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ATOMICS INTERNATIONAL ENVIRONMENTAL MONITORING AND FACILITY EFFLUENT ANNUAL REPORT 1974

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ABSTRACT

Environmental and facility effluent radioactivity monitoring at Atomics International is performed by the Radiation and Nuclear Safety Unit of the Health, Safety, and Radiation Services Department. Soil, vegetation, and surface water are routinely sampled, up to a distance of 10 miles from Atomics International sites. Continuous air sampling and thermoluminescent dosimetry is performed on site for monitoring airborne radioactivity and environmental radiation levels. Radioactivity in gaseous effluents released from Atomics International facilities is continuously sampled and monitored, to ensure that levels released to unrestricted areas are within appropriate limits, and to identify processes where additional engineering safeguards may be necessary to minimize radioactivity levels in such effluents. In addition, selected nonradioactive constituents in surface water discharged to unrestricted areas are determined prior to release. No radioactive material is released to surface waterways. This report summarizes and discusses monitoring results for 1974.

The environmental radioactivity reported here is attributed to natural causes and to nuclear weapons testing.

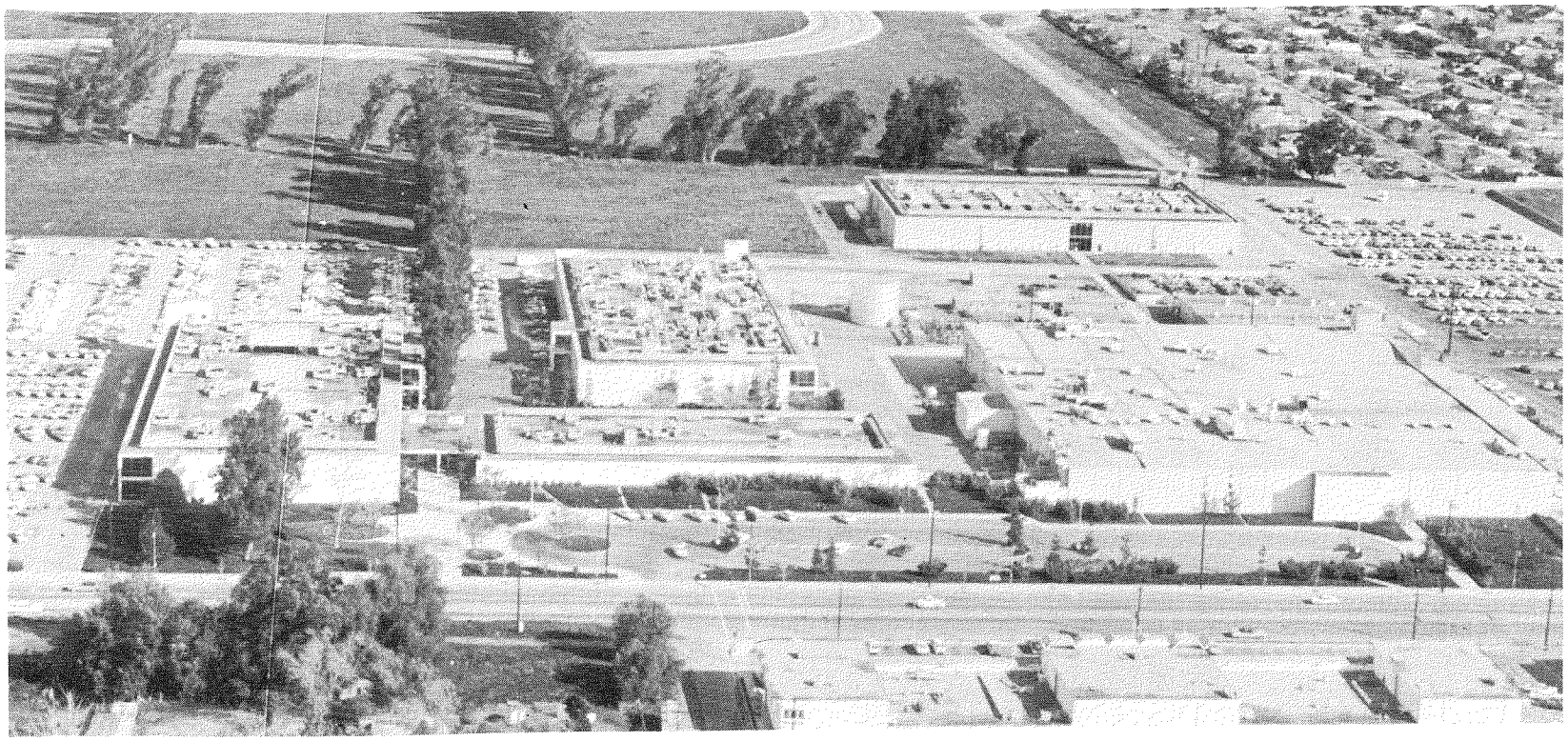

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Figure 1. Atomics International Headquarters

I. INTRODUCTION

Atomics International (AI) Division of Rockwell International Corporation has been engaged in atomic energy research and development since 1946. The Division is engaged in the design, development, fabrication, and testing of components and systems for central station power plants, and fabrication of nuclear fuel for test reactors. The Division is also engaged in programs for development and fabrication of systems for stack gas SO_2 control, gasification of coal, and solid and liquid waste disposal.

The Division occupies modern administration, scientific research, and manufacturing facilities in Canoga Park, California, approximately 23 miles northwest of downtown Los Angeles (Figure 1), where nuclear programs, licensed by both the Nuclear Regulatory Commission (NRC) and the State of California, are conducted. The 290-acre Nuclear Development Field Laboratory (NDFL) (Figure 2), on which is located both Energy Research and Development Administration (ERDA), and Rockwell-owned facilities, as shown in Figure 3, is located in the Simi Hills of Ventura County, approximately 29 miles northwest of downtown Los Angeles. The NDFL also contains facilities in which nuclear operations, licensed by both NRC and the State, are conducted. The licensed facilities include: (1) the Atomics International Hot Laboratory (AIHL), Building 020, (2) the Nuclear Materials Development Facility (NMDF), Building 055, (3) a neutron radiography facility containing the L-85 nuclear examination and research reactor, Building 093, and (4) several x-radiography inspection facilities. The location of these sites, in relation to nearby communities, is shown in Figure 4.

Also included within the NDFL site is an 82-acre Government optioned area where ERDA-contract activities are conducted, primarily by the Liquid Metals Engineering Center (LMEC). The major operational nuclear installation within the optioned area is the Radioactive Material Disposal Facility (RMDF), Building 022, which will be used for processing of wastes generated as a result of the Decontamination and Disposition of Facilities (D&D) Program, beginning in 1975. Several deactivated nuclear reactor and support facilities, all within the optioned area, will be affected by the D&D Program. Included will be (1) the Engineering Test Building, Building 003, formerly used in

