ENVIRONMENTAL MONITORING REPORT

APRIL 1, 1960, to JUNE 30, 1960

ATOMICS INTERNATIONAL

CANOGA PARK, CALIFORNIA

SUMMARY

The environs of Atomics International World Headquarters and Nuclear Development Field Laboratory near Los Angeles, California are periodically surveyed to determine the radioactivity of typical surface soil, vegetation, and water samples. In addition, continuous air samples taken at the above sites provide information concerning airborne particulate radioactivity. This report summarizes the environmental monitoring results for the second quarter of 1960.

Soil and vegetation are sampled monthly at forty-two locations. Ten of these are within the boundaries of Atomics International sites; the remaining thirty-two are within a ten mile radius of the sites.

The average soil and vegetation activities are shown in Tables I and II.

Table I - Soil

Location	Activity	1959		Second Quarter 1960	
		No.Samples	Average uuc/gram	No.Samples	Average uuc/gram
On Site	α	107	0.41	28	0.44
	β-γ	107	15.	28	22.
Off Site	α	377	0.31	99	0.38
	β-γ	380	14.	96	16.

Table II - Vegetation

Location	Activity	1959		Second Quarter 1960	
		No.Samples	Average uuc/gram(ash)	No.Samples	Average uuc/gram(ash)
On Site	α	96	0.24	20	.20
	β-γ	107	220.	28	150.
Off Site	α	286	0.18	78	0.18
	β-γ	380	170.	95	140.

Two water wells at the N.D.F.L. are sampled monthly. The average water activity is shown in Table III.

Table III - Well Water

Location	Activity	1959		Second Quarter - 1960	
		No.Samples	Average uuc/liter	No.Samples	Average uuc/liter
N.D.F.L.	α	18	0.076	1	0.38
	$\beta-\gamma$	16	2.8	5	2.8

Environmental air sampling is performed continuously at the Headquarters and N.D.F.L. sites. The average concentration of long lived airborne beta emitters is shown in Table IV.

Table IV - Air

Location	Activity	1959		Second Quarter - 1960	
		No.Samples	Average uuc/M^3	No.Samples	Average uuc/M^3
Head-quarters	$\beta-\gamma$	215	2.5	6	0.63
N.D.F.L.	$\beta-\gamma$	257	0.93	8	0.21

Table I indicates that the second quarter 1960 soil radioactivity is slightly higher than the 1959 average. The difference between on-site and off-site levels is generally within the accuracy of the measurement. Table II indicates that the second quarter 1960 vegetation alpha activity is virtually the same, whereas the beta-gamma level is lower than the 1959 average.

Since N.D.F.L. operations do not release significant levels or quantities of radioactivity to the soil, the slight variation in well water radioactivity, Table III, is attributed to natural causes.

Table IV indicates a considerable decrease in airborne beta-gamma activity from the 1959 averages for Headquarters and N.D.F.L. The higher 1959 average is believed to have been caused by fallout.

General Description of Program

Soil and vegetation sample collection and analysis, initiated in 1952 in the Downey, California area, was extended to the proposed SRE site in May 1954, and to the Canoga Park area in December 1954. The Downey area survey was stopped when Atomics International relocated to Canoga Park. The primary purpose of the environmental monitoring program is to ensure that Atomics International's operations are not contributing measurably to environmental radioactivity and, at the same time, to provide a continuing check on the integrity of engineering safeguards for the containment of radioactivity. Due to the effect of geographical location on environmental radioactivity, comparison between widely spread sampling locations is difficult. Useful information can be obtained, however, by observing the trend of individual or closely spaced groups of locations.

For this reason, samples are collected monthly in five survey areas including Canoga Park (2), Santa Susana Mountains, Simi Valley and Russell Valley. Forty-two sampling stations are currently established within the indicated areas. The maximum sampling station distance from the Nuclear Development Field Laboratory at Santa Susana is approximately ten miles. Sampling station locations are indicated on Figures 1, 2, and 3, and in Table VI.

