. Strong daytime heating during the summer can force vertical mixing up to 1-2 km (3000-6000 ft) above ground level (AGL), but the generally light winds have limited effect in diluting contaminants horizontally.

Clear skies and light winds have a negative effect on nighttime dispersion, causing strong, shallow surface inversions to form. These inversions can severely restrict near-surface vertical and horizontal dispersion. Inversions are especially strong during the winter. Shallow drainage winds can fill lower areas with cold air, thereby creating deeper inversions, common toward the Rio Grande Valley (White Rock) on clear nights with light winds. Canyons can also limit dispersion by channeling air flow. Strong, large-scale inversions during the winter can limit vertical mixing to under 1 km (3000 ft) AGL.

Dispersion is generally greatest during the spring when the winds are strongest. However, deep vertical mixing is greatest during the summer. Low-level dispersion is generally the least durin summer and autumn when winds are light. Even though low-level, winter dispersion is general greater, intense surface inversions can cause least-dispersive conditions during the night and early morning.

The frequencies of atmospheric dispersive capability are 52 percent unstable (stability classes A-C), 21 percent neutral (D), and 27 percent stable (E-F) during the winter at TA-59. The frequencies are based on measured vertical wind variations. Stability generally increases (becomes less dispersive) toward the valley.

A.3.4 Ecology

The diversity of ecosystems in the Los Alamos area is due partly to the dramatic 1500-m (5000 ft) elevation gradient from the Rio Grande on the east to the Jemez Mountains 20 km (12 mi) to the west, and partly to the many canyons with abrupt surface slope changes that dissect the area. Six major vegetative complexes or community types are found in Los Alamos County. These are juniper-grassland, pinon-juniper, ponderosa pine, mixed conifer, spruce-fir, and subalpine grassland. The juniper-grassland is found along the Rio Grande on the eastern border of the plateau and extends upward on the south-facing sides of canyons, at 1700 to 1900 m (5600-6200 ft). The pinon-juniper, generally in the 1900- to 2100-m (6200-6900 ft) elevation range, includes large portions of the mesa tops and north-facing slopes at the lower elevations. Ponderosa pine is found in the western portion of the plateau in the 2100 to 2300-m (6900-7500 ft) elevation range. These three types predominate, each occupying about one-third of the Laboratory site. The mixed conifer at an elevation of 2300 to 2900 m (7500-9500 ft) interfaces with the ponderosa pine in the deeper canyons and north slopes and extends to the west from the higher mesas on the slopes of the Jemez Mountains. The subalpine grasslands are mixed with the spruce-fir communities at higher elevations of 2900-3200 m (9500-10,500 ft).

Because of the variety of complex interlocking ecotones in the Los Alamos area, there is no single ecological structure of food webs that can characterize the associations of flora and fauna in the area. Food-web relationships for the biota of the Laboratory environs have been studied only enough to provide general descriptions and expectations.

Generally, the larger mammals and the birds are wide-ranging and occupy commensurately large habitats, from the dry mesa-canyon country at lower elevations to the high mountain tops west of the Laboratory. The smaller mammals, reptiles, invertebrates, and vegetation are more sensitive to the variations in elevation and thus are confined to generally smaller habitats.

The sheer canyon walls at the lower elevations serve as important nesting habitat for the birds of prey. Herbivorous rodents, insects, and small birds probably form the bases for the food webs in the lower canyons.

At the lower elevations of 1800 to 1940 m (5900-6360 ft), the canyons are dry except during rainfall run-off events, although some surface water is perennial as a result of treated Laboratory and municipal effluents.

At the higher elevations of 1940 to 2180 m (6360-7150 ft), the canyons are relatively narrow and densely forested. Some surface water is perennial. The lower elevation vegetation types grade into less prominence with other plants assuming dominance.

Mice generally decrease in population density at higher elevations in the canyons while rodent population densities increase with elevation on the mesa tops. This apparent anomaly is at least partly due to the relationship of canyon and mesa-top rodent study sites to ecotonal areas. Rodent species present include those already mentioned for the lower elevation as well as tree squirrels and the meadow vole, a species typical of moist habitats. Bird populations appear to markedly increase along the ecotone between the pinon-juniper and ponderosa pine communities.

The mountainous areas to the west of the Laboratory are heavily forested with open areas created by lightning-strike forest fires. This area has not been studied in sufficient detail to determine all major faunal associations.