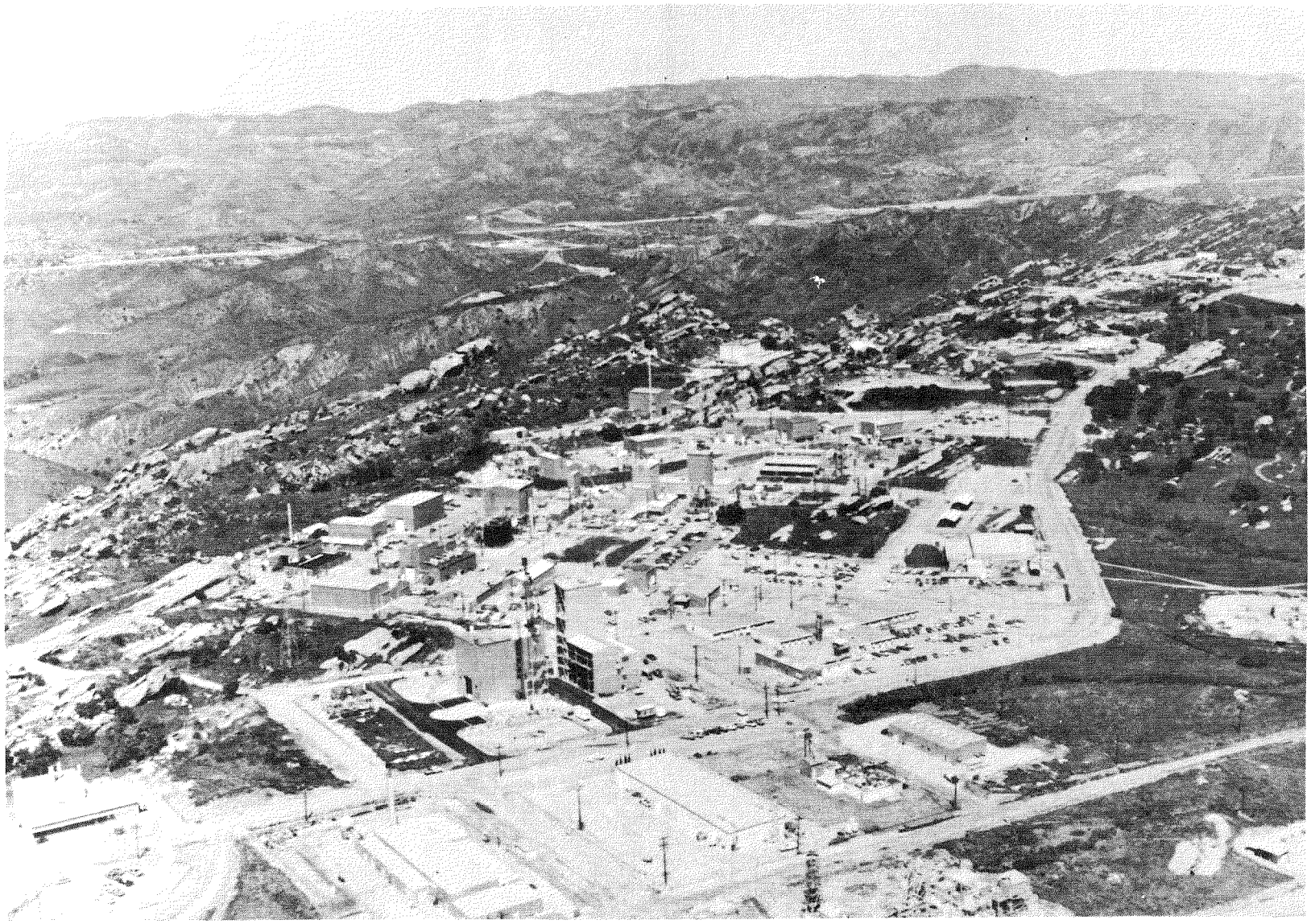

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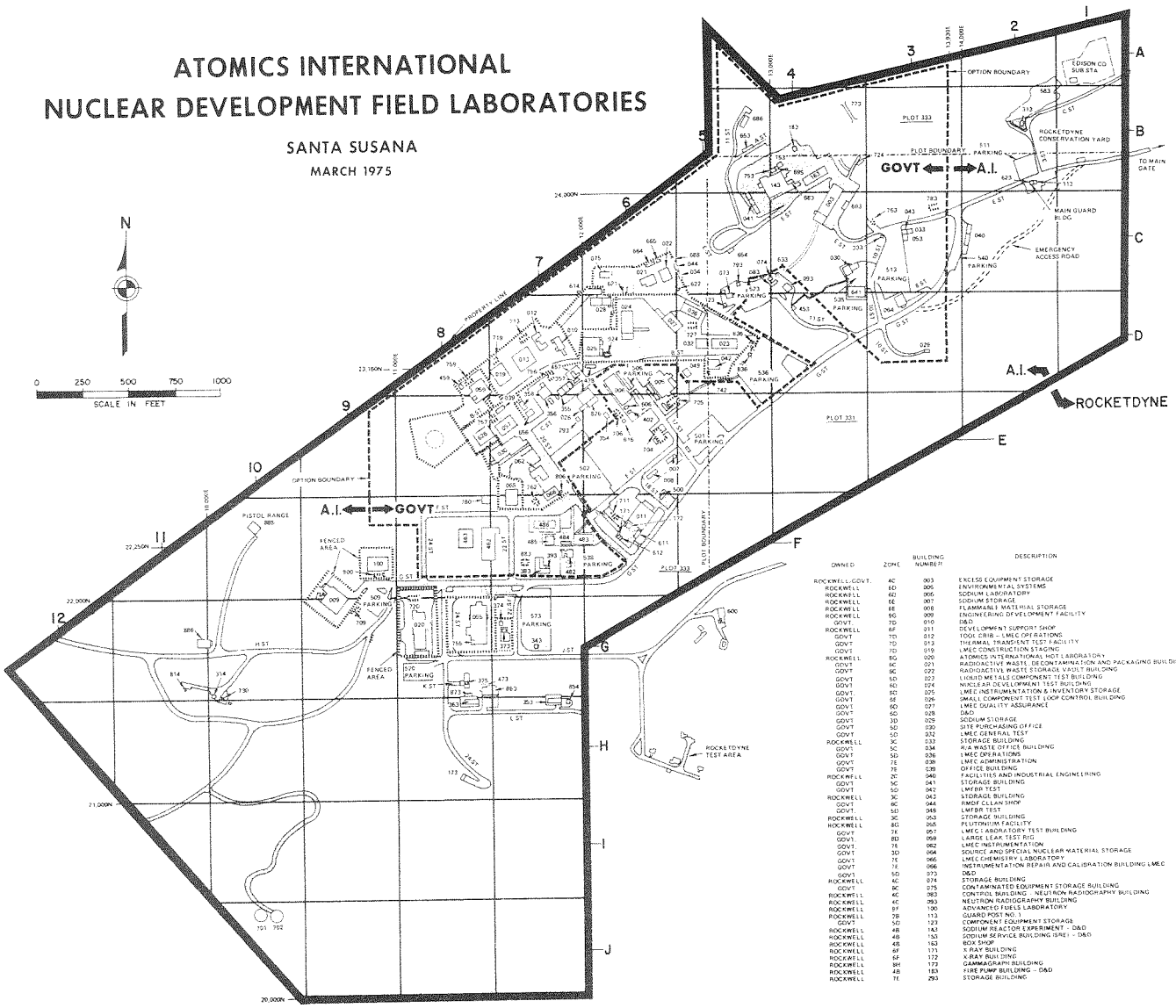
Figure 2. Atomics International Nuclear Development Field Laboratory



OWNED	ZONE	BUILDING NUMBER	DESCRIPTION
ROCKWELL-GOVT.	4C	003	EXCESS EQUIPMENT STORAGE
ROCKWELL	6D	005	ENVIRONMENTAL SYSTEMS
ROCKWELL	6D	006	SODIUM LABORATORY
ROCKWELL	6E	007	SODIUM STORAGE
ROCKWELL	6E	008	FLAMMABLE MATERIAL STORAGE
ROCKWELL	9G	009	ENGINEERING DEVELOPMENT FACILITY
GOVT.	7D	010	D&D
ROCKWELL	6F	011	DEVELOPMENT SUPPORT SHOP
GOVT	7D	012	TOOL CRIB — LMEC OPERATIONS
GOVT	7D	013	THERMAL TRANSIENT TEST FACILITY
GOVT	7D	019	LMEC CONSTRUCTION STAGING
ROCKWELL	8G	020	ATOMICS INTERNATIONAL HOT LABORATORY
GOVT	6C	021	RADIOACTIVE WASTE, DECONTAMINATION AND PACKAGING BUILDING
GOVT	6C	022	RADIOACTIVE WASTE STORAGE VAULT BUILDING
GOVT	5D	023	LIQUID METALS COMPONENT TEST BUILDING
GOVT	6D	024	NUCLEAR DEVELOPMENT TEST BUILDING
GOVT	8D	025	LMEC INSTRUMENTATION & INVENTORY STORAGE
GOVT	6E	026	SMALL COMPONENT TEST LOOP CONTROL BUILDING
GOVT	6D	027	LMEC QUALITY ASSURANCE
GOVT	6D	028	D&D
GOVT	7D	029	SODIUM STORAGE
GOVT	5D	030	SITE PURCHASING OFFICE
GOVT	5D	032	LMEC GENERAL TEST
ROCKWELL	3C	033	STORAGE BUILDING
GOVT.	5C	034	R/A WASTE OFFICE BUILDING
GOVT	5D	036	LMEC OPERATIONS
GOVT	7E	038	LMEC ADMINISTRATION
GOVT	7E	039	OFFICE BUILDING
ROCKWELL	2C	040	FACILITIES AND INDUSTRIAL ENGINEERING
GOVT	6C	041	STORAGE BUILDING
GOVT	5D	042	LMFBR TEST
ROCKWELL	3C	043	STORAGE BUILDING
GOVT	6C	044	RMDF CLEAN SHOP
GOVT.	5D	045	LMFBR TEST
ROCKWELL	3C	053	STORAGE BUILDING
ROCKWELL	8G	055	PLUTONIUM FACILITY
GOVT.	7E	057	LMEC LABORATORY TEST BUILDING
GOVT.	8D	059	LARGE LEAK TEST RIG
GOVT.	7E	062	LMEC INSTRUMENTATION
GOVT	3D	064	SOURCE AND SPECIAL NUCLEAR MATERIAL STORAGE
GOVT	7E	066	LMEC CHEMISTRY LABORATORY
GOVT	7E	068	INSTRUMENTATION REPAIR AND CALIBRATION BUILDING LMEC
GOVT	5D	073	D&D
ROCKWELL	4C	074	STORAGE BUILDING
GOVT	8C	075	CONTAMINATED EQUIPMENT STORAGE BUILDING
ROCKWELL	4C	083	CONTROL BUILDING - NEUTRON RADIOGRAPHY BUILDING
ROCKWELL	4C	093	NEUTRON RADIOGRAPHY BUILDING
ROCKWELL	8F	100	ADVANCED FUELS LABORATORY
ROCKWELL	7B	113	GUARD POST NO. 1
GOVT	5D	123	COMPONENT EQUIPMENT STORAGE
ROCKWELL	4B	143	SODIUM REACTOR EXPERIMENT - D&D
ROCKWELL	4B	153	SODIUM SERVICE BUILDING (SRE) - D&D
ROCKWELL	4B	163	BOX SHOP
ROCKWELL	6F	171	X-RAY BUILDING
ROCKWELL	6F	172	X-RAY BUILDING
ROCKWELL	8H	173	GAMMAGRAPH BUILDING
ROCKWELL	4B	183	FIRE PUMP BUILDING - D&D
ROCKWELL	7E	293	STORAGE BUILDING