During each calendar quarter, approximately 126 soil, 126 vegetation, 21 water and 90 environmental air samples are obtained and analyzed by the Health and Safety Laboratory for gross alpha and/or beta-gamma activity.

Methods

SOIL

Surface soil types available for sampling range from decomposed granite to clay and sandy loam. Collected samples represent the top one half inch layer of ground surface. The soil is packed in small plastic containers which are then taken to the laboratory for analysis. Sample preparation consists of transferring the soil to pyrex beakers and drying in a muffle furnace at 500° centigrade for eight hours.

After cooling the soil is screened to obtain uniform particle sizes for counting. One gram aliquots of the screened soil are then transferred to stainless steel planchets and fixed with collodion acetone solution.

The prepared samples are then counted in a thin window, gas flow proportional counter calibrated with Ra D+E (with and without alpha absorber) and K^{40}. The K^{40} in the form of crystalline KCl is used to correct for self absorption in the soil and vegetation samples. This method affords the minimum detection limits shown in Table V. While better sensitivity and accuracy are possible, the additional counting time required is not warranted for routine analysis.

Table V - Minimum Detection Limits at 95% Confidence Level.

Sample	Activity	Minimum Detection Limit
Soil	α	0.25 ± 0.076 uuc/gram
	$\beta-\gamma$	0.34 ± 0.018 uuc/gram
Vegetation	α	0.008 ± 0.005 uuc/gram (ash)
	$\beta-\gamma$	1.1 ± 0.068 uuc/gram (ash)
Water	α	0.016 ± 0.0099 uuc/liter
	$\beta-\gamma$	0.08 ± 0.042 uuc/liter

VEGETATION

Vegetation samples obtained in the field at each station are of the same plant type wherever possible, and are generally sun flower or wild tobacco plant leaves. These plant types maintain an active rate of growth during the dry season, a characteristic uncommon to most other plant types indigenous to the area. Vegetation leaves to be sampled are stripped from the plant and placed in ice cream cartons for transfer to the Health and Safety Laboratory.

Preparation of samples for analysis includes rinsing in distilled water to remove foreign matter and placing in porcelain crucibles for reduction to ash. The crucibles are placed in a muffle furnace at 500° centigrade for approximately eight hours. This ashing time is sufficient to produce a finely divided, completely oxidized ash

of uniform density. Three hundred milligram aliquots of ash from each crucible are then weighed and transferred to stainless steel planchets for analysis. Analytical methods are the same as for soil samples. Sensitivity and accuracy are shown in Table V.

WATER

Samples of well water are obtained at the Nuclear Development Field Laboratory. The water is drawn into one liter polyethylene bottles for transfer to the laboratory. The samples are measured into 500 milliliter volumetric flasks and then evaporated into crystallizing dishes at approximately 90° centigrade. The residue salts are transferred to stainless steel planchets, wetted to produce an even deposition in the planchet, re-dried and counted in the proportional system. Sensitivity and accuracy are shown in Table V.

AIR

Environmental air sampling is conducted continuously at the Headquarters and NDFL sites by automatic twenty four hour step cycle air monitors. Airborne particulates are collected on a fixed filter tape which is moved, after each twenty-four hour period, to place the new sample beneath a thin window G.M. detector. At pre-set intervals, usually twenty minutes, the number of counts observed by the scaler during the interval is recorded.

It has been determined that for this type of instrument twice the counting rate after 18.6 hours decay minus the counting rate after 8 hours decay closely approximates the long-lived contribution. This counting rate can be converted easily to the average long-lived airborne activity (uuc/m^3) during the sampling period. The minimum detection limit, which varies somewhat between instruments, is on the order of 0.04 uuc/m^3.

