Sandia Labs Awareness Project – Phase II
Albuquerque Center for Peace and Justice
202 Harvard SE
Reports

Radiation Releases at Sandia National Laboratories/New Mexico: Recently Reported Radiation Releases and Other Potential Sources of Radiation Release

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Review of Environmental Monitoring for Radionuclides in Air at the Sandia National Laboratory

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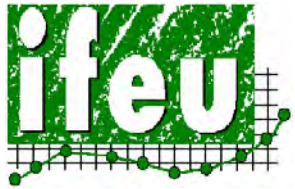


http://www.sandia.gov/recordsmgmt/highlights/snl_historyfs.pdf

http://www.globalsecurity.org/wmd/facility/sandia_nm.htm

On November 1, 1949, Sandia Corporation - a wholly owned subsidiary of Western Electric and, later, Bell Labs and AT&T Corporation - began managing Sandia. In 1993, Martin Marietta Corporation (now Lockheed Martin) acquired SNL/NM's management contract.

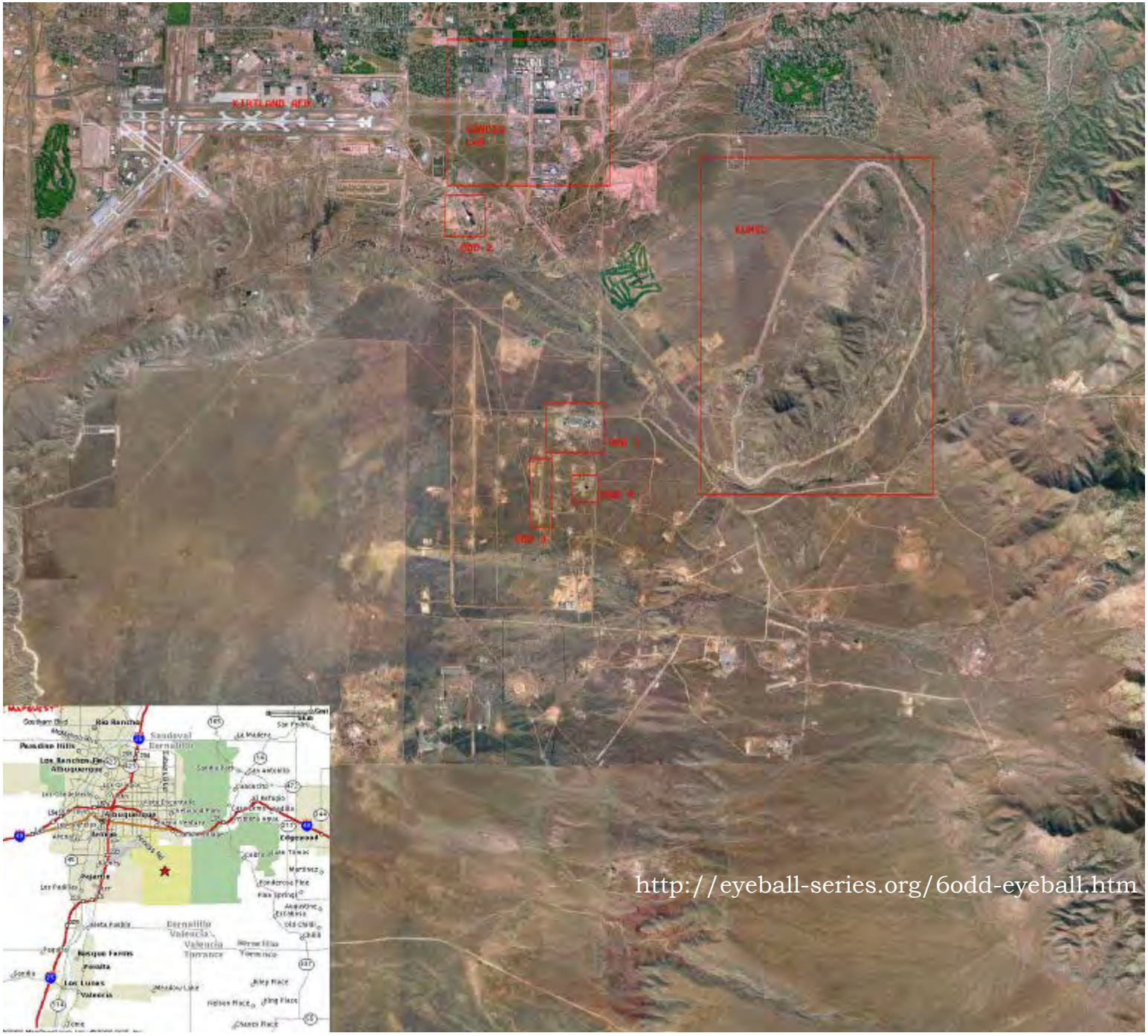
"Sandia's missions meet national needs in five key areas:

- **Nuclear Weapons — Ensuring the stockpile is safe, secure, reliable, and can support our nation's deterrence policy**
- **Nonproliferation and Assessments — Reducing the proliferation of weapons of mass destruction, the threat of nuclear accidents, and the potential for damage to the environment**
- **Military Technologies and Applications — Helping to maintain superiority of our armed forces**
- **Homeland Security — Helping to protect our nation against terrorism [and]**
- **Energy and Infrastructure Assurance — Keeping America's resources and information flowing"**

Sandia is a government-owned/contractor-operated facility "managed by a subsidiary of Lockheed Martin Corporation for the Department of Energy's (DOE) National Nuclear Security Administration (NNSA). Sandia also works for and partners with other DOE agencies, the Department of Defense (DoD), the Department of Homeland Security (DHS), other federal, state, and local agencies and governments, private industry, and academic institutions to accomplish."

“Sandia designs and develops more than 90 percent of the 3,000-6,500 components in a modern nuclear weapon. Since 1993, Sandia has also manufactured some of the most complex nuclear weapon components.”

As of Fall 2005, SNL/NM employed the equivalent of 8,600 full time employees and projected an annual budget of $2.7 billion for Fiscal Year 2006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Los Lunas
Valencia
Edgewood
Tijeras
Bosque Farms
Peralta
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http://eyeball-series.org/6odd-eyeball.htm

Radiation Releases at Sandia National Laboratories/New Mexico:
Recently Reported Radiation Releases and Other Potential Sources of Radiation Release

