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U.S. Department of Energy Report
1997 LANL Radionuclide Air Emissions

Los Alamos
NATIONAL LABORATORY

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ABSTRACT

Presented is the Laboratory-wide certified report regarding radioactive effluents released into the air by the Los Alamos National Laboratory (LANL) in 1997. This information is required under the Clean Air Act and is being reported to the U.S. Environmental Protection Agency (EPA). The highest effective dose equivalent (EDE) to an offsite member of the public was calculated using procedures specified by the EPA and described in this report. For 1997, the dose was 3.51 mrem. Airborne effluents from a 1 mA, 800 MeV proton accelerator contributed to over 90% of the EDE; more than 86% of the total dose contribution was through the air immersion pathway.

Section I. Facility Information

61.94(b)(1) Name and Location of Facility

Los Alamos National Laboratory (LANL or the Laboratory) and the associated residential areas of Los Alamos and White Rock are located in Los Alamos County, in north-central New Mexico, approximately 100 km (60 miles) north-northeast of Albuquerque and 40 km (25 miles) northwest of Santa Fe (Fig. 1).

61.94(b)(2) List of Radioactive Materials Used at LANL

Since the Laboratory's inception in 1943, its primary mission has been nuclear weapons research and development. Programs include weapons development, magnetic and inertial fusion, nuclear fission, nuclear safeguards and security, and laser isotope separation. There is also basic research in the areas of physics, chemistry, and engineering that supports such programs.

The primary facilities involved in emissions of radioactivity are outlined in this section. The facility locations are designated by technical area and building. For example, the facility designation TA-3-29 is building 29 at Technical Area 3 (see Fig. 2 showing the technical areas at LANL). Potential radionuclide release points are listed in tables that follow. Some of the sources described below are characterized as nonpoint. Beginning in 1995, air sampling results from LANL's air sampling network (AIRNET) were used, with EPA approval, to calculate off-site impacts due to diffuse and fugitive emissions of radioactive particles and tritium oxide from nonpoint sources.

Radioactive materials used at LANL include weapons grade plutonium, heat source plutonium, enriched uranium, depleted uranium, and tritium. Also, a variety of materials are generated through the process of activation; consequent emissions occur as gaseous mixed activation products designated as GMAP, and particulate and vapor form activation products, designated as P/VAP.

The radionuclides emitted from point sources at LANL in the calendar year (CY) 1997 are listed in the tables that follow. Tritium is released as tritium oxide and elemental tritium. Plutonium contains traces of Am-241, a transformation product of Pu-241. Some of the uranium emissions are from open-air explosive tests involving depleted uranium. GMAP emissions include: Ar-41, C-10, C-11, N-13, N-16, O-14 and O-15. Various radionuclides, dominated by Be-7, Br-77, Br-82, and Se-75 make up the majority of the P/VAP emissions.

60.94(b)(3) Handling and Processing of Radioactive Materials at LANL Technical Areas

The primary facilities responsible for radiological airborne emissions follow. Additional descriptions of LANL technical areas can be found in the annual site environmental report for LANL.

TA-3-29: Programs conducting chemical and metallurgical research are located in this facility. Principal radionuclides are isotopes of plutonium and uranium.

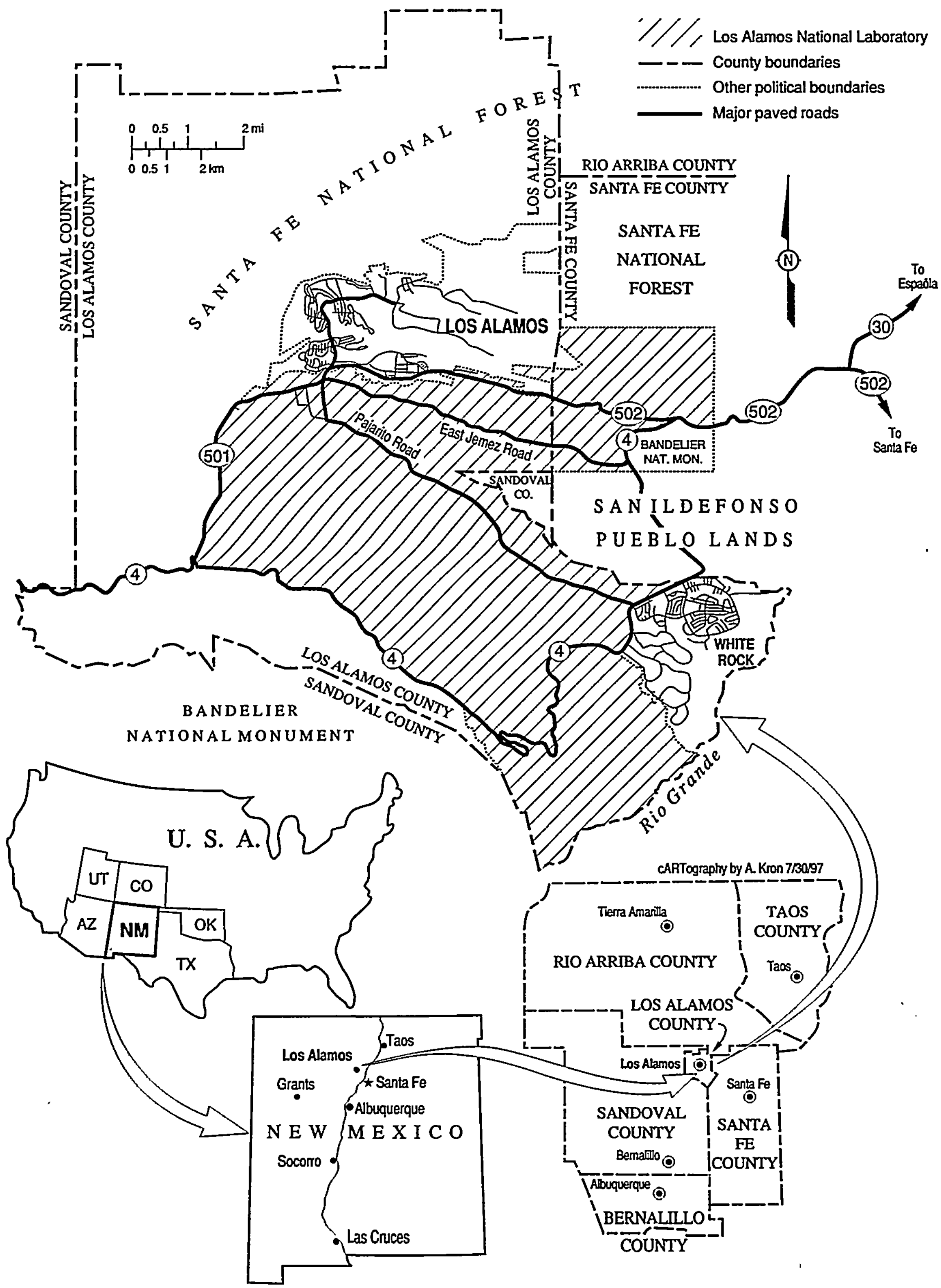

Fig. 1. Location of Los Alamos National Laboratory.

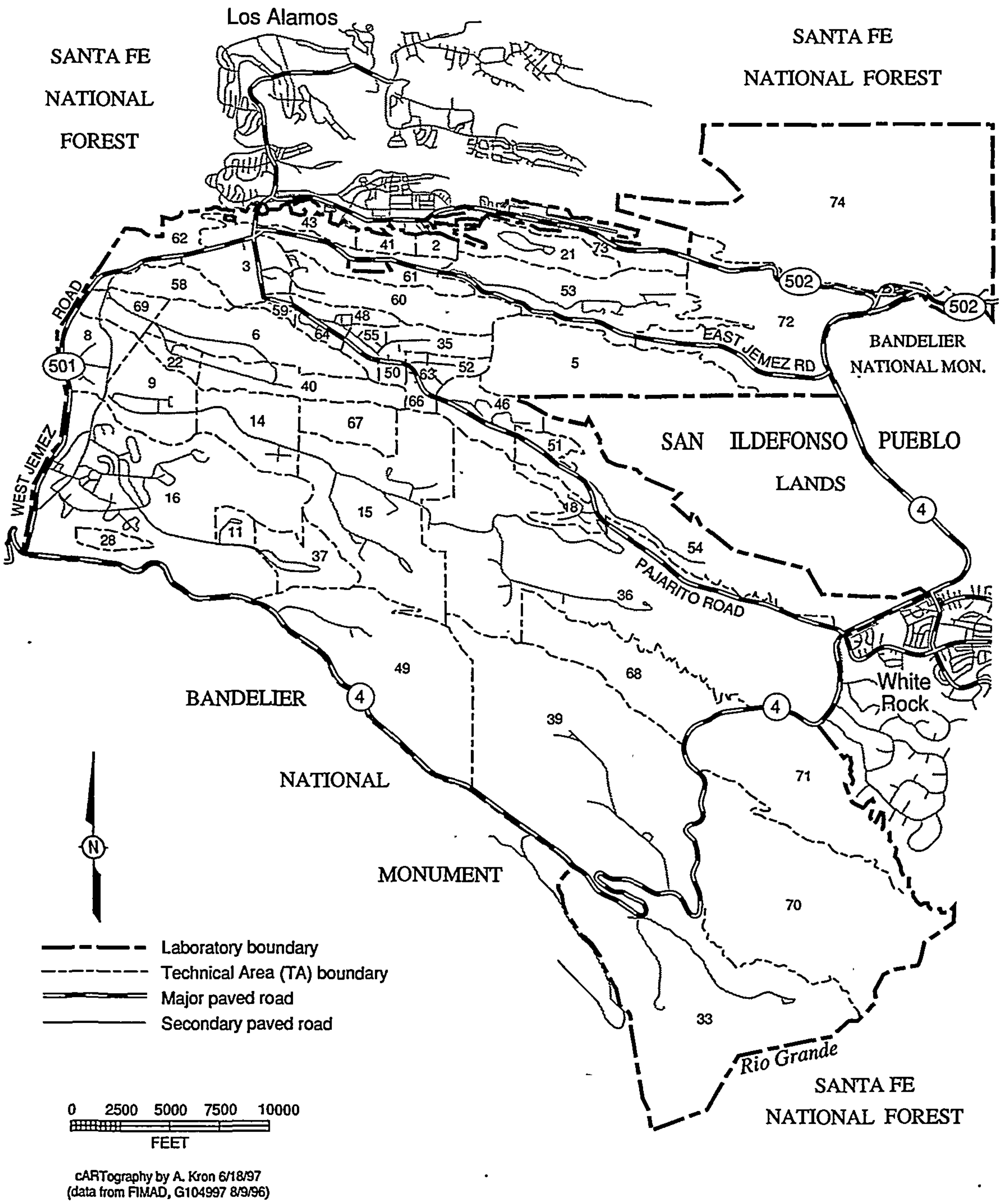

Fig. 2. Los Alamos technical areas by number.

TA-3-35: The facility houses a 5,000-ton capacity press which has been used in the metalworking of radioactive materials.

TA-3-102: This machine shop is used for the metalworking of radioactive materials, primarily depleted uranium.

TA-15-PHERMEX, TA-36: These facilities conduct open-air explosive tests involving depleted uranium.

TA-16-205, TA-21-155, and **TA-21-209:** These facilities conduct operations involving tritium. Programs include testing of tritium control systems for the nuclear fusion program (TA-21-155), preparation of targets containing tritium for laser-fusion research, and the handling of tritium for defense programs.

TA-18: This nuclear facility studies the behavior of multiplying assemblies of nuclear materials. Some of the assemblies are used as a source of fission neutrons for experimental purposes, resulting in a diffuse source of Ar-41 emissions.

TA-21: Many of the facilities at this decommissioned radiochemistry site are undergoing decontamination, demolition, and disposal. Some of these operations may contribute to diffuse releases of uranium and plutonium into the air.

TA-33-86, TA-41-4: These buildings were formerly used as tritium-handling facilities. All accountable tritium has been removed, and current emissions result from residual tritium contamination.

TA-48-1: The principal activities carried out in this facility are radiochemical separations in support of the medical radioisotope production program, the Yucca Mountain program, nuclear chemistry experiments, and geochemical and environmental research. These separations involve nCi to Ci (hot cell) amounts of radioactive materials and use a wide range of analytical chemical separation techniques, such as ion exchange, solvent extraction, mass spectroscopy, plasma emission spectroscopy, and ion chromatography.

TA-50-1: This waste management site consists of a low-level liquid waste treatment plant. Also, there is a wastewater outfall from TA-50-1 that results in a diffuse source of airborne tritium.

TA-50-37: This controlled air incinerator was decommissioned in 1996 and is no longer active. It is being remodeled to house the Radioactive Materials Research Operations Demonstration (RAMROD) project.

TA-50-69: This waste management site consists of a waste characterization and reduction facility.

TA-53: This technical area houses the Los Alamos Neutron Science Center (LANSCE), a linear particle accelerator complex. The accelerator is used to conduct research in areas of physics, radiobiology, materials science, and isotope production. The Manual Lujan Neutron Scattering Center and the Proton Storage Ring are part of LANSCE.

The facility accelerates protons to an energy of 800 MeV into target materials such as graphite and tungsten to produce a variety of subatomic particles. The design current of the accelerator is approximately 1 mA. The operating cycle of the facility during 1997 was about 5 months. A variety of radioisotopes are produced at LANSCE, by spallation reactions in targets just upstream of the beam stop. The radioisotopes are distributed worldwide for a variety of medical and research procedures.

Airborne radioactive emissions result from the proton beams and secondary particles passing through and activating air in the target cells, beam stop, and surrounding areas. The majority of the emissions are short-lived activation products such as C-11, N-13, and O-15. Most of the activated air is vented through the main stack; however, a fraction of the activated air becomes a fugitive emission from the target areas. In addition, there are three wastewater lagoons at TA-53 that have received water containing radioactivity from the accelerator (only one lagoon was active in 1997). Evaporation of water from the lagoons results in a diffuse source of airborne tritium.

TA-54: This waste management site consists of active and inactive shallow land burial sites for solid waste and is the primary storage area for mixed and transuranic radioactive waste. Area G at TA-54 is a known source of diffuse emissions of tritium vapor. Resuspension of soil contaminated with low levels of plutonium/americium has also created a diffuse source.

TA-55-4: The functional purposes of this facility are to perform special nuclear materials research to develop, demonstrate, and exchange technology and to provide production support to the national defense and energy programs.

Section II. Air Emissions Data

60.94(b)(4) Point Sources

Sampled and unsampled point sources at LANL are listed in Table 1. Each entry is identified by technical area and building. Also listed in Table 1 are the number, type, and efficiency of the effluent controls used on the release points. Each stage of the high-efficiency particulate air (HEPA) exhaust filters is tested at least once every 12 months. The performance criteria for HEPA filter systems are a maximum penetration of 5×10^{-4} for one stage and 2.5×10^{-7} for two stages in series, where penetration equals concentration of aerosol downstream of the air cleaner divided by concentration upstream.

The distance between the point source and the nearest receptor is provided in Table 2. The nearest receptor can be a residence, school, business, or office. The distance to the nearest farm producing milk is 20 km from the Laboratory's eastern boundary; the nearest farms producing meat and vegetables adjoin the Laboratory's eastern boundary, about 4 km from the main exhaust stack at LANSCE. Detailed information is published separately from this report.[1]

Unmonitored release points at LANL are also included in Table 1. 1997 was the fourth year that unsampled release points have been inventoried, characterized, and added to the LANL radionuclide air emissions report. These stacks and vents (listed as ES and/or FE numbers) are points from which radioactive material could possibly have been released to the atmosphere.

In addition to 31 monitored release points, the Laboratory also has more than 40 unmonitored release points in more than 30 buildings. Under 40 CFR 61.93(b)(4)(i), sampling of these release points is not required because each release point has a potential effective dose equivalent of less than 0.1 mrem/yr at the nearest off-site receptor. However, in order to verify that emissions from unmonitored point sources remain low, LANL conducts "periodic confirmatory measurements" in the form of the Radioactive Materials Usage Survey. The purpose of the usage survey (formerly called the Radionuclide Point Source Inventory) is to collect and analyze radioactive materials usage and process information for the monitored and unmonitored point sources at LANL.

Guidance in Appendix D to 40 CFR 61 and good engineering judgment are used to develop conservative emissions estimates from unmonitored point sources using the data collected from the facilities. Estimated potential effective dose equivalents (PEDEs) are calculated by modeling these emissions estimates using the EPA-approved CAP-88 dose modeling software. A comprehensive survey of all of LANL's monitored and unmonitored point sources is conducted biannually.

For facilities with PEDEs approaching the 0.1 mrem/yr threshold for monitoring ("approaching" is defined as having a PEDE that is greater than 1/20th of the monitoring requirement), a usage survey is conducted during the interim year (i.e., 1997) in order to more accurately track potential releases from these unmonitored point sources. Therefore, the 1997 Usage Survey includes evaluations of only those facilities with 1996 PEDEs that meet or exceed the criteria identified previously, and additional facilities not identified on the 1996 Inventory. The cumulative PEDE for all unmonitored point sources at LANL was conservatively estimated (using '96 Inventory and '97 Usage Survey data) to be 0.20 mrem/yr. This value is calculated at each building receptor. The actual PEDE at a facility-wide critical receptor location will be less than 0.1 mrem/yr. The Laboratory has established administrative requirements to evaluate all potential new sources. These requirements are established for the review of all new Laboratory activities and projects to ensure that air quality regulatory requirements are met before the activity or project begins.[2]

Nonpoint Sources

There are a variety of nonpoint sources within the 111 square kilometers of land occupied by LANL. Nonpoint sources can occur as diffuse or large area sources, or as leaks or fugitive emissions from facilities. Examples of nonpoint sources of airborne radionuclides include surface impoundment, shallow land burial sites, open burn sites, firing sites, outfalls, container storage areas, unvented buildings, waste treatment areas, solid waste management units, and tanks. The Laboratory measures annual average ambient concentrations of important airborne radionuclides (other than activated gases) at a number of potential receptor locations as described below.