When abnormally high activities are observed, the data is plotted to determine the presence of short-lived activities other than radon and thoron daughters. If fallout is suspected, samples are removed

to the laboratory where their decay is observed for a period of several days to several weeks. If the activity decays as a function of $t^{-1.2}$, the data is extrapolated in order to find the date of origin. This date is then compared with the dates of publicized nuclear detonations in order to demonstrate that the abnormal airborne activity was not caused by Atomics International operations.

Table VI

Sample Station Locations

Station	Location
SV-1	SRE Reactor
SV-2	SRE Perimeter Drainage Ditch
SV-3	Building 064 Parking Lot
SV-4	West of Building 020
SV-5	Building 363
SV-6	Rocketdyne Retention Reservoir, PFL
SV-7	Rocketdyne PFL
SV-8	Rocketdyne PFL
SV-9	Rocketdyne PFL
SV-10	Santa Susana Site Access Road
SV-11	Santa Susana Site Access Road
SV-12	KEWB Reactor
SV-13	Sodium Burning Pad
SV-14	Canyon below Building 022
SV-15	Reseda Blvd. and Ventura Blvd.
SV-16	Topanga Canyon Blvd. and Ventura Blvd.
SV-17	Topanga Canyon Blvd. and Vanowen St.
SV-18	Topanga Canyon Blvd. and Saticoy St.
SV-19	Santa Susana Facility Entrance
SV-20	Topanga Canyon Blvd. and Devonshire St.
SV-21	Reseda Blvd. and Devonshire St.
SV-22	Reseda Blvd. and Nordhoff St.
SV-23	Reseda Blvd. and Sherman Way
SV-24	Headquarters
SV-25	DeSoto Ave. and Plummer St.
SV-26	Nordhoff St. and Mason Ave.
SV-27	DeSoto Ave. and Parthenia St.
SV-28	Canoga Ave. and Nordhoff St.
SV-29	Santa Susana Knolls
SV-30	Los Angeles Ave. at Bridge
SV-31	Los Angeles Ave. and Sycamore Road
SV-32	Tapo Canyon
SV-33	Los Angeles Ave. and Sinaloa Road

Station Con't	Location Con't
SV-34	Meier Canyon
SV-35	Brandeis Camp Entrance
SV-36	Moorpark Road and Camarillo Road
SV-37	Moorpark Road at Oil Pumping Station
SV-38	Moorpark Road and Ventura Blvd.
SV-39	Ventura Blvd. at Potrero Road
SV-40	Ventura Blvd. at Cornell Corners (Agoura)
SV-41	Ventura Blvd. at Calabasas
SV-42	Non Radioactive Materials Disposal Area, Nuclear Development Field Laboratory
W 2	SRE Perimeter Drainage Ditch
W 6	Rocketdyne Retention Reservoir, PFL
W 7	Well Water from Engineering Test Building
W 11	Well Water from Building 363
W R.O.	Run Off Collection Sump
W C.T.	Edison Cooling Tower
W R.D.	SRE Retention Dam