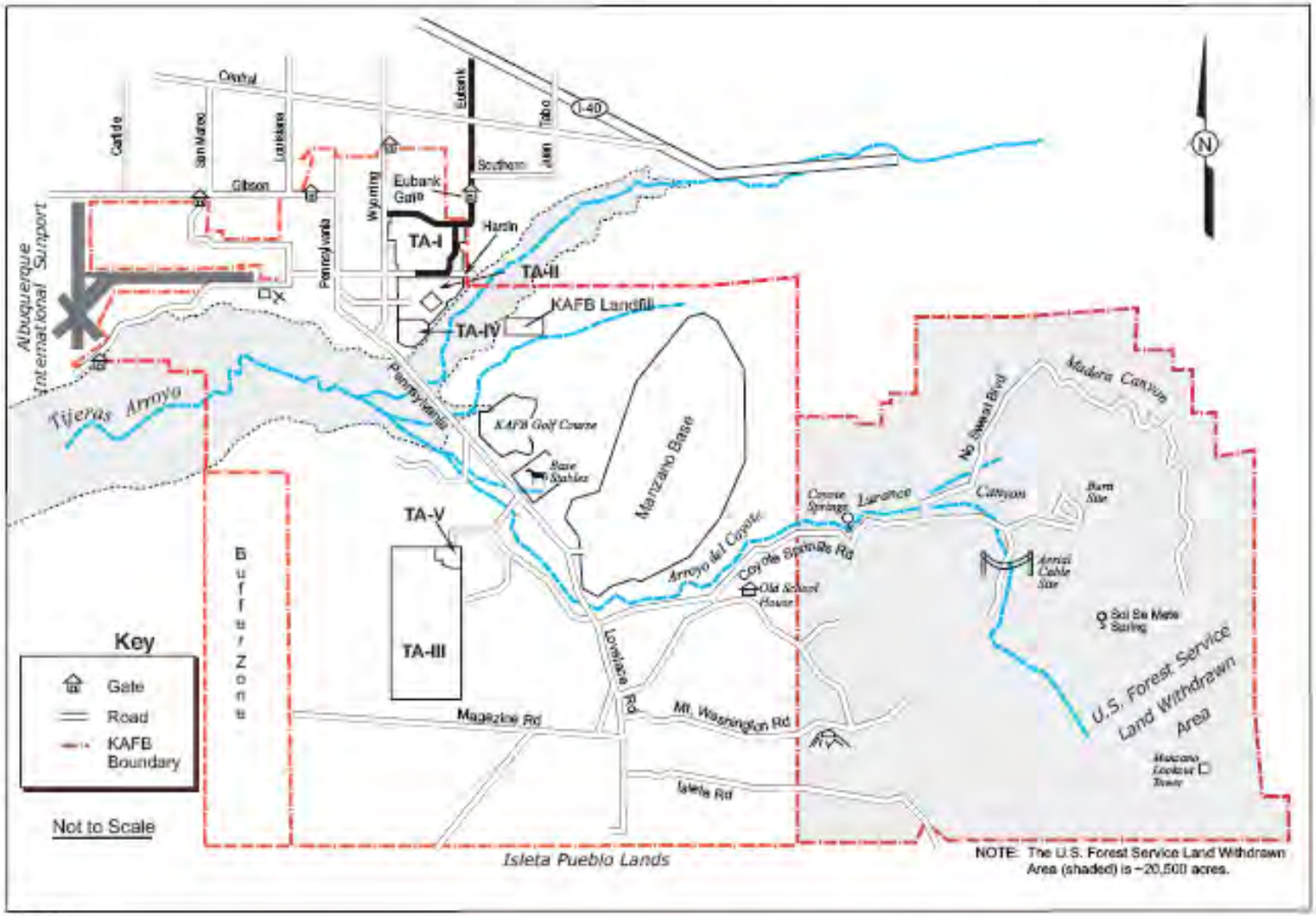
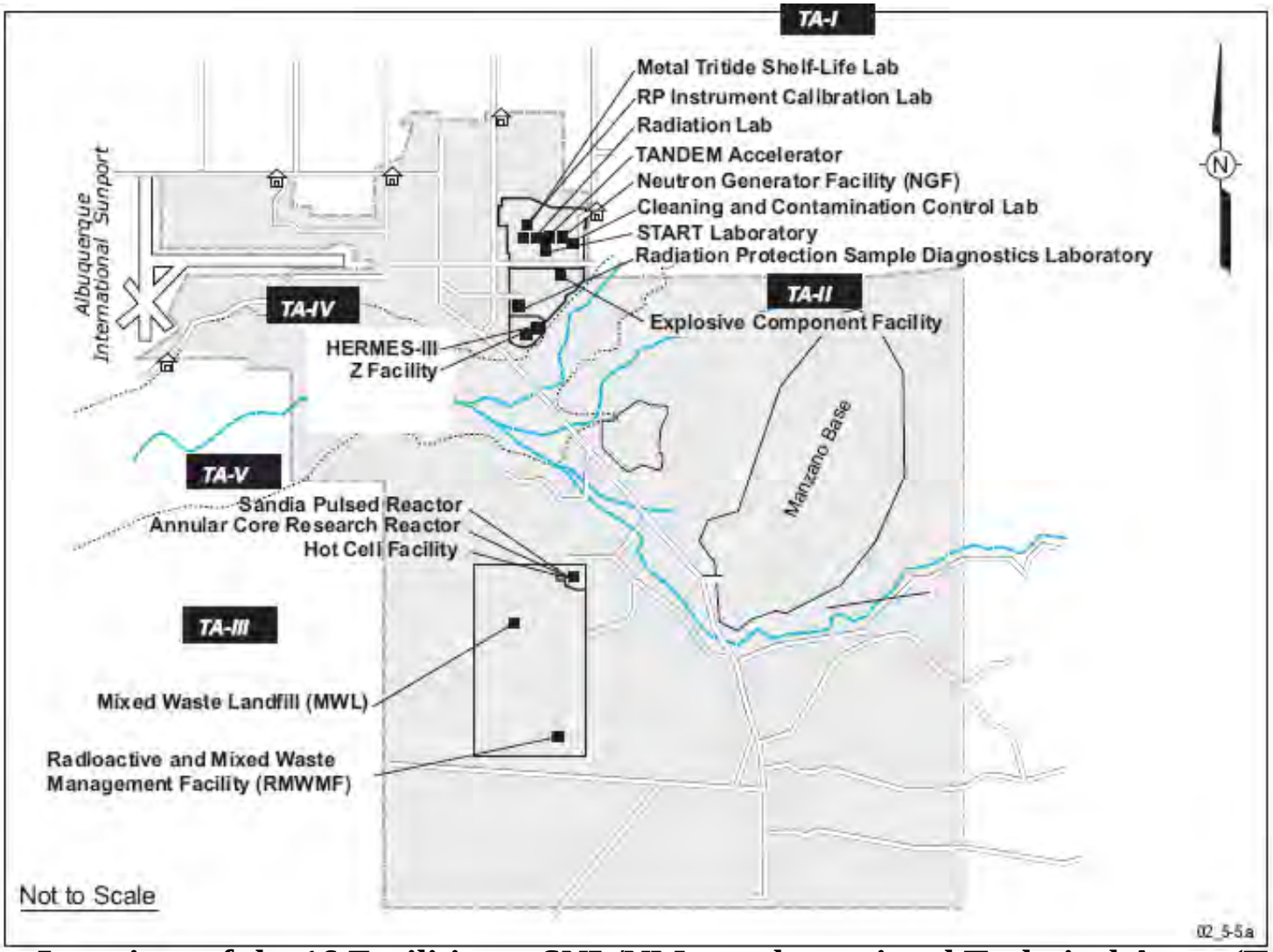
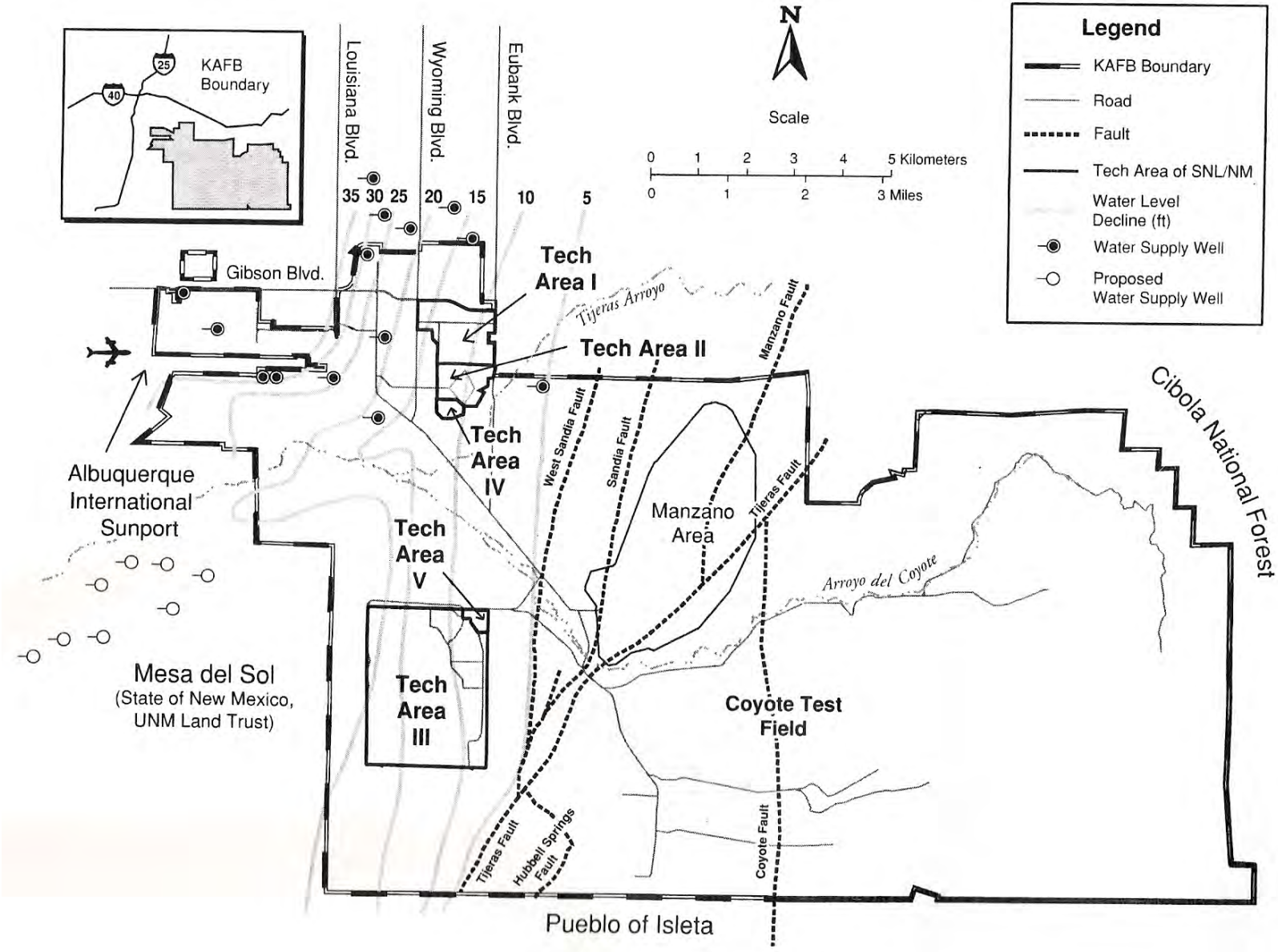


FIGURE 1-1. SNL/NM Technical Areas and the U.S. Forest Service Land Withdrawn Area



Locations of the 16 Facilities at SNL/NM – and associated Technical Areas (TAs) - that Provided Radionuclide Release Inventories in 2005



Selected Groundwater Features and Neighboring Land Uses at Sandia National Laboratories

Location: **Tech Area (TA)-I**

Sandia Tomography and Radionuclide Transport (START) Laboratory – This laboratory is used to perform small-scale experiments. In 2005, the facility reported emissions of plutonium-239, cobalt-60 and cesium-137. In 2004, the facility reported emission of cobalt-60 and cesium-137.

Radiation Laboratory – Small-scale radiation experiments resulted in the release of air-activation products and tritium.

Calibration Laboratory – Calibration of radiation detection equipment resulted in small releases of tritium.

Neutron Generator Facility (NGF) - Building 870 - *The NGF is the nation's principal production facility for neutron generators. This facility currently emits only tritium.*

The facility has two stacks, but only utilizes the main stack in the Tritium Envelope North Wing. **In 2005, 0.56 Curies (Ci) were reported released from the North Wing stack, based on continuous stack monitoring. This emission is approximately five times 2004 reported release of 0.11 Curies (Ci) from the North Wing stack, also based on continuous stack monitoring.**

Although anticipated tritium releases do not exceed the regulatory threshold requiring continuous monitoring, it is performed voluntarily at the NGF as a best management practice (BMP).