Beginning in 1995, LANL began summarizing the potential impacts of nonpoint sources by analyzing and reporting air concentration measurements collected at 17 ambient air sampling sites around the Laboratory. Previously, LANL had estimated emissions from the most significant nonpoint sources and determined the impacts using EPA's dose assessment computer program. The Laboratory and EPA negotiated this new method of assessing nonpoint sources as part of the Federal Facilities Compliance Agreement.[3] Results of the air sampling analysis are provided in Section III of this report. With the exception noted below, there were no unusual readings measured at the air sampling stations in 1997.

Air concentration values for gross alpha exceeded action levels for sample periods 11/24/97 and 12/8/97 at the County Landfill AIRNET sampling station (#32). Because of these exceedances, the samples were reanalyzed for gross alpha and gross beta. Isotopic analyses were also performed in order to identify which radionuclides were causing the gross alpha increases.

From these data, LANL's Air Quality Group concluded that Po-210, a radionuclide within the natural radon decay chain, was entirely responsible for the increased gross alpha values at the time of the reanalysis, but not necessarily at the time of the original analysis due to potential for in-growth of Po-210 from Pb-210. Plutonium, uranium, and americium from LANL operations were not elevated and did not cause the elevated gross alpha for either the original analysis or the reanalysis.

Large, short-term fluctuations in atmospheric levels of radon and radon decay products are very common, but it is not concluded that these natural fluctuations caused the gross alpha and gross beta increases in late 1997. The Air Quality Group does not possess a method (either by analytical chemistry or calculations) to allow us to make a definitive judgment as to whether or not the Po-210 was the cause of the high alpha concentrations measured by the original analysis in late 1997. Because naturally occurring radon decay products are constantly being deposited on the surface of materials exposed to the atmosphere, it is likely that handling any material will resuspend these decay products such as Pb-210 and Po-210 to some extent. Such resuspensions will occur with regularity at a landfill. Therefore, nearby samplers such as this AIRNET sampler will occasionally collect elevated concentrations of these naturally occurring radioactive materials.

For complying with the Clean Air Act, this elevated value will be considered a release of Po-210 when calculating annual effective dose equivalent to a member of the public for compliance with 40 CFR 61, Subpart H. The elevated Po-210 dose at sampling station #32 was estimated to be approximately 0.6 mrem.

The air quality group recently revised the technique used to calculate tritium concentrations in ambient air. Two factors are needed to estimate ambient levels of tritium as an oxide (water): water vapor concentrations in the air and tritium concentrations in the water vapor. Both of these need to be representative of the true concentrations to obtain an accurate estimate of the ambient tritium concentrations. In early 1998, it was discovered that the silica gel collection media was not capable of removing all of the moisture from the atmosphere.[4] Collection efficiencies were as low as 10 to 20 percent in the middle of the summer when the ambient concentrations of water vapor are the highest. Because 100 percent of the water is not collected, then atmospheric water vapor, and therefore tritiated water, has been underestimated because the amount of water collected on the silica gel is used to measure water vapor concentrations. However, data from the meteorological monitoring network provide accurate measurements of atmospheric water vapor concentrations and have been combined with the analytical results to calculate ambient tritium concentrations in this report. Results from both the old and new method are provided in this report.

Radionuclide Emissions

Radionuclides released from sampled point sources along with the annual release rate for each radionuclide are provided in the tables. The point sources are identified using an exhaust stack (ES) eight-digit identification number: the first two digits represent the LANL technical area, the next four the building area, and the last two the ES number. No detectable emissions are denoted as ND.

Section III. Dose Assessment

61.94(b)(7) Description of Dose Calculations

Effective dose equivalent (or dose) calculations for point sources, unsampled point sources, and nonpoint gaseous activation products from LANSCE and TA-18 were performed with the mainframe CAP-88 version of AIRDOS. This procedure included using PREPAR to prepare the input file to AIRDOS and using the DARTAB preprocessor to prepare the dose conversion factor input file for DARTAB. The calculations used dose conversion factors taken from the RADRISK database that was distributed along with the CAP-88 programs.[5] Dose factors for C-10, N-16, and O-14 were added to the RADRISK database by LANL. Periodically, LANL verifies the operation of CAP-88 by running one of the EPA's test cases originally distributed with the mainframe version.[6]

Development of Source Term

Tritium emissions

Tritium emissions from the Laboratory's tritium facilities are measured using a collection device known as a bubbler. This device enables the Laboratory to determine not only the total amount of tritium released but also whether it is in the elemental (HT) or oxide (HTO) form. The bubbler operates by pulling a continuous sample of air from the stack, which is then "bubbled" through three sequential vials containing ethylene glycol. The ethylene glycol collects the water vapor from the sample of air, including any tritium that is part of a water molecule (tritium oxide or HTO). After "bubbling" through these three vials, essentially all HTO is removed from the air, leaving only elemental tritium. The sample, containing the elemental tritium, is then passed through a palladium catalyst which converts the elemental tritium to HTO. The sample is then pulled through three additional vials containing ethylene glycol, which collects the newly formed HTO. The amount of HTO and HT is determined by analyzing the ethylene glycol for the presence of tritium using liquid scintillation counting (LSC). Although LANL's measurement device can distinguish the presence of HTO from HT, all emissions of tritium are assumed to be HTO for modeling the off-site dose. Because HTO contributes approximately 20,000 times more dose than an equivalent amount of HT, this is an extremely conservative measure that further ensures that the dose to an off-site receptor is not underestimated.

Tritium emissions from LANSCE are determined using a silica gel sampler. A sample of stack air is pulled through a cartridge containing silica gel. The silica gel collects the water vapor from the air, including any HTO. The water is distilled from the sample, and the amount of HTO is determined by analyzing the water using LSC. Because the primary source for tritium is activated water, sampling for only HTO is appropriate.

Radioactive particle emissions

Emissions of radioactive particulate matter, generated by operations at facilities such as the Chemistry and Metallurgy Research Building (CMR) and TA-55, are sampled using a glass-fiber filter. A continuous sample of stack air is pulled through the filter, where small particles of radioactive material are captured. These samples are analyzed weekly using gross alpha/beta counting and gamma spectroscopy to identify any increase in emissions and to identify short-lived radioactive materials. Every six months, LANL composites these samples to be shipped to an off-site Laboratory. These composited samples are analyzed to determine the total activity of materials such as U-234/235/238, Pu-238/239/240, and Am-241. These data are then combined with estimates of sampling losses and stack and sample flows to calculate emissions. For the case of radionuclides that have short-lived daughters, LANL includes these progeny in the source term. For example, the parent radionuclide U-238 is measured by the analytical laboratory, and its short-lived progeny (Pa-234m and Th-234) are assumed to be in equilibrium with the U-238. This allows LANL to more accurately calculate the dose from such radionuclides.

Vapor form emissions (VAP)

VAP emissions, generated by LANSCE operations and by hot cell activities at CMR and TA-48, are sampled using a charcoal filter or canister. A continuous sample of stack air is pulled through a charcoal filter where vaporous emissions of radionuclides are adsorbed. The amount and identity of the radionuclide(s) present on the filter are determined through the use of gamma spectroscopy. This information is then used to calculate emissions. Radionuclides of this type include Br-82 and Se-75.

Gaseous Mixed Activation Products (G/MAP)

G/MAP emissions, resulting from activities at LANSCE, are measured using real-time monitoring data. A sample of stack air is pulled through an ionization chamber that measures the total amount of radioactivity in the sample. Specific radioisotopes are identified through the use of gamma spectroscopy and decay curves. This information is then used to calculate emissions. Radionuclides of this type include C-11, N-13, and O-15.

Summary of Input Parameters

Effective dose equivalents to potential receptors were calculated for all radioactive air emissions from sampled LANL point sources. Input parameters for these point sources are provided in Tables 3 and 4. The relationships of receptor locations to the individual source release points are provided in Table 5. The critical receptor location is different for each point source. However, because the majority of the yearly dose is derived from LANSCE emissions, the LANSCE critical receptor location is the maximum dose location for all Laboratory emissions in 1997. This location is a business office approximately 800 m north-northeast of the LANSCE stack. Emissions and doses from LANSCE are calculated on a monthly basis during beam operations to ensure continued compliance with the 10- mrem standard.

Other site-specific parameters as well the source of these data are provided in Table 6. The Air Quality Group operates an on-site network of five meteorological monitoring towers. Data gathered by the towers is summarized and formatted for input to the CAP-88 program. Copies of the meteorological data files used for the 1997 dose assessment are provided in Table 7. The Air Quality Group inputs population array data to the CAP-88 program. An example of the population array used for the LANSCE facility is provided in Table 8. For agricultural array input, LANL is currently using the default values in CAP-88. Finally, the radionuclide inputs for the point sources monitored in 1997 are provided in Table 9.

Point Source Emissions Modeling

The CAP-88 program was used to calculate doses from both the monitored and unmonitored point sources at LANL. Atmospheric dispersion and transport of the radioactive effluents are calculated by the CAP-88 program using on-site meteorological data. There are a number of radionuclides monitored in LANL effluents that are not included in the dose factor database used by CAP-88.[6] For the substantial amount of GMAP effluents such as C-10, N-16, and O-14, LANL has added the appropriate dose factor to the database. For other effluents such as Br-76, Br-77, Hg-195, Se-75, etc., LANL used the CAP-88 code to calculate environmental concentrations of these radionuclides at the receptor locations, then applied an appropriate dose factor to estimate dose.

LANSCE Fugitive Emission Modeling

Some of the gaseous mixed activation products (GMAP) created at the accelerator target cells migrate into room air and into the environment. These fugitive sources are continuously monitored throughout the beam operating period. In 1997, approximately 832 Ci of C-11 and 35 Ci of Ar-41 were released from LANSCE as fugitive emissions. This source was modeled as an area source, using CAP-88 and meteorological data coinciding with the LANSCE run cycle. Fugitive effluents were modeled from three areas at LANSCE; additional source information is provided in Table 10.

TA-18 Nonpoint Emission Modeling

This site consists of a variety of nuclear assemblies that are operated at near-critical conditions. During the near-critical operations, neutrons are generated that in turn activate argon atoms in the air surrounding the assembly. Operations conducted in 1997 were evaluated for their potential to create Ar-41 gas. In 1997, approximately 1.37 Ci of Ar-41 was generated; the dose was evaluated with CAP-88; additional source information is provided in Table 10.

Environmental Data

The net annual average ambient concentration of important airborne radionuclides, measured by 17 air sampling stations (Fig. 3), is calculated by subtracting an appropriate background concentration value. The net concentration is converted to an annual effective dose equivalent (EDE) using Table 2 of Appendix E of 40 CFR 61 and applying the valid assumption that each table value is equivalent to 10 mrem/yr from all appropriate exposure pathways (100% occupancy assumed at the respective location). Results from each air sampler are given in

Table 11. The operational performance of each air sampler is provided in Table 12. Dose estimates from the revised tritium concentration method are given in Table 13.

61.92 Compliance Assessment

The highest effective dose equivalent to a member of the public at an inhabited off-site point for LANL operations in 1997, was 3.51 mrem. This dose was calculated by adding up the doses for each of the point sources at LANL, the diffuse gaseous activation products from LANSCE and TA-18, and the dose measured by the ambient air sampler in the vicinity of the critical receptor location (Table 14). The location of the inhabited off-site point of highest impact is a business office approximately 800 m north-northeast of the site boundary of TA-53.

Section IV. Constructions and Modifications

61.94(b)(8) Constructions and Modifications

A brief description of constructions and modifications that were completed and/or reviewed in 1997, but for which the requirement to apply for approval to construct or modify was waived under 61.96, is provided in Table 15. The documentation developed to support the waiver is maintained by the Air Quality Group for LANL/DOE.

Section V. Additional Information

This following section is provided pursuant to DOE guidance and is not required by Subpart H reporting requirements.

Environmental Monitoring

The Air Quality Group operates an extensive environmental monitoring network that includes several environmental monitoring stations located near the LANSCE boundary inhabited by the public. Measurement systems at these stations include LiF thermoluminescent dosimeters, continuously operated air samplers, and an *in situ* ion chamber. The combination of these measurement systems allows for monitoring of radionuclide air concentrations and the radiation exposure rate. Results showed the total measured dose is less than the modeled dose given in this report. Results are published here and by the Environmental Assessments and Resource Evaluations Group in the annual Environmental Surveillance Report for LANL.

Other Supplemental Information

- Collective effective dose equivalent for 1997 airborne releases: not available at time of publication.
- Compliance with Subparts Q and T of 40 CFR 61 – Radon-222 Emissions.

These regulations apply to Rn-222 emissions from DOE storage/disposal facilities that contain byproduct material. "Byproduct material" is the tailings or wastes produced by the extraction or concentration of uranium from ore. Although this regulation targets uranium mills, LANL has likely stored small amounts of byproduct material used in experiments in the TA-54 low-level waste facility, Area G, making the Laboratory subject to this regulation. Subject facilities cannot exceed an emissions rate of 20 pCi/m^2 s of Rn-222. In 1993 and 1994, LANL conducted a study to characterize emissions from the Area G disposal site.[8] This study showed an average emission rate of 0.14 pCi/m^2 s for Area G. The performance assessment for Area G has determined that there will not be a significant increase in Rn-222 emissions in the future.[9]

- Potential to exceed 0.1 mrem from LANL sources of Rn-222 or Rn-220 emissions: not applicable at LANL.
- Status of compliance with EPA effluent monitoring requirements: As of June 3, 1996, LANL came into compliance with EPA effluent monitoring requirements.

Table 1. 61.94(b)(4-5) Release Point Data

ESIDNUM	Location	Control Description	Number of Effluent Controls	Control Efficiency	Monitored
03001608	TA-03-016	none	0	0%	☐
03001609	TA-03-016	none	0	0%	☐
03001614	TA-03-016	none	0	0%	☐
03001616	TA-03-016	none	0	0%	☐
03001621	TA-03-016	none	0	0%	☐
03001641	TA-03-016	none	0	0%	☐
03002914	TA-03-29-2	HEPA	2	99.95% each	☑
03002915	TA-03-29-2	HEPA	2	99.95% each	☑
03002919	TA-03-29-3	Aerosol 95	1	80%	☑
03002920	TA-03-29-3	Aerosol 95	1	80%	☑
03002922	TA-03-29-3	none	0	0%	☐
03002923	TA-03-29-4	FARR 30/30	1	~ 20%	☑
03002924	TA-03-29-4	FARR 30/30	1	~ 20%	☑
03002928	TA-03-29-5	HEPA	2	99.95% each	☑
03002929	TA-03-29-5	HEPA	2	99.95% each	☑
03002932	TA-03-29-7	HEPA	2	99.95% each	☑
03002933	TA-03-29-7	HEPA	2	99.95% each	☑
03002937	TA-03-29-V	HEPA	2	99.95% each	☑
03002944	TA-03-29-9	RIGA-Flow 220	1	80%	☑
03002945	TA-03-29-9	RIGA-Flow 220	1	80%	☑
03002946	TA-03-29-9	RIGA-Flow 220	1	80%	☑
03003401	TA-03-034	none	0	0%	☐
03003435	TA-03-035	none	0	0%	☐
03003501	TA-03-35	HEPA	1	99.95%	☑

Table 1. Continued

ESIDNUM	Location	Control Description	Number of Effluent Controls	Control Efficiency	Monitored
03004025	TA-03-040	HEPA	1	99.95%	☐
03006601	TA-03-066	none	0	0%	☐
03006606	TA-03-066	none	0	0%	☐
03006608	TA-03-066	none	0	0%	☐
03006609	TA-03-066	none	0	0%	☐
03006613	TA-03-066	none	0	0%	☐
03006618	TA-03-066	none	0	0%	☐
03006625	TA-03-066	none	0	0%	☐
03006626	TA-03-066	HEPA	1	99.95%	☐
03006628	TA-03-066	none	0	0%	☐
03006643	TA-03-066	none	0	0%	☐
03010222	TA-03-102	HEPA	1	99.95%	☑
03010225	TA-03-102	HEPA	1	99.95%	☐
03169801	TA-03-1698	none	0	0%	☐
09002103	TA-09-021	none	0	0%	☐
09003201	TA-09-032	none	0	0%	☐
15018301	TA-15-183	none	0	0%	☐
15023301	TA-15-233	none	0	0%	☐
16020504	TA-16-205	none	0	0%	☑
16024801	TA-16-248	none	0	0%	☐
16041001	TA-16-410	none	0	0%	☐
16041002	TA-16-410	none	0	0%	☐
16041005	TA-16-410	none	0	0%	☐

Table 1. Continued

ESIDNUM	Location	Control Description	Number of Effluent Controls	Control Efficiency	Monitored
16041021	TA-16-410	none	0	0%	☐
18012701	TA-18-127	none	0	0%	☐
18016801	TA-18-168	none	0	0%	☐
21000507	TA-21-005	HEPA	2	99.95% each	☐
21002S00	TA-21-2S	HEPA	1	99.95%	☐
21011600	TA-21-116	HEPA	1	99.95%	☐
21015001	TA-21-150	HEPA	1	99.95%	☐
21015505	TA-21-155	none	0	0%	☑
21020901	TA-21-209	none	0	0%	☑
21021301	TA-21-213	none	0	0%	☐
21025704	TA-21-257	none	0	0%	☐
33008602	TA-33-086	none	0	0%	☐
33008604	TA-33-086	none	0	0%	☐
33008606	TA-33-086	none	0	0%	☑
35003401	TA-35-034	none	0	0%	☐
35021305	TA-35-213	none	0	0%	☐
35021308	TA-35-213	none	0	0%	☐
41000104	TA-41-001	HEPA	2	99.95% each	☐
41000417	TA-41-004	none	0	0%	☑
43000102	TA-43-001	none	0	0%	☐
46000325	TA-46-003	none	0	0%	☐
46000341	TA-46-003	none	0	0%	☐
46002401	TA-46-024	none	0	0%	☐
46003101	TA-46-031	none	0	0%	☐