SV - Soil and Vegetation

W - Water

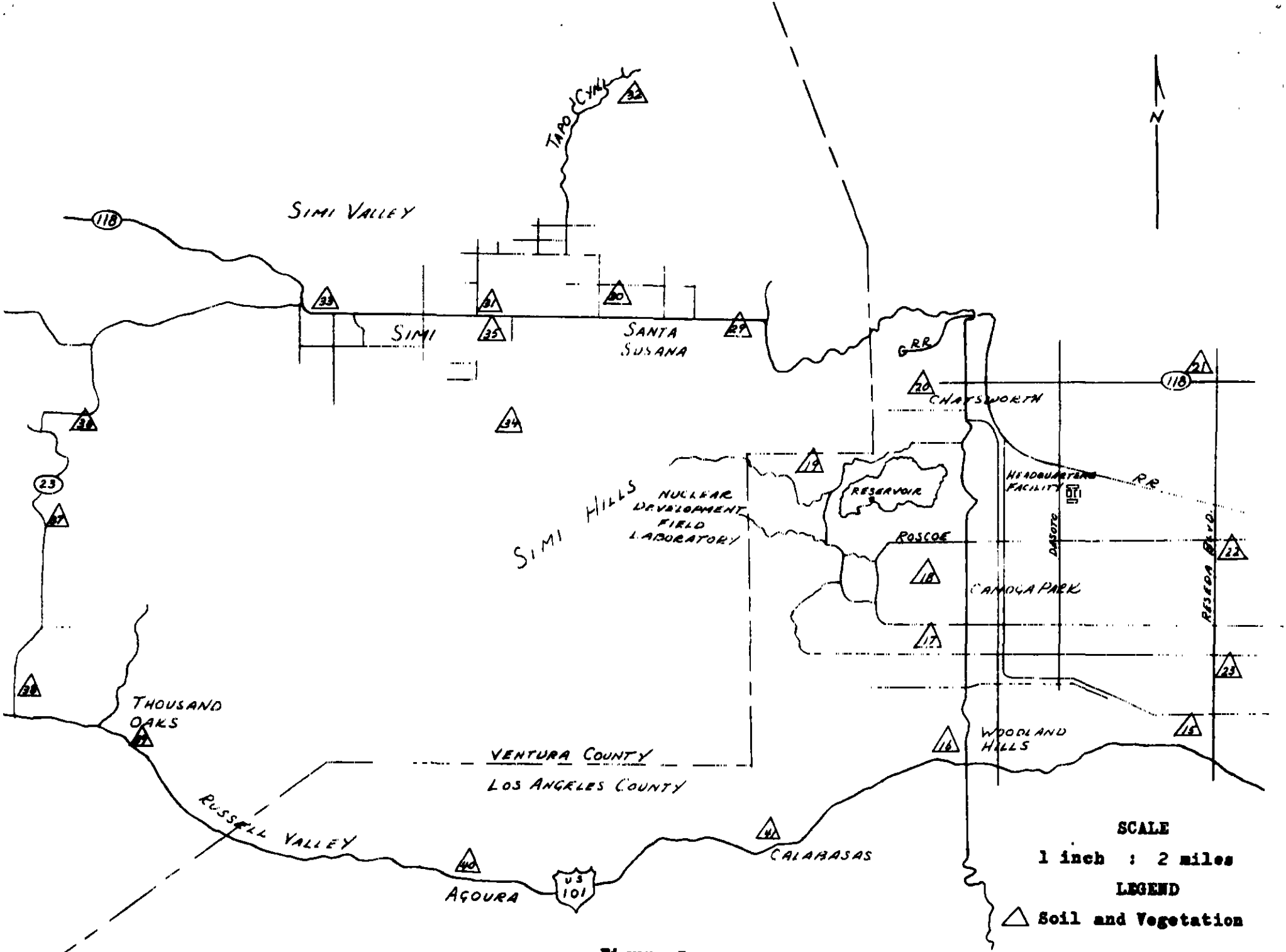
SIMI VALLEY
TAPO CYN.
SIMI
SANTA SUSANA
CHATSWORTH
RR
SIMI HILLS
NUCLEAR DEVELOPMENT FIELD LABORATORY
RESERVOIR
HEADQUARTERS FACILITY
ROSCOE
DeSOTO
RESEDA BLVD.
CANOGA PARK
WOODLAND HILLS
THOUSAND OAKS
VENTURA COUNTY
LOS ANGELES COUNTY
RUSSELL VALLEY
AGOURA
CALABASAS
US 101
118
23
N
SCALE
1 inch : 2 miles
LEGEND
△ Soil and Vegetation