Emissions from NGF are expected to increase over the next few years due to an increase in use of the neutron generator facility for tritium target loading associated with fabrication of nuclear weapons as proposed in the Final Environmental Assessment for the Proposed Consolidation of Neutron Generator Tritium Target Loading Production DOE/EA-1532 (FEA). In the FEA, DOE proposes to consolidate the neutron generator manufacturing program (target loading, neutron tube and neutron generator production) by centralizing all neutron generator development and manufacturing processes at SNL/NM.

Implementing the program recommended in the FEA is projected to result in an estimated tritium emission of 785 Ci/year from the NGF.

The FEA identified the total amount of tritium that would be contained in the maximum number of neutron generator parts, gas standards, loaders, and the tritium capture system (TCS) contained at any given time to be 15,999 Ci for the proposed level of activity.

TANDEM Accelerator – This is an ion solid interaction and defect physics accelerator facility. Although the TANDEM did not operate in 2005 or 2004, the facility reported potential emissions of tritium that were being housed in the facility.

Metal Tritide Shelf-Life Laboratory – This laboratory, which conducts research on tritium materials, released negligible levels of tritium (five billionths of a curie).

Cleaning and Contamination Control Laboratory (CCCL) – The CCCL is used for R&D of new and superior materials for government and industrial needs. Carbon-14 was the only radionuclide emission reported in 2004. No emissions were reported in 2005.

Radiation Protection Sample Diagnostics Laboratory (RPSD) – Small-scale radiometric sample analyses on an as-needed basis.

Location: TA-II

Explosive Components Facility (ECF) – Building 905 - The ECF conducts destructive testing on neutron generators. In 2005 and 2004, the facility reported emissions of tritium.

Location: TA-III

Mixed Waste Landfill (MWL) – Although a diverse inventory of radionuclides is present in the MWL, measurements indicate that tritium is the only radionuclide released into the air. In 1992, 1993, and 2003, studies were conducted to quantify the tritium emissions. The most recent value, from 2003, is used for their annual inventory.

The MWL was used to dispose of radioactive and mixed wastes from SNL between 1959 and 1988 using roughly 50 unlined pits and trenches dug 15 – 25 feet into the soil in a 2.6-acre area, including a 0.6-acre "classified waste landfill."

Based on data provided by SNL, the MWL contains approximately 100,000 cubic feet of radioactive and hazardous waste, including more than 10 tons of depleted uranium, estimated to have contained more than 6300 curies of radioactivity at the time of disposal. Hazardous constituents include organic chemicals such as trichloroethylene (TCE) and carbon tetrachloride and heavy metals such as lead and cadmium. Radioactive constituents include more than 40 radioactive isotopes such as: tritium (H-3), sodium-22, barium-133, cobalt-57, cobalt-60, molybdenum-54, krypton-85, strontium-90, iodine-129, and cesium-137, polonium-210, radium-226, uranium-235, americium-241, thorium oxide, and plutonium-238, among other isotopes.

Radioactive and Mixed Waste Management Facility (RMWMF) – The RMWMF primarily handles low-level waste (LLW), mixed waste (MW), and some transuranic (TRU) waste. In 2005 and 2004, the RMWMF reported tritium releases, americium-241, strontium-90, and cesium-137 as determined by continuous stack monitoring. The increase in the tritium release again in 2005 was due to the final processing of tritium-containing oil waste at the RMWMF (begun in 2003).

Mixed Waste Landfill

http://eyeball-series.org/6odd-eyeball.htm

igure 6: "Unclassified Waste" Disposal in Trench B, looking South, circa 1974

Figure 4: Mixed Waste Landfill, "Classified Waste" Disposal, circa 1974

Location: TA-IV

High-Energy Radiation Megavolt Electron Source - III (HERMES - III) – Building 970 - The HERMES III accelerator is used to test the effects of prompt radiation on electronics and complete military systems. This facility produces air activation products, primarily nitrogen-13 and oxygen-15. In 2003, 2004 and 2005, the facility reported releases of nitrogen-13 and oxygen-15.

Z Facility – The Z Facility is an accelerator used for research on light ion inertial confinement fusion. Large amounts of electrical energy are stored over several minutes and then released as an intense concentrated burst (shot) at a target. In 2005, the facility reported releases of tritium. In 2004, the facility reported releases of tritium, uranium-234, uranim-235, and uranium-238.

Location: TA-V

Hot Cell Facility (HCF) - Building 6580 - The HCF provides full capability to remotely handle and analyze radioactive materials such as irradiated targets. It consists of the Hot Cell itself, which contains steel confinement boxes; the glove box laboratory; ancillary analytical equipment; support areas; and fissile- and radioactive-material storage areas. Types and quantities of materials handled, the operations carried out, and the types and quantities of wastes produced vary from project to project.

In 2005, there were no reportable emissions. In 2004, the facility was used for the 7% enriched project and the lead characterization project. The 7% enriched project is done in a fully enclosed and filtered glovebox; therefore there were no reportable emissions. The lead characterization program work is done where there is triple HEPA filtration, so again there were no reportable emissions.


Annular Core
Research Reactor
Sandia Pulsed Reactor
Tech Area V
http://eyeball-series.org/60dd-eyeball.htm

Annular Core Research Reactor (ACRR) - **Building 6588** – The ACRR is a pool-type reactor used primarily to support defense program projects. It has a steady state peak power potential of 4 megawatts (MW) with a pulsed power peak up to 30,000 MW. Used primarily for electronics and reactor safety research, the facility has the capability to support the Medical Isotope Production Project (MIPP) by producing molybdenum-99 and other isotopes used in nuclear medicine. Argon-41, an air activation product, was the only reported releases in 2005 and 2004.

ACRR

Activities using the reactor assembly are conducted in a pool of water. In June 2006, SNL was considering re-start of the ACRR without storage pool water following repairs to reconstruct the storage pool after pool water contamination due to deterioration of depleted uranium shielding and a pool liner leak. Following problems with decontamination of the liner and determination that the replacement liner fails to meet specifications, SNL considered operations without storage pool water to meet re-start scheduling objectives.

The ACRR Building also houses the Old Gamma Irradiation Facility (OGIF) consisting of two adjoining irradiation cells The OGIF contains approximately 150,000 Ci of Co-60 and is used mainly for radiation certification of satellites and weapons systems, electronic components, dosimetry calibration, and radiation damage to materials studies.


SPR

Sandia Pulsed Reactor (SPR) - Building 6590 - The SPR, including reactors, SPR II and SPR III, is used to produce intense neutron bursts for effects testing on materials and electronics. The reactors provide a unique, near-fission-spectrum radiation environment to test technologies that support defense and non-defense activities. The primary mission is radiation effects on electronics.

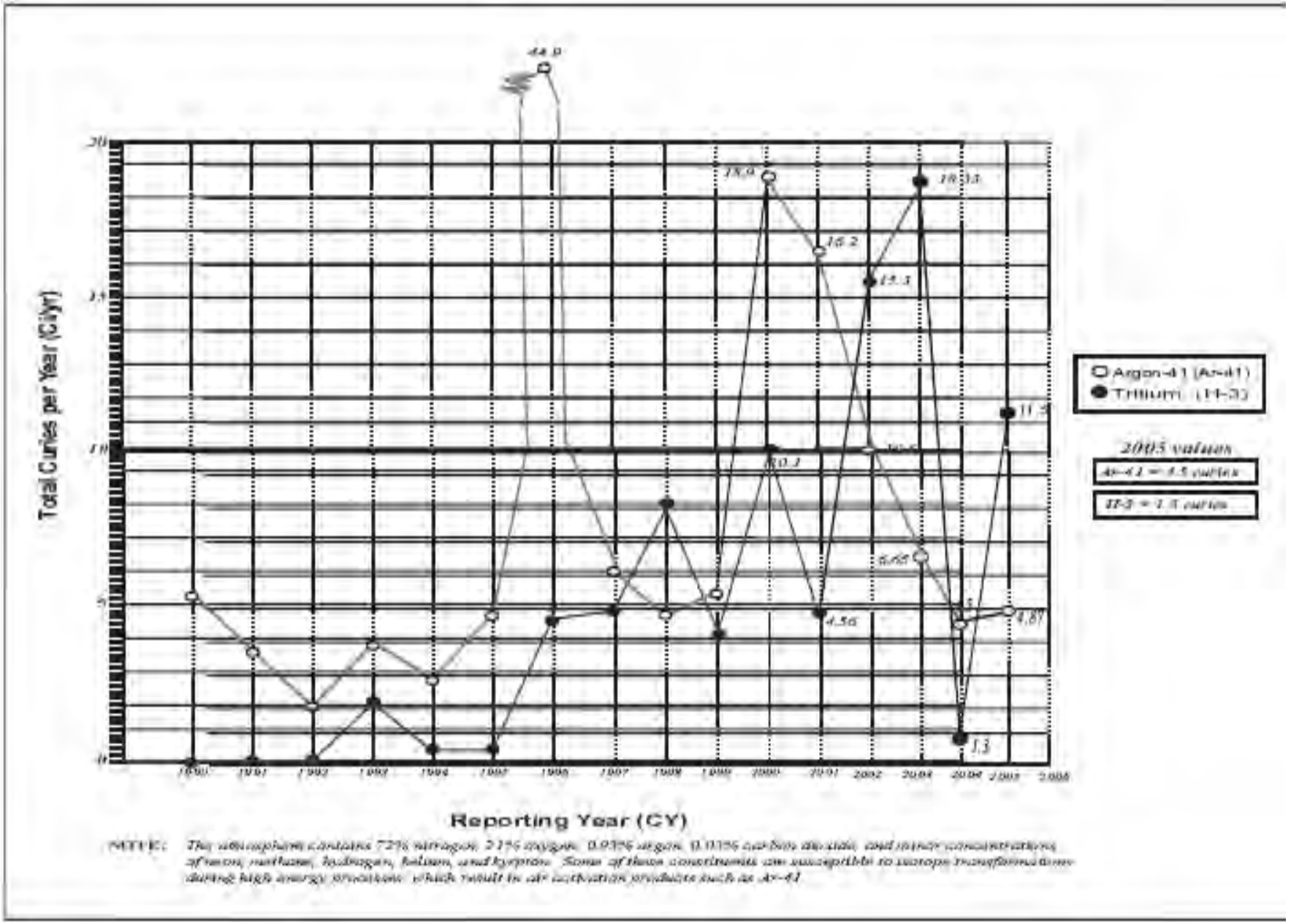
In 2005, the SPR released Ar-41 was reported. No reportable emissions were released in 2004.