As a result of past and present human use of the Laboratory's environs, areas of vegetation are undergoing secondary succession. This process has had, and will continue to have, important consequences to the natural systems. Farming by prehistoric Indians and by Spanish and Anglo settlers before the Laboratory's establishment in 1943 created open grassy areas on the mesas that have not completely returned to climax plant communities. These areas afford suitable feeding areas for herbivores, especially the deer and elk, with adjacent timbered canyon slopes providing cover for these species. The food-web relationships of the mesa areas are related to those of the canyons to some degree.

Birds are strongly dependent upon the vegetation of an area to produce a spectrum of environments that may be classified as (1) a lower habitat threshold occupied during seasonal movements or during times of strong intra-specific competition; (2) an optimum habitat for vital functions of mating, nesting, and feeding; and (3) a zone of exclusion imposed by plant succession. The clearing of the ponderosa pine forest has created large openings with an appreciable "edge effect" that is exploited by bird communities. Margins of clearings often have 95 percent more birds, representing 40 percent more species, compared with undisturbed stands of trees; however, openings that are heavily developed offer no such increase in bird or other animal communities. The succession sequence of vegetation results in a richness of bird life that testifies to the general health of the ecosystem.

The pronounced east-west canyon and mesa orientation, with accompanying differences in soils, moisture, and solar radiation, produces an interlocking finger effect, resulting in many ecotones or transitional overlaps of plant and animal communities within small areas.

Wetland vegetation is associated with small marshes (often manmade) scattered throughout the Laboratory. Riparian habitats are dispersed along intermittently flowing streams that course through the various canyons. Springs emerge from rock formations in the lower portions of the Laboratory, producing short perennial streams. These streams are bordered by willow, birch, alder, narrowleaf and Rio Grande cottonwood. Marshes are vegetated with cattails, various forbs such as watercress and a number of species of grasses, rushes, and sedges.

The various plant communities within the Laboratory provide a home for a variety of animals. Large mammal populations include elk, deer, bear, and mountain lion. A variety of small mammals have been identified within various habitats including the deer mouse, harvest mouse, brush mouse, pinon mouse, and the white throated woodrat. Raccoon, chipmunks, Abert's squirrels, coyotes, porcupines, and a variety of medium-size mammals are common.

Wetland and riparian habitats provide conditions necessary for the survival of several species of frogs and toads including the chorus frog, canyon treefrog, Woodhouse's toad and spadefoot toad. These aquatic or semi-aquatic habitats have a variety of fauna including mayflies, dragonflies, various snails, and small bivalves. Moist canyon bottoms provide grassy habitats for skunks and various venomous and non-venomous snakes including prairie and diamondback rattlesnakes; ringneck snake, and coachwhips. Reptiles such as the collared lizard, eastern fence lizard, and 2 species of whiptails are more commonly found in the more arid uplands.

More than 200 species of birds have been identified within the 144-square-mile-area that includes Los Alamos County and the Laboratory. Raptor species include the redtail hawk, Cooper's hawk, American Kestrel, and peregrin falcon. In autumn, hummingbirds and a variety of passerines and hawks follow the adjacent mountain ridges as they gradually move south. Wintering flocks of juncos and nomadic fringillids roam the plateau woodlands.

To date, 90 species of ants have been collected in Los Alamos County. Approximately 17 orders and 215 families of insects have been identified. Additionally 74 species of nomadic ground-surface-inhabiting spiders have been found along streambanks.

A.3.5 Cultural Resources

Approximately 60 percent of DOE land in Los Alamos County has been surveyed for prehistoric and historic cultural resources and close to 1000 sites have been recorded. Over 95 percent of these ruins date from the fourteenth and fifteenth centuries. Most of the sites are found in the pinon-juniper vegetation zone, with 80 percent lying between 5,800 and 7,100 feet in elevation. Almost three-quarters of all ruins are found on mesa tops, which are the preferred locations for development at the Laboratory today.

These prehistoric sites can be dated to the following time periods:

Paleo-Indian Period, 10,000 B.C. to 4,000 B.C.: Characterized by small groups of big-game hunters who may have followed game herds up and down the Rio Grande, with trips onto the Pajarito Plateau to procure obsidian and other resources. This period is represented on DOE land by occasional surface finds of diagnostic projectile points made from both local obsidian and exotic unidentified chert.

Archaic Period, 4,000 B.C. to A.D. 600: Characterized by small groups who may have used the Pajarito Plateau for hunting expeditions and for seasonal exploitation of certain wild plants. This period is represented on DOE land as scatters of lithic tools, chipping debris, and diagnostic projectile points. Little research has been conducted for this period; it is possible that buried habitation sites are also present on DOE land.