OWNED	ZONE	BUILDING NUMBER	DESCRIPTION
ROCKWELL	2B	313	CONSERVATION BUILDING
ROCKWELL	10D	314	LARGE LEAK INJECTOR DEVICE (LLID) TEST CONTROL BUILDING
ROCKWELL	3C	333	TIME CLOCK BUILDING
ROCKWELL	7G	343	TIME CLOCK BUILDING
ROCKWELL	7H	353	RESEARCH AND DEVELOPMENT LABORATORY BUILDING
GOVT	6L	354	CONTROL ELEMENT TEST STRUCTURE
GOVT	7D	355	SCTI CONTROL BUILDING
GOVT	7D	356	SODIUM COMPONENT TEST INSTALLATION
GOVT	7D	357	LMEC PUMP BEARING TEST FACILITY CONTROL BUILDING
GOVT	7E	358	CHEMICAL STORAGE BUILDING
ROCKWELL	8H	363	RESEARCH AND DEVELOPMENT LABORATORY BUILDING
ROCKWELL	7G	373	DEVELOPMENT TEST BUILDING
GOVT	7G	374	TEST LOOP ENCLOSURE
ROCKWELL	8D	375	CONTROL SHELTER BUILDING
GOVT	7F	383	LMEC CONSTRUCTION STAGING
ROCKWELL	6E	402	HYDROGEN RECOMBINER TEST
ROCKWELL	4D	453	STC NEUTRON RADIOGRAPHY STORAGE
GOVT	7D	457	PUMP BEARING TEST STRUCTURE
GOVT	8D	458	UNINTERRUPTABLE POWER SUPPLY
GOVT	8F	462	SODIUM PUMP TEST FACILITY
GOVT	8F	463	SODIUM CLEANING AND HANDLING FACILITY
ROCKWELL	9G	473	HYDRAULIC TEST INSTRUMENTATION BUILDING
GOVT	6D	478	SUPPORT TRAILER (LMEC)
GOVT	7J	482	GOVERNMENT PROJECT OFFICES
GOVT	7F	483	LMEC OFFICE COMPLEX
GOVT	7F	484	REST ROOM - TRAILER
GOVT	7F	485	LMEC OFFICE COMPLEX
GOVT	7F	486	LMEC OFFICE COMPLEX
ROCKWELL	6F	500	COMPRESSED GAS BOTTLE STORAGE DOCK
ROCKWELL	5E	501	PARKING LOT
ROCKWELL	7E	502	PARKING LOT
ROCKWELL	6D	506	PARKING LOT
ROCKWELL	9G	509	PARKING LOT
ROCKWELL	9B	511	PARKING LOT
GOVT	3C	513	PARKING LOT
ROCKWELL	8G	520	PARKING LOT
ROCKWELL	5C	523	PARKING LOT
GOVT.	4C	535	PARKING LOT
ROCKWELL	5D	536	PARKING LOT
GOVT	6F	538	PARKING LOT
ROCKWELL	3C	540	PARKING LOT
ROCKWELL	7G	543	PARKING LOT
ROCKWELL	2B	562	CONSERVATION STORAGE YARD
ROCKWELL	5A	606	SEWAGE TREATMENT PLANT
ROCKWELL	6E	606	HYDROGEN RECOMBINER TEST
ROCKWELL	6F	611	PAINT SPRAY BOOTH
ROCKWELL	6F	612	STORAGE BUILDING
GOVT	7D	614	DRAINAGE SUMP
ROCKWELL	6L	616	COOLING TOWER
GOVT	6C	621	RADIOACTIVE ACCOUNTABLE WASTE STORAGE BUILDING
GOVT	7C	622	RADIOACTIVE WASTE COUNTING BUILDING
ROCKWELL	2B	623	GUARD POST NO. 1
GOVT	6J	625	LMEC INVENTORY STORAGE
ROCKWELL	4C	633	REACTOR COOLING WATER PAD
GOVT	6D	636	GUARD POST
GOVT	4C	641	RECEIVING & STORAGE BUILDING
GOVT	8B	653	LIQUID RADIOACTIVE WASTE VAULT - D&D
GOVT	5C	654	INTERIM RADIOACTIVE WASTE - D&D
GOVT	7F	656	SCTI COOLING TOWER
GOVT	6C	664	LOW LEVEL RADIOACTIVE WASTE PROCESSING
GOVT	9C	665	HMDF OXIDATION FACILITY
GOVT	4C	683	ELECTRICAL SUBSTATION
GOVT	5B	686	TEMPORARY HOT WASTE STORAGE - D&D
GOVT	5C	689	AUXILIARY SKID BUILDING
GOVT	4C	693	ELECTRICAL SUBSTATION NO. 1
GOVT	4B	695	COLD TRAP VAULT (SRE) - D&D
ROCKWELL	10J	701	WATER TANK (DEER FLATS)
ROCKWELL	10J	702	WATER TANK (DEER FLATS)
GOVT	6E	704	ELECTRICAL SUBSTATION
ROCKWELL	6E	705	ELECTRICAL SUBSTATION
ROCKWELL	6E	706	ELECTRICAL SUBSTATION
ROCKWELL	9C	709	ELECTRICAL SUBSTATION
ROCKWELL	6F	711	ELECTRICAL SUBSTATION
GOVT.	7D	713	ELECTRICAL SUBSTATION
GOVT	7D	719	ELECTRICAL SUBSTATION
ROCKWELL	8G	720	ELECTRICAL SUBSTATION
GOVT	4B	724	CONTAMINATED SODIUM CLEANING BUILDING
GOVT	5D	727	ELECTRICAL SUBSTATION
ROCKWELL	10G	730	STORAGE SHED
GOVT	5D	742	ELECTRICAL SUBSTATION
GOVT	4B	753	PRIMARY FILL TANK VAULT - D&D
ROCKWELL	8G	755	ELECTRICAL SUBSTATION
GOVT	7D	756	ELECTRICAL SUBSTATION
GOVT	8E	757	ELECTRICAL SUBSTATION
GOVT	8D	759	ELECTRICAL SUBSTATION
GOVT	7F	762	ELECTRICAL SUBSTATION
GOVT	9C	763	ELECTRICAL SUBSTATION
GOVT	4B	773	DRAINAGE CONTROL DAM
GOVT	8F	780	ELECTRICAL SUBSTATION
SCE	3C	783	ELECTRICAL SUBSTATION
GOVT	5C	793	ELECTRICAL CONTROL BUILDING
ROCKWELL	9F	800	ELECTRICAL SUBSTATION
ROCKWELL	7E	806	TIME CLOCK BUILDING
ROCKWELL	11G	814	LARGE LEAK INJECTOR DEVICE
GOVT	6L	824	SMALL COMPONENT TEST LOOP
ROCKWELL	5D	836	TIME CLOCK BUILDING
GOVT	7H	854	TEST STRUCTURE
ROCKWELL	7H	863	HYDRAULIC TEST LOOP
ROCKWELL	8G	873	HYDRAULIC TEST LABORATORY
ROCKWELL	7F	883	ELECTRICAL SUBSTATION
ROCKWELL	10F	885	PISTOL RANGE
ROCKWELL	11G	886	SODIUM DISPOSAL FACILITY
GOVT	9D	924	ELECTRICAL SUBSTATION

Figure 3. Map of Nuclear Development Field Laboratory Facilities

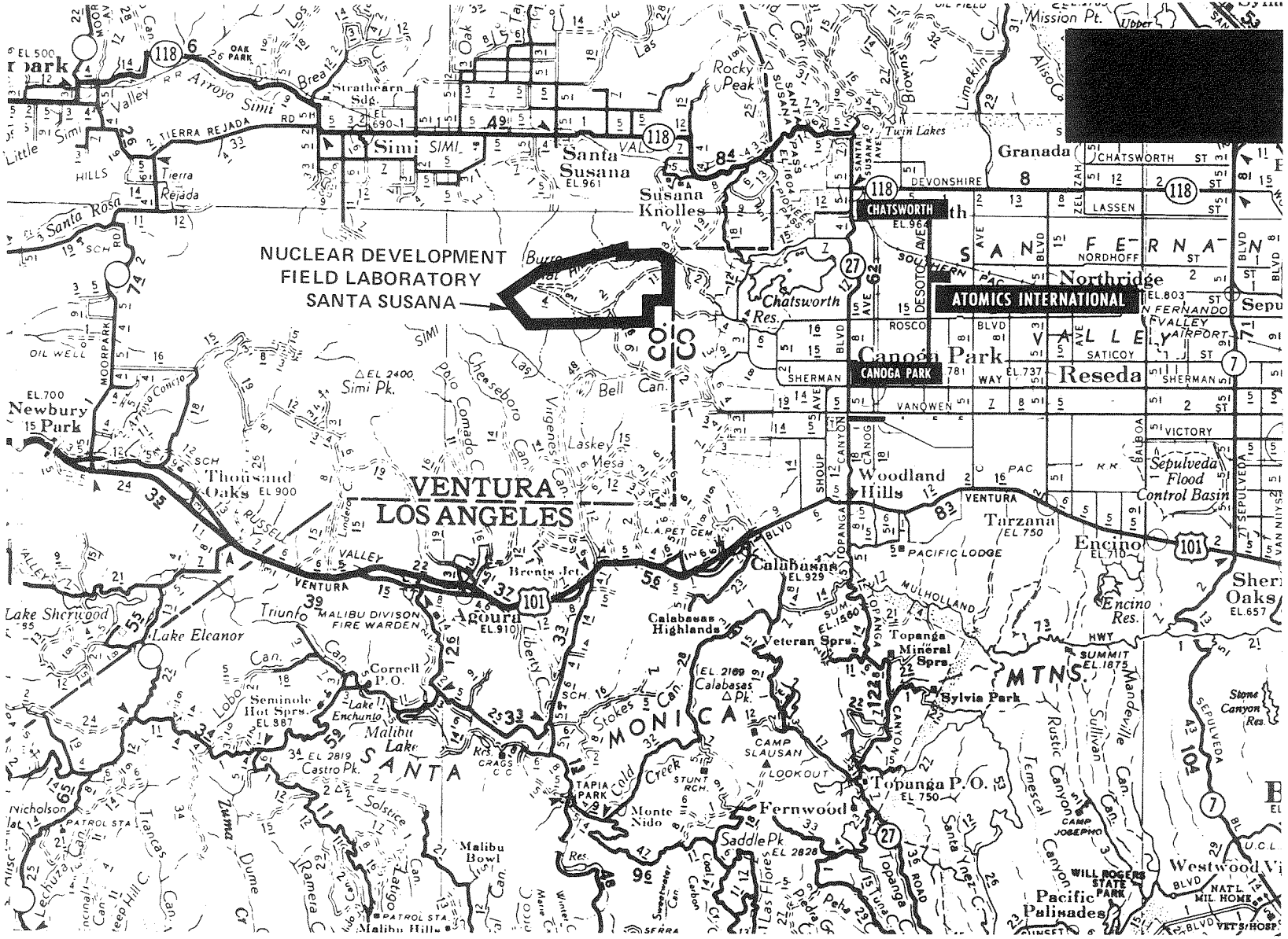


Figure 4. Map of Headquarters and Nuclear Development Field Laboratory Environs

support of Sodium Reactor Experiment (SRE) operations, (2) several facilities used for Systems for Nuclear Auxiliary Power (SNAP) reactor test operations, Buildings 010, 024, and 059, (3) a Shield Test and Irradiation Reactor (STIR), Building 028, and (4) a Kinetic Experiment Water Boiler (KEWB) test reactor facility, Buildings 073 and 083. Also included will be the Sodium Reactor Experiment (SRE), Building 143.

Licensed programs conducted during 1974 included: (1) commercial operation of the L-85 reactor for central station power plant operator training and neutron radiography inspection of precision forgings, castings, and electronic and explosive devices for manufacturing defects, (2) the operation of the Atomics International Hot Laboratory for nuclear reactor system component examination and the fabrication of sealed radiation sources, and (3) the operation of nuclear fuel manufacturing facilities for the production of experimental and test reactor fuel involving normal and enriched uranium, and plutonium - uranium oxide mixing operations for carbothermic reduction to Pu-UC for advanced fuels development.

The basic policy for control of radiological and toxicological hazards at Atomics International Division requires adequate containment of such materials, and, through rigid operational controls, minimizes effluent releases and external radiation levels. The environmental monitoring program provides a measure of the effectiveness of the Division's safety procedures and engineering safeguards incorporated into facility designs. Specific radionuclides are not identified, due to the extremely low levels of radioactivity determined by the environmental monitoring program.

Environmental sampling stations, located within the boundaries of Atomics International Division sites, are referred to as "on-site" stations. The remaining stations, located within a 10-mile radius of the sites, are referred to as "off-site" stations. The on-site environs of the Atomics International Headquarters and Nuclear Development Field Laboratory (NDFL) facilities are sampled monthly, to determine the concentration of radioactivity in typical surface soil, vegetation, and water samples. The off-site environs are sampled quarterly. Continuous on-site environmental air sampling provides information concerning long-lived airborne particulate radioactivity.

The development of a site background gamma radiation monitoring program, utilizing thermoluminescent dosimetry (TLD), begun in 1971, is now operational.

Nonradioactive wastes released to unrestricted areas are limited to liquid released to sanitary sewage systems and to surface drainage systems. No intentional releases of liquid pollutants are made to unrestricted areas. Liquid waste generated at the Headquarters site is discharged into the city sewerage system. Sanitary sewage from all ERDA and Atomics International facilities at the NDFL site is treated at an on-site sewage plant. The plant outfall drains into a holding reservoir, located at the adjoining Rocketdyne Division Santa Susana Field Laboratory (SSFL). The surface drainage system of the NDFL is composed of catch ponds and open drainage ditches leading to the same holding reservoir that receives the sewage plant outfall. Water from the reservoir may be reclaimed as industrial process water, or it may be released offsite into Bell Creek, a tributary of the Los Angeles River. The reservoir is monitored for nonradioactive pollutants by Rocketdyne Division, as required by discharge permits issued to Rocketdyne by the California Regional Water Quality Control Board.