The future for the SPR may be very short. In May 2004, the DOE Secretary, then Spencer Abraham, said that after operations of three years or less, the Sandia Pulsed Reactor will no longer be need since computer simulations will be able to assume its mission. When the SPR mission is complete the reactor fuel will be removed from SNL/NM, though no repository for the fuel as identified.

As recently as June 2006, SNL/NM Vice-President Joan Woodward confirmed this Sandia Lab News, “for reasons associated with the cost of operation and security, we’re going to operate SPR this year and at the end of this year it is done.”

Radioactive Releases from 16 NESHAP Sources at Sandia National Laboratories/New Mexico in 2005

Facility Name	Monitoring Method*	Used in Dose Calculation?	Radionuclide	Reported or Predicted Release (Ci/yr)
Sandia Tomography and Radionuclide Transport (START) Laboratory	Calculation	No	Co-60 Cs-137 Pu-238	3.4E-07 5.5E-07 1.0E-07
Radiation Laboratory	Calculation	No	H-3 N-13 Ar-41	1.0E-05 2.0E-07 1.0E-09
Calibration Laboratory	Calculation	No	H-3	2.2E-05
Neutron Generator (NGF)	Continuous	Yes	H-3	0.56
TANDEM Accelerator	Calculation	No	H-3	1.0E-05
Metal Tritide Shelf-Life Laboratory	Calculation	No	H-3	5.0E-09
Cleaning and Contamination Control Laboratory (CCCL)	Calculation	No	N/A (C-14 in 2004)	N/A (2.7E-04 in 2004)
Radiation Protection Sample Diagnostics Laboratory	Calculation	No	Am-243 Cl-36 Cm-244 Co-57 Co-60 Cs-134 Cs-137 Fe-55 H-3 Mn-54 Ni-63 Pu-236 Pu-238 Pu-239 Pu-241 Pu-242 Ra-226 Ra-228 Sr-90 Tc-99 Th-232 U-232 U-233 U-236 U-238 Zn-65	3.9E-13 1.2E-08 1.3E-10 1.0E-10 1.0E-10 1.2E-08 1.2E-08 1.3E-10 1.2E-08 1.3E-10 1.3E-10 3.9E-13 3.9E-13 3.9E-13 3.9E-13 3.9E-13 1.3E-10 1.3E-10 1.3E-10 1.2E-08 1.3E-10 3.9E-13 3.9E-13 1.3E-10 1.3E-10 1.0E-15
Explosive Components Facility (ECF)	Calculation	No	H-3	8.0E-04
Mixed Waste Landfill (MWL)	Periodic	Yes	H-3	0.09
Radioactive & Mixed Waste Management Facility (RMWMF)	Continuous	Yes	H-3 Am-241 Sr-90 Cs-137	0.74 2.20E-05 3.5E-07 1.4E-07
High Energy Radiation Megavolt Electron Source III (HERMES III)	Periodic	No	N-13 O-15	1.4E-03 1.4E-04
Z-Facility (Accelerator)	Calculation	No	H-3 (U-238 in 2004) (U-234 in 2004) (U-235 in 2004)	6.6E-07 2.0E-07 9.2E-09 2.1E-09
Hot Cell Facility (HCF)	Periodic	Yes	N/A	N/A
Annular Core Research Reactor (ACRR)	Periodic	Yes	Ar-41	4.86
Sandia Pulsed Reactor (SPR)	Periodic	Yes	Ar-41	7.0E-07



Summary of Atmospheric Releases in Argon-41 and Tritium from SNL/NM Facilities Since 1990 (Emissions vary from year to year based on operations within the facility)

RADIOACTIVE MATERIAL AT SNL/NM NOT IDENTIFIED AS SOURCES OF RADIATION RELEASE IN SANDIA'S ANNUAL SITE ENVIRONMENTAL REPORTS

REACTOR FUEL AND REACTOR IRRADIATED NUCLEAR MATERIALS

Seventeen batches of reactor irradiated nuclear materials have recently been identified at SNL/NM as a result of Freedom of Information Act (FOIA) queries by Citizen Action.

A May 2005 report SNL provided the NMED an inventory list of irradiated reactor fuel and RINM stored in below-grade storage facilities at Technical Area-V (TA-V) and in the Manzano Bunkers surround Four Hills.

In March 2006 NMED determined that the reactor fuel and reactor irradiated nuclear materials reported by SNL included "metal-bearing materials potentially regulated as hazardous or mixed waste under the Resource Conservation Recovery Act (RCRA). Metals include cadmium, lithium, silver and sodium; other potentially reactive materials in storage in the below-grade storage facilities were also documented." Based on that report NMED required SNL to provide NMED the information … concerning the storage, management and characterization of irradiated reactor fuel, RINM, as well as other potentially hazardous and/or mixed waste stored in below-grade facilities at TA-V and the Manzano Bunkers."

NMED requested detailed information on six of the 18 bins, or "batches," of Reactor Irradiated Nuclear Materials that SNL reported as containing constituents that may be appropriately regulated as hazardous or mixed waste. These materials included:

Batch 5, Deuterium Materials, LiD powders containing chemically reactive Lithium; Batch 9, Irradiated Uranium, presence of thermocouple materials in scrap and miscellaneous materials and in complete experimental parts and assemblies; Batches 14 and 15, Sodium-bonded Uranium Materials and Spent Fuel, Uranium fuel bonded with or surrounded by sodium and the sodium removed from the fuel; Batch 17, Uranium Hexafluoride, exhibits RCRA reactive characteristics; Batch 18, Uranyl Nitrate, RCRA characteristics (if any) not addressed.

In addition to those six batches of material, SNL identified 12 batches of reactor irradiated nuclear materials with significant radioactive material content that have yet to be disposed of in licensed or permitted facilities but may not include hazardous waste constituents along with their radioactive material content.

MANZANO STORAGE FACILITY BUNKERS

In March 2006, NMED required detailed information regarding 46 containers in the five of the Manzano Bunkers. The Manzano Bunkers are storage facilities authorized to store nuclear material and waste. Classified nuclear and radioactive materials (fissile and non-fissile) are stored on a long-term basis.

RADIOACTIVE MATERIALS NOT YET REGULATED OR DISPOSED OF

In March 2006, the NMED requested detail information on materials identified in 1993 at SNL but yet to be effectively regulated or disposed of:

- Manzano Storage Facility, Class "C" explosive in a non-irradiated assembly;
- Annular Core Research Reactor Storage Vault, containing lead and silver solder and lead shield;
- Hot Cell Facility Steel Confinement Boxes, Glove Box Line or Hot Cell, containing soldered electrical components and metals including cadmium, silver, lead, sodium, etc.

CORRECTIVE ACTION MANAGEMENT UNIT (CAMU)