Early Developmental Period, A.D. 600 to A.D. 900: Characterized by settled hunter-gatherers living in semi-subterranean pithouses and making simple pottery. Some possible pithouse locations and associated artifacts have been identified on DOE land but identification is tenuous.

Late Developmental Period, A.D. 900 to A.D. 1100: Characterized by small groups of maize horticulturalists who still relied to a great extent on gathered wild plants. Sites are typically small adobe, sometimes crude masonry, pueblo structures. Very few sites from this period are located on DOE land; most of those recorded are located close to the Rio Grande in the vicinity of Chaquihui Mesa and Lower Water Canyon.

Coalition Period, A.D 1100 to A.D. 1325: Characterized by maize horticulturalists. Early sites are adobe and masonry rectangular structures and later sites are large masonry roomblocks of over 100 rooms enclosing a plaza. Most of the ruins recorded on DOE land date to this time period (700 have been recorded). Most researchers attribute the increase in site density to migration but others see the increase in site numbers as a result of local population growth.

Classic Period, A.D. 1325 to A.D. 1600: Characterized by intensive maize horticulturalists. Settlements on the Pajarito Plateau aggregated into three population clusters with outlying fieldhouses of 1-2 rooms. The central site cluster consists of four temporally overlapping sites: Navawi, Otowi, Tsankawi and Tsirege. Otowi and Tsirege are on DOE land. These ruins are ancestral to the Tewa speakers now living at San Ildefonso Pueblo.

LIST OF FIGURES

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Appendix B

ACRONYMS AND ABBREVIATIONS

ACGIH	American Conference of Governmental Industrial Hygienists
ACHP	Advisory Council on Historic Preservation
ADCM	Associate Director of Chemistry and Materials
ADDRA	Associate Director of Defense Research and Applications
ADET	Associate Director of Energy and Technology
ADNWT	Associate Director of Nuclear Weapons Technology
ADR	Associate Director of Research
AGL	Above Ground Level
AL	Albuquerque Field Office
ALARA	As Low As Reasonably Achievable
ANS	American Nuclear Society
ANSI	American National Standard Institute
AO	Administrative Order
AQCR	Air Quality Control Regulation
AQMS	Air Quality and Meteorology Section
AR	Administrative Requirement
ASER	Annual Site Environmental Report
AVGAS	Aviation Gas
BOS	Badge Office System
BRASS	Basic Rapid Alarm Security System
C-4	Communications Group
CAIRS	Computerized Accident and Incident Reporting System
CAM	Continuous Air Monitor
CAS	Central Alarm Station
CERCLA	Environmental Response, Compensation, and Liability Act
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CMR	Chemistry and Metallurgy Research
CMS	Corrective Measures Study
CONT	Controller's Office
CPM	Counts Per Minute
CWA	Clean Water Act
DAC	Disaster Assistance Center
D&D	Decontamination and Decommissioning
DDESB	Department of Defense Explosives Safety Board
DEC	DOE Environmental Checklist

DHR	Director of Human Resources
DoD	Department of Defense
DOE	Department of Energy
DOE/AL	Department of Energy/Albuquerque Office
DOE/EV/#	DOE Explosives Safety Manual
DOE/HQ	Department of Energy/Headquarters
DOE/LAAO	Department of Energy/Los Alamos Area Office
DOT	Department of Transportation
DPM	Disintegrations Per Minute
EA	Environmental Assessment
EAP	Employee Assistance Program
EDS	Employment Development System
EIS	Environmental Impact Statement
EM	Environment Management (Division)
EM-7	Waste Management Group
EM-8	Environmental Protection
EM-9	Environmental Chemistry
EM-13	Environmental Restoration
EMO	Emergency Management Office
EMP	Environmental Monitoring Plan
ENG	Facilities Engineering (Division)
ENG-1	Protection Management
ENG-2	Planning ENG-3 Design
ENG-4	Estimating ENG-7 Records Management
ENG-5	Field Operations Group
ENG-6	Maintenance
ENG-8	Fire Protection and Utilities Group
EOC	Emergency Operations Center
EP	Extraction Procedure
EPA	Environmental Protection Agency
ER	Environmental Restoration
ERP	Emergency Response Plan
ERT	Emergency Response Team
ES&H	Environment, Safety, and Health
ES&H CC	ES&H Coordination Center
ES&H Manual	*The Laboratory Manual, Chapter 1, Environment, Safety, and Health*
FAA	Federal Aviation Administration
FAR	Federal Aviation Regulation
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
FYP	Five-year Plan
GEMS	*Los Alamos Guide to ES&H Management Structure*
GET	General Employee Training