Table 1. Continued

ESIDNUM	Location	Control Description	Number of Effluent Controls	Control Efficiency	Monitored
46003125	TA-46-031	none	0	0%	☐
46003141	TA-46-031	none	0	0%	☐
46004106	TA-46-041	none	0	0%	☐
46015405	TA-46-154	none	0	0%	☐
48000107	TA-48-001	HEPA/Charcoal Bed	2	99.95% each	☑
48000111	TA-48-001	none	0	0%	☐
48000115	TA-48-001	none	0	0%	☐
48000135	TA-48-001	none	0	0%	☐
48000140	TA-48-001	Aerosol 95	1	80%	☐
48000145	TA-48-001	none	0	0%	☐
48000146	TA-48-001	none	0	0%	☐
48000151	TA-48-001	HEPA	1	99.95%	☐
48000154	TA-48-001	HEPA	2	99.95% each	☑
48000160	TA-48-001	HEPA	1	99.95%	☑
48000161	TA-48-001	none	0	0%	☐
48004501	TA-48-045	none	0	0%	☐
50000102	TA-50-001	HEPA	1	99.95% each	☑
50000201	TA-50-002	none	0	0%	☐
50003701	TA-50-037	HEPA	2	99.95% each	☑
50006901	TA-50-069	HEPA	1	99.95%	☐
50006902	TA-50-069	HEPA	1	99.95%	☐
50006903	TA-50-069	HEPA	2	99.95% each	☑
50018500	TA-50-185	HEPA	1	99.95%	☐

Table 1. Continued

ESIDNUM	Location	Control Description	Number of Effluent Controls	Control Efficiency	Monitored
53000303	TA-53-003	HEPA	1	99.95%	☑
53000702	TA-53-007	HEPA	1	99.95%	☑
54000201	TA-54-002	HEPA	2	99.95% each	☐
54000202	TA-54-002	HEPA	1	99.95%	☐
54003300	TA-54-033	HEPA	1	99.95%	☐
54003600	TA-54-036	HEPA	1	99.95%	☐
54021501	TA-54-215	HEPA	1	99.95%	☐
54022601	TA-54-226	none	0	0%	☐
54028101	TA-54-281	HEPA	1	99.95%	☐
54100901	TA-54-1009	none	0	0%	☐
54100902	TA-54-1009	none	0	0%	☐
55000415	TA-55-004	HEPA	4	99.95% each	☑
55000416	TA-55-004	HEPA	4	99.95% each	☑
59000104	TA-59-001	none	0	0%	☐
59000114	TA-59-001	none	0	0%	☐
59000121	TA-59-001	none	0	0%	☐
59000122	TA-59-001	none	0	0%	☐
59000123	TA-59-001	none	0	0%	☐
59000124	TA-59-001	none	0	0%	☐
59000125	TA-59-001	none	0	0%	☐
59000126	TA-59-001	none	0	0%	☐
59000127	TA-59-001	none	0	0%	☐
59000130	TA-59-001	none	0	0%	☐

Table 2. 61.94(b)(6) Distances from Monitored Release Points to Nearest Receptor

ESIDNUM	Nearest Receptor	Receptor Direction
03002914	999	N
03002915	999	N
03002919	1139	N
03002920	1139	N
03002923	1010	N
03002924	1010	N
03002928	1149	N
03002929	1149	N
03002932	1165	N
03002933	1165	N
03002937	1113	N
03002944	1197	N
03002945	1197	N
03002946	1197	N
03003501	1129	N
03010222	1205	N
16020504	710	S
21015505	668	NNW
21020901	700	NNW
33008606	2301	WNW
41000417	215	NNE
48000107	753	N
48000154	751	N
48000160	766	N
50000102	1175	N
50003701	1161	N
50006903	1176	N

Table 2. Continued

ESIDNUM	Nearest Receptor	Receptor Direction
53000303	800	NNE
53000702	944	NNE
55000415	1004	N
55000416	1056	N

Table 3. 61.94(b)(7) User-Supplied Data - Monitored Stack Parameters

ESIDNUM	Height (m)	Diameter (m)
03002914	15.9	1.07
03002915	15.9	1.07
03002919	15.9	1.07
03002920	15.9	1.07
03002923	15.9	1.07
03002924	15.9	1.07
03002928	15.9	1.07
03002929	15.9	1.07
03002932	15.9	1.07
03002933	15.9	1.07
03002937	16.8	0.20
03002944	16.5	1.40
03002945	16.5	1.40
03002946	16.5	1.80
03003501	12.0	0.86
03010222	13.4	0.91
16020504	18.3	0.46
21015505	29.9	0.81
21020901	22.9	1.22
33008606	23.4	0.56
41000417	30.8	1.50
48000107	13.4	0.30
48000154	13.1	0.91
48000160	12.4	0.38
50000102	15.5	1.83
50003701	12.4	0.91
50006903	10.5	0.34

Table 3. Continued

ESIDNUM	Height (m)	Diameter (m)
53000303	33.5	0.91
53000702	13.1	0.91
55000415	9.5	0.93
55000416	9.5	0.93

Table 4. 61.94(b)(7) User-Supplied Data - Monitored Stack Parameters

ESIDNUM	stack exit velocity (m/s)
03002914	5.1
03002915	20.3
03002919	24.6
03002920	21.5
03002923	20.3
03002924	15.2
03002928	20.2
03002929	19.0
03002932	12.2
03002933	20.1
03002937	19.8
03002944	9.3
03002945	6.9
03002946	6.2
03003501	3.1
03010222	0.9
16020504	17.2
21015505	8.2
21020901	11.0
33008606	8.5
41000417	3.3
48000107	21.4
48000154	5.6
48000160	10.4
50000102	12.9
50003701	6.8
50006903	4.8

Table 4. Continued

ESIDNUM	stack exit velocity
53000303	11.6
53000702	9.8
55000415	10.7
55000416	14.1

Table 5. 61.94(b)(7) User-Supplied Data - Receptor Locations for Monitored Release Points

ESIDNUM	Nearest Receptor	Direction	LANL Maximum Dose Location	Direction
03002914	999	N	5,981	E
03002915	999	N	5,983	E
03002919	1,139	N	5,969	E
03002920	1,139	N	5,967	E
03002923	1,010	N	6,130	E
03002924	1,010	N	6,132	E
03002928	1,149	N	6,116	E
03002929	1,149	N	6,118	E
03002932	1,165	N	5,966	E
03002933	1,165	N	5,965	E
03002937	1,113	N	6,054	E
03002944	1,197	N	6,055	E
03002945	1,197	N	6,057	E
03002946	1,197	N	6,057	E
03003501	1,129	N	5,751	E
03010222	1,205	N	6,249	E
16020504	710	S	9,799	ENE
21015505	668	NNW	1,525	E
21020901	700	NNW	1,453	E
33008606	2,301	WNW	10,362	N
41000417	215	NNE	3,832	E
48000107	753	N	4,730	ENE
48000154	751	N	4,694	ENE
48000160	766	N	4,733	ENE
50000102	1,175	N	4,131	ENE
50003701	1,161	N	4,242	ENE
50006903	1,176	N	4,297	ENE

Table 5. Continued

ESIDNUM	Nearest Receptor	Direction	LANL Maximum Dose Location	Direction
53000303	800	NNE	800	NNE
53000702	944	NNE	944	NNE
55000415	1,004	N	4,434	ENE
55000416	1,056	N	4,508	ENE

Table 6. 61.94(b)(7) User-Supplied Data - Input Parameters

Description	Value	Units	CAP88 Variable Name	Reference
Annual rainfall rate	45.3	cm/yr	RR	Bowen (1990)
Lid height	1525	m	LIPO	Holzworth (1972)
Annul median temp	281.9	K	TA	Bowen (1990)
E-vertical temperature gradient	0.02	K/m	TG	EPA (1995)
F-vertical temperature gradient	0.035	K/m	TG	EPA (1995)
G-vertical temperature gradient	0.035	K/m	TG	EPA (1995)
Food supply fraction - local vegetables	0.076		F1V	EPA (1989)
Food supply fraction - vegetable regional	0.924		F2V	EPA (1989)
Food supply fraction - vegetable imported	0		F3V	EPA (1989)
Food supply fraction - meat local	0.008		F1B	EPA (1989)
Food supply fraction - meat regional	0.992		F2B	EPA (1989)
Food supply fraction - meat imported	0		F3B	EPA (1989)
Food supply fraction - milk local	0		F1M	EPA (1989)
Food supply fraction - milk regional	1		F2M	EPA (1989)
Food supply fraction - milk imported	0		F3M	EPA (1989)

References

Brent M. Bowen, "Los Alamos Climatology," Los Alamos National Laboratory report LA-11735-MS (1990).

George C. Holzworth, "Mixing Heights, Wind Speeds, and Potential for Urban Air Pollution throughout the Contiguous United States," U.S. Environmental Protection Agency Office of Air Programs report PB-207 103 (1972).

U.S. Environmental Protection Agency, "User's Guide for the Industrial Source Complex (ISC3) Dispersion Models Volume II - Description of Model Algorithms," U.S. Environmental Protection Agency report EPA-454/B-95-003b (1995).

U.S. Environmental Protection Agency, "Risk Assessments Methodology, Environmental Impact Statement, NESHAPS for Radionuclides, Background Information Document - Volume 1," U.S. Environmental Protection Agency report EPA/520/189-005 (1989).

Table 7. 61.94(b)(7) User-Supplied Data - Wind Frequency Arrays

CAP88 Input Data For 1997 TA-6 Meteorological Tower

1	1	0.001030.000630.000000.000000.000000.00000
1	2	0.002380.000890.000000.000000.000000.00000
1	3	0.004250.002130.000030.000000.000000.00000
1	4	0.007300.002990.000000.000000.000000.00000
1	5	0.008530.004140.000000.000000.000000.00000
1	6	0.008790.006210.000000.000000.000000.00000
1	7	0.010490.012240.000170.000030.000000.00000
1	8	0.006900.010370.000110.000000.000000.00000
1	9	0.003990.005340.000140.000000.000000.00000
1	10	0.001840.001640.000230.000000.000000.00000
1	11	0.001380.000890.000060.000000.000000.00000
1	12	0.000570.000520.000030.000000.000000.00000
1	13	0.000600.000660.000060.000000.000000.00000
1	14	0.000570.000720.000110.000000.000000.00000
1	15	0.000660.000750.000060.000000.000000.00000
1	16	0.000860.000720.000030.000000.000000.00000
2	1	0.000400.000780.000430.000000.000000.00000
2	2	0.000780.001240.000290.000030.000000.00000
2	3	0.001060.002790.000170.000000.000000.00000
2	4	0.002670.003960.000000.000000.000000.00000
2	5	0.001950.003190.000000.000000.000000.00000
2	6	0.001490.003220.000030.000000.000000.00000
2	7	0.001580.005370.000170.000060.000000.00000
2	8	0.001840.010290.001490.000060.000000.00000
2	9	0.001520.006870.002360.000000.000000.00000
2	10	0.000430.003330.001260.000000.000000.00000
2	11	0.000370.001350.000750.000000.000000.00000
2	12	0.000090.000800.000340.000000.000000.00000
2	13	0.000140.000520.000260.000000.000000.00000
2	14	0.000170.000750.000170.000000.000000.00000
2	15	0.000370.000830.000230.000000.000000.00000
2	16	0.000230.000520.000060.000030.000000.00000
3	1	0.000980.001780.000830.000000.000000.00000
3	2	0.001900.005000.002610.000320.000000.00000
3	3	0.001750.005320.001260.000030.000000.00000
3	4	0.002700.004680.000110.000000.000000.00000
3	5	0.002330.003620.000030.000000.000000.00000
3	6	0.001290.002930.000090.000000.000000.00000
3	7	0.001210.002330.000090.000000.000000.00000
3	8	0.002470.012470.006460.000000.000000.00000
3	9	0.002040.020280.014280.000060.000000.00000
3	10	0.001440.009680.006980.000110.000000.00000
3	11	0.000570.005230.004340.000170.000000.00000
3	12	0.000370.002180.004480.000340.000000.00000
3	13	0.000290.001380.001950.000030.000000.00000
3	14	0.000340.001900.002180.000230.000000.00000
3	15	0.000340.002870.003070.000260.000000.00000
3	16	0.000630.001470.000950.000030.000000.00000
4	1	0.005600.008710.001120.000030.000000.00000
4	2	0.005920.008560.003620.000660.000000.00000
4	3	0.004250.005200.000290.000000.000000.00000
4	4	0.004370.002470.000110.000000.000000.00000
4	5	0.003480.001610.000030.000000.000000.00000

4	6	0.003190.001120.000000.000000.000000.00000
4	7	0.003710.000950.000090.000090.000000.00000
4	8	0.004600.004650.001060.000200.000000.00000
4	9	0.006230.021690.005260.000630.000000.00000
4	10	0.006840.029310.007930.000600.000030.00000
4	11	0.004770.022550.003450.000370.000000.00000
4	12	0.003190.011950.004740.002100.000140.00000
4	13	0.002640.005400.013300.007040.000660.00009
4	14	0.002670.007810.017470.009970.002790.00052
4	15	0.003360.012270.006950.001290.000060.00000
4	16	0.004190.007990.001260.000090.000000.00000
5	1	0.005060.002130.000000.000000.000000.00000
5	2	0.003790.001290.000200.000060.000000.00000
5	3	0.001700.000370.000000.000000.000000.00000
5	4	0.001470.000140.000000.000000.000000.00000
5	5	0.000950.000170.000000.000000.000000.00000
5	6	0.000660.000140.000000.000000.000000.00000
5	7	0.001180.000230.000000.000000.000000.00000
5	8	0.001610.000320.000000.000000.000000.00000
5	9	0.003850.001610.000000.000000.000000.00000
5	10	0.006000.005570.000000.000000.000000.00000
5	11	0.006950.010540.000000.000000.000000.00000
5	12	0.006090.021630.000460.000000.000000.00000
5	13	0.004170.017900.003790.000110.000000.00000
5	14	0.005170.017530.006090.000060.000000.00000
5	15	0.005630.029880.000200.000000.000000.00000
5	16	0.006440.007180.000030.000000.000000.00000
6	1	0.003760.000980.000060.000000.000000.00000
6	2	0.002670.000320.000110.000000.000000.00000
6	3	0.001350.000060.000000.000000.000000.00000
6	4	0.000800.000030.000000.000000.000000.00000
6	5	0.000320.000000.000000.000000.000000.00000
6	6	0.000460.000000.000000.000000.000000.00000
6	7	0.000800.000000.000000.000000.000000.00000
6	8	0.000550.000060.000000.000000.000000.00000
6	9	0.001350.000860.000000.000000.000000.00000
6	10	0.002470.000750.000000.000000.000000.00000
6	11	0.004600.001210.000000.000000.000000.00000
6	12	0.006440.009830.000000.000000.000000.00000
6	13	0.008760.038440.001320.000000.000000.00000
6	14	0.008710.035220.000800.000000.000000.00000
6	15	0.008680.009540.000000.000000.000000.00000
6	16	0.005770.003050.000000.000000.000000.00000

CAP88 Input Data For February 1997 TA-53 Meteorological Tower

1	1	0.001080.000360.000000.000000.000000.00000
1	2	0.000360.000000.000000.000000.000000.00000
1	3	0.003950.000720.000000.000000.000000.00000
1	4	0.005030.000720.000000.000000.000000.00000
1	5	0.006110.001080.000000.000000.000000.00000
1	6	0.005390.002160.000000.000000.000000.00000
1	7	0.003950.001800.000000.000000.000000.00000
1	8	0.001080.001080.000000.000000.000000.00000
1	9	0.000360.000720.000000.000000.000000.00000
1	10	0.002510.000360.000000.000000.000000.00000
1	11	0.001080.000000.000000.000000.000000.00000
1	12	0.000000.000000.000000.000000.000000.00000
1	13	0.000360.000000.000000.000000.000000.00000