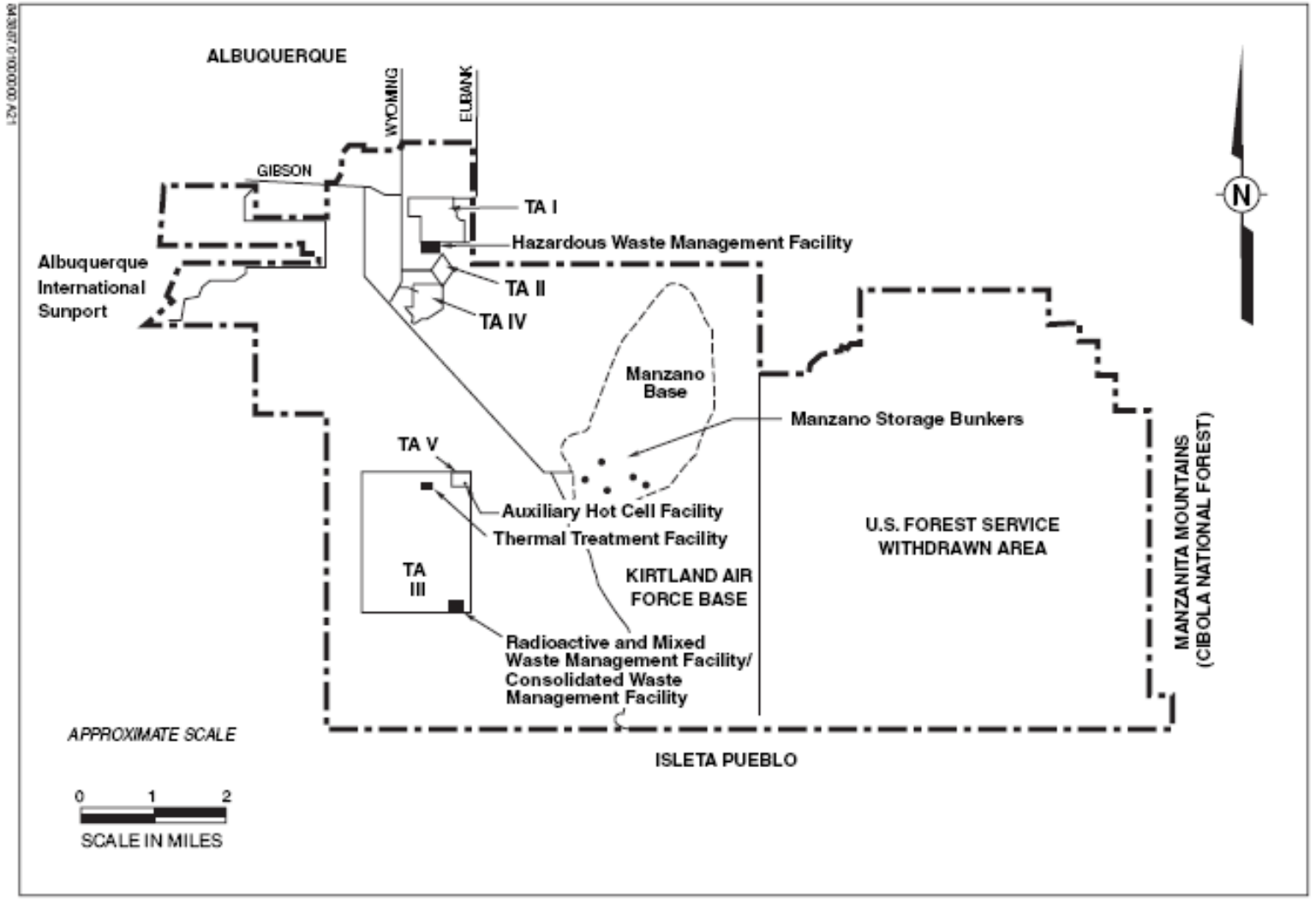
The Corrective Action Management Unit (CAMU) is designed and permitted to store, treat, and permanently contain Environmental Restoration (ER) Project hazardous wastes. The CAMU is located near the southeastern corner of Technical Area III next to the site of the Chemical Waste Landfill (CWL). Waste and debris accumulated during excavation of the CWL are stored at the CAMU.

Sandia says the CAMU is not a SNL-regulated radiological work permit (RWP) site or radioactive material management area (RMMA) as no radionuclides above background are permitted within the CAMU except tritium. Soil moisture that contains tritium below a concentration of 20,000 pCi/L has been accepted at the CAMU. This tritium concentration is above what is considered background (i.e., 420 pCi/L), but this referenced level is a EPA drinking water standard and the concentrations in the soil at the CAMU do not pose any significant radiological health risks.

"Some of the waste managed at the CAMU contains regulated chemical constituents that have potential toxicological and physical hazards. Including:

- Volatile Organic Compounds (VOCs) - 1,1,1-Trichloroethane and Acetone;
- Semivolatile Organic Compounds (SVOCs) - Aniline, Bis(2-ethylhexyl)phalate, and O-toluidine;
- Heavy Metals - Arsenic, Barium, Cadmium, Chromium, Lead, Mercury, and Selenium ; and
- Polychlorinated Biphenyls (PCBs)

Locations of Resource Conservation Act (RCRA)-Regulated waste handling and treatment facilities at SNL/NM in relationship to SNL Technical Areas (TAs) and the Kirtland Air Force Base (KAFB) Boundary



Hazardous Waste Management Facility (HWMF). The HWMF is south of SNL/NM TA-I. used for storage and packaging of RCRA-regulated wastes. The wastes are transported to off-site RCRA-permitted facilities for treatment, storage, and/or disposal.

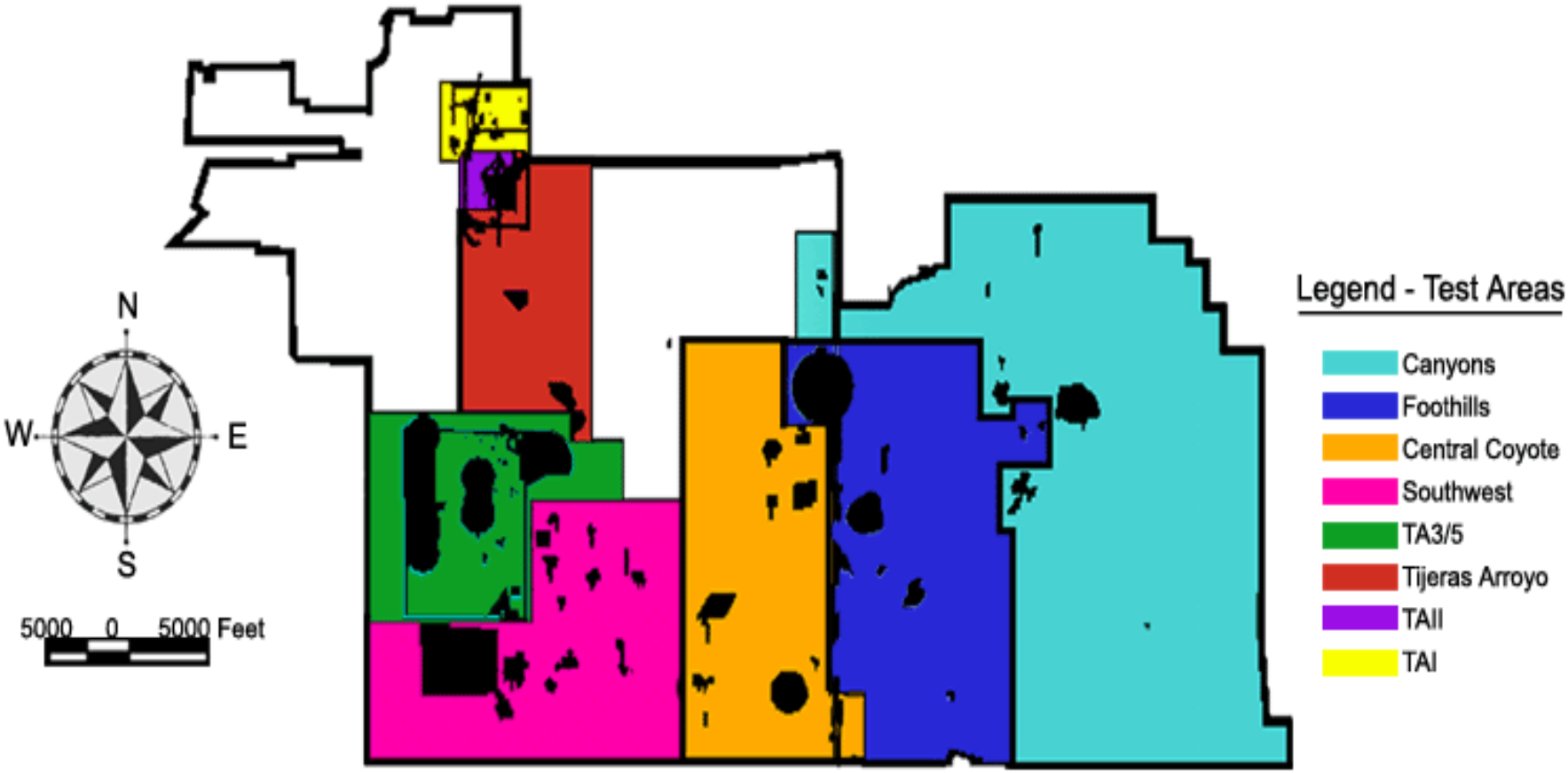
Thermal Treatment Facility (TTF). The TTF consists of a burn cage with ancillary equipment located in a fenced area south of Building 6715 in the northern part of TA-III. The TTF is used for thermal treatment of explosive wastes generated by SNL/NM operations. RCRA-regulated treatment residues (ash) are transported to off-site permitted facilities for treatment, storage, and/or disposal.

Radioactive and Mixed Waste Management Facility (RMWMF). The RMWMF is in the southeastern corner of TA-III and used for storage, treatment, and packaging of RCRA-regulated wastes generated during SNL/NM operations and corrective action activities. RCRA-regulated wastes and treated residues are transported to off-site permitted facilities for treatment, storage, and/or disposal.

Auxiliary Hot Cell Facility (AHCF). The AHCF is located in TA-V. The AHCF will be used for treatment, packaging, and storage of RCRA-regulated wastes generated during SNL/NM operations and corrective action activities.

Manzano Storage Bunkers (MSB). The MSB are concrete walled bunkers constructed into the sides of the Four Hills at the east end of KAFB used to store RCRA-regulated wastes generated during SNL/NM operations and corrective action activities. The seven MSB bunkers listed in the RCRA permit and renewal application are located within the former Manzano Base in the eastern part of KAFB.

Location of Environmental Restoration sites - inactive waste disposal sites – managed by the SNL/NM Long-term Environmental Stewardship Program



"Major" ER sites – All located in Technical Areas 3 and 5 (TA3/5):

- Corrective Action Management Unit (CAMU),
- Chemical Waste Landfill, and
- Mixed Waste Landfill

"Minor" ER sites include:
Waste disposal systems:

- Drainage Septic Tanks, and
- Liquid Waste Disposal System

"Other" ER sites identified as:

- "Areas of Concern;"
- "ER Sites with Accepted No Further Action Plans (NFAs)" (No Further Action Plans are actions reviewed and approved accepted by the NMED Hazardous Waste Bureau that regulates the ER sites); and
- ER Sites "Removed from Hazardous Solid Waste Amendment Act (HSWA) Permit" and no longer being considered for remediation.