This report summarizes environmental monitoring results for 1974. A comparison of 1974 radioactivity results with previous years appears in Appendix A.

II. ENVIRONMENTAL MONITORING SUMMARY RESULTS

A. RADIOACTIVE MATERIALS – 1974

The average radioactivity concentrations in soil and vegetation samples are presented in Tables 1 and 2.

TABLE 1

SOIL RADIOACTIVITY DATA – 1974

Area	Activity	No. Samples	Gross Radioactivity (μCi/gm)	
			Average Value (95% Confidence Level)	Maximum Observed Value
On Site	α	144	$(6.0 \pm 1.5)\ 10^{-7}$	9.1×10^{-7}
	β–γ	144	$(2.5 \pm 0.1)\ 10^{-5}$	4.9×10^{-5}
Off Site	α	48	$(5.4 \pm 1.4)\ 10^{-7}$	8.5×10^{-7}
	β–γ	48	$(2.4 \pm 0.1)\ 10^{-5}$	2.9×10^{-5}

TABLE 2

VEGETATION RADIOACTIVITY DATA – 1974

Area	Activity	No. Samples	Gross Radioactivity (μCi/gm)		
			Dry Weight Average Value	Ash	
				Average Value (95% Confidence Level)	Maximum Observed Value
On Site	α	144	$<3.6 \times 10^{-8}$	$<(2.0 \pm 1.3)\ 10^{-7}$	1.6×10^{-6}
	β–γ	144	2.5×10^{-5}	$(1.52 \pm 0.03)\ 10^{-4}$	2.59×10^{-4}
Off Site	α	48	$<6.4 \times 10^{-8}$	$<(2.7 \pm 1.7)\ 10^{-7}$	1.8×10^{-6}
	β–γ	48	3.2×10^{-5}	$(1.41 \pm 0.02)\ 10^{-4}$	2.58×10^{-4}

Process water used at the NDFL is obtained from Ventura County Water District No. 8, which also supplies nearby communities, and is distributed onsite by the same piping system previously used when process water was obtained from onsite wells. Conversion was completed during 1969. Pressure is provided by elevated storage tanks and storage reservoirs onsite.

Water from the pipe system is sampled monthly at two locations. The average process water radioactivity concentration is presented in Table 3.

TABLE 3
NDFL PROCESS WATER* RADIOACTIVITY DATA – 1974

Area	Activity	No. Samples	Gross Radioactivity (μCi/mℓ)	
			Average Value (95% Confidence Level)	Maximum Observed Value
NDFL	α	24	$<(2.4 \pm 2.4)\ 10^{-10}$	5.8×10^{-10}
	β-γ	24	$(2.7 \pm 0.63)\ 10^{-9}$	3.7×10^{-9}

* Water supplied by Ventura County Water District No. 8

As discussed earlier, surface discharged waters from NDFL facilities and the sewage plant outfall drain southward into a holding reservoir on Rocketdyne property. When full, the reservoir may be drained into Bell Creek, a tributary of the Los Angeles River in the San Fernando Valley, Los Angeles County. Pursuant to the requirements of Los Angeles Regional Water Quality Control Board Resolution 66-49 of September 21, 1966, a sampling station for evaluating environmental radioactivity in Bell Creek Canyon was established approximately 2.5 miles downstream from the south Rockwell International Corporation boundary. Samples, obtained and analyzed monthly, include stream bed mud, vegetation, and water. Average radioactivity concentrations in Rocketdyne Reservoir and Bell Creek samples are presented in Table 4.

TABLE 4

BELL CREEK AND ROCKETDYNE SSFL RESERVOIR
RADIOACTIVITY DATA – 1974

Area	Activity	No. Samples	Gross Radioactivity		
			Average Value (95% Confidence Level)	Maximum Observed Value	% of Guide*
Bell Creek Mud No. 54 (μCi/gm)	α	12	$(3.2 \pm 1.0)\ 10^{-7}$	4.8×10^{-7}	NA
	β-γ	12	$(2.2 \pm 0.1)\ 10^{-5}$	2.4×10^{-5}	NA
Bell Creek Vegetation No. 54 (μCi/gm ash)	α	12	$<(1.6 \pm 1.3)\ 10^{-7}$	4.1×10^{-7}	NA
	β-γ	12	$(1.42 \pm 0.03)\ 10^{-4}$	1.84×10^{-4}	NA
Bell Creek Vegetation No. 54 (μCi/gm dry weight)	α	12	$<(3.1 \pm 3.4)\ 10^{-8}$	8.5×10^{-8}	NA
	β-γ	12	$(3.0 \pm 0.1)\ 10^{-5}$	4.5×10^{-5}	NA
Bell Creek Water No. 16 (μCi/mℓ)	α	12	$<(2.1 \pm 2.5)\ 10^{-10}$	2.1×10^{-10}	0.2
	β-γ	12	$(2.5 \pm 0.7)\ 10^{-9}$	3.6×10^{-9}	2.5
SSFL Reservoir Water No. 6 (μCi/mℓ)	α	12	$<(2.2 \pm 2.4)\ 10^{-10}$	2.8×10^{-10}	0.2
	β-γ	12	$(4.2 \pm 0.8)\ 10^{-9}$	6.4×10^{-9}	4.2
SSFL Reservoir Water No. 12 (μCi/mℓ)	α	12	$<(2.1 \pm 1.6)\ 10^{-10}$	2.5×10^{-9}	0.2
	β-γ	12	$(4.5 \pm 0.7)\ 10^{-9}$	5.6×10^{-9}	4.5

* Guide: 1×10^{-7} μCi/mℓ – 10 CFR 20 Appendix C, CAC 17 Appendix A

Environmental air sampling for long-lived particulate alpha and beta-gamma radioactivity is performed continuously with automatic sequential samplers at both the Headquarters and NDFL sites. Air is drawn through an HV-70 filter which is analyzed, after a minimum 120-hr decay period, for long-lived radioactivity. The average concentration of long-lived alpha and beta-gamma radioactivity is presented in Table 5.

TABLE 5

AIRBORNE RADIOACTIVITY DATA – 1974

Area	Activity	No. Samples	Average Value (95% Confidence Level)	Maximum Observed Value (daily)	% of Guide §
Headquarters (μCi/mℓ)	α*	663	$<(5.6 \pm 5.2)\ 10^{-15}$	3.5×10^{-14}	<9.3
	β-γ†	663	$<(1.6 \pm 0.6)\ 10^{-13}$	6.2×10^{-13}	<16
NDFL (μCi/mℓ)	α*	2477	$<(5.7 \pm 6.8)\ 10^{-15}$	6.9×10^{-14}	<9.5
	β-γ†	2477	$<(1.6 \pm 0.6)\ 10^{-13}$	7.1×10^{-13}	<16

*αMDL = 5.4×10^{-15} μCi/mℓ – Daily samples with activity levels of 0 to 5.4×10^{-15} μCi/mℓ recorded, and averaged as 5.4×10^{-15} μCi/mℓ.

†β-γ MDL = 1.2×10^{-14} μCi/mℓ – Daily samples with activity levels of 0 to 1.2×10^{-14} μCi/mℓ recorded, and averaged as 1.2×10^{-14} μCi/mℓ. Indicated average values are upper limits, since some data were below the minimum detection levels.

§Guide: 6×10^{-14} μCi/mℓ α, 1×10^{-12} μCi/mℓ β-γ – 10 CFR 20 Appendix C, CAC 17 Appendix A

Radioactivity levels observed in most sample types for 1974, reported in Tables 1 through 5, compare closely with levels reported for recent years. Local environmental radioactivity levels, which had shown the effect of fallout during the period of atmospheric testing of nuclear devices, have decreased, and have been generally constant, during the past several years. This indicates that current environmental radioactivity is due primarily to natural radionuclides and long-lived fission product radioactivity from fallout.

Environmental radiation monitoring is performed with calcium fluoride (CaF_2·Mn) bulb-type thermoluminescent dosimeters (TLD), placed at selected locations on or near the perimeters of the Headquarters and NDFL sites. Each dosimeter, sealed in a light-proof energy compensation shield, is installed in a polyethylene container mounted at each monitoring location. The dosimeters are exchanged and analyzed quarterly. There are ten on-site TLD monitoring locations. Three additional dosimeters, located off site at locations up to 10 miles from the sites, are similarly evaluated to determine the local

area natural background radiation level, which averaged 0.01 mrem/hr for 1974. The radiation dose monitored at each dosimeter location is presented in Table 6. The table shows that on-site radiation levels are essentially identical to levels monitored off site by dosimeters maintained at three widely separated locations to provide comparative data. The variability observed in the integrated radiation doses between dosimeter locations indicates that factors other than dosimeter linearity and reproducibility, approximately 2% and ± 2% respectively, are affecting local background radiation levels. This variability is attributed to differences in elevation and geological conditions throughout the dosimeter location sites. Radiation dose rates for all dosimeter locations are essentially identical, thus showing there is no radiation dose to the general population or to individuals in off-site areas due to Atomics International operations.

TABLE 6

SITE BACKGROUND RADIATION DOSIMETRY DATA – 1974

Dosimeter Location	Dose (mrem)	Average Dose Rate (mrem/hr)
TLD-1 Headquarters	100	0.01§
TLD-2 Headquarters	50*	0.01
TLD-3 Headquarters	92	0.01
TLD-4 Headquarters	92	0.01
TLD-5 NDFL	90	0.01
TLD-6 NDFL	113	0.01
TLD-7 NDFL	106	0.01
TLD-8 NDFL	94†	0.01
TLD-9 NDFL	73	0.01
TLD-10 NDFL	117	0.01
TLD-11 Off Site	114	0.01
TLD-12 Off Site	103	0.01
TLD-13 Off Site	87	0.01

*No data for 2nd quarter – dosimeter packet lost, due to vandalism.
†No data for 1st quarter – dosimeter packet lost, due to vandalism.
§Radiation Protection Standard = 0.5 rem/year; % of Standard–zero.