1	14	0.000360.000000.000000.000000.000000.00000
1	15	0.000360.000360.000000.000000.000000.00000
1	16	0.001080.000000.000000.000000.000000.00000
2	1	0.000000.000360.000000.000000.000000.00000
2	2	0.000720.000000.000000.000000.000000.00000
2	3	0.000720.000720.000000.000000.000000.00000
2	4	0.000720.002160.000000.000000.000000.00000
2	5	0.001080.002510.000000.000000.000000.00000
2	6	0.000000.001080.000000.000000.000000.00000
2	7	0.000000.003950.000000.000000.000000.00000
2	8	0.001440.001080.000000.000000.000000.00000
2	9	0.000720.001800.000000.000000.000000.00000
2	10	0.000000.000720.000000.000000.000000.00000
2	11	0.000000.000000.000000.000000.000000.00000
2	12	0.000000.000000.000000.000000.000000.00000
2	13	0.000000.000360.000000.000000.000000.00000
2	14	0.000000.000000.000000.000000.000000.00000
2	15	0.000360.000000.000000.000000.000000.00000
2	16	0.000000.000000.000000.000000.000000.00000
3	1	0.000360.000000.000000.000000.000000.00000
3	2	0.000000.002510.001080.000360.000000.00000
3	3	0.002160.003590.000000.000000.000000.00000
3	4	0.001080.007540.000000.000000.000000.00000
3	5	0.001800.001440.000000.000000.000000.00000
3	6	0.000360.003590.000000.000000.000000.00000
3	7	0.001080.005030.000000.000000.000000.00000
3	8	0.001440.006110.000360.000000.000000.00000
3	9	0.001080.004310.000360.000000.000000.00000
3	10	0.000720.001800.000360.000000.000000.00000
3	11	0.000000.000360.000360.000000.000000.00000
3	12	0.000000.000360.000000.000000.000000.00000
3	13	0.000000.000000.000360.000000.000000.00000
3	14	0.000360.000720.000000.000000.000000.00000
3	15	0.000000.000000.000360.000000.000000.00000
3	16	0.000000.000000.000000.000000.000000.00000
4	1	0.005030.010420.006110.011140.000000.00000
4	2	0.004310.008260.006820.004670.000000.00000
4	3	0.003230.005750.002510.000000.000000.00000
4	4	0.002870.005390.000360.000000.000000.00000
4	5	0.003950.003590.000360.000000.000000.00000
4	6	0.002160.002870.000360.000000.000000.00000
4	7	0.002160.004670.002510.000000.000000.00000
4	8	0.001440.013290.015450.000720.000000.00000
4	9	0.003230.019400.051720.006110.000000.00000
4	10	0.001440.014730.065010.016880.000000.00000
4	11	0.002870.023350.057110.007540.000000.00000
4	12	0.002870.008260.010420.003230.000360.00000
4	13	0.003590.005750.010060.001080.000000.00000
4	14	0.002510.003950.005030.000360.000000.00000
4	15	0.005390.002510.001800.000000.000000.00000
4	16	0.004670.002870.002160.000360.000000.00000
5	1	0.006470.008980.003590.000000.000000.00000
5	2	0.010780.011490.001800.000000.000000.00000
5	3	0.005750.006110.000720.000000.000000.00000
5	4	0.005030.003230.000360.000000.000000.00000
5	5	0.002160.001080.000000.000000.000000.00000
5	6	0.002160.000720.000000.000000.000000.00000
5	7	0.002510.002510.000000.000000.000000.00000
5	8	0.001440.005030.003230.000000.000000.00000
5	9	0.002870.015450.006820.000720.000000.00000
5	10	0.002870.036280.034120.002510.000000.00000

5	11	0.002870.022630.014730.000000.000000.00000
5	12	0.001800.016160.017960.000000.000000.00000
5	13	0.005030.017600.005750.000000.000000.00000
5	14	0.004670.012930.000360.000000.000000.00000
5	15	0.007180.010420.000720.000000.000000.00000
5	16	0.010060.005030.001440.000000.000000.00000
6	1	0.002510.000360.000000.000000.000000.00000
6	2	0.003230.000720.000000.000000.000000.00000
6	3	0.004670.001080.000000.000000.000000.00000
6	4	0.002870.000720.000000.000000.000000.00000
6	5	0.002160.000000.000000.000000.000000.00000
6	6	0.003230.000000.000000.000000.000000.00000
6	7	0.003230.000360.000000.000000.000000.00000
6	8	0.002160.000360.000000.000000.000000.00000
6	9	0.003590.002510.000000.000000.000000.00000
6	10	0.002870.003590.000000.000000.000000.00000
6	11	0.001080.002510.000000.000000.000000.00000
6	12	0.000720.002870.000000.000000.000000.00000
6	13	0.000720.003230.000360.000000.000000.00000
6	14	0.001800.002870.000000.000000.000000.00000
6	15	0.003230.001080.000000.000000.000000.00000

CAP88 Input Data For March 1997 TA-53 Meteorological Tower

1	1	0.001080.000000.000000.000000.000000.00000
1	2	0.003230.000720.000000.000000.000000.00000
1	3	0.003230.001080.000000.000000.000000.00000
1	4	0.005030.002870.000000.000000.000000.00000
1	5	0.004310.004310.000000.000000.000000.00000
1	6	0.002510.002160.000000.000000.000000.00000
1	7	0.001800.003590.000000.000000.000000.00000
1	8	0.003230.002160.000000.000000.000000.00000
1	9	0.001440.002160.000000.000000.000000.00000
1	10	0.000720.000360.000000.000000.000000.00000
1	11	0.000720.000360.000000.000000.000000.00000
1	12	0.000360.000360.000000.000000.000000.00000
1	13	0.000360.000000.000000.000000.000000.00000
1	14	0.000000.000000.000000.000000.000000.00000
1	15	0.000000.000000.000000.000000.000000.00000
1	16	0.000720.000000.000000.000000.000000.00000
2	1	0.000360.000000.000000.000000.000000.00000
2	2	0.000000.000360.000000.000000.000000.00000
2	3	0.000360.001800.000000.000000.000000.00000
2	4	0.001800.002510.000360.000000.000000.00000
2	5	0.000360.003590.000000.000000.000000.00000
2	6	0.000720.002510.000000.000000.000000.00000
2	7	0.000360.003590.000000.000000.000000.00000
2	8	0.000360.004310.000000.000000.000000.00000
2	9	0.000000.000720.000000.000000.000000.00000
2	10	0.000360.000360.000000.000000.000000.00000
2	11	0.000000.000000.000000.000000.000000.00000
2	12	0.000000.000360.000000.000000.000000.00000
2	13	0.000000.000000.000360.000000.000000.00000
2	14	0.000000.001080.000720.000000.000000.00000
2	15	0.000000.000000.000360.000000.000000.00000
2	16	0.000000.000360.000000.000000.000000.00000
3	1	0.000720.001800.000000.000000.000000.00000
3	2	0.001800.002160.000720.000000.000000.00000
3	3	0.001080.005030.002160.000000.000000.00000

3	4	0.001080.007180.002160.000000.000000.00000
3	5	0.000360.004310.000360.000000.000000.00000
3	6	0.000000.004670.000000.000000.000000.00000
3	7	0.000000.006110.000000.000000.000000.00000
3	8	0.000360.006110.000360.000000.000000.00000
3	9	0.000000.006470.001080.000000.000000.00000
3	10	0.000000.001800.000720.000000.000000.00000
3	11	0.000000.000720.000360.000000.000000.00000
3	12	0.000360.000720.001080.000000.000000.00000
3	13	0.000000.002870.003230.000360.000000.00000
3	14	0.000000.000000.002870.000000.000000.00000
3	15	0.000360.000720.000360.000000.000000.00000
3	16	0.000720.000720.000360.000000.000000.00000
4	1	0.003950.004310.017240.009700.001440.00000
4	2	0.002510.009340.015090.006470.000360.00000
4	3	0.001080.010060.014730.000720.000000.00000
4	4	0.002510.004670.002510.000000.000000.00000
4	5	0.001440.001800.000360.000000.000000.00000
4	6	0.001800.001800.000000.000000.000000.00000
4	7	0.000720.002870.000000.000000.000000.00000
4	8	0.002160.011140.011850.001440.000000.00000
4	9	0.002510.012210.043100.008980.000000.00000
4	10	0.002510.008980.033760.011490.000000.00000
4	11	0.001080.011850.017240.004670.000000.00000
4	12	0.000360.007900.019040.015450.002510.00000
4	13	0.001440.006470.024780.017240.000000.00000
4	14	0.002870.006470.022270.006820.001080.00000
4	15	0.003230.003950.005030.005030.000000.00000
4	16	0.001800.003590.005030.003230.000000.00000
5	1	0.008260.009700.002870.000000.000000.00000
5	2	0.007180.011850.002870.000000.000000.00000
5	3	0.005390.005750.001440.000000.000000.00000
5	4	0.001800.002510.000360.000000.000000.00000
5	5	0.001080.000720.000000.000000.000000.00000
5	6	0.002510.001080.000000.000000.000000.00000
5	7	0.002160.002160.000000.000000.000000.00000
5	8	0.001080.002870.001080.000000.000000.00000
5	9	0.000720.005750.008260.000360.000000.00000
5	10	0.001800.016520.033760.001440.000000.00000
5	11	0.001800.025500.014730.000360.000000.00000
5	12	0.001440.011490.017960.000360.000000.00000
5	13	0.001080.017240.028740.000000.000000.00000
5	14	0.003950.011490.004670.000000.000000.00000
5	15	0.007180.007180.001800.000720.000000.00000
5	16	0.007180.012210.006820.000000.000000.00000
6	1	0.004670.000360.000000.000000.000000.00000
6	2	0.004310.000720.000000.000000.000000.00000
6	3	0.002160.000360.000000.000000.000000.00000
6	4	0.002870.000000.000000.000000.000000.00000
6	5	0.002160.000000.000000.000000.000000.00000
6	6	0.001080.000360.000000.000000.000000.00000
6	7	0.000360.000720.000000.000000.000000.00000
6	8	0.001080.000720.000000.000000.000000.00000
6	9	0.000720.000720.000000.000000.000000.00000
6	10	0.001440.005390.000000.000000.000000.00000
6	11	0.001080.000360.000000.000000.000000.00000
6	12	0.000360.003590.002510.000000.000000.00000
6	13	0.000000.002160.001440.000000.000000.00000
6	14	0.002160.002510.000000.000000.000000.00000
6	15	0.002160.000360.000000.000000.000000.00000
6	16	0.004670.000000.000000.000000.000000.00000

1	1	0.000360.000720.000000.000000.000000.00000
1	2	0.002890.000360.000360.000000.000000.00000
1	3	0.003260.001450.000000.000000.000000.00000
1	4	0.004700.006150.000000.000000.000000.00000
1	5	0.003980.008680.000000.000000.000000.00000
1	6	0.002890.004340.000000.000000.000000.00000
1	7	0.003620.004340.000000.000000.000000.00000
1	8	0.002170.001810.000000.000000.000000.00000
1	9	0.003260.001810.000000.000000.000000.00000
1	10	0.000360.000720.000000.000000.000000.00000
1	11	0.000720.000720.000360.000000.000000.00000
1	12	0.000360.000360.000000.000000.000000.00000
1	13	0.001090.000360.000360.000000.000000.00000
1	14	0.000000.000720.000720.000000.000000.00000
1	15	0.001090.000000.000000.000000.000000.00000
1	16	0.001090.000000.000000.000000.000000.00000
2	1	0.000360.000720.000000.000000.000000.00000
2	2	0.000000.001090.000360.000000.000000.00000
2	3	0.000360.000360.000000.000000.000000.00000
2	4	0.001090.004340.000000.000000.000000.00000
2	5	0.000360.005430.000000.000000.000000.00000
2	6	0.000000.002530.000000.000000.000000.00000
2	7	0.001810.001450.000000.000000.000000.00000
2	8	0.000360.002530.000000.000000.000000.00000
2	9	0.000720.001810.000000.000000.000000.00000
2	10	0.000000.001450.000000.000000.000000.00000
2	11	0.000000.000360.000000.000000.000000.00000
2	12	0.000000.000360.000000.000000.000000.00000
2	13	0.000000.000720.000000.000000.000000.00000
2	14	0.000000.000360.000720.000000.000000.00000
2	15	0.000000.000720.000000.000000.000000.00000
2	16	0.000000.000000.000000.000000.000000.00000
3	1	0.001090.000720.000360.000000.000000.00000
3	2	0.000360.000720.000360.000000.000000.00000
3	3	0.001450.003260.000000.000000.000000.00000
3	4	0.000360.003980.000720.000000.000000.00000
3	5	0.000000.005790.000000.000000.000000.00000
3	6	0.000360.004700.000000.000000.000000.00000
3	7	0.000720.005430.000000.000000.000000.00000
3	8	0.000720.005070.001090.000000.000000.00000
3	9	0.000360.004700.002530.000000.000000.00000
3	10	0.000360.003260.001450.000000.000000.00000
3	11	0.000000.002530.001810.000000.000000.00000
3	12	0.000000.000360.001090.000000.000000.00000
3	13	0.000000.001810.007960.000000.000000.00000
3	14	0.000000.000360.006870.000360.000000.00000
3	15	0.000720.000720.001810.000000.000000.00000
3	16	0.000720.000360.001450.000000.000000.00000
4	1	0.003260.003980.001450.007600.003260.00000
4	2	0.002170.003980.003260.005070.002170.00000
4	3	0.003620.005430.001090.001450.000000.00000
4	4	0.002170.004700.002170.000000.000000.00000
4	5	0.001090.001450.001090.000000.000000.00000
4	6	0.001450.000720.000720.000000.000000.00000
4	7	0.001450.002890.001090.000720.003980.00000
4	8	0.000720.007240.011580.006150.005790.00036
4	9	0.001450.022070.056440.018450.001450.00000

4	10	0.001810.014470.075980.026410.000720.00000
4	11	0.004340.011940.020620.005790.000720.00000
4	12	0.002170.009040.007240.005070.000000.00000
4	13	0.001450.005790.011580.006870.000000.00000
4	14	0.002170.006150.022790.010130.000360.00000
4	15	0.002530.005070.006150.004340.000000.00000
4	16	0.003620.006510.004340.002530.000000.00000
5	1	0.003260.005070.002530.000360.000000.00000
5	2	0.002530.005430.000720.000000.000000.00000
5	3	0.004340.003980.000360.000000.000000.00000
5	4	0.005070.002530.000000.000000.000000.00000
5	5	0.002890.002170.000000.000000.000000.00000
5	6	0.000360.003620.000000.000000.000000.00000
5	7	0.000720.000720.000000.000000.000000.00000
5	8	0.001810.002890.002890.000000.000000.00000
5	9	0.002170.011220.005790.000720.000000.00000
5	10	0.002890.016640.038350.000720.000000.00000
5	11	0.002170.018090.014110.000360.000000.00000
5	12	0.001810.012660.006870.000000.000000.00000
5	13	0.002530.018090.012300.000000.000000.00000
5	14	0.003620.016640.002530.000000.000000.00000
5	15	0.003260.007240.003980.000000.000000.00000
5	16	0.005790.007960.001810.000000.000000.00000
6	1	0.003620.000000.000000.000000.000000.00000
6	2	0.002170.001090.000360.000000.000000.00000
6	3	0.001090.000000.000000.000000.000000.00000
6	4	0.000720.000000.000000.000000.000000.00000
6	5	0.002170.000000.000000.000000.000000.00000
6	6	0.003260.000000.000000.000000.000000.00000
6	7	0.002170.000720.000000.000000.000000.00000
6	8	0.001450.001090.000000.000000.000000.00000
6	9	0.001810.003980.000000.000000.000000.00000
6	10	0.002530.009040.002170.000000.000000.00000
6	11	0.002170.000720.000360.000000.000000.00000
6	12	0.001090.002170.000360.000000.000000.00000
6	13	0.000000.003260.000720.000000.000000.00000
6	14	0.000720.001090.000000.000000.000000.00000
6	15	0.002170.000000.000000.000000.000000.00000
6	16	0.001090.000720.000000.000000.000000.00000

CAP88 Input Data For May 1997 TA-53 Meteorological Tower

1	1	0.000000.000000.000000.000000.000000.00000
1	2	0.001860.001240.000000.000000.000000.00000
1	3	0.004340.002170.000000.000000.000000.00000
1	4	0.007120.007120.000000.000000.000000.00000
1	5	0.003720.008360.000000.000000.000000.00000
1	6	0.004650.006810.000000.000000.000000.00000
1	7	0.005570.006500.000000.000000.000000.00000
1	8	0.003720.003100.000000.000000.000000.00000
1	9	0.001550.001550.000000.000000.000000.00000
1	10	0.000930.001860.000000.000000.000000.00000
1	11	0.000310.001860.000000.000000.000000.00000
1	12	0.000000.000310.000000.000000.000000.00000
1	13	0.000620.001550.000000.000000.000000.00000
1	14	0.000620.000620.000000.000000.000000.00000
1	15	0.000000.000930.000000.000000.000000.00000
1	16	0.000310.000620.000000.000000.000000.00000
2	1	0.000310.001240.000000.000000.000000.00000