Review of Environmental Monitoring for Radionuclides in Air at the Sandia National Laboratory

Results include:

• In 2004, 15 sources of releases of radioactive materials into the air were identified by SNL. In addition to the identified sources, there are sources of potential releases such as buried radioactive materials and nuclear weapons stored at Kirtland Air Force Base (KAFB).

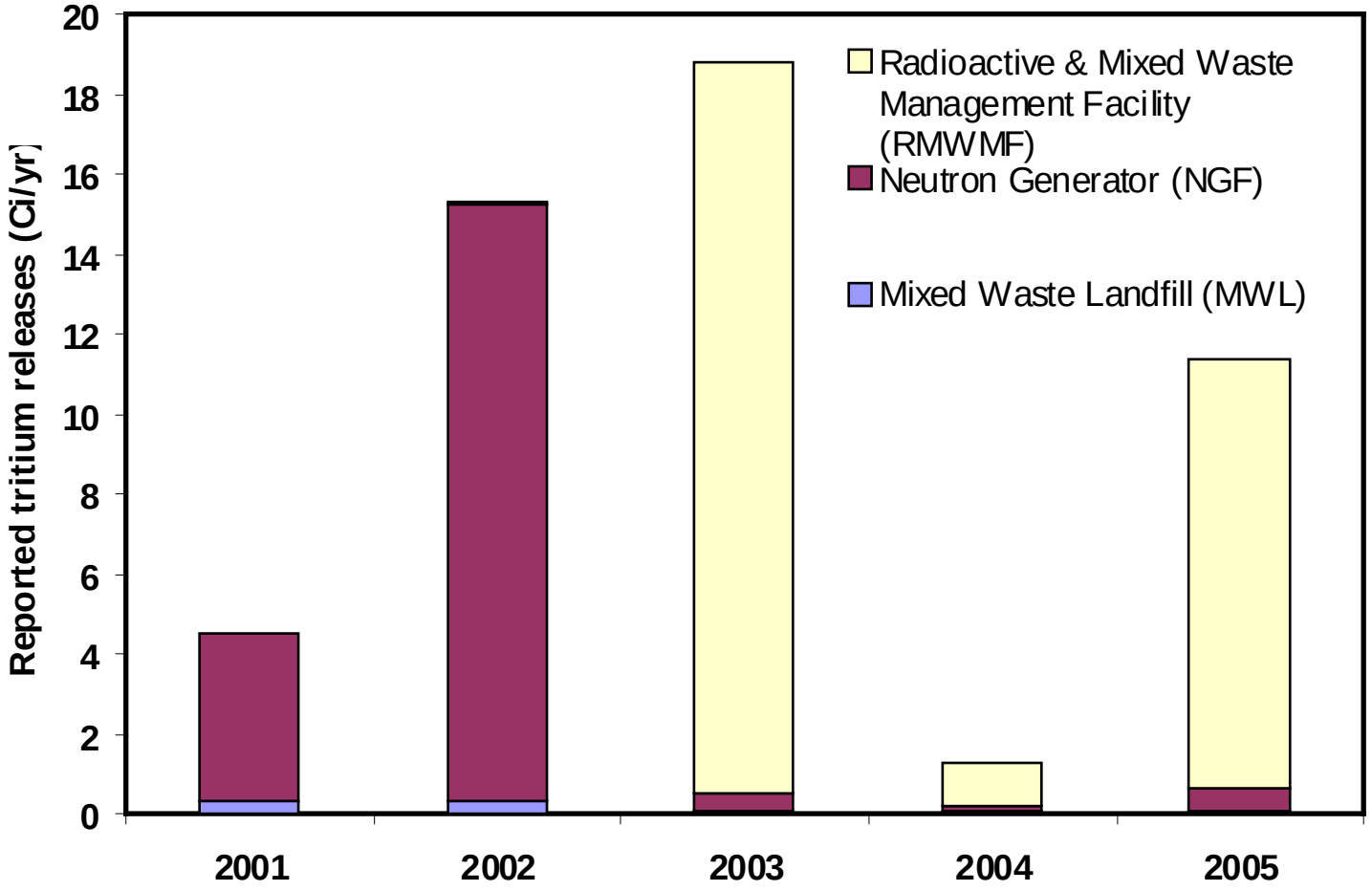
• SNL currently conducts no monitoring of radioactive materials in ambient air. Monitoring was only carried out at four locations by the New Mexico Environment Department (NMED) for the years 1997 to 2000 and not published by NMED until 2004. The alpha and beta activity levels do not confirm compliance with regulatory requirements which require reporting of isotope specific analysis.

• The comparison of ambient air monitoring at six other selected DOE sites indicates no definitive relationship between the reported release and the number of monitoring sites. While Pantex, TX, reported tritium emissions that were a factor of 6,800 lower than at SNL in 2004, tritium monitoring of ambient air is carried out at 27 locations onsite and at the plant perimeter.

Ambient levels of alpha and beta particulate activity in air are measured at DOE facilities that reported lower releases than SNL (for alpha: LANL, LLNL, BNL and Pantex; beta: LLNL and BNL). The lack of ambient air monitoring at SNL does not meet the de facto standard established at other DOE facilities.

• Consistent and comprehensive ambient air monitoring for radionculides at and around SNL is highly recommended: (a) to demonstrate compliance with regulatory standards, (b) to be better prepared radioactive releases in case of accidents or disasters, and (c) to establish a level of information and assurance at SNL equivalent to that at other DOE facilities.

Reported releases of tritium from major sources at SNL, 2001 - 2005



Reported releases of selected airborne radionulides at SNL, 2001 to 2005 (Ci/yr)

Facility Name	2001	2002	2003	2004	2005
Tritium (H-3)	4.50E+00	1.54E+01	1.88E+01	1.30E+00	1.14E+01
Argon-41 (Ar-41)	1.62E+01	1.06E+01	6.60E+00	4.50E+00	4.87E+00
Uranium	1.13E-06	1.43E-06	1.00E-13	4.19E-07	2.61E-10
Transuranics (americium, plutonium)	3.07E-07	2.53E-07	1.40E-05	1.00E-05	2.16E-05

Potential releases of airborne radionuclides that are not reported

In addition to the reported sources of airborne radioactive releases in the SNL New National Emission Standards for Hazardous Air Pollutants (NESHAP) Compliance reports, there are other potential sources at and around SNL.

Nuclear warheads at KAFB

There is no information available with respect to the tritium inventory at SNL. It is likely that large amounts of tritium are contained in the nuclear weapons at KAFB. According to Zerriffi (1996), one warhead is assumed to require a minimum of three grams of tritium but contains an average of approximately four grams of tritium. One gram of tritium is equivalent to about 10,000 curies. It was estimated that 2,450 nuclear warheads are stored at KAFB (Arkin 1998) . The authors conclude:

> ***"Because of a backlog of warheads awaiting dismantlement at the DOE's Pantex facility near Amarillo, TX, the Kirtland Underground Munitions Storage Complex (KUMSC) at Kirtland AFB, Albuquerque, New Mexico has emerged as number one in U.S. nuclear warheads deployed in a single location, a rise from 2nd place in 1992 and 11th place in 1985."*** **(Arkin 1998)**

If four grams of tritium in each of the 2,450 warheads is assumed to be stored at KAFB amounts, the tritium inventory would be about 98 million curies.

Diffuse radioactivity from historic releases

For many years, the Mixed Waste Landlfill (MWL) and Chemical Waste Landfill (CWL) and other facilities have been a potential source of releases of radioactive material into the air. Radioactive particles are likely to have been deposited on onsite soil. There is no published inventory of such releases and the location of their deposition. They pose a potential of resuspension speciually at high wind speeds.

Storage of irradiated reactor fuel

Another potential source of radionuclide emissions into the air is stored reactor fuel. The New Mexico Environment department (NMED) requested information about this issue in a March 16, 2006 letter to SNL. Pending the outcome of this investigation, it is wise to assume that additional sources of airborne radionuclide emissions exist.