GWPMPP	Groundwater Protection Management Program Plan
HAZMAT	Hazardous Material
HAZPACT	Hazardous Material Packaging and Shipping Section
HE	High Explosives
HEPA	High-Efficiency Particulate Air (Filter)
HP	Health Physics
HQ	Headquarters
HRD	Human Resources Development
HS	Health and Safety (Division)
HS-1	Health Physics Operations
HS-2	Occupational Health
HS-3	Safety and Risk Assessment
HS-4	Health Physics Measurements
HS-5	Industrial Hygiene
HS-6	Nuclear Criticality Safety
HS-12	Health Physics Policy and Programs
HSE	Health, Safety and Environment (Division)
HSE-1	Radiation Protection
HSEAC	Health, Safety, and Environment Advisory Council (UC)
HSWA	Hazardous and Solid Waste Amendments of 1984
JCI	Johnson Controls World Services Inc.
Laboratory	Los Alamos National Laboratory
LACFD	Los Alamos County Fire Department
LAMPF	Los Alamos Meson Physics Facility (Title revised to Clinton P. Anderson Meson Physics Facility)
LAM	Los Alamos Airport
LANL	Los Alamos National Laboratory
LAO	Laboratory Assessment Office
LAT	Laboratory Assessment Team
LC	Laboratory Counsel
LDCC	Laboratory Data Communication Center
LDR	Land Disposal Restrictions
LJ#	Laboratory Job Number
M Division	Dynamic Testing
M-8	Explosive Applications Group
MASS	Material Accountability and Safeguards System
MAT	Materials Management
MAT-2	Property and Transportation Management Group
MAT-14	Receiving Group
MEE-9	Engineering Design and Quality Assurance Group
M&H	Mason and Hanger-Silas Mason, Inc.

DOE Order 5480.7	Fire Protection (November 16, 1987)
DOE Order 5480.8	Contractor Occupational Medical Program (November 16, 1987)
DOE Order 5480.10	Contractor Industrial Hygiene Program (June 26, 1985)
DOE Order 5480.11	Radiation Protection for Occupational Workers (June 29, 1990)
DOE Order AL 5480.16	Firearms Safety (August 17, 1989)
DOE Order 5480.16	Firearms Safety (October 10, 1990)
DOE Order 5480.17	Site Safety Representatives (October 5, 1988)
DOE Order 5480.18	Accreditation of Performance-Based Training for Category A Reactors and Nuclear Facilities (November 2, 1989)
DOE Order 5480.19	Conduct of Operations Requirements for DOE Facilities (July 9, 1990)
DOE Order 5480.20	Personnel Selection, Qualification, Training, and Staffing Requirements at DOE Reactor and Non-Reactor Nuclear Facilities (February 20, 1991)
DOE Order 5481.1B	Safety Analysis and Review System (May 19, 1987)
DOE Order 5482.1B	Environment, Safety, and Health Appraisal Program (September 23, 1986)
DOE Order 5483.1A	Occupational Safety and Health Program for DOE Contractor Employees at Government-owned Contractor-operated Facilities (June 22, 1983)
DOE Order 5484.1	Environmental Protection, Safety, and Health Protection Information Reporting Requirements (June 29, 1990)
DOE Order 5500.2B	Emergency Categories, Classes, and Notification and Reporting Requirements (April 30, 1991)
DOE Order 5500.3A/B	Planning and Preparedness for Operational Emergencies (April 30, 1991)
DOE Order 5500.4	Public Affairs Policy and Planning Requirements for Emergencies (September 30, 1982)

DOE Order 5500.10	Emergency Readiness Assurance Program (April 30, 1991)
DOE Order 5610.1	Packaging and Transporting of Nuclear Explosives, Nuclear Components, and Special Assemblies (September 11, 1979)
DOE Order 5632.6	Physical Protection of DOE Property and Unclassified Facilities (February 9, 1988)
DOE Order AL 5700.6B	General Operations Quality Assurance (July 7, 1989)
DOE Order 5700.6B	Quality Assurance (March 28, 1990)
Draft DOE Order 5700.6C	Quality Assurance (February 25, 1991)
DOE Order 5820.2A	Radioactive Waste Management (September 26, 1988)
DOE Order 6430.1A	General Design Criteria (April 6, 1989)