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2  2   0.000310.000310.000000.000000.000000.00000
2  3   0.001240.002170.000000.000000.000000.00000
2  4   0.001240.004650.000000.000000.000000.00000
2  5   0.000930.005570.000000.000000.000000.00000
2  6   0.000310.002790.000000.000000.000000.00000
2  7   0.000620.002480.000000.000000.000000.00000
2  8   0.000620.002170.000000.000000.000000.00000
2  9   0.000620.002480.000000.000000.000000.00000
2 10   0.000310.004650.000000.000000.000000.00000
2 11   0.000000.000620.000000.000000.000000.00000
2 12   0.000000.000620.000000.000000.000000.00000
2 13   0.000000.001240.000310.000000.000000.00000
2 14   0.000310.000930.000930.000310.000000.00000
2 15   0.000000.000620.000310.000000.000000.00000
2 16   0.000000.000310.000000.000000.000000.00000
3  1   0.000310.001240.000310.000000.000000.00000
3  2   0.000310.000620.000310.000000.000000.00000
3  3   0.001240.002790.000310.000000.000000.00000
3  4   0.001860.005570.000310.000000.000000.00000
3  5   0.000310.007120.001240.000000.000000.00000
3  6   0.000310.003410.000620.000000.000000.00000
3  7   0.000930.004030.000000.000000.000000.00000
3  8   0.000310.007120.000000.000000.000000.00000
3  9   0.000620.009600.003720.000000.000000.00000
3 10   0.000000.003410.000930.000000.000000.00000
3 11   0.000000.003100.002170.000000.000000.00000
3 12   0.000000.001240.001550.000000.000000.00000
3 13   0.000310.001550.006500.000000.000000.00000
3 14   0.000000.003100.003720.000620.000000.00000
3 15   0.000000.003100.001550.000000.000000.00000
3 16   0.000000.000620.000310.000000.000000.00000
4  1   0.004340.005880.009600.003100.000000.00000
4  2   0.002790.008980.006190.003100.000930.00000
4  3   0.004960.004340.004650.000310.000000.00000
4  4   0.002790.006500.002170.000000.000000.00000
4  5   0.002790.006810.000930.000000.000000.00000
4  6   0.003100.002790.000000.000000.000000.00000
4  7   0.002480.004030.001240.000000.000000.00000
4  8   0.003720.012390.021990.001240.000000.00000
4  9   0.003100.021060.028180.005880.000000.00000
4 10   0.001860.016100.029110.007430.000000.00000
4 11   0.002480.012700.031900.016410.000310.00000
4 12   0.002790.012390.021680.008980.003720.00062
4 13   0.002790.012390.030660.008670.000000.00000
4 14   0.004030.012390.022610.005260.001240.00000
4 15   0.003410.007430.016100.006190.001550.00031
4 16   0.005260.008050.010530.007120.000620.00000
5  1   0.001860.003100.000930.000000.000000.00000
5  2   0.003100.003100.001550.000000.000000.00000
5  3   0.002480.002790.000930.000000.000000.00000
5  4   0.001240.001550.000000.000000.000000.00000
5  5   0.000930.001550.000000.000000.000000.00000
5  6   0.000310.000310.000310.000000.000000.00000
5  7   0.000310.003100.000310.000000.000000.00000
5  8   0.001240.002170.000310.000000.000000.00000
5  9   0.001240.003410.003410.000000.000000.00000
5 10   0.001550.008050.015480.000000.000000.00000
5 11   0.004650.018270.014870.000000.000000.00000
5 12   0.001860.024160.013320.000000.000000.00000
5 13   0.002170.019200.010530.000000.000000.00000
5 14   0.000930.020130.002170.000000.000000.00000
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5	16	0.002790.004340.008670.000000.000000.00000
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6	2	0.000620.000310.000000.000000.000000.00000
6	3	0.000930.000000.000000.000000.000000.00000
6	4	0.001240.000000.000000.000000.000000.00000
6	5	0.000310.000000.000000.000000.000000.00000
6	6	0.000000.000310.000000.000000.000000.00000
6	7	0.000310.000930.000000.000000.000000.00000
6	8	0.001550.001240.000000.000000.000000.00000
6	9	0.002480.000310.000000.000000.000000.00000
6	10	0.002480.000930.000000.000000.000000.00000
6	11	0.002480.000310.000000.000000.000000.00000
6	12	0.000620.001550.000310.000000.000000.00000
6	13	0.000930.001240.000310.000000.000000.00000
6	14	0.000930.002480.000000.000000.000000.00000
6	15	0.000930.000620.000000.000000.000000.00000
6	16	0.001240.000000.000000.000000.000000.00000

CAP88 Input Data For June 1997 TA-53 Meteorological Tower

1	1	0.002150.000720.000000.000000.000000.00000
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1	4	0.009340.005750.000000.000000.000000.00000
1	5	0.003590.006100.000000.000000.000000.00000
1	6	0.003950.005390.000000.000000.000000.00000
1	7	0.005750.002510.000000.000000.000000.00000
1	8	0.002510.002510.000000.000000.000000.00000
1	9	0.001440.002870.000000.000000.000000.00000
1	10	0.000360.001080.000000.000000.000000.00000
1	11	0.001800.000720.000000.000000.000000.00000
1	12	0.001440.000720.000000.000000.000000.00000
1	13	0.001440.001800.000000.000000.000000.00000
1	14	0.001080.000000.000000.000000.000000.00000
1	15	0.001080.000720.000000.000000.000000.00000
1	16	0.001080.000720.000000.000000.000000.00000
2	1	0.000720.000360.000000.000000.000000.00000
2	2	0.001080.000360.000360.000000.000000.00000
2	3	0.001440.002870.000000.000000.000000.00000
2	4	0.002510.006100.000000.000000.000000.00000
2	5	0.000360.003230.000000.000000.000000.00000
2	6	0.001440.000360.000000.000000.000000.00000
2	7	0.000360.004310.000000.000000.000000.00000
2	8	0.000000.002150.000000.000000.000000.00000
2	9	0.000000.003230.000360.000000.000000.00000
2	10	0.000360.001800.000000.000000.000000.00000
2	11	0.000000.000360.000360.000000.000000.00000
2	12	0.000360.001440.000360.000000.000000.00000
2	13	0.000000.001080.000000.000000.000000.00000
2	14	0.000000.000360.000000.000000.000000.00000
2	15	0.000720.000360.000000.000000.000000.00000
2	16	0.000000.000360.000000.000000.000000.00000
3	1	0.001440.001440.000000.000000.000000.00000
3	2	0.001800.003230.000360.000000.000000.00000
3	3	0.001440.002510.000360.000000.000000.00000
3	4	0.001440.003590.000000.000000.000000.00000
3	5	0.001440.004310.000000.000000.000000.00000
3	6	0.000360.001440.000000.000000.000000.00000

3	7	0.000000.002150.000000.000000.000000.00000
3	8	0.002150.006460.001080.000000.000000.00000
3	9	0.000000.006820.003950.000000.000000.00000
3	10	0.000360.003230.002510.000360.000000.00000
3	11	0.000360.003230.001080.000000.000000.00000
3	12	0.000720.002150.003950.000000.000000.00000
3	13	0.000000.002510.003590.000000.000000.00000
3	14	0.000000.001440.001800.000000.000000.00000
3	15	0.001080.001080.000000.000000.000000.00000
3	16	0.001080.000000.000360.000000.000000.00000
4	1	0.007180.010050.004310.001080.000360.00000
4	2	0.005750.010050.002510.000720.000000.00000
4	3	0.004670.010050.001800.001080.000000.00000
4	4	0.006100.002870.002150.000000.000000.00000
4	5	0.003590.001800.001080.000000.000000.00000
4	6	0.003230.001440.001080.000000.000000.00000
4	7	0.001800.003230.001800.001080.000000.00000
4	8	0.002150.006100.012210.006460.000360.00000
4	9	0.001080.007900.055300.026210.000360.00000
4	10	0.001800.015800.046320.018670.000720.00000
4	11	0.001800.016160.037700.006820.000360.00000
4	12	0.001440.010770.031240.007540.000000.00000
4	13	0.000720.012570.022620.002510.000360.00000
4	14	0.002510.011850.012210.006100.000360.00000
4	15	0.001800.003590.006100.002510.001080.00072
4	16	0.007540.006460.007540.002150.002150.00072
5	1	0.003590.003230.000000.000000.000000.00000
5	2	0.002870.002150.000720.000000.000000.00000
5	3	0.002510.004670.000720.000000.000000.00000
5	4	0.002510.003590.000360.000000.000000.00000
5	5	0.001440.000720.000000.000000.000000.00000
5	6	0.000360.001080.000000.000000.000000.00000
5	7	0.000360.000720.000000.000000.000000.00000
5	8	0.000720.001080.000000.000000.000000.00000
5	9	0.000360.001080.000720.000000.000000.00000
5	10	0.001080.008260.011490.000000.000000.00000
5	11	0.001080.015440.010050.000000.000000.00000
5	12	0.002150.015080.038060.000000.000000.00000
5	13	0.000720.023700.036620.000000.000000.00000
5	14	0.002870.014720.007180.000000.000000.00000
5	15	0.004670.005390.002870.000000.000000.00000
5	16	0.002150.005750.001800.000000.000000.00000
6	1	0.000360.000000.000000.000000.000000.00000
6	2	0.000360.000360.000000.000000.000000.00000
6	3	0.000720.001080.000000.000000.000000.00000
6	4	0.001080.000360.000000.000000.000000.00000
6	5	0.000720.000360.000000.000000.000000.00000
6	6	0.000360.000000.000000.000000.000000.00000
6	7	0.000720.000000.000000.000000.000000.00000
6	8	0.000360.000360.000000.000000.000000.00000
6	9	0.001800.000360.000000.000000.000000.00000
6	10	0.001440.000720.000000.000000.000000.00000
6	11	0.000720.001080.000000.000000.000000.00000
6	12	0.001080.001080.000720.000000.000000.00000
6	13	0.001080.002510.000720.000000.000000.00000
6	14	0.001080.003950.000000.000000.000000.00000
6	15	0.000720.001440.000000.000000.000000.00000
6	16	0.001080.000000.000000.000000.000000.00000

CAP88 Input Data For July 1997 TA-53 Meteorological Tower

1	1	0.001080.000720.000000.000000.000000.00000
1	2	0.002510.000360.000000.000000.000000.00000
1	3	0.006820.002510.000000.000000.000000.00000
1	4	0.007180.011850.000000.000000.000000.00000
1	5	0.003230.007900.000000.000000.000000.00000
1	6	0.003230.005390.000000.000000.000000.00000
1	7	0.002870.003590.000000.000000.000000.00000
1	8	0.002870.003230.000000.000000.000000.00000
1	9	0.000720.004670.000000.000000.000000.00000
1	10	0.000720.003590.000000.000000.000000.00000
1	11	0.000360.002150.000000.000000.000000.00000
1	12	0.000000.001080.000000.000000.000000.00000
1	13	0.000720.000720.000000.000000.000000.00000
1	14	0.000720.001440.000000.000000.000000.00000
1	15	0.000000.000720.000000.000000.000000.00000
1	16	0.001080.001440.000000.000000.000000.00000
2	1	0.000360.000720.000000.000000.000000.00000
2	2	0.000000.000360.000000.000000.000000.00000
2	3	0.000360.005030.000000.000000.000000.00000
2	4	0.000360.004310.000000.000000.000000.00000
2	5	0.000720.005390.000000.000000.000000.00000
2	6	0.000720.003950.000000.000000.000000.00000
2	7	0.000360.003230.000000.000000.000000.00000
2	8	0.000720.002510.000000.000000.000000.00000
2	9	0.000000.003230.000000.000000.000000.00000
2	10	0.000360.001800.000000.000000.000000.00000
2	11	0.000000.002150.000000.000000.000000.00000
2	12	0.000360.000000.000000.000000.000000.00000
2	13	0.000000.002150.000000.000000.000000.00000
2	14	0.000000.000720.000360.000000.000000.00000
2	15	0.000000.001800.000000.000000.000000.00000
2	16	0.000360.000000.000000.000000.000000.00000
3	1	0.000720.002870.000360.000000.000000.00000
3	2	0.000720.003230.000000.000000.000000.00000
3	3	0.000720.005750.000360.000000.000000.00000
3	4	0.000720.009340.001440.000000.000000.00000
3	5	0.000720.006100.000720.000000.000000.00000
3	6	0.000720.002870.000000.000000.000000.00000
3	7	0.000360.002870.000000.000000.000000.00000
3	8	0.000000.005390.001440.000000.000000.00000
3	9	0.000360.006820.001800.000000.000000.00000
3	10	0.000360.004670.003590.000360.000000.00000
3	11	0.000000.000360.000000.000000.000000.00000
3	12	0.000000.001440.000360.000000.000000.00000
3	13	0.000720.002150.000720.000360.000000.00000
3	14	0.000360.001440.003950.000000.000000.00000
3	15	0.000000.001800.001440.000360.000000.00000
3	16	0.000000.002870.000000.000000.000000.00000
4	1	0.007540.013290.013290.006460.000000.00000
4	2	0.006100.013640.007540.004310.000000.00000
4	3	0.003950.006100.002870.001440.000000.00000
4	4	0.003590.005750.003590.000000.000000.00000
4	5	0.005030.002150.001080.000360.000000.00000
4	6	0.002510.001800.002510.000000.000000.00000
4	7	0.002870.002870.002150.000360.000000.00000
4	8	0.001440.008260.022260.003950.000360.00000
4	9	0.002510.016160.036620.013290.000000.00000
4	10	0.003950.015080.029440.013290.001080.00000
4	11	0.000000.015800.027650.015800.001440.00000

4	12	0.000720.007540.012930.003590.000000.00000
4	13	0.002510.007900.015800.002510.000000.00000
4	14	0.003230.008260.018310.011130.001080.00000
4	15	0.004670.008620.009690.002510.000720.00000
4	16	0.006820.010770.009690.002150.000000.00000
5	1	0.005390.010410.002870.000000.000000.00000
5	2	0.002510.006820.003230.000000.000000.00000
5	3	0.001080.002510.002870.000000.000000.00000
5	4	0.001440.003230.000360.000000.000000.00000
5	5	0.001080.001800.000000.000000.000000.00000
5	6	0.000720.001080.000000.000000.000000.00000
5	7	0.001800.000720.000000.000000.000000.00000
5	8	0.000720.001440.000000.000000.000000.00000
5	9	0.000000.005390.002150.000000.000000.00000
5	10	0.000720.015080.019390.000000.000000.00000
5	11	0.001440.031240.009340.000000.000000.00000
5	12	0.001080.019390.016160.000000.000000.00000
5	13	0.001080.013290.014000.000000.000000.00000
5	14	0.003230.012930.002510.000000.000000.00000
5	15	0.002510.009690.001800.000000.000000.00000
5	16	0.005030.011490.005750.000000.000000.00000
6	1	0.001440.000360.000000.000000.000000.00000
6	2	0.000720.000360.000000.000000.000000.00000
6	3	0.000720.000000.000000.000000.000000.00000
6	4	0.001080.000360.000000.000000.000000.00000
6	5	0.001080.000000.000000.000000.000000.00000
6	6	0.000360.000000.000000.000000.000000.00000
6	7	0.000360.000720.000000.000000.000000.00000
6	8	0.001080.000720.000000.000000.000000.00000
6	9	0.000360.000720.000360.000000.000000.00000
6	10	0.001800.002510.000000.000000.000000.00000
6	11	0.000720.000720.000000.000000.000000.00000
6	12	0.001080.000720.000000.000000.000000.00000
6	13	0.000360.002150.000360.000000.000000.00000
6	14	0.000720.002510.000000.000000.000000.00000
6	15	0.001440.001440.000000.000000.000000.00000
6	16	0.001440.000000.000360.000000.000000.00000

CAP88 Input Data For August 1997 TA-53 Meteorological Tower

1	1	0.002600.000290.000000.000000.000000.00000
1	2	0.006070.000000.000000.000000.000000.00000
1	3	0.006070.002600.000000.000000.000000.00000
1	4	0.012150.006650.000000.000000.000000.00000
1	5	0.011280.008390.000000.000000.000000.00000
1	6	0.002890.008390.000000.000000.000000.00000
1	7	0.007520.003760.000000.000000.000000.00000
1	8	0.005790.002310.000000.000000.000000.00000
1	9	0.002890.001740.000000.000000.000000.00000
1	10	0.002600.001450.000000.000000.000000.00000
1	11	0.002020.001450.000000.000000.000000.00000
1	12	0.001450.001160.000000.000000.000000.00000
1	13	0.001160.000000.000000.000000.000000.00000
1	14	0.002020.000000.000000.000000.000000.00000
1	15	0.001740.000870.000000.000000.000000.00000
1	16	0.001450.000290.000000.000000.000000.00000
2	1	0.001740.000290.000000.000000.000000.00000
2	2	0.001160.000290.000290.000000.000000.00000
2	3	0.001450.002020.000000.000000.000000.00000

2	4	0.001450.008100.000000.000000.000000.00000
2	5	0.002310.005210.000000.000000.000000.00000
2	6	0.001160.004340.000000.000000.000000.00000
2	7	0.001740.001740.000000.000000.000000.00000
2	8	0.000870.002890.000000.000000.000000.00000
2	9	0.000000.001740.000000.000000.000000.00000
2	10	0.000000.002310.000000.000000.000000.00000
2	11	0.000580.000580.000000.000000.000000.00000
2	12	0.000580.000580.000000.000000.000000.00000
2	13	0.000290.000000.000000.000000.000000.00000
2	14	0.000000.000000.000000.000000.000000.00000
2	15	0.000000.000580.000000.000000.000000.00000
2	16	0.000290.000290.000000.000000.000000.00000
3	1	0.001160.000870.000290.000000.000000.00000
3	2	0.002020.002600.000000.000000.000000.00000
3	3	0.002890.006070.000290.000000.000000.00000
3	4	0.003470.006940.000000.000000.000000.00000
3	5	0.001450.006650.000000.000000.000000.00000
3	6	0.001740.004630.000000.000000.000000.00000
3	7	0.000870.002600.000290.000000.000000.00000
3	8	0.000580.003760.000000.000000.000000.00000
3	9	0.000870.005500.001160.000000.000000.00000
3	10	0.000000.005790.000580.000000.000000.00000
3	11	0.000290.002020.000580.000000.000000.00000
3	12	0.000290.001740.000000.000000.000000.00000
3	13	0.000580.001450.000580.000000.000000.00000
3	14	0.000580.002600.001160.000000.000000.00000
3	15	0.000870.002020.000290.000000.000000.00000
3	16	0.000290.001160.000290.000000.000000.00000
4	1	0.009840.014460.006360.003180.000580.00000
4	2	0.005210.013880.008100.002890.000000.00000
4	3	0.005500.009550.004050.000580.000000.00000
4	4	0.004630.006070.001160.000000.000000.00000
4	5	0.002890.004050.000580.000000.000000.00000
4	6	0.001740.002600.000580.000000.000000.00000
4	7	0.002020.003180.000000.000000.000000.00000
4	8	0.002020.008390.004920.001160.000000.00000
4	9	0.001450.018800.016780.000870.000000.00000
4	10	0.003180.032400.024590.002310.000000.00000
4	11	0.002020.029510.016200.000870.000000.00000
4	12	0.004340.018220.011860.002020.000290.00000
4	13	0.003760.014750.026030.002600.000000.00000
4	14	0.005500.009840.012730.004340.000000.00000
4	15	0.006650.006940.008680.004920.000000.00000
4	16	0.005790.008970.006360.003470.000290.00000
5	1	0.006360.010410.002600.000000.000000.00000
5	2	0.004920.006650.001450.000000.000000.00000
5	3	0.003470.005500.000290.000000.000000.00000
5	4	0.001740.001740.000000.000000.000000.00000
5	5	0.002310.001740.000000.000000.000000.00000
5	6	0.001450.000580.000000.000000.000000.00000
5	7	0.000870.000290.000000.000000.000000.00000
5	8	0.000290.001160.000580.000000.000000.00000
5	9	0.000870.002020.001450.000000.000000.00000
5	10	0.002310.013600.008100.000000.000000.00000
5	11	0.002020.020540.007520.000000.000000.00000
5	12	0.002890.030080.024010.000000.000000.00000
5	13	0.004630.019960.023430.000000.000000.00000
5	14	0.005210.012440.008100.000000.000000.00000
5	15	0.006070.008390.000870.000000.000000.00000
5	16	0.004340.011280.001740.000000.000000.00000

```
6  1  0.002600.001160.000000.000000.000000.00000
6  2  0.000870.000000.000000.000000.000000.00000
6  3  0.002600.000000.000000.000000.000000.00000
6  4  0.002020.000000.000000.000000.000000.00000
6  5  0.002020.000000.000000.000000.000000.00000
6  6  0.000290.000000.000000.000000.000000.00000
6  7  0.000290.000870.000000.000000.000000.00000
6  8  0.000580.000290.000000.000000.000000.00000
6  9  0.001160.000000.000000.000000.000000.00000
6 10  0.001450.000580.000000.000000.000000.00000
6 11  0.002310.000870.000000.000000.000000.00000
6 12  0.002310.000580.000000.000000.000000.00000
6 13  0.001740.003180.000290.000000.000000.00000
6 14  0.002600.004050.000000.000000.000000.00000
6 15  0.002310.001160.000000.000000.000000.00000
6 16  0.003470.000870.000000.000000.000000.00000
```