Results of NMED monitoring of ambient air around SNL, 1997 to 2000 (µCi/mL)

Year	*Location*			
	Four Hills	**USGS**	**SW Base**	**UNM**
	Gross alpha activity			
1997	6.35E-15	4.38E-15	4.27E-15	5.78E-15
1998	4.24E-15	4.00E-15	4.24E-15	4.35E-15
1999	2.95E-15	3.62E-15	4.32E-15	3.67E-15
2000	3.32E-15	4.62E-15	4.43E-15	2.67E-15
	Gross beta activity			
1997	1.21 E-14	1.22E-14	1.15E-14	1.25E-14
1998	1.44E-14	1.10E-14	1.52E-14	1.51 E-14
1999	1.76E-14	1.95E-14	1.72E-14	1.56E-14
2000	1.44E-14	1.45E-14	1.63E-14	1.30E-14
	Tritium activity			
1997	1.10E-11	1.05E-11	1.17E-11	1.32E-11
1998	2.27E-12	4.69E-12	5.43E-12	2.63E-12
1999	3.33E-12	1.62E-12	1.93E-12	1.83E-12
2000	5.10E-12	4.54E-12	1.05E-11	5.03E-12

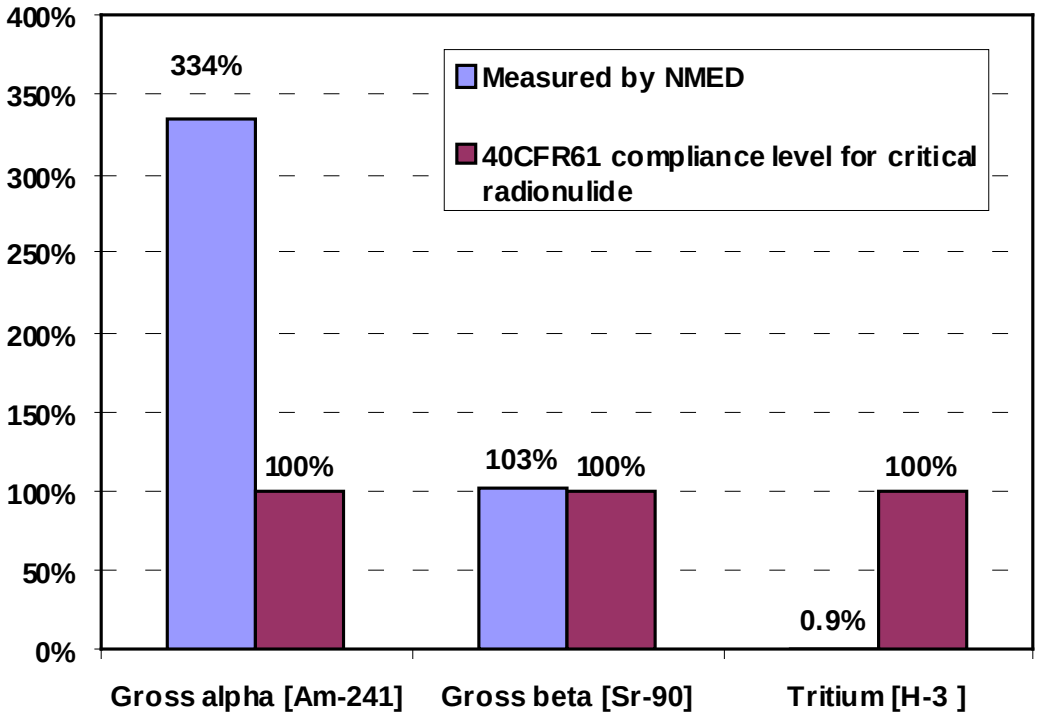
The NMED summary report concludes:

"The Oversight Bureau's tritium based dose values ranged approximately 14 to 56 times greater than Sandia's modeled dose values at the same locations using the CAP-88 computer code for a variety of radionuclides. Even at UNM, which is the background station, indicated a greater dose value based on tritium in relation to Sandia's highest modeled dose values. However, all measured dose values were approximately 1,200 to 18,000 less than the applicable regulatory criteria."

Comparison of maximum annual levels of gross alpha, gross beta and tritium in ambient air with the compliance level for the critical radionuclide

Type	(A): Highest measured concentration (Table 3-1)	(B): Environmental compliance level for critcal radionuclide identified in Table 2-1	Ratio (A / B)
Gross alpha activity	6.35E-15 µCi/mL	1.9E-15 µCi/mL (Am-241)	334 %
Gross beta activity	1.95E-14 µCi/mL	1.9.0E-14 µCi/mL (Sr-90)	103 %
Tritium activity	1.32E-11 µCi/mL	1.5E-09 µCi/mL	0.9%

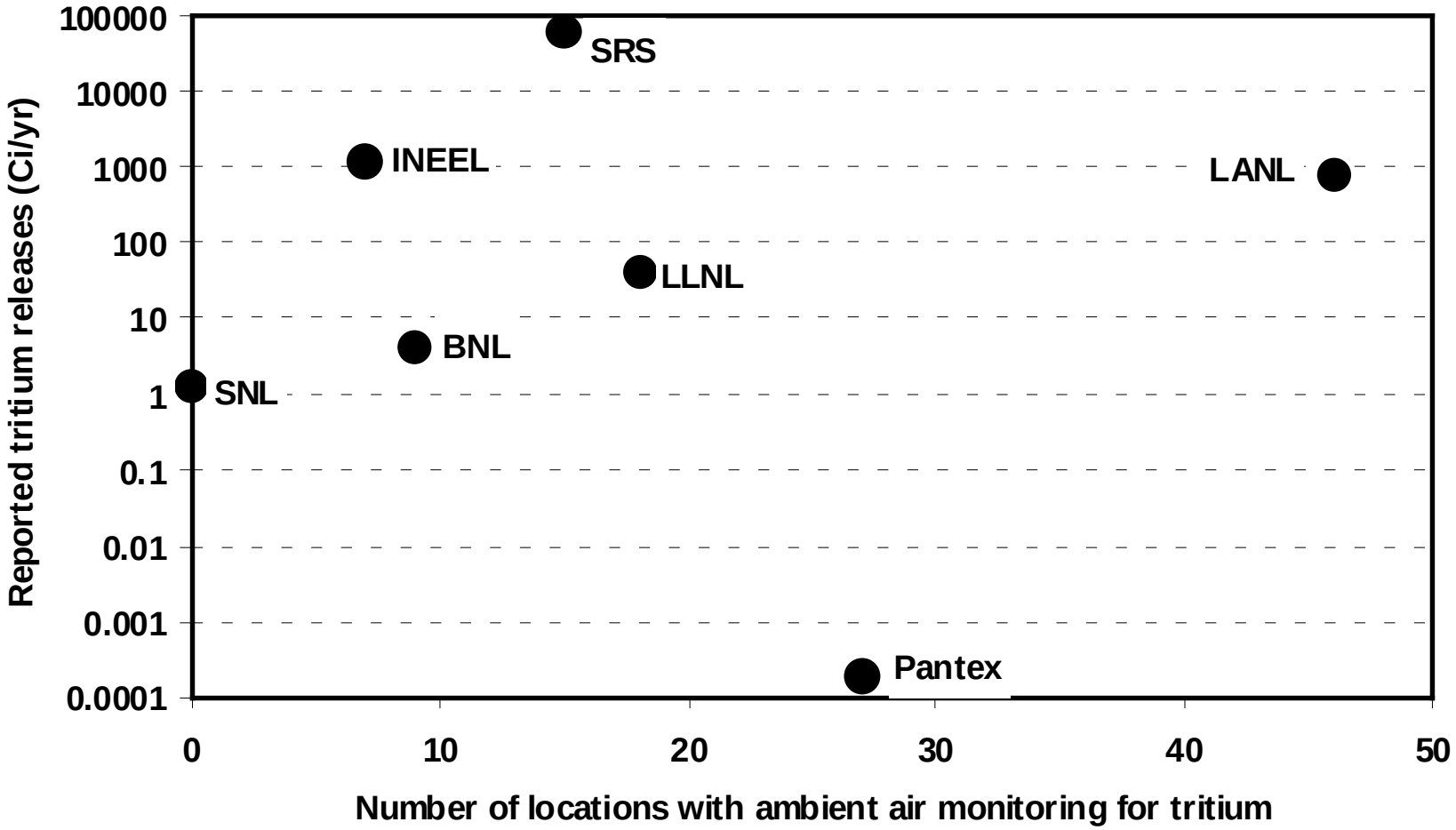
Comparison of maximum annual levels of gross alpha, gross beta and tritium in ambient air with the compliance level for the critical radionuclide



Ambient air monitoring for tritium at selected DOE facilities in 2004

Facility	Reported tritium release (Ci)[a)]	Number of ambient air stations sampling tritium[a)]	Population in 50 mile radius[b)]
Pantex, TX	0.00019	27 (5 onsite, 22 perimeter)	260,000
Sandia National Laboratories, NM	1.3	0	500,000
Brookhaven National Laboratory, NY	4.1	9 (7 onsite, 2 perimeter)	5,200,000
Lawrence Livermore National Laboratory, CA	40.4	18 (12 onsite, 6 offsite)	5,300,000
Los Alamos National Laboratory, NM	789	46 (15 onsite; 24 perimeter; 7 offsite)	160,000
Idaho National Engineering and Environmental Laboratory, ID	1,210	7 (2 onsite; 5 offsite)	103,000
Savannah River Site, SC	61,300	15 (1 onsite; 10 perimeter 4 offsite)	550,000