Figure I

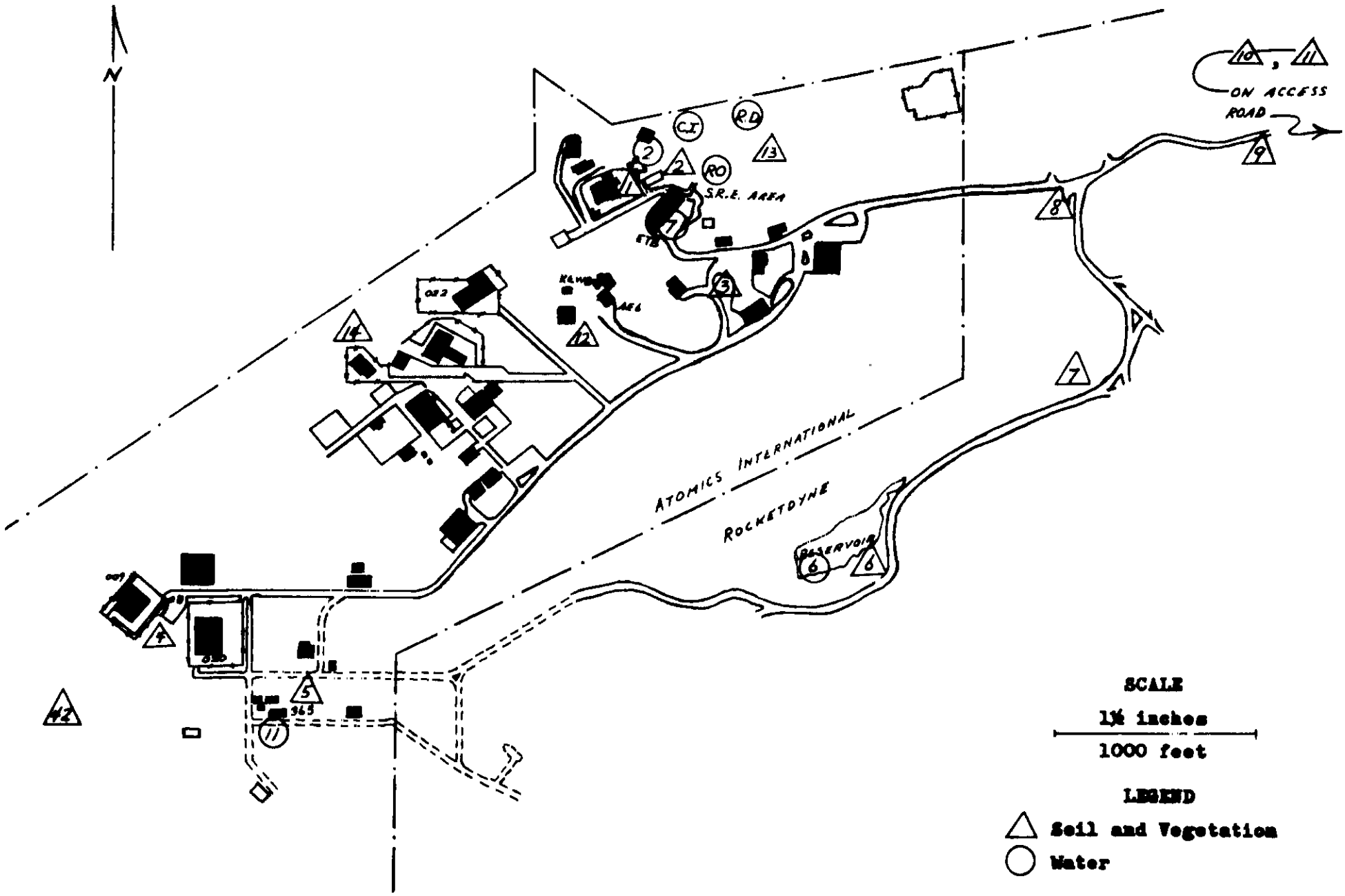
N
ON ACCESS ROAD
S.R.E. AREA
ATOMICS INTERNATIONAL
ROCKETDYNE
RESERVOIR
SCALE
1¼ inches
1000 feet
LEGEND
Soil and Vegetation
Water