CAP88 Input Data TA-53 LANSCE Run-Cycle Meteorological Tower

```
1  1  0.000900.000390.000000.000000.000000.00000
1  2  0.003030.000650.000060.000000.000000.00000
1  3  0.005480.002320.000000.000000.000000.00000
1  4  0.006710.006710.000000.000000.000000.00000
1  5  0.004130.007100.000000.000000.000000.00000
1  6  0.003480.004970.000000.000000.000000.00000
1  7  0.004190.004130.000000.000000.000000.00000
1  8  0.003230.002450.000000.000000.000000.00000
1  9  0.001680.002520.000000.000000.000000.00000
1 10  0.000840.001480.000000.000000.000000.00000
1 11  0.000900.001160.000060.000000.000000.00000
1 12  0.000580.000580.000000.000000.000000.00000
1 13  0.000840.000840.000060.000000.000000.00000
1 14  0.000650.000520.000130.000000.000000.00000
1 15  0.000650.000520.000000.000000.000000.00000
1 16  0.000840.000580.000000.000000.000000.00000
2  1  0.000520.000580.000000.000000.000000.00000
2  2  0.000320.000450.000130.000000.000000.00000
2  3  0.000710.002520.000000.000000.000000.00000
2  4  0.001230.004970.000060.000000.000000.00000
2  5  0.000710.004970.000000.000000.000000.00000
2  6  0.000580.002450.000000.000000.000000.00000
2  7  0.000580.002840.000000.000000.000000.00000
2  8  0.000450.002770.000000.000000.000000.00000
2  9  0.000190.002320.000060.000000.000000.00000
2 10  0.000260.002130.000000.000000.000000.00000
2 11  0.000060.000710.000060.000000.000000.00000
2 12  0.000190.000520.000060.000000.000000.00000
2 13  0.000060.000970.000130.000000.000000.00000
2 14  0.000060.000650.000520.000060.000000.00000
2 15  0.000130.000650.000130.000000.000000.00000
2 16  0.000060.000190.000000.000000.000000.00000
3  1  0.000770.001550.000190.000000.000000.00000
3  2  0.000900.002000.000320.000000.000000.00000
3  3  0.001290.004190.000580.000000.000000.00000
3  4  0.001290.006070.000840.000000.000000.00000
3  5  0.000520.005740.000450.000000.000000.00000
3  6  0.000390.003480.000130.000000.000000.00000
3  7  0.000320.003740.000060.000000.000000.00000
3  8  0.000710.005940.000650.000000.000000.00000
```

3	9	0.000320.007030.002450.000000.000000.00000
3	10	0.000190.003480.001680.000060.000000.00000
3	11	0.000060.002060.001100.000000.000000.00000
3	12	0.000260.001290.001550.000000.000000.00000
3	13	0.000260.002000.003870.000130.000000.00000
3	14	0.000060.001290.003550.000190.000000.00000
3	15	0.000390.001480.000970.000060.000000.00000
3	16	0.000520.000840.000450.000000.000000.00000
4	1	0.003810.006390.008450.005420.000970.00000
4	2	0.002970.008840.006900.003550.000650.00000
4	3	0.002520.006780.004520.000900.000000.00000
4	4	0.002520.004520.002320.000000.000000.00000
4	5	0.001810.002710.000970.000060.000000.00000
4	6	0.001870.001740.000770.000000.000000.00000
4	7	0.001230.002840.000770.000390.000710.00000
4	8	0.001610.008320.013160.003230.001160.00006
4	9	0.001480.016260.040840.012390.000320.00000
4	10	0.001810.013360.038460.012900.000320.00000
4	11	0.001810.014520.025360.008710.000450.00000
4	12	0.001550.007740.015940.007480.001230.00013
4	13	0.001480.007360.018450.006710.000060.00000
4	14	0.002190.007550.018520.007030.000770.00000
4	15	0.002840.004000.008070.004580.000650.00019
4	16	0.003480.005680.006390.003420.000520.00013
5	1	0.005230.007480.002060.000060.000000.00000
5	2	0.004190.006390.001870.000060.000000.00000
5	3	0.003420.004320.001480.000000.000000.00000
5	4	0.002840.003230.000320.000000.000000.00000
5	5	0.002000.001610.000000.000000.000000.00000
5	6	0.001420.001610.000130.000000.000000.00000
5	7	0.001290.001740.000450.000000.000000.00000
5	8	0.001480.003030.002650.000320.000000.00000
5	9	0.001100.006580.005480.000390.000000.00000
5	10	0.002260.019160.026000.000580.000000.00000
5	11	0.002650.024390.013610.000320.000000.00000
5	12	0.002130.021550.022840.000060.000000.00000
5	13	0.002130.020000.022260.000130.000000.00000
5	14	0.003810.016580.004070.000000.000000.00000
5	15	0.004320.009360.003870.000130.000000.00000
5	16	0.005610.009360.005740.000190.000000.00000
6	1	0.002520.000190.000000.000000.000000.00000
6	2	0.001810.000520.000060.000000.000000.00000
6	3	0.001740.000260.000000.000000.000000.00000
6	4	0.001740.000130.000000.000000.000000.00000
6	5	0.001680.000060.000000.000000.000000.00000
6	6	0.000970.000130.000000.000000.000000.00000
6	7	0.000970.000650.000000.000000.000000.00000
6	8	0.001290.000840.000000.000000.000000.00000
6	9	0.001740.001290.000060.000000.000000.00000
6	10	0.002060.003550.000390.000000.000000.00000
6	11	0.001610.000710.000060.000000.000000.00000
6	12	0.000840.001740.000710.000000.000000.00000
6	13	0.000450.002130.000650.000000.000000.00000
6	14	0.001420.002520.000000.000000.000000.00000
6	15	0.001230.000710.000000.000000.000000.00000
6	16	0.002190.000190.000060.000000.000000.00000