TABLE 7

NONRADIOACTIVE CONSTITUENTS IN WASTEWATER DISCHARGED TO UNRESTRICTED AREAS—1974

(Analysis results for wastewater discharged to Bell Creek on date indicated — Sample Station W-12)

Constituent	April 18		June 26		Sept 19		Dec 10		Dec 12		Limits of Detection
	Result	% of Guide	Result	% of Guide	Result	% of Guide	Result	% of Guide	Result	% of Guide	
Total Dissolved Solids (mg/ℓ)	445	44	520	52	495	50	605	61	420	42	0.1
Total Hardness (mg/ℓ)	NA	-	163	33	208	42	246	49	175	35	0.1
Chloride (mg/ℓ)	NA	-	90	36	88	35	105	42	72	29	0.1
Chloride plus Sulfate (mg/ℓ)	NA	-	NA	-	203	27	NA	-	NA	-	1.1
Suspended Solids (mg/ℓ)	12	-	ND	-	ND	-	3	7	8	18	0.1
Settleable Solids (mℓ/ℓ-hr)	0.1	-	ND	-	<0.1	-	<0.1	<50	0.1	<50	1
BOD (mg/ℓ)	31	-	6	-	12	-	30	100	31	103	0.1
Oil and Grease (mg/ℓ)	7	28	1	4	3	12	6	40	8	53	0.1
Nitrate Nitrogen (mg/ℓ)	1.4	3	1.5	3	4.1	8	2.4	24	7.7	77	0.1
Color (in color units)	NA	-	13	65	28	140	17	85	15	75	1
Turbidity (TU)	47	47	12	12	10	10	8	11	20	27	0.1
Total Chromium (mg/ℓ)	ND	-	ND	-	ND	-	ND	-	ND	-	0.01
Fluoride (mg/ℓ)	0.72	48	0.92	61	0.64	43	0.52	52	0.52	52	0.01
Boron (mg/ℓ)	ND	-	ND	-	ND	-	0.24	24	1.2	120	0.01
Residual Chlorine (mg/ℓ)	NA	-	NA	-	NA	-	NA	-	NA	-	0.01
Fecal Coliform (MPN/100 mℓ)	>16.0	-	NA	-	NA	-	NA	-	NA	-	2.2
Surfactants (mg/ℓ)	NA	-	NA	-	ND	-	0.10	20	0.17	34	0.01
pH	8.2		8.9		8.4		7.7		7.7		0.02

NA - Not available. Analysis not requested or not performed
ND - None detected. Level below limit of detection

B. NONRADIOACTIVE MATERIALS – 1974

Wastewater discharged from Atomics International Division NDFL drains to Retention Reservoir R-2A, operated by the Rocketdyne Division. Water samples are taken from the reservoir and analyzed for various constituents, as required by the Regional Water Quality Control Board, for each discharge to Bell Canyon. The results of these analyses are presented in Table 7.

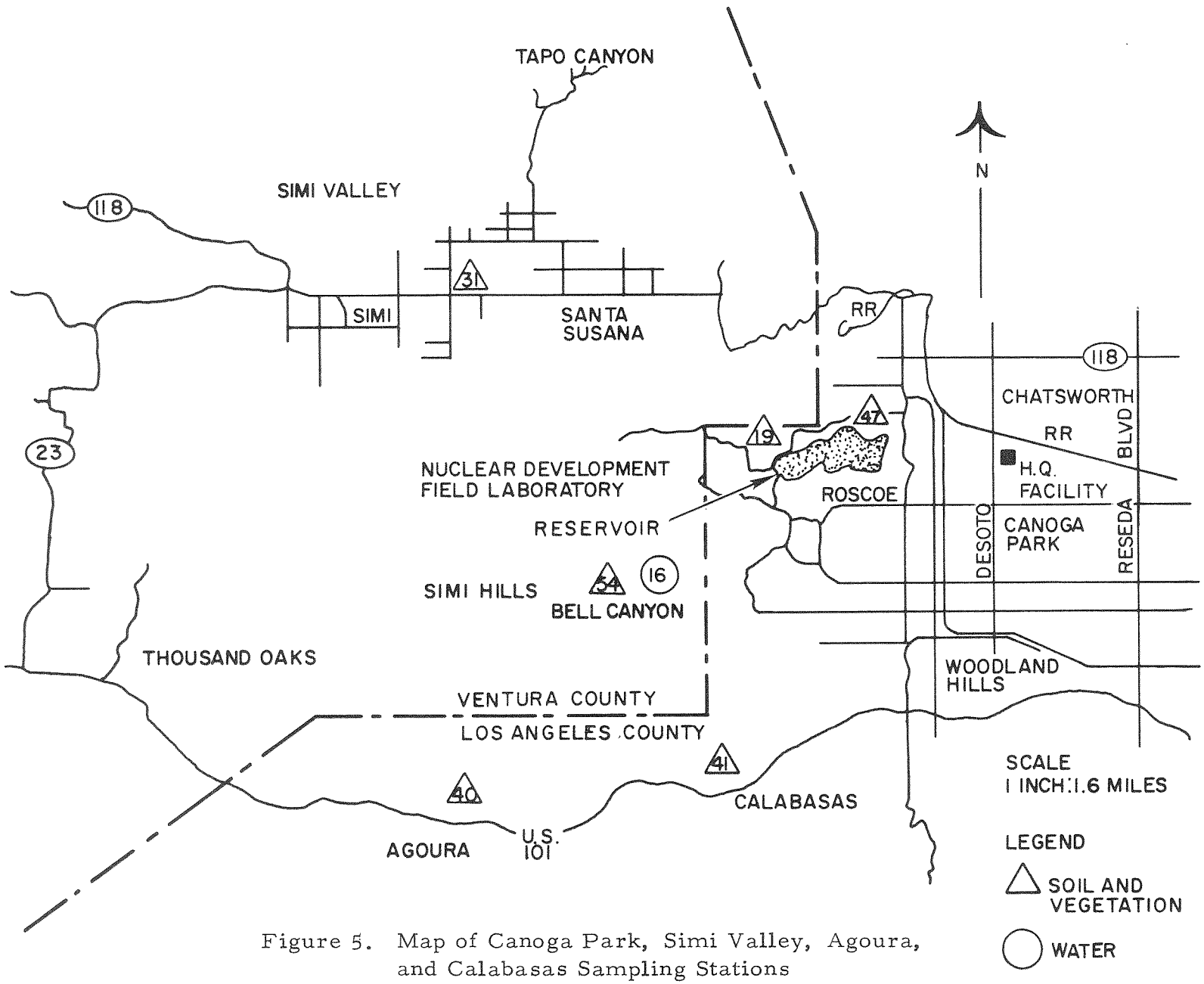


Figure 5. Map of Canoga Park, Simi Valley, Agoura, and Calabasas Sampling Stations

III. ENVIRONMENTAL MONITORING PROGRAM

A. GENERAL DESCRIPTION

Soil and vegetation sample collection and analysis for radioactivity were initiated in 1952, in the Downey, California, area, where the Division was initially located. Environmental sampling was subsequently extended to the proposed Sodium Reactor Experiment (SRE) site in the Simi Hills in May of 1954. In addition, sampling was conducted in the Burro Flat area, southwest of SRE, where other nuclear installations are currently in operation. The Downey area survey was terminated when the Division relocated to Canoga Park. The primary purpose of the environmental monitoring program is to survey environmental radioactivity adequately to ensure that Atomics International operations do not contribute significantly to environmental radioactivity. The locations of sampling stations are shown in Figures 5, 6, and 7, and in Table 8.

B. SAMPLING AND SAMPLE PREPARATION

1. Soil

Surface soil types available for sampling range from decomposed granite to clay and loam. Samples are taken from the top 1/2-in. layer of undisturbed ground surface. The soil samples are packaged in plastic containers, and returned to the laboratory for analysis.

Sample preparation consists of transferring the soils to Pyrex beakers, and drying in a muffle furnace at approximately 500°C for 8 hr. After cooling, the soil is sieved to obtain uniform particle size. Two-gram aliquots of the sieved soil are weighed, and transferred to copper planchets. The soil is wetted in the planchet with alcohol, evenly distributed to obtain uniform sample thickness, dried, and counted. Soil specific gravity ranges from 1.07 to 1.41 gm/mℓ, and averages 1.24 gm/mℓ.