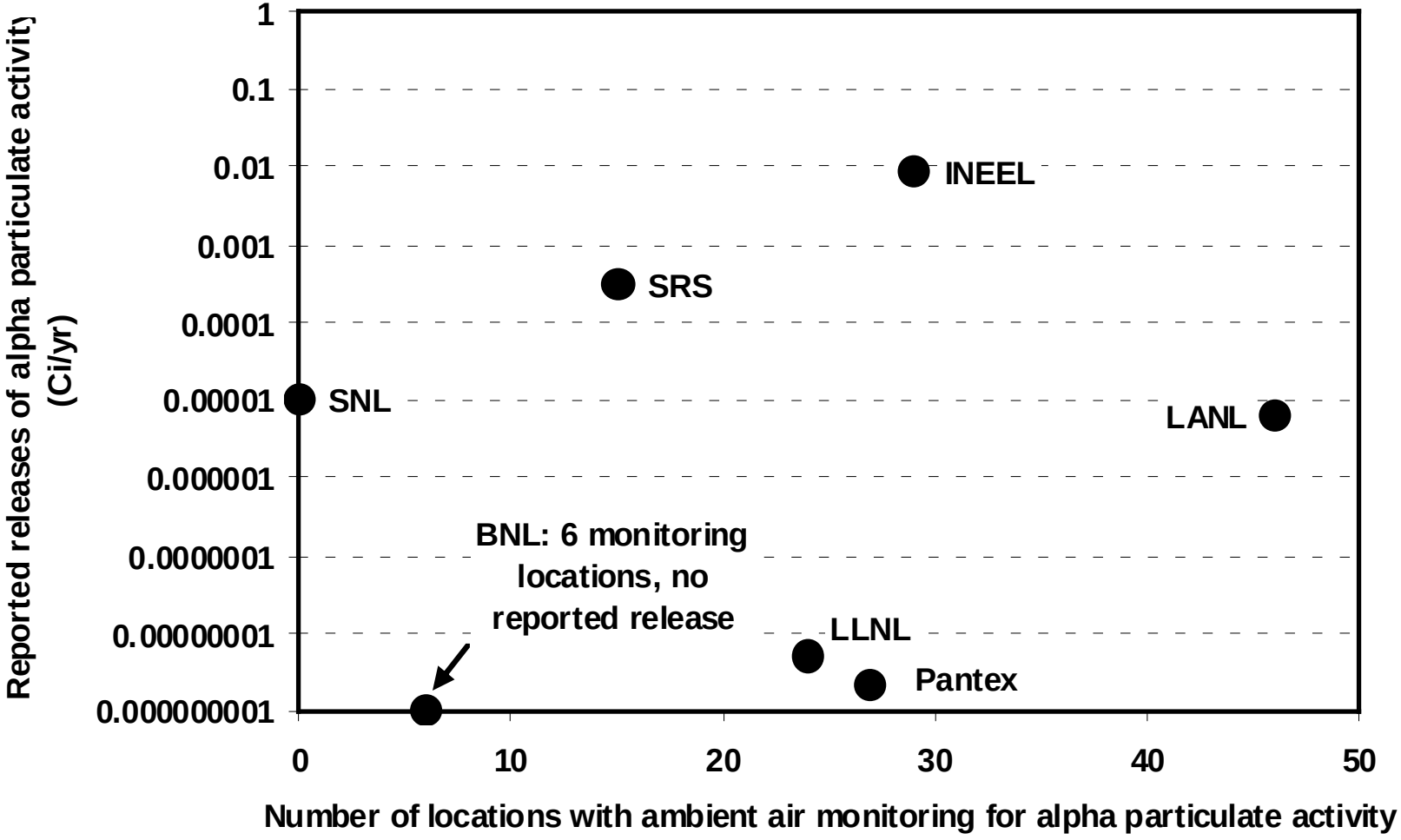
Number of locations at selected DOE facilities with ambient air monitoring for tritium as a function of the reported releases of airborne tritium



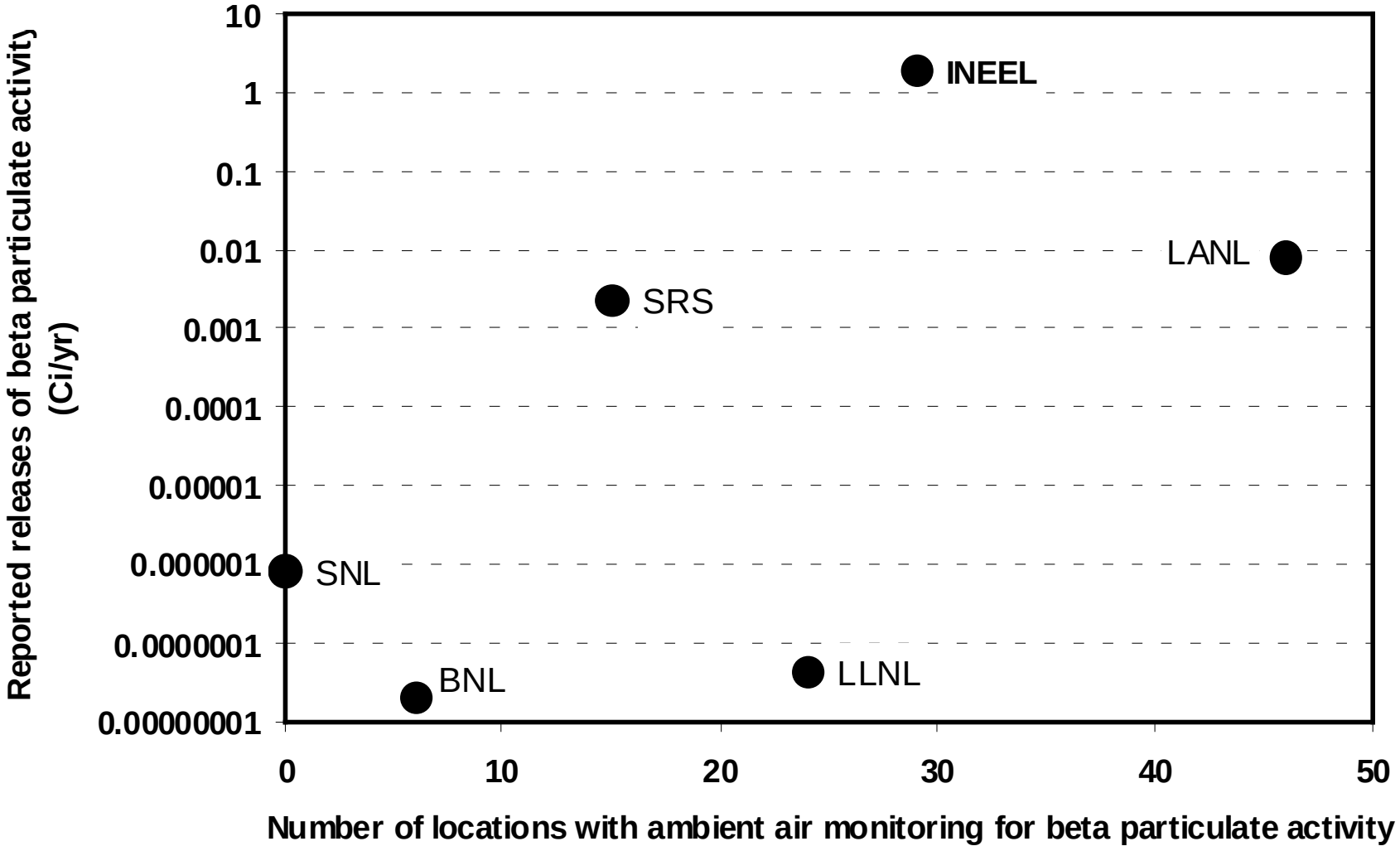
Ambient air monitoring for alpha activity in particulates at selected DOE facilities in 2004

Facility	Reported alpha particulate emissions (Ci)	Reported radionuclides from monitored facilities	Number of ambient air monitoring stations	Reported radionuclides in air
Pantex, TX	2.20E-09	Th-232 U-233/234 U-238 Pu-239/240	27 (5 onsite, 22 perimeter)	Th-232 U-233/234 U-238 Pu-239/240
Sandia National Laboratories, NM	1.10E-05	U-234 U-235 U-238 Am-241	0	none
Brookhaven National Laboratory, NY	0	N/A	6	gross alpha
Lawrence Livermore National Laboratory, CA	5.14E-09	gross alpha gross beta	24 (15 onsite, 9 offsite)	gross alpha Pu-239/240 U-234/238
Los Alamos National Laboratory, NM	6.60E-06	Am-241 Isotopes of U Pu Th	46	gross alpha Pu-238 U-234/238 Pu-239/240 Am-241
Idaho National Engineering and Environmental Laboratory, ID	8.96E-03	Isotopes of Am, Cf, Cm, Pu, U, Ra, Th	29 (15 onsite; 8 perimeter 6 offsite)	gross alpha Pu-239/240 U-234/238
Savannah River Site, SC	3.01E-04	U-234 U-235 U-238 Pu-238 Pu-239 Am-241 Cm-244	15 (1 onsite; 10 perimeter 4 offsite)	gross alpha U-234/238 Am-241 Cm-244

Number of locations at selected DOE facilities with ambient air monitoring for alpha particulate activity as a function of the reported releases of airborne alpha particulate activity



Number of locations at selected DOE facilities with ambient air monitoring for beta particulate activity as a function of the reported releases of airborne beta particulate activity



The need for ambient air monitoring at SNL:

- **Like any other Department of Energy Facility, SNL has to comply with Subpart H of the National Emission Standards for Hazardous Air Pollutants (40CFR61). Ambient air monitoring may be the primary method to demonstrate compliance especially in case of diffuse source emissions.**
- **For point sources, compliance with 40CFR61 Subpart H can be established with computer models such as CAP88 (for details see CAP88-PC 2006). In such a case, ambient air monitoring will provide supplemental verification because monitoring results can be compared with model predictions.**
- **Ambient air monitoring can provide a precautionary meaure for the event of accidental releases of radioactivity.**
- **Ambient air monitoring can improve public relations with surrounding communities.**

Recommendation

Based on the foregoing, it is highly recommended to install a comprehensive monitoring system of radioactive materials in ambient air at and around SNL. The system should be based on the following principles:

- **Ambient air monitors should be placed in a dense network at the plant perimeters covering all wind directions;**

- **Tritium should be sampled as well as particulate activity in air on a weekly basis (supplemented by monthly or quarterly isotopic analysis of alpha and beta activity);**

- **The data should be rapidly made public on SNL's website and be subject to independant quality assurance (e.g. by NMED); and**

- **SNL should involve the local community in the planning process.**

Ambient air monitoring at SNL should be coordinated with efforts to establish NEWNET system near SNL

Thank you for your time and attention