CAP88 Input Data For TA-53 Meteorological Tower

```
1  1  0.001660.000340.000000.000000.000000.00000
1  2  0.002900.000430.000030.000000.000000.00000
1  3  0.005910.001640.000000.000000.000000.00000
1  4  0.008670.004620.000000.000000.000000.00000
1  5  0.007380.005680.000000.000000.000000.00000
1  6  0.004940.004590.000000.000000.000000.00000
1  7  0.005170.003390.000000.000000.000000.00000
1  8  0.003270.002090.000000.000000.000000.00000
1  9  0.001780.001660.000000.000000.000000.00000
1 10  0.001180.001090.000000.000000.000000.00000
1 11  0.000980.000660.000030.000000.000000.00000
1 12  0.000550.000460.000000.000000.000000.00000
1 13  0.000770.000460.000030.000000.000000.00000
1 14  0.000720.000340.000060.000000.000000.00000
1 15  0.000630.000320.000000.000000.000000.00000
1 16  0.001000.000400.000000.000000.000000.00000
2  1  0.000430.000340.000000.000000.000000.00000
2  2  0.000570.000630.000090.000000.000000.00000
2  3  0.001090.001640.000000.000000.000000.00000
2  4  0.001410.003960.000030.000000.000000.00000
2  5  0.001120.003870.000000.000000.000000.00000
2  6  0.000800.002530.000000.000000.000000.00000
2  7  0.000890.002470.000000.000000.000000.00000
2  8  0.001150.002320.000000.000000.000000.00000
2  9  0.000490.001810.000030.000000.000000.00000
2 10  0.000230.001350.000000.000000.000000.00000
2 11  0.000090.000400.000030.000000.000000.00000
2 12  0.000200.000370.000060.000000.000000.00000
2 13  0.000060.000550.000110.000000.000000.00000
2 14  0.000090.000320.000290.000030.000000.00000
2 15  0.000110.000520.000110.000000.000000.00000
2 16  0.000230.000140.000000.000000.000000.00000
3  1  0.000720.001150.000170.000000.000000.00000
3  2  0.000860.002120.000370.000030.000000.00000
3  3  0.001810.003620.000460.000000.000000.00000
3  4  0.001870.005770.000370.000000.000000.00000
3  5  0.001520.005970.000260.000000.000000.00000
3  6  0.000600.003730.000090.000000.000000.00000
3  7  0.000690.004080.000030.000000.000000.00000
3  8  0.001260.006310.000320.000000.000000.00000
3  9  0.000690.006460.001350.000000.000000.00000
3 10  0.000460.002780.000890.000030.000000.00000
3 11  0.000110.001550.000660.000000.000000.00000
3 12  0.000260.001180.000800.000000.000000.00000
3 13  0.000200.001430.002040.000090.000000.00000
3 14  0.000170.001150.001840.000110.000000.00000
3 15  0.000400.000980.000630.000030.000000.00000
3 16  0.000460.000600.000290.000000.000000.00000
4  1  0.005650.008490.008840.004450.000490.00000
4  2  0.004190.009330.007810.003670.000370.00000
4  3  0.003620.007380.004330.000800.000000.00000
4  4  0.003040.004910.001430.000000.000000.00000
4  5  0.002090.003530.000600.000030.000000.00000
4  6  0.002180.002380.000550.000000.000000.00000
4  7  0.001690.003990.000920.000200.000320.00000
4  8  0.002300.009590.009070.001920.000630.00003
4  9  0.002380.017220.031710.008120.000570.00011
4 10  0.002090.014550.036560.010420.000490.00009
4 11  0.002470.014640.024450.005880.000230.00000
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4	12	0.002270.006830.010790.004510.000660.00006
4	13	0.002470.007660.013890.004280.000030.00000
4	14	0.002700.006280.012110.004480.000400.00000
4	15	0.003850.003560.005420.002760.000370.00011
4	16	0.004910.005450.004760.002150.000290.00009
5	1	0.007610.010910.002960.000030.000000.00000
5	2	0.007520.010650.002980.000090.000000.00000
5	3	0.005540.005540.001260.000000.000000.00000
5	4	0.003420.002760.000260.000000.000000.00000
5	5	0.002840.001490.000000.000000.000000.00000
5	6	0.002300.001230.000090.000000.000000.00000
5	7	0.001980.001950.000230.000000.000000.00000
5	8	0.001890.003360.002320.000140.000000.00000
5	9	0.002610.009300.005140.000290.000000.00000
5	10	0.003440.021930.023650.000860.000000.00000
5	11	0.004250.023420.011970.000140.000000.00000
5	12	0.003440.020120.017740.000030.000000.00000
5	13	0.004330.021180.016820.000140.000000.00000
5	14	0.006000.016160.003560.000000.000000.00000
5	15	0.007260.009590.002730.000090.000000.00000
5	16	0.007860.010700.003730.000110.000000.00000
6	1	0.003870.001000.000030.000000.000000.00000
6	2	0.003040.001150.000090.000000.000000.00000
6	3	0.003360.000660.000000.000000.000000.00000
6	4	0.002870.000490.000000.000000.000000.00000
6	5	0.002730.000060.000000.000000.000000.00000
6	6	0.002120.000110.000000.000000.000000.00000
6	7	0.002500.000660.000000.000000.000000.00000
6	8	0.002840.001000.000000.000000.000000.00000
6	9	0.003560.002440.000200.000000.000000.00000
6	10	0.003670.004280.001000.000000.000000.00000
6	11	0.002900.001520.000090.000000.000000.00000
6	12	0.001980.003330.000550.000000.000000.00000
6	13	0.001520.004100.000430.000000.000000.00000
6	14	0.002300.003330.000030.000000.000000.00000
6	15	0.002350.001230.000000.000000.000000.00000
6	16	0.003130.001030.000030.000000.000000.00000

CAP88 Input Data For TA-49 Meteorological Tower

1	1	0.000230.000090.000000.000000.000000.00000
1	2	0.000640.000030.000000.000000.000000.00000
1	3	0.000780.000090.000000.000000.000000.00000
1	4	0.001040.000290.000000.000000.000000.00000
1	5	0.001790.000550.000000.000000.000000.00000
1	6	0.001650.000380.000000.000000.000000.00000
1	7	0.001850.000550.000000.000000.000000.00000
1	8	0.001040.000260.000000.000000.000000.00000
1	9	0.000840.000120.000000.000000.000000.00000
1	10	0.000520.000030.000000.000000.000000.00000
1	11	0.000290.000030.000000.000000.000000.00000
1	12	0.000230.000090.000000.000000.000000.00000
1	13	0.000350.000030.000030.000000.000000.00000
1	14	0.000200.000060.000000.000000.000000.00000
1	15	0.000140.000000.000000.000000.000000.00000
1	16	0.000400.000030.000000.000000.000000.00000
2	1	0.000030.000140.000000.000000.000000.00000
2	2	0.000200.000120.000000.000000.000000.00000
2	3	0.000170.000060.000000.000000.000000.00000

2	4	0.000490.000400.000000.000000.000000.00000
2	5	0.001300.000920.000000.000000.000000.00000
2	6	0.000520.000750.000000.000000.000000.00000
2	7	0.000490.000900.000000.000000.000000.00000
2	8	0.000430.000490.000000.000000.000000.00000
2	9	0.000380.000460.000000.000000.000000.00000
2	10	0.000090.000230.000000.000000.000000.00000
2	11	0.000090.000170.000000.000000.000000.00000
2	12	0.000120.000060.000000.000000.000000.00000
2	13	0.000000.000060.000000.000000.000000.00000
2	14	0.000120.000060.000000.000000.000000.00000
2	15	0.000090.000060.000000.000000.000000.00000
2	16	0.000090.000090.000000.000000.000000.00000
3	1	0.000230.000290.000000.000000.000000.00000
3	2	0.000380.000230.000000.000000.000000.00000
3	3	0.000580.000520.000000.000000.000000.00000
3	4	0.001240.001390.000000.000000.000000.00000
3	5	0.001560.003550.000000.000000.000000.00000
3	6	0.001240.003120.000000.000000.000000.00000
3	7	0.001210.003840.000000.000000.000000.00000
3	8	0.001180.002400.000000.000000.000000.00000
3	9	0.000810.002080.000000.000000.000000.00000
3	10	0.000230.000920.000030.000000.000000.00000
3	11	0.000140.000400.000060.000000.000000.00000
3	12	0.000120.000290.000000.000000.000000.00000
3	13	0.000140.000490.000120.000000.000000.00000
3	14	0.000120.000350.000120.000000.000000.00000
3	15	0.000200.000460.000090.000000.000000.00000
3	16	0.000170.000120.000030.000000.000000.00000
4	1	0.001100.001700.001270.002800.000090.00000
4	2	0.001070.002340.000520.001960.000090.00000
4	3	0.001790.004300.000120.000490.000000.00000
4	4	0.001850.006790.000290.000030.000000.00000
4	5	0.002170.008260.000230.000030.000000.00000
4	6	0.002110.006010.000460.000000.000000.00000
4	7	0.001530.006790.000380.000230.000460.00003
4	8	0.001880.011730.003150.001420.000490.00000
4	9	0.002050.015280.009010.011870.000810.00035
4	10	0.001420.005600.005750.005520.000260.00003
4	11	0.000840.003490.002890.003260.000460.00000
4	12	0.000950.002630.004740.003440.000380.00000
4	13	0.000980.002860.006610.005110.000400.00009
4	14	0.001010.003580.010740.006560.000640.00003
4	15	0.001330.002220.004390.005290.000580.00003
4	16	0.001300.001440.002200.002770.000350.00006
5	1	0.002860.014530.008670.000200.000000.00000
5	2	0.003090.011700.005400.000320.000000.00000
5	3	0.002720.012190.006850.000260.000000.00000
5	4	0.002740.006410.001790.000000.000000.00000
5	5	0.002600.004910.000810.000000.000000.00000
5	6	0.001650.002140.000950.000000.000000.00000
5	7	0.001760.003490.001500.000120.000000.00000
5	8	0.001990.007740.010690.000950.000000.00000
5	9	0.002540.027380.054880.005810.000000.00000
5	10	0.003260.029290.026600.001680.000000.00000
5	11	0.002400.021660.015920.000840.000000.00000
5	12	0.002630.011120.009100.000400.000000.00000
5	13	0.001990.009530.007710.000460.000000.00000
5	14	0.001960.010740.013200.000610.000000.00000
5	15	0.002830.009470.008780.000520.000000.00000
5	16	0.003000.009100.005980.000170.000000.00000

6	1	0.008120.013950.001940.000000.000000.00000
6	2	0.005630.002400.000170.000000.000000.00000
6	3	0.003900.001560.000380.000000.000000.00000
6	4	0.002140.000430.000000.000000.000000.00000
6	5	0.002080.000320.000000.000000.000000.00000
6	6	0.001420.000380.000000.000000.000000.00000
6	7	0.001880.000870.000000.000000.000000.00000
6	8	0.002220.000980.000090.000000.000000.00000
6	9	0.002690.003000.000490.000000.000000.00000
6	10	0.004190.006900.000660.000030.000000.00000
6	11	0.005370.013720.001180.000000.000000.00000
6	12	0.005810.022130.005550.000000.000000.00000
6	13	0.006610.031710.012710.000000.000000.00000
6	14	0.005200.017970.008200.000030.000000.00000
6	15	0.007020.023950.010280.000030.000000.00000
6	16	0.008490.033360.017100.000030.000000.00000

CAP88 Input Data For TA-54 Meteorological Tower

1	1	0.001010.000260.000000.000000.000000.00000
1	2	0.001810.000750.000000.000000.000000.00000
1	3	0.003800.003280.000000.000000.000000.00000
1	4	0.008150.004950.000000.000000.000000.00000
1	5	0.011580.005930.000000.000000.000000.00000
1	6	0.010630.004720.000000.000000.000000.00000
1	7	0.007460.003740.000000.000000.000000.00000
1	8	0.004580.002650.000030.000000.000000.00000
1	9	0.002280.002530.000000.000000.000000.00000
1	10	0.001560.001470.000000.000000.000000.00000
1	11	0.001210.000600.000000.000000.000000.00000
1	12	0.000490.000400.000000.000000.000000.00000
1	13	0.000580.000630.000000.000000.000000.00000
1	14	0.000550.000320.000000.000000.000000.00000
1	15	0.000550.000260.000030.000000.000000.00000
1	16	0.000750.000320.000000.000000.000000.00000
2	1	0.000140.000230.000030.000000.000000.00000
2	2	0.000370.001090.000000.000000.000000.00000
2	3	0.001040.002680.000000.000000.000000.00000
2	4	0.001380.003570.000030.000000.000000.00000
2	5	0.000780.001840.000000.000000.000000.00000
2	6	0.000890.001410.000000.000000.000000.00000
2	7	0.001070.001210.000030.000000.000000.00000
2	8	0.000660.002590.000000.000000.000000.00000
2	9	0.000290.002620.000000.000000.000000.00000
2	10	0.000320.001610.000030.000000.000000.00000
2	11	0.000370.000810.000000.000000.000000.00000
2	12	0.000230.000400.000000.000000.000000.00000
2	13	0.000090.000430.000120.000000.000000.00000
2	14	0.000140.000290.000030.000000.000000.00000
2	15	0.000090.000260.000030.000000.000000.00000
2	16	0.000140.000170.000000.000000.000000.00000
3	1	0.000140.000840.000090.000000.000000.00000
3	2	0.000580.003050.000060.000000.000000.00000
3	3	0.001670.006480.000320.000000.000000.00000
3	4	0.001380.003800.000350.000000.000000.00000
3	5	0.000660.001330.000090.000000.000000.00000
3	6	0.000600.000750.000140.000000.000000.00000
3	7	0.000920.001760.000090.000000.000000.00000
3	8	0.000840.004550.000600.000000.000000.00000

3	9	0.000400.007580.001150.000000.000000.00000
3	10	0.000660.006020.000810.000000.000000.00000
3	11	0.000350.002020.000400.000000.000000.00000
3	12	0.000320.001010.001210.000000.000000.00000
3	13	0.000120.001350.002330.000140.000000.00000
3	14	0.000170.001210.002250.000120.000000.00000
3	15	0.000170.000520.000260.000000.000000.00000
3	16	0.000140.000550.000030.000000.000000.00000
4	1	0.002190.002360.003800.003370.000230.00000
4	2	0.002020.010200.008700.002250.000030.00000
4	3	0.002940.010770.003830.000140.000000.00000
4	4	0.002360.002560.000370.000000.000000.00000
4	5	0.002070.001070.000060.000000.000000.00000
4	6	0.001090.000580.000090.000030.000000.00000
4	7	0.000950.001210.000490.000400.000200.00000
4	8	0.001350.003110.005100.001700.000320.00000
4	9	0.001270.010630.026850.006570.000200.00003
4	10	0.001440.014490.038800.012910.001040.00006
4	11	0.001580.008010.012790.004930.000090.00000
4	12	0.001470.004580.007120.001870.000060.00000
4	13	0.001560.005620.007490.001470.000060.00000
4	14	0.001670.005530.007580.001670.000060.00000
4	15	0.001580.002770.004350.001640.000060.00000
4	16	0.001960.002100.002020.000980.000120.00000
5	1	0.004810.008320.004410.000030.000000.00000
5	2	0.004180.007950.005160.000140.000000.00000
5	3	0.003260.004150.000550.000030.000000.00000
5	4	0.002250.001120.000000.000000.000000.00000
5	5	0.001070.000170.000000.000000.000000.00000
5	6	0.000840.000060.000030.000000.000000.00000
5	7	0.000920.000320.000030.000000.000000.00000
5	8	0.000890.000600.000120.000000.000000.00000
5	9	0.001670.004670.003110.000120.000000.00000
5	10	0.002070.017970.027250.001070.000000.00000
5	11	0.002450.023250.019960.000520.000000.00000
5	12	0.002790.014000.001930.000030.000000.00000
5	13	0.004700.018700.001330.000000.000000.00000
5	14	0.007400.017230.001350.000000.000000.00000
5	15	0.008010.020570.000920.000030.000000.00000
5	16	0.008090.008960.002360.000090.000000.00000
6	1	0.008440.009160.000400.000000.000000.00000
6	2	0.006190.004750.000140.000000.000000.00000
6	3	0.003800.001440.000000.000000.000000.00000
6	4	0.001440.000170.000000.000000.000000.00000
6	5	0.000400.000030.000000.000000.000000.00000
6	6	0.000140.000000.000000.000000.000000.00000
6	7	0.000580.000030.000000.000000.000000.00000
6	8	0.000690.000120.000000.000000.000000.00000
6	9	0.001440.000890.000090.000000.000000.00000
6	10	0.002620.004350.000260.000000.000000.00000
6	11	0.003950.015530.002480.000000.000000.00000
6	12	0.005880.023760.002130.000000.000000.00000
6	13	0.011870.021690.000750.000000.000000.00000
6	14	0.019760.024230.000000.000000.000000.00000
6	15	0.017000.034910.000750.000000.000000.00000
6	16	0.011030.014660.001330.000000.000000.00000

Table 8. 40.94(b)(7) User-Supplied Data - Population Array

Projected 1996/1997 Population within 80 km of Los Alamos National Laboratory[1]

Direction	Distance from TA-53 (km) 0-0.8	0.8-1.0	1-2	2-4	4-8	8-15	15-20	20-30	30-40	40-60	60 - 80
N	0	7	87	234	131	0	13	90	950	811	587
NNE	0	6	64	93	23	2	10	2,338	395	671	313
NE	0	3	11	0	0	1	1,181	14,743	2,536	2,457	3,591
ENE	0	1	0	0	0	559	1,499	4,546	3,585	1,416	1,601
E	0	0	0	0	1	316	1,332	4,096	386	22	413
ESE	0	0	0	0	0	9	10	669	8,017	727	2,240
SE	0	0	2	0	4,468	565	0	984	72,724	7,485	664
SSE	0	0	3	0	510	341	0	293	5,656	2,577	110
S	0	0	4	0	0	21	0	16	148	399	3,056
SSW	0	0	6	0	0	30	1	794	1,316	6,974	53,789
SW	0	0	13	0	1	4	1	0	0	2,249	188
WSW	0	0	17	27	0	7	0	32	387	2,474	5
W	0	0	3	119	173	0	7	66	291	64	72
WNW	0	2	14	1,007	5,839	0	0	26	30	63	2,622
NW	0	5	29	886	1,431	0	2	24	49	0	577
NNW	0	6	59	681	282	0	6	19	259	161	283
Total	0	42	303	3,047	12,859	1,855	4,062	28,736	96,729	28,550	70,111

Total Population within 80 km of Los Alamos National Laboratory is over 246,000.

[1] Jacobson, et al., (1998) Updated with values for the 1996/1997 time period.

Table 9. 61.94(b)(7) User-Supplied Data - Radionuclide Effluents

ESIDNUM	Nuclide	Emission (Ci)
03002914	Am-241	6.04E-09
03002914	Pu-238	5.10E-09
03002914	Pu-239	8.04E-09
03002915	Am-241	6.82E-09
03002915	U-235	8.58E-09
03002915	Th-231	8.58E-09
03002919	Am-241	2.49E-07
03002919	Pu-238	3.49E-07
03002919	Pu-239	2.37E-06
03002920	None	
03002923	U-235	2.05E-07
03002923	Th-234	2.13E-07
03002923	Pa-234m	2.13E-07
03002923	Th-231	2.05E-07
03002923	U-234	4.94E-06
03002923	Pu-239	3.92E-09
03002923	Pu-238	2.24E-08
03002923	Am-241	1.39E-08
03002923	U-238	2.13E-07
03002924	Pu-239	6.92E-08
03002924	Th-231	7.86E-08
03002924	U-235	7.86E-08
03002924	Th-228	3.69E-07
03002924	Pu-238	2.29E-07
03002924	Am-241	2.48E-08
03002924	U-234	1.56E-05
03002928	Am-241	1.02E-08

Table 9. Continued

ESIDNUM	Nuclide	Emission (Ci)
03002928	Pu-238	2.53E-07
03002928	Pu-239	9.64E-08
03002929	Pu-238	1.66E-08
03002932	Th-231	5.25E-09
03002932	Pu-238	5.87E-09
03002932	U-235	5.25E-09
03002933	U-234	3.43E-08
03002937	Pu-238	2.61E-10
03002937	Pu-239	3.26E-10
03002944	Pu-239	3.24E-08
03002944	Am-241	2.51E-08
03002944	Pu-238	2.51E-08
03002945	Y-90	7.83E-08
03002945	Sr-90	7.83E-08
03002945	Am-241	1.77E-08
03002945	Pu-239	2.16E-08
03002946	Pu-239	2.43E-08
03002946	Am-241	1.26E-08
03002946	Pu-238	4.45E-09
03003501	U-234	1.60E-07
03003501	U-235	6.02E-09
03003501	Pu-239	1.49E-09
03003501	Am-241	1.38E-09
03003501	Th-231	6.02E-09
03003501	Pu-238	1.14E-09
03010222	Th-234	3.10E-08
03010222	Pu-238	6.79E-10
03010222	Pu-239	6.99E-10

Table 9. Continued

ESIDNUM	Nuclide	Emission (Ci)
03010222	Th-228	6.29E-09
03010222	Th-230	2.90E-09
03010222	Th-232	1.74E-09
03010222	U-234	7.49E-07
03010222	U-235	3.54E-08
03010222	Th-231	3.54E-08
03010222	U-238	3.10E-08
03010222	Pa-234m	3.10E-08
03010222	Am-241	5.31E-10
16020504	H-3(HTO)	9.11E+01
16020504	H-3(GAS)	7.35E+00
21015505	H-3(HTO)	3.09E+01
21015505	H-3(GAS)	7.29E+00
21020901	H-3(GAS)	4.13E+01
21020901	H-3(HTO)	1.32E+02
33008606	H-3(HTO)	2.41E+01
33008606	H-3(GAS)	1.86E+01
41000417	H-3(HTO)	4.12E+01
41000417	H-3(GAS)	7.63E-01
48000107	Y-90	1.51E-09
48000107	Se-75	9.91E-05
48000107	Os-191	9.19E-06
48000107	Br-77	1.63E-03
48000107	As-74	6.37E-07
48000107	As-73	9.51E-06
48000107	As-72	2.94E-05
48000107	Sr-90	1.51E-09
48000154	Pu-239	6.69E-10

Table 9. Continued

ESIDNUM	Nuclide	Emission (Ci)
48000154	Pu-238	9.51E-10
48000160	Se-75	1.79E-05
48000160	Pu-238	5.81E-10
48000160	As-73	2.79E-06
48000160	Am-241	3.64E-10
48000160	Pu-239	3.45E-10
50000102	Y-90	1.01E-07
50000102	Pu-238	2.69E-08
50000102	Pu-239	2.73E-08
50000102	Sr-90	1.01E-07
50000102	Am-241	8.44E-09