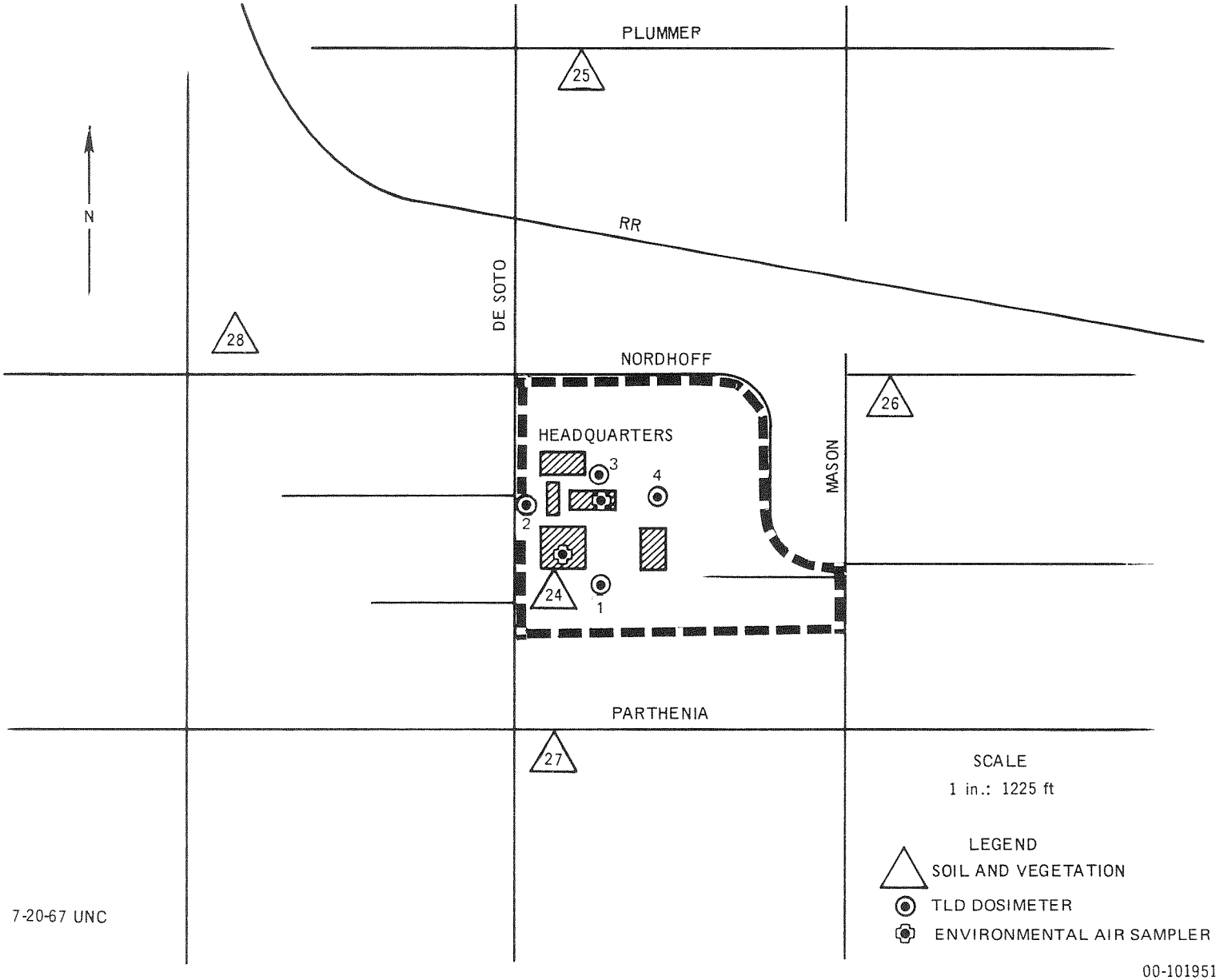


Figure 6. Map of Headquarters Vicinity Sampling Stations

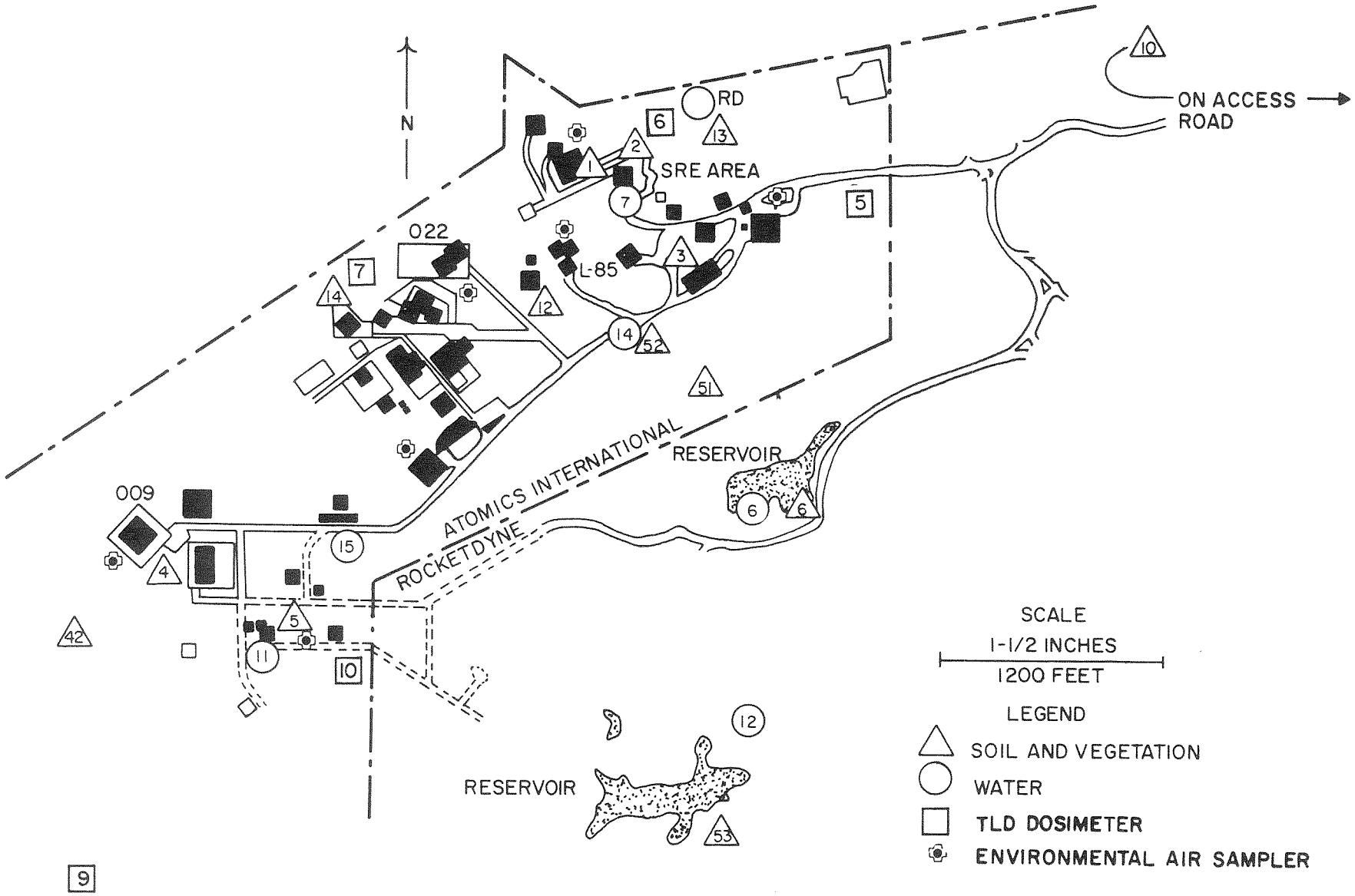


Figure 7. Map of NDFL Sampling Stations

TABLE 8

SAMPLE STATION LOCATIONS
(Sheet 1 of 2)

Station	Location
SV-1	SRE Reactor, NDFL
SV-2	SRE Perimeter Drainage Ditch, NDFL
SV-3	Bldg. 064 Parking Lot, NDFL
SV-4	Bldg. 020, NDFL
SV-5	Bldg. 363, NDFL
SV-6	Rocketdyne Reservoir, SSFL
SV-10	Santa Susana Site Access Road
SV-12	L-85 Reactor, NDFL
SV-13	Sodium Cleaning Pad, NDFL
SV-14	Below Bldg. 022, NDFL
SV-19	Santa Susana Site Entrance, Woolsey Canyon
SV-24	Atomics International Headquarters
SV-25	DeSoto Avenue and Plummer Street
SV-26	Mason Avenue and Nordhoff Street
SV-27	DeSoto Avenue and Parthenia Street
SV-28	Canoga Avenue and Nordhoff Street
SV-31	Simi Valley, Alamo Avenue and Sycamore Road
SV-40	Agoura – Kanan Road and Ventura Freeway
SV-41	Calabasas – Parkway Calabasas and Ventura Freeway
SV-42	Nonradioactive Materials Disposal Area, NDFL
SV-47	Chatsworth Reservoir North Boundary
SV-51	Bldg. 029, NDFL
SV-52	Burro Flat Drainage Control Pond, G Street and 17th Street, NDFL
SV-53	Top of Bell Canyon Below Rocketdyne Delta Pond Spillway, SSFL
SV-54	Bell Creek

SV – Soil and Vegetation Sample Station

TABLE 8

SAMPLE STATION LOCATIONS
(Sheet 2 of 2)

Station	Location
W-6	Rocketdyne Reservoir, SSFL
W-7	Process Water from Bldg. 003, NDFL
W-11	Process Water from Bldg. 363, NDFL
W-12	Rocketdyne Reservoir, SSFL
W-16	Bell Creek
A-1	Atomics International Headquarters, Bdlg. 001 Roof
A-2	Atomics International Headquarters, Bldg. 004 Roof
A-3	Bldg. 009, NDFL
A-4	Bldg. 011, NDFL
A-5	Bldg. 012, NDFL
A-6	Bldg. 040, NDFL
A-7	Bldg. 074, NDFL
A-8	Bldg. 143, NDFL
A-9	Bldg. 363, NDFL
TLD-1	Atomics International Headquarters, South of Bldg. 102 on Fence
TLD-2	Atomics International Headquarters, West of Bldg. 001 on Gate to Plant Water Supply Enclosure
TLD-3	Atomics International Headquarters, Guard Post No. 1, Bldg. 201
TLD-4	Atomics International Headquarters, East Fence Gate
TDL-5	Bldg. 113, NDFL
TLD-6	SRE Retention Dam, NDFL
TLD-7	Electric Substation No. 719, NDFL
TLD-8	Property Line Gate, West End of H Street, NDFL
TLD-9	Water Tank No. 701, NDFL
TLD-10	Bldg. 854, NDFL
TLD-11	Off Site, Northridge
TLD-12	Off Site, Simi Valley
TLD-13	Off Site, Northridge

W — Water Sample Station
A — Air Sample Station
TLD — Thermoluminescent Dosimeter Location

2. Vegetation

Vegetation samples obtained in the field are of the same perennial plant types, wherever possible – generally, sunflower or wild tobacco leaves. Vegetation leaves are stripped from plants, and placed in ice cream cartons for transfer to the laboratory for analysis. Plant root systems are not normally analyzed.

Vegetation samples are first washed with tap water to remove foreign matter, and then thoroughly rinsed with distilled water. Washed vegetation is dried in tared beakers at 100°C for 24 hr for dry weight determination, then ashed in a muffle furnace at approximately 500°C for 8 hr, producing a completely burned ash. One-gram aliquots of pulverized ash from each beaker are weighed, and transferred to copper planchets. The vegetation ash is wetted in the planchet with alcohol, evenly distributed to obtain uniform sample thickness, dried, and counted for alpha and beta radiation. The dry/ash weight ratio is used for the determination of the standard dry weight gross radioactivity concentration value.

3. Water

Surface water samples are obtained monthly at the NDFL and from Bell Creek. The water is drawn into 1-ℓ polyethylene bottles, and transferred to the laboratory.

Five hundred milliliter volumes of water are evaporated to dryness in crystallizing dishes at approximately 90°C. The residue salts are redissolved into distilled water, transferred to copper planchets, dried under heat lamps, and counted for radioactivity.

4. Air

Environmental air sampling is conducted continuously at the Headquarters and NDFL sites with automatic air samplers, operating on 24-hr sampling cycles. Airborne particulate radioactivity is collected on HV-70 filter paper, which is automatically changed at the end of each sampling period. The filters are removed from the sampler and counted for long-lived radioactivity following a minimum 120-hr decay period. The volume of a typical daily environmental air sample is approximately 25 m^3.

A graph of daily averaged airborne long-lived alpha and beta-gamma radioactivity concentrations detected at the Headquarters and NDFL facilities during 1974 is presented in Figure 8. The average beta-gamma concentration for each month is also indicated by horizontal bars. The graph shows a few prominent peaks occurring during the first 6 months, followed by a decreasing concentration trend through the summer and fall months.

C. COUNTING AND CALIBRATION

Environmental soil, vegetation, water, and air samples are counted for alpha and beta-gamma radioactivity with a low-background proportional counting system, capable of the simultaneous counting of both alpha and net beta radioactivity. The sample-detector configuration provides a nearly 2π geometry. The thin-window detector is continually purged with methane counting gas. A preset time mode of operation is used for all samples; however, an overriding preset count mode is available to limit the counting time for high-activity samples. The minimum detection limits shown in Table 9 were determined by using typical values for counting time, system efficiency, background count rates (approximately 0.05 cpm α and 1.0 cpm β-γ) and sample size. For this, the minimum statistically significant amount of radioactivity, irrespective of sample configuration, is taken as that amount equal in count rate to three times the standard deviation of the system background count rate.

Counting system efficiencies are determined routinely with Ra-D+E+F (with alpha absorber), Th^{230}, and U^{235} standard sources, and with K^{40}, in the form of standard reagent grade KCl, which is used to simulate soil and vegetation samples. Self-absorption standards are made by dividing sieved KCl into samples, increasing in mass, by 200-gm increments, from 100 to 3000 mg. The samples are placed in copper planchets, of the type used for environmental samples, and counted. The ratio of sample activity to the observed net count rate for each sample is plotted as a function of sample weight. The correction factor (ratio) corresponding to sample weight is obtained from the graph. The product of the correction factor and the net sample count rate yields the sample activity (dpm). This method has been proved usable by applying it to various-sized aliquots of uniformly mixed environmental samples and observing that the resultant specific activities fall within the expected statistical counting error.

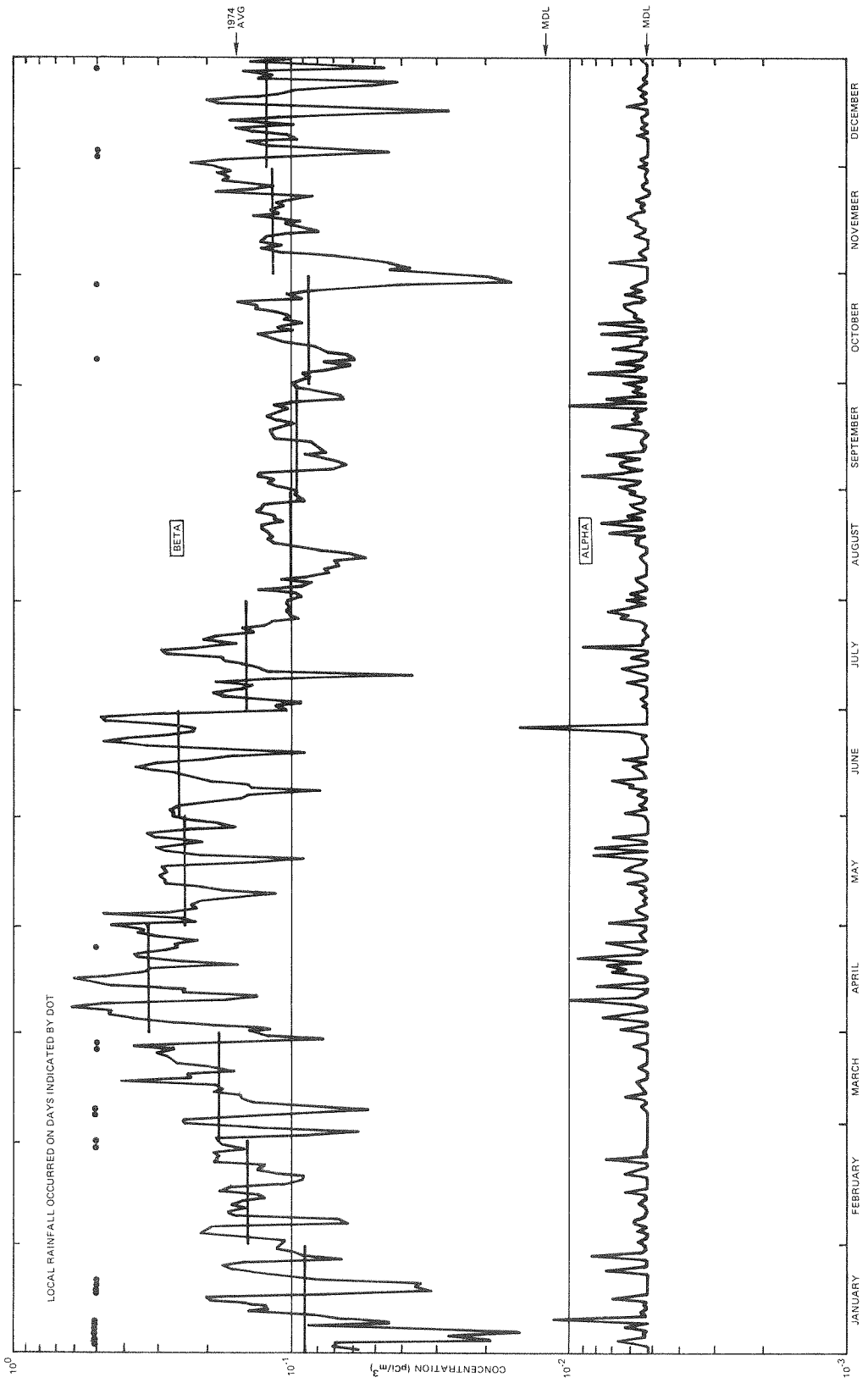


Figure 8. Daily Averaged Long-Lived Airborne Radioactivity at Headquarters and NDFL – 1974

TABLE 9

MINIMUM RADIOACTIVITY DETECTION LIMITS

Sample	Activity	Minimum Detection Limits*
Soil	α	$(5.1 \pm 6.1)\ 10^{-8}$ μCi/gm
	β-γ	$(2.2 \pm 2.2)\ 10^{-7}$ μCi/gm
Vegetation	α	$(1.0 \pm 1.2)\ 10^{-7}$ μCi/gm ash
	β-γ	$(3.5 \pm 3.5)\ 10^{-7}$ μCi/gm ash
Water	α	$(2.1 \pm 2.4)\ 10^{-10}$ μCi/mℓ
	β-γ	$(6.3 \pm 6.3)\ 10^{-10}$ μCi/mℓ
Air	α	$(5.4 \pm 6.4)\ 10^{-15}$ μCi/mℓ
	β-γ	$(1.2 \pm 1.2)\ 10^{-14}$ μCi/mℓ

*95% Confidence Level

D. NONRADIOACTIVE MATERIALS

Rockwell International Corporation, Rocketdyne Division, has filed a Report of Waste Discharge with the California Regional Water Quality Control Board, and has been granted a National Pollutant Discharge Elimination System permit to discharge wastewater, pursuant to Section 402 of the Federal Water Pollution Control Act. The permit, NPDES No. CA0001309, became effective on December 6, 1974, and supersedes all previously held permits for wastewater discharge from the Rocketdyne Division SSFL. Discharge of up to 3,500,000 gal/day of overflow is permitted into Bell Creek from water reclamation reservoirs. Discharge generally occurs only during and immediately after periods of heavy rainfall or during extended periods of rocket engine testing.

Only one of the reservoirs receives influent from the Atomics International Division NDFL. It is identified as W-12 in Table 8. The influent includes sewage treatment plant outfall and surface runoff water. Grab-type water samples, taken at the reservoir prior to a discharge, are analyzed by a California State certified analytical testing laboratory. The specific

constituents analyzed for, and their respective limitations in discharged wastewater, are presented in Appendix B. Wastewater originating from facilities located throughout the Santa Susana site are composited in the reservoir. Therefore, the point of origin of nonradioactive constituents found in wastewater is impossible to determine.

IV. EFFLUENT MONITORING PROGRAM

Radioactive effluents are generated at Atomics International Division facilities as the result of operations performed under contract to ERDA, under Special Nuclear Materials License SNM-21, and under State of California Radioactive Material License 0015-59. The specific facilities are identified as Buildings 001 and 004 at the Headquarters site, and Buildings 003, 020, 022, and 055 at the Santa Susana Site, NDFL.

A. FACILITY DESCRIPTIONS

1. Headquarters Site

a. Building 001 — NRC and California State Licensed Activities

Operations at Building 001 which generate radioactive effluents consist of production operations associated with the manufacture of enriched uranium fuel elements. Only particulate radioactive material contained in the gaseous effluent is released from the facility to unrestricted areas. Liquid wastes are released to the sanitary sewage system, which is considered a controlled area, as provided by the California Radiation Control Regulations (CAC 17). Radionuclides that may be released include U^{238} and U^{235}.

b. Building 004 — NRC and California State Licensed Activities

Operations at Building 004 which generate radioactive effluents consist of research studies in physics and chemistry, and the chemical analysis of small quantities of fuel materials, usually limited to a few grams. Only particulate radioactive material contained in gaseous effluent is released from the facility to unrestricted areas. Liquid laboratory wastes are released to a Brookhaven-type proportional sampling tank which retains an aliquot of the liquid wastes released to the sanitary sewage system. The aliquot is composited and analyzed for radioactive material. Radionuclides that may be released include U^{238} and U^{235}.

2. Santa Susana Site, NDFL

a. Building 003 – ERDA Contract Activities

Building 003, currently deactivated, contains a small hot cell, previously used for reactor fuel element examination. Only particulate material contained in gaseous effluent is released from the facility to unrestriced areas. No radioactive liquid waste is released from the facility. Radionuclides that may be released are mixed fission products including Cs^{137} and Sr^{90}.

b. Building 020 – NRC and California State Licensed Activities

Operations at Building 020 which generate radioactive effluents consist of hot cell examination of irradiated nuclear fuels and reactor components. Solid particulate material, as well as radioactive gases, may be contained in the gaseous effluent from the facility, depending on the operations being performed and the history of the irradiated fuel. The chemical form of such effluent may be U metal, UO_2, UC, mixed fission products, and various activation products. No radioactive liquid waste is released from the facility. Radionuclides that may be released include U^{238}, U^{235}, Cs^{137}, Sr^{90}, and Kr^{85}.

c. Building 022 – ERDA Contract Activities

Operations at Building 022 which generate radioactive effluents consist of the processing, packaging, and temporary storage of liquid and dry radioactive waste material for disposal. Only particulate radioactive material contained in gaseous effluent is released from the facility to unrestricted areas. No radioactive liquid waste is released from the facility. Radionuclides that may be released include U^{238}, U^{235}, Cs^{137}, and Sr^{90}.

d. Building 055 – NRC and California State Licensed Activities

Operations at Building 055 which generate radioactive effluents consist of fabrication of plutonium and plutonium-uranium fuel pins. Only particulate radioactive material contained in gaseous effluents are released from the facility to unrestricted areas. No radioactive liquid waste is released from the facility. Radionuclides that may be released include U^{238}, U^{235}, Pu^{238}, Pu^{239}, Pu^{240}, Pu^{241}, and Am^{241}.

B. TREATMENT AND HANDLING

Waste streams released to unrestricted areas are limited, in all cases, to gaseous effluents.

The level of radioactivity contained in all gaseous effluents is reduced to the lowest practicable values by releasing the effluents through certified HEPA filters. These effluents are sampled for particulate radioactive materials by means of continuous stack exhaust samplers. In addition, stack monitors are provided at Buildings 020, 022, and 055 which provide automatic alarm capability in the event of the release of gaseous activity from Buildings 020 or 022, or particulate activity from Building 055. The HEPA filters used for filtering gaseous effluents are 99.95% efficient for particles of 0.3-micron diameter.

