Historical Radiological Activities at Building 038 (Vanowen Building)

Facility Address:
Rocketdyne Propulsion & Power
The Boeing Company
6633 Canoga Ave.
Canoga Park, CA 91309-7922

Phil Rutherford
Manager, Radiation Safety

Historical Operations (1956-60)

In 1956, Atomics International (AI) was formed as a division of North American Aviation. AI performed R&D into the peaceful uses of nuclear energy. Between 1956 and 1960, this work was performed at the Vanowen building at the Atomics International (now Rocketdyne) facility on Canoga Avenue in Canoga Park, CA. Principal work performed at the Vanowen facility included design, development and operation of small, aqueous, 93% enriched uranyl sulfate, reactors, named L-47 and L-77; reactor design, fuel development, and radiochemistry.

Reactor	Max Power (watts)	License	Period of Operation
L-47	5	R-19	August 1957 – June 1958
L-77	10	R-40	May 1958 – February 1960

Both reactors were licensed by the U.S. Atomic Energy Commission (AEC) and operations were routinely inspected by AEC staff (References 1 and 2). The location of both reactors was in the southeast corner of the Vanowen building in what is now the loading dock area (Reference 3).

In 1960, AI moved to its new facility on De Soto Ave. in Canoga Park, and all radiological activities were transferred to De Soto.

Building Radiological Surveys

All rooms within the Vanowen Building that supported nuclear operations were routinely surveyed by health physicists, up to, and following, removal of all radioactive material. All final room surveys, during the later months of 1959 and the first 4 months of 1960, indicated no contamination above current U.S. Nuclear Regulatory Commission (NRC) limits for release of facilities for unrestricted use (Reference 4). These routine and final surveys are on file with Rocketdyne's Radiation Safety Department in Building 4057 of the Santa Susana Field Laboratory, and are available for inspection.

At AI's request, the AEC terminated the operating license for L-47 (Reference 5) in 1958 following dismantlement of the reactor. In June 1960, the AEC amended the license of L-77 (Reference 6) allowing transfer of the reactor to AI's new headquarters facility on De Soto Ave. License actions such as these, are implemented by the AEC (and subsequently by the NRC) only when AEC (or NRC) have satisfied themselves that surveys verify that no residual radioactive contamination remains that exceeds regulatory guidelines. See also the subsequent inspection and survey by the Nuclear Regulatory Commission discussed in Section 4.0.

Environmental Surveys

3.1 Soil & Vegetation

Routine environmental sampling of soil and vegetation surrounding the Vanowen facility was conducted prior to, during, and after radiological operations (Reference 7). Monthly analysis of gross alpha and gross beta radioactivity soil and vegetation show the normal expected distribution of environmental background radioactivity. As an example, beta activity of soil ranged from 6 to 23 pCi/gram as a result of naturally occurring potassium-40, uranium daughters, and thorium daughters. The trend over a 6-year period, from December 1954 through the end of 1960, is flat, indicating no increase in environmental contamination due to Vanowen operations.

3.2 Groundwater

In October 1989, 20 groundwater wells were sampled and analyzed for radioactivity. Eight wells surrounded the Vanowen building perimeter (including one inside the building). Twelve wells surrounded the Vanowen building at larger distances ranging from 200 to 2,000 feet. Reference 8 documents the results. No man-made fission products or activation products, which would have indicated contamination, were detected. Uranium isotopes were detected in isotopic ratios indicating non-enriched, naturally occurring material. Combined radium-226 and radium-228 met drinking water limits of less than 5 pCi/L. All strontium-90 results were less than detection limits. All gamma emitting cesium-137 results were less than the detection limits. Gross beta levels all met drinking water limits of less than 50 pCi/L. All gross alpha levels were commensurate with the levels of naturally occurring uranium found and met the 15 pCi/L drinking water limit when uranium was excluded.

Nuclear Regulatory Commission Verification Inspection/Survey

In 1995, the NRC toured the Vanowen facility, performed a radiation survey, and reviewed Rocketdyne's documentation on the facility. The NRC documented their visit in Reference 9, and stated that ....

- "... the former reactor room was visited and surveyed for radioactive contamination and none was identified."
- "No readings above background were identified in or around the former reactor room."

The NRC goes on to conclude,

- "The former Reactor Room was toured and was found to be free of radioactive materials which indicated that the area had been successfully

remediated by either Atomics International or Rockwell International in the past."

- "No further action is planned by the Region for this license file

Conclusions

Nuclear operations at the Vanowen facility were licensed and inspected by the Atomic Energy Commission.

The Atomic Energy Commission terminated the licenses for Vanowen operations when operations ceased in 1960.

Facility surveys by Atomics International and the Nuclear Regulatory Commission have confirmed that no residual radioactivity remains in the Vanowen building.

Environmental surveys of soil and vegetation have confirmed that no environmental radioactive contamination occurred due to Vanowen operations.

Groundwater monitoring by an independent company has confirmed that groundwater has not been radioactively contaminated due to Vanowen operations.

The Nuclear Regulatory Commission has confirmed that the reactor operating licenses for L-44 and L-77 were appropriately terminated by the Atomic Energy Commission, and that no further action is required.

References

Letter from H. L. Price (AEC) to C. Starr (AI), "License R-19 for Reactor L-47", August 5, 1957.

2. Letter from H. L. Price (AEC) to C. Starr (AI), "License R-40 for Reactor L-77", May 17, 1958.

3. Map of the Vanowen Building in relation to the immediate neighborhood of Canoga Park, and map showing the location of the L-77 reactor in the southeast corner of the building.

4. USAEC Regulatory Guide 1.86, "Termination of Operating Licenses for Nuclear Reactors." June 1974.

5. Letter from E. R. Price (AEC) to T. F. Humphrey (AI), "Notice of Termination of Reactor License R-19." June 30, 1958.

6. Letter from H. L. Price (AEC) to T. F. Humphrey (AI), "Notice of Amendment of Reactor License R-