50003701	Y-90	1.50E-08
50003701	U-235	1.33E-09
50003701	Th-231	1.33E-09
50003701	Sr-90	1.50E-08
50006903	Y-90	2.03E-10
50006903	Pu-238	1.55E-10
50006903	Sr-90	2.03E-10
53000303	H-3(HTO)	1.54E+01
53000303	TA-182	1.26E-03
53000303	Os-185	1.29E-03
53000303	Os-183	3.70E-03
53000303	Hg-195	4.06E-03
53000303	Be-7	8.09E-05
53000303	Ar-41	1.86E+02
53000303	C-10	1.89E+02
53000303	C-11	1.20E+04
53000303	N-13	2.02E+03

Table 9. Continued

ESIDNUM	Nuclide	Emission (Ci)
53000303	N-16	1.27E+02
53000303	O-14	9.06E+01
53000303	NA-24	2.06E-03
53000303	O-15	4.44E+03
53000303	Hg-197	9.55E-03
53000303	Br-76	1.16E-01
53000303	CO-60	2.44E-04
53000303	Br-77	2.17E-01
53000303	Br-82	1.66E-01
53000702	N-13	6.01E+01
53000702	Br-76	1.30E-03
53000702	Au-192	1.16E-02
53000702	O-14	5.80E-01
53000702	Ar-41	7.95E+00
53000702	H-3(HTO)	1.75E+00
53000702	C-11	4.32E+02
53000702	O-15	6.65E+01
53000702	N-16	0.00E+00
53000702	Hg-197M	2.41E-03
53000702	Hg-197	1.65E-02
53000702	Hg-195M	7.69E-04
53000702	Hg-195	1.52E-02
53000702	Hg-193	4.25E-03
53000702	Br-82	3.53E-01
53000702	C-10	1.30E-01
53DIFFUS	C-11	8.32E+02
53DIFFUS	Ar-41	3.50E+01
55000415	Th-234	2.82E-08

Table 9. Continued

ESIDNUM	Nuclide	Emission (Ci)
55000415	Pa-234m	2.82E-08
55000415	U-238	2.82E-08
55000415	Th-228	4.45E-08
55000415	Pu-239	6.04E-08
55000415	Pu-238	8.13E-09
55000415	Am-241	3.99E-08
55000416	Pu-239	3.93E-08
55000416	Am-241	9.52E-09
55000416	H-3(GAS)	5.57E+00
55000416	H-3(HTO)	6.06E+00

Table 10. 40.94(b)(7) User-Supplied Data - Modeling Parameters for LANL Nonpoint Sources

LANL Air Activation Sources

Source	Emission	#Ci	area of source (m^2)	distance to LANL maximum dose location (m)
TA-53-Switchyard	Ar-41	0.5	484	774
	C-11	11.4	484	774
TA-53-Isotope Production	Ar-41	9.0	37	740
	C-11	227.0	37	740
TA-53-Area A East	Ar-41	25.0	1,423	756
	C-11	593.0	1,423	756
TA-18-116	Ar-41	0.3	31,400	4,261
TA-18-168	Ar-41	1.1	31,400	3,860

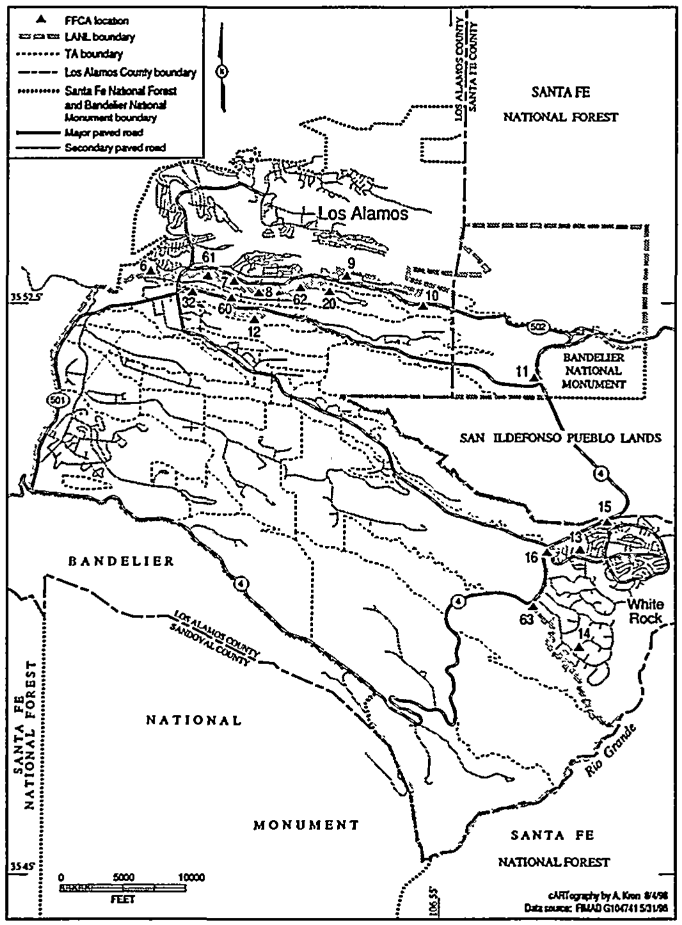

Fig. 3. Location of air sampling stations used for nonpoint source compliance.

Table 11. (FFCA) Environmental Data

1997 Effective Dose Equivalent (net in mrem) at Air Sampling Locations Around LANL

Site # and Name	AM-241	H-3	PU-238	PU-239	U-234	U-235	U-238	Rounded Total
06 48th Street	0.003	0.003	0.000	0.002	0.000	0.000	0.000	0.01
07 Gulf/Exxon/Shell Station	0.002	0.006	0.000	0.001	0.011	0.001	0.013	0.03
08 McDonalds	0.002	0.013	0.000	0.002	0.005	0.001	0.012	0.03
09 Los Alamos Airport	0.000	0.008	0.000	0.005	0.005	0.001	0.004	0.02
10 Eastgate	0.003	0.011	0.000	0.006	0.004	0.000	0.001	0.03
11 Well PM-1 (E. Jemez Road)	0.002	0.005	0.000	0.002	0.002	0.000	0.001	0.01
12 Royal Crest Trailer Court	0.002	0.007	0.000	0.001	0.004	0.001	0.011	0.03
13 Pinon School	0.003	0.008	0.003	0.005	0.002	0.000	0.001	0.02
14 Pajarito Acres	0.003	0.003	0.000	0.001	0.003	0.000	0.001	0.01
15 White Rock Fire Station	0.002	0.006	0.001	0.002	0.005	0.001	0.002	0.02
16 White Rock Nazarene Church	0.006	0.007	0.000	0.000	0.004	0.000	0.000	0.02
20 TA-21 Area B	0.003	0.013	0.006	0.005	0.005	0.000	0.004	0.04
32 County Landfill (TA-48)	0.005	0.005	0.001	0.017	0.041	0.002	0.041	0.11
60 LA Canyon	-0.002	0.010	0.001	0.006	0.007	0.001	0.006	0.03
61 LA Hospital	0.001	0.005	-0.001	0.001	0.013	0.001	0.008	0.03
62 Trinity Bible Church	-0.001	0.007	0.001	0.006	0.005	0.001	0.011	0.03
63 Monte Rey South	0.002	0.003	0.000	0.001	0.003	0.000	0.001	0.01

Table 12. (FFCA) Analytical Completeness Summary - Air Sampler Operation

Site #	Site Name	% Run Time	% Analytical Completeness
06	48th Street	100	100
07	Gulf/Exxon/Shell Station	99	100
08	McDonalds	100	100
09	Los Alamos Airport	99	100
10	Eastgate	100	100
11	Well PM-1 (E. Jemez Road)	98	100
12	Royal Crest Trailer Court	97	100
13	Pinon School	100	100
14	Pajarito Acres	98	100
15	White Rock Fire Station	100	99
16	White Rock Nazarene Church	99	100
20	TA-21 Area B	97	100
32	County Landfill (TA-48)	99	100
60	LA Canyon	99	100
61	LA Hospital	100	100
62	Trinity Bible Church	98	100
63	Monte Rey South	99	100

Table 13. (FFCA) Environmental Data - Revised

1997 Effective Dose Equivalent (net in mrem) at Air Sampling Locations Around LANL

(using new tritium calculation method)

Site # and Name		H-3
06	48th Street	0.007
07	Gulf/Exxon/Shell Station	0.009
08	McDonalds	0.023
09	Los Alamos Airport	0.015
10	Eastgate	0.023
11	Well PM-1 (E. Jemez Road)	0.015
12	Royal Crest Trailer Court	0.010
13	Pinon School	0.015
14	Pajarito Acres	0.007
15	White Rock Fire Station	0.011
16	White Rock Nazarene Church	0.019
20	TA-21 Area B	0.029
32	County Landfill (TA-48)	0.008
60	LA Canyon	0.015
61	LA Hospital	0.005
62	Trinity Bible Church	0.012
63	Monte Rey South	0.006

Table 14. 61.92 Effective Dose Equivalent

ESIDNUM	Record ID	Dose at East Gate
03002914	97All03002914	5.67E-07
03002915	97All03002915	3.06E-07
03002919	97All03002919	6.55E-05
03002923	97All03002923	4.46E-05
03002924	97All03002924	1.54E-04
03002928	97All03002928	7.41E-06
03002929	97All03002929	3.45E-07
03002932	97All03002932	1.78E-07
03002933	97All03002933	2.92E-07
03002937	97All03002937	1.43E-08
03002944	97All03002944	2.23E-06
03002945	97All03002945	1.22E-06
03002946	97All03002946	1.16E-06
03003501	97All03003501	1.93E-06
03010222	97All03010222	8.03E-06
16020504	97All16020405	4.97E-04
18011600	97Dif18011600	1.48E-05
18016800	97Dif18016800	7.29E-05
21015505	97All21015505	1.07E-03
21020901	97All21020901	5.55E-03
33008606	97All33008606	1.95E-04
41000417	97All41000417	4.23E-04
48000107	97All48000107	3.11E-11
48000107	97Con48000107	5.42E-05
48000154	97All48000154	3.78E-08
48000160	97Cap48000160	3.55E-08
48000160	97Con48000160	9.43E-06
50000102	97All50000102	1.53E-06

Table 14. Continued

ESIDNUM	Record ID	Dose at East Gate
50003701	97All50003701	1.34E-08
50006903	97All50006903	3.96E-09
53000303	97Apr53000303	5.52E-01
53000303	97Aug53000303	5.68E-02
53000303	97Con53000303	3.82E-03
53000303	97Feb53000303	8.79E-04
53000303	97Jul53000303	6.76E-01
53000303	97Jun53000303	7.10E-01
53000303	97Mar53000303	1.01E-01
53000303	97May53000303	6.11E-01
53000303	97VAP53000303	1.76E-03
53000702	97Apr53000702	3.83E-02
53000702	97Aug53000702	1.58E-03
53000702	97Con53000702	2.76E-04
53000702	97Feb53000702	2.02E-03
53000702	97Jul53000702	3.48E-02
53000702	97Jun53000702	3.65E-02
53000702	97Mar53000702	2.54E-02
53000702	97May53000702	2.69E-02
53000702	97VAP53000702	2.33E-03
53DIFFUS	97Dif530003-A	2.66E-01
53DIFFUS	97Dif530003IP	1.22E-01
53DIFFUS	97Dif53057400	8.97E-03
55000415	97All55000415	4.57E-06
55000416	97All55000416	1.58E-04
NA	97Sampler0010	2.50E-02
NA	97UsageSurvey	2.00E-01

Table 15. 40.94(b)(8) Constructions and Modifications Reviewed

96-0226 TRU WASTE CHARACTERIZATION OPERATIONS AT TA-50-37
This project involves the addition of three glove-boxes within TA-50-037, rooms 110 and 112. These will be used to open TRU waste containers, examine contents, and repackage waste. Each glove-box will be HEPA-filtered and will be tied into the building's existing HEPA filtration system. Radioactive waste constitutes may include: Pu-239, Pu-238, Am-241 and anything with an atomic number greater than or equal to uranium. Quantities of radioactive constituents will be limited to less than 200 fissile gram equivalents of Pu-239.

97-0018 ANALYSIS OF FLUORESCENT MICROSPHERES IN TRITIATED WATER SAMPLES
This project involves the analysis of fluorescent microspheres in tritiated water samples using a flow cytometer. Water samples will be obtained from the Nevada Test Site. The water samples are expected to contain between 0 and 170,000 pCi/l of tritium.

97-0034 LASER Spark Analysis of Soil
This project involves the measurement of radioactive and metal contamination in soil using laser spark spectroscopy. Approximately one gram of contaminated soil will be transferred to and sealed in a glass vial in a hood. Laser pulses will be focused through the vial to form a laser spark inside the vial. The resulting spark light will be collected and analyzed to determine the contaminant composition using atomic emission spectroscopy. A maximum of 6 experiments will be conducted in TA-46, Building 41. The radioactive contamination includes U-238, Th-234, U-235, Th-231, Co-60, and Cs-137.

97-0036 Central Health Physics Calibration Facility Project TA-36
This project involves the consolidation of the existing physics calibration maintenance and repair functions in one location. Calibration activities taking place at Technical Area (TA) 3, Buildings SM-40 and 130, will be relocated to TA-36, Buildings 1 and 214. The consolidated calibration facility will allow for the calibration of radiation protection instruments to the required levels for x-rays, beta and alpha contamination, gamma photons, tritium, and neutron dose equivalents.

97-0065 Metallography and Analysis of Contaminated Parts
This project will be a continuation of metallographic studies previously conducted at the Savannah River Site (SRS). Although this work will be conducted using existing laboratories and equipment at TA-35, Building 213, it is a new potential tritium source for this facility. Each study may involve up to one mCi of tritium, and a total of three runs per year will be conducted.

97-0070 DARHT - 2nd Axis Accelerator
The second axis accelerator will have enhanced capabilities over the first axis accelerator. The second axis accelerator will generate 4 separate pulses at 1000 rad (per pulse) and last 60 nanoseconds, and the electron beam energy will be 20 MeV. The operation of the second axis accelerator will generate at most 1 Ci of air activation product per test. An estimated 30 tests will be performed per year.

97-0104 Contaminated Records Storage Area
Contaminated records will be stored in the Central Weapons Information Center. Potential contaminants include tritium, alpha contamination, gamma contamination, beryllium, lead, and high explosives residue. Potential contamination from the files is estimated based on typical levels of contamination in trash receptacles and bench tops at TA-21. Maximum level of contamination are estimated to be 0.04 Ci for 1000 boxes.

97-0106 Installation of Waste Compactor SM-66
This project involves the installation at TA-3, SM-66, of a hydraulic trash compactor for depleted uranium contaminated waste. The compactor will minimize the volume and number of times waste is handled. Wastes will consist of booties, cardboard, packing, used machinery seals, and rags. Volume of waste is estimated to be 540 ft^3/yr. The contamination level is estimated to be 1 uCi/yr of depleted uranium.

97-0162 Neptunium Sphere
The objective of this project is to build a clad neptunium sphere. The sphere will be built at CMR, TA-3-29, Wing 9, in either room 9163 or 9133. The process will take place in an "Alpha" box inside a hot cell. The system is equipped with a furnace for the melting of neptunium at approximately 630°C, pouring into a nickel mold, and spinning to avoid air bubbles . Finally, two tungsten hemispheres will be fit over the nickel mold. The "Alpha" box will be filled with inert gas, nitrogen, during processing. At the completion of the process, the gas will be released through a HEPA filter. A maximum of 10 kg of neptunium will be processed for this project.

97-9990 TA-37-27 flood
During the weekend of November 15th, chiller water leaked and flooded the basement of TA-35-27 to a level of 5 1/2 feet. The basement contains sealed sources of radioactive material. A portable enclosure (doghouse) vented through a HEPA will be brought into the basement of Building 27 to be used to enclose smear sampling operations involving 109 sources with known exterior removable contamination. The doghouse will be vented back into the room and portable air sampling will be performed at the exhaust.

References

1. K. W. Jacobson, S. Duffy, and K. Kowalewsky "Population and Agricultural Data Arrays for the Los Alamos National Laboratory," Los Alamos National Laboratory report LA-13469-MS (1998).

2. Los Alamos National Laboratory, "Performance Requirements for Air Quality," Air Quality Group Laboratory Implementation Requirement, LPR 404-10-00.0 (1998).

3. U.S. Environmental Protection Agency, Federal Register, Vol. 60, No. 107 (June 5, 1995).

4. Craig F. Eberhart, "Water Vapor and Tritium Collection Efficiency of Silica Gel," LANL memorandum ESH-17:98-142 (1998).

5. U.S. Environmental Protection Agency, "The Clean Air Act Assessment Package–1988 (CAP-88): A Dose and Risk Assessment Methodology for Radionuclide Emissions to Air," Vol. 1: User's Manual, EPA/Washington D.C. (1990).

6. Radiation Shielding Information Center, "CAP-88 Clean Air Act Assessment Package," Oak Ridge National Laboratory, Tennessee (1990).

7. U.S. Environmental Protection Agency, "National Emission Standards for Emissions of Radionuclides other than Radon from Department of Energy Facilities," Code of Federal Regulations, Title 40, Part 61.90, Subpart H (1989).

8. Bart Eklund, "Measurements of Emission Fluxes from Technical Area 53, Areas G and L," Radian Corporation report, Austin, Texas (1995).

9. LANL, "Performance Assessment and Composite Analysis for Los Alamos National Laboratory Materials Disposal Area G," Los Alamos National Laboratory report LA-UR9785 (1997).

61.94(b)(9) Certification

I certify under penalty of law that I have personally examined and am familiar with the information submitted herein and based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment (See, 18 USC., 1001).

Signature: Date: 6.26.98

Charles S. Przybylek, Owner
Acting Area Manager, Los Alamos Area Office
U.S. Department of Energy

Signature: Date: 6/24/98

Dennis J. Erickson, Operator
Director, Environment, Safety and Health Division
Los Alamos National Laboratory

1996 LANL Radionuclide Emissions Report Errata as noted by K.W. Jacobson

Page 9 and page 19: For source 03002915 (page 9), the second radionuclide entry should read Pu-238, not Pu-239. The dose was recalculated using the correct radionuclide; hence the dose for source 03002915 (page 19) is changed from 9.29e-06 to 9.18e-06 mrem.

Page 9 and page 19: For source 03002919 (page 9), the radionuclide Am-241 (9.4e-07 Ci) should be included. The dose was recalculated using the added radionuclide; hence the dose for source 03002919 (page 19) is changed from 3.34e-04 to 3.62e-04 mrem.

Pages 10 through 14: Pa-234 should have been listed as Pa-234m. The correct nuclide was used in the calculations.

Page 11 and page 19: For source 03002944 (Cont.), the radionuclide Se-75 (1.7e-05 Ci) should be included. The dose was recalculated with the added radionuclide; hence the dose for source 030029144 (page 19) is changed from 7.96e-06 to 1.53e-05 mrem.

Page 11 and page 19: For source 03002945, the radionuclide Se-75 (9.6e-06 Ci) should be included. The radionuclide Ba-137 should be listed as Ba-137m. The sampled release for Cs-137/Ba-137m should read 2.5e-07, not 5.5e-09. The dose was recalculated; hence the dose (page 19) is changed from 1.15e-05 to 1.65e-05 mrem.

Page 12 and page 19: For source 03014106 the radionuclide U-234 (6.4e-08 Ci) should not have been listed. The dose was recalculated; hence the dose for source 03014106 (page 19) is changed from 1.23e-06 to 5.80e-07 mrem.

Page 12 and page 20: For source 48000107 the sampled Ge-68 release should read 5.0e-05 not 5.0e-06. Also, the hand calculated dose from the four non-CAP-88 radionuclides (Ge-68, Ga-68, Rb-83 and Se-75) was revised; hence the dose for source 48000107 (page 20) is changed from 2.46e-05 to 2.24e-05 mrem.

Page 13 and page 20: For source 48000160, the hand-calculated dose from the non-CAP-88 radionuclide Se-75 was revised; hence the dose for source 48000160 (page 20) is changed from 5.78e-11 to 2.00e-07 mrem.

Page 13 and page 20: For source 50006903 the radionuclide U-234 (2.7e-10 Ci) should not have been listed. The dose was recalculated; hence the dose for source 50006903 (page 20) is changed from 1.78e-07 to 1.75e-07 mrem.

Page 13: For 5300303, the sampled release of N-13 should read 1.8e+03, not 1.8e-03. The correct data were used in the calculations.

Page 14: For 53000303, the sampled release of Ta-182 should read 1.6e-03, not 1.6e-02. Also, the sampled release of H-3 should read 1.3e+00, not 1.0e+00. The dose was recalculated; however, the dose for 53000303 was unaffected by these revisions.

Page 14: For 53000702, the sampled release of C-10 should read 3.9e-01, not 3.9e+01. The correct data were used in the calculations.

Page 14: For 5500416, the radionuclide Th-234 is listed twice, the correct dose is listed on page 20 for this source.

Page 17 and page 19: The distance to MEI listed for source 03003501 should read 5,751 (m). The dose was recalculated using the correct distance; hence the dose for 03003501 is changed from 7.03e-06 to 7.59e-06 mrem.

Page 17: The distance to the MEI listed for source 03010222 should read 6,249 (m). The dose was recalculated using the correct distance; hence the dose for 03010222 is changed from 5.29e-06 to 5.69e-06 mrem.

Page 17: The stack parameters were omitted for source 5000101. These were height:15.2 m, diameter:1.5 m, velocity: 3.7 m/s, distance: 4,123m, and direction: ENE. The correct data were used in the calculations.

Page 18: The column heading in Table 7 should read "Wind Speed in m/s", not "Wind Speed in knots." The correct data were used in the calculations.

Page 20: An incorrect stack diameter was used for source 41000417. The dose was recalculated using the correct stack diameter of 1.5 (m); hence the dose for 41000417 is changed from 1.03e-03 to 1.62e-03 mrem.

Page 22: The location of Air sampling station #20 is missing from Fig. 3. Sampler 20 is located SE of sampler 62.