The average concentration and total curies of radioactivity in gaseous effluent released to unrestricted areas is shown in Table 10.

TABLE 10

GASEOUS EFFLUENT RELEASED TO UNRESTRICTED AREAS – 1974

Building	Point of Release	Approximate Effluent Volume (ft^3)	Activity Monitored	Approximate Minimum Detection Limit ($\mu Ci/m\ell$)	Average Concentration ($\mu Ci/m\ell$)	Maximum Concentration ($\mu Ci/m\ell$)	Total Activity Released (Ci)
001	Stack Exit	2.2×10^{11}	α	4.0×10^{-16}	$<6.0 \times 10^{-16}$	1.1×10^{-15}	$<4.6 \times 10^{-7}$
			β-γ	1.6×10^{-15}	$<3.4 \times 10^{-15}$	3.0×10^{-14}	$<3.3 \times 10^{-6}$
004	Stack Exit	5.2×10^{11}	α	6.3×10^{-16}	$<1.2 \times 10^{-15}$	2.6×10^{-14}	$<2.2 \times 10^{-6}$
			β-γ	2.5×10^{-15}	$<9.5 \times 10^{-15}$	9.5×10^{-14}	$<1.9 \times 10^{-5}$
003	Stack Exit	7.3×10^{10}	α	1.7×10^{-16}	$<2.4 \times 10^{-16}$	1.7×10^{-15}	$<6.3 \times 10^{-8}$
			β-γ	6.3×10^{-16}	$<4.8 \times 10^{-15}$	2.0×10^{-14}	$<3.3 \times 10^{-7}$
020	Stack Exit	1.5×10^{11}	α	8.3×10^{-17}	$<3.1 \times 10^{-16}$	2.4×10^{-15}	2.0×10^{-7}
			β-γ	3.1×10^{-16}	1.4×10^{-14}	3.6×10^{-14}	8.3×10^{-6}
022	Stack Exit	7.6×10^{10}	α	2.1×10^{-16}	$<4.8 \times 10^{-16}$	5.4×10^{-15}	$<1.4 \times 10^{-7}$
			β-γ	7.7×10^{-16}	$<5.5 \times 10^{-15}$	1.8×10^{-14}	$<1.6 \times 10^{-6}$
055	Stack Exit	1.2×10^{11}	α	1.8×10^{-16}	$<2.7 \times 10^{-16}$	1.2×10^{-15}	$<1.2 \times 10^{-7}$
						Total	$<3.7 \times 10^{-5}$

APPENDIX A
COMPARISON OF ENVIRONMENTAL RADIOACTIVITY DATA FOR 1974 WITH PREVIOUS YEARS

This section compares environmental monitoring results for the calendar year 1974 with previous annual data. The annual average radioactivity concentrations determined in all sample types are presented in the following tables.

TABLE A-1

SOIL RADIOACTIVITY DATA – 1965 THROUGH 1974

Year	On Site – Average (10^{-6} μCi/gm)			Off Site – Average (10^{-6} μCi/gm)		
	No. Samples	α	β-γ	No. Samples	α	β-γ
1974	144	0.60	25.	48	0.54	24.
1973	144	0.57	25.	48	0.51	24.
1972	144	0.56	25.	48	0.57	24.
1971	144	0.55	25.	48	0.53	23.
1970	144	0.47	27.	48	0.48	25.
1969	144	0.42	27.	48	0.42	25.
1968	144	0.47	26.	48	0.48	26.
1967	144	0.42	28.	48	0.39	24.
1966	144	0.41	29.	48	0.44	25.
1965	144	0.46	36.	142	0.47	29.

TABLE A-2

VEGETATION RADIOACTIVITY DATA – 1965 THROUGH 1974

Year	On Site – Average (10^{-6} μCi/gm ash)			Off Site – Average (10^{-6} μCi/gm ash)		
	No. Samples	α	β-γ	No. Samples	α	β-γ
1974	144	<0.20	152.	48	<0.27	141.
1973	144	<0.24	155.	48	<0.24	142.
1972	144	0.23	145.	48	0.36	125.
1971	144	0.24	165.	48	0.31	132.
1970	144	0.33	159.	48	0.30	142.
1969	144	0.40	165.	48	0.36	144.
1968	144	0.51	158.	48	0.51	205.
1967	144	0.62	286.	48	0.39	413.
1966	144	0.37	169.	48	0.37	123.
1965	144	0.56	162.	142	0.61	138.

TABLE A-3

NDFL PROCESS WATER RADIOACTIVITY DATA – 1965 THROUGH 1974

Year	No. Samples	Average α	Average β-γ
		(10^{-9} μCi/mℓ)	(10^{-9} μCi/mℓ)
1974	24	<0.24	2.7
1973	24	<0.26	3.4
1972	24	0.22	3.7
1971	24	0.28	4.9
1970	24	0.18	5.3
1969	24	0.11	5.0
1968	24	0.16	5.0
1967	24	0.13	6.1
1966	24	0.13	4.6
1965	24	0.22	6.0

TABLE A-4

BELL CREEK AND ROCKETDYNE SSFL RESERVOIR RADIOACTIVITY DATA – 1966 THROUGH 1974

Year	Samples														
	Bell Creek Mud 54			Bell Creek Vegetation 54			Bell Creek Water 16			Reservoir No. 6 Water			Reservoir No. 12 Water		
	No. Samples	Average (10^{-6} μCi/gm)		No. Samples	Average (10^{-6} μCi/gm ash)		No. Samples	Average (10^{-9} μCi/mℓ)		No. Samples	Average (10^{-9} μCi/mℓ)		No. Samples	Average (10^{-9} μCi/mℓ)	
		α	β-γ		α	β-γ		α	β-γ		α	β-γ		α	β-γ
1974	12	0.32	22.	12	<0.16	142.	12	<0.21	2.5	12	<0.22	4.2.	12	<0.21	4.5
1973	12	0.34	24.	12	<0.17	147.	12	<0.21	2.7	12	<0.23	4.5	12	<0.37	5.6
1972	12	0.32	22.	12	0.12	139.	12	0.20	2.5	12	0.22	5.3	12	0.22	5.5
1971	12	0.36	23.	12	0.19	128.	12	0.15	3.8	12	0.18	6.2	12	0.16	6.4
1970	12	0.44	24.	12	0.23	165.	12	0.15	3.7	12	0.15	6.9	12	0.12	7.4
1969	12	0.35	27.	12	0.28	166.	12	0.04	4.0	12	0.07	5.9	11	0.10	5.7
1968	11	0.32	24.	11	0.39	170.	8	0.05	4.6	11	0.23	8.1	12	0.33	7.7
1967	12	0.40	24.	12	0.38	180.	12	0.07	5.8	12	0.19	6.6	10	0.17	7.0
1966	3	0.39	25.	3	1.1	108.	3	0.75	2.5	9	0.11	5.8	8	1.1	6.3

TABLE A-5

AIRBORNE RADIOACTIVITY DATA –
1965 THROUGH 1974

Year	Headquarters Average (10^{-12} μCi/mℓ)			NDFL Average (10^{-12} μCi/mℓ)		
	No. Samples	α	β-γ	No. Samples	α	β-γ
1974	663	<0.0056	<0.16	2477	<0.0057	<0.16
1973	715	<0.0075	<0.041	2311	<0.0072	<0.038
1972	708	0.0085	0.14	2430	0.0086	0.14
1971	730	0.0087	0.30	2476	0.0086	0.33
1970	668	-	0.34	2434	-	0.36
1969	687	-	0.27	2364	-	0.26
1968	650	-	0.32	2157	-	0.32
1967	712	-	0.39	2400	-	0.41
1966	706	-	0.18	2205	-	0.17
1965	483	-	0.83	1062	-	0.21

APPENDIX B

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD CRITERIA FOR DISCHARGING NONRADIOACTIVE CONSTITUENTS FROM ROCKETDYNE DIVISION, SSFL

The discharge of an effluent in excess of the following limits is prohibited.

TABLE B-1

RESOLUTION No. 58-77, ADOPTED OCTOBER 16, 1959, RESCINDED DECEMBER 6, 1974

Constituent	Concentration Limit (ppm)
Total Dissolved Solids	1000
Total Hardness	500
Chloride	250
Sulfate	500
Nitrogen (as NO_3)	50
Hexavalent Chromium	0.05
Fluoride	1.5
Boron	1.0
Turbidity	100
Color	20*
Floatable Oil and Grease	None visible
Total Oil and Grease	25
pH	5.5 to 11.0

*Color units

TABLE B-2

NPDES No. CA 0001309, EFFECTIVE DECEMBER 6, 1974

Constituent	Discharge Rate (lb/day)		Concentration Limit (mg/ℓ)	
	Maximum Daily	30-day Average	Average	Maximum
Total Dissolved Solids	29,200	29,200	---	1,000
Total Hardness (as $CaCO_3$)	14,600	14,600	---	500
Chloride	7,300	7,300	---	250
Chloride plus Sulfate	14,600	14,600	---	500
Suspended Solids	1,310	875	30	45
Settleable Solids	---	---	0.1(1)	0.2(1)
BOD 20°C	875	584	20	30
Oil and Grease	438	292	10	15
Nitrate Nitrogen	292	292	---	10
Color	---	---	---	20(2)
Turbidity	---	---	50(3)	75(3)
Total Chromium	0.29	0.15	0.005	0.01
Fluoride	29.2	29.2	---	1.0
Boron	29.2	29.2	---	1.0
Residual Chlorine	---	---	---	0.5
Fecal Coliform	---	---	200(4,5)	400(4,6)
Surfactants (as MBAS)	---	---	---	0.5
pH		6.5 to 9.0		

(1)In mℓ/ℓ
(2)In color units
(3)In turbidity units (TU)
(4)In MPN/100 mℓ
(5)30-day average, geometric mean
(6)7-day average, geometric mean

APPENDIX C
REFERENCES

1. ERDA Manual Chapter 0524, Appendix
2. Code of Federal Regulations, Title 10, Part 20
3. California Radiation Control Regulations, California Administrative Code, Title 17, Public Health
4. California Regional Water Quality Control Board, Los Angeles Region, Order No. 74-379, NPDES No. CA0001309, Effective December 6, 1974

APPENDIX D
EXTERNAL DISTRIBUTION

1. Radiologic Health Section, State Department of Public Health, California
2. Radiological Health Division, Los Angeles County Health Department
3. U.S. Energy Research and Development Administration, San Francisco Operations Office
4. Gordon Facer, ERDA
5. Andrew J. Pressesky, ERDA
6. James Miller, ERDA
7. ERDA-Hq Library, Attention: Charles Sherman