Figure II

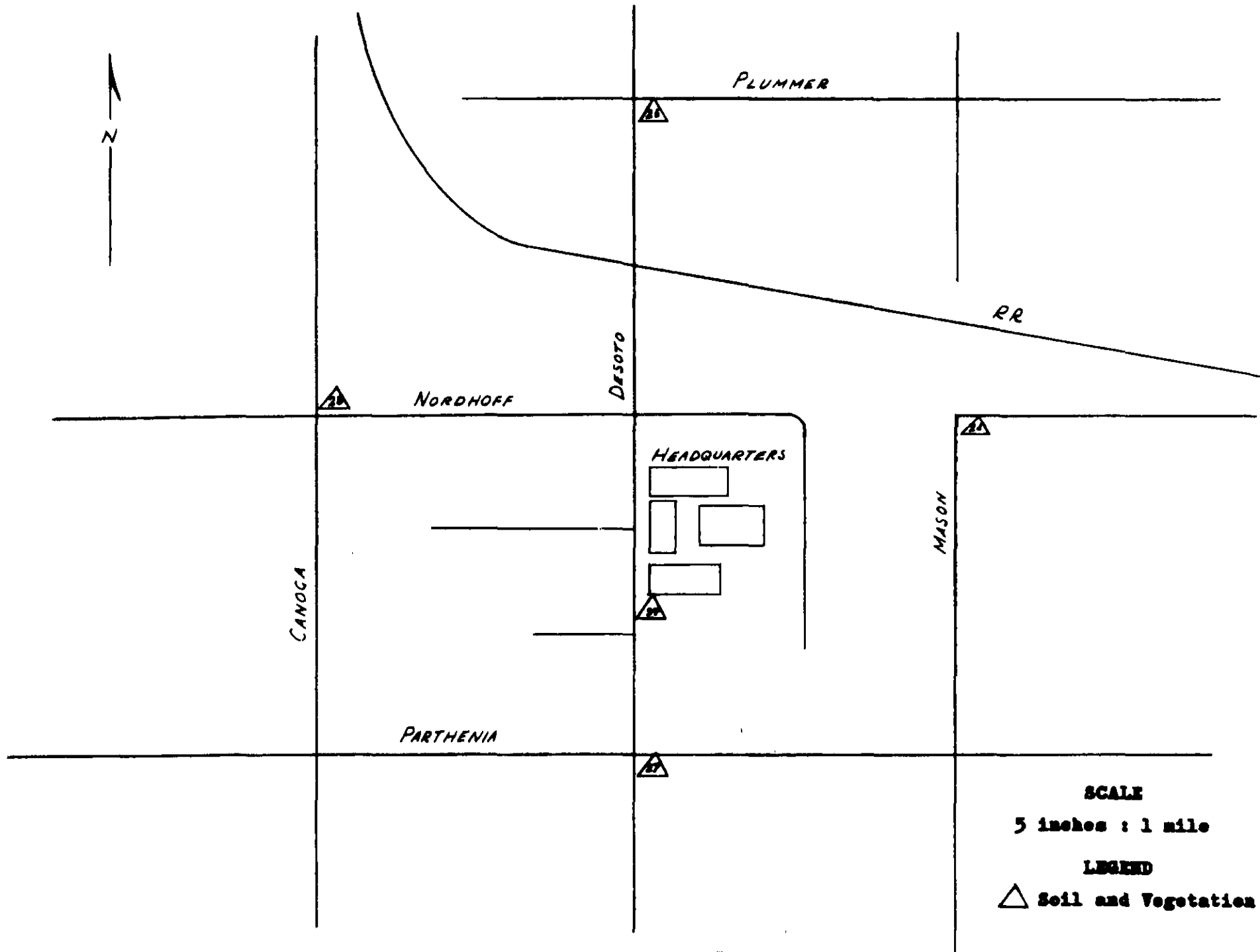
N
PLUMMER
RR
DESOTO
NORDHOFF
HEADQUARTERS
MASON
CANOCA
PARTHENIA
SCALE
5 inches : 1 mile
LEGEND
Soil and Vegetation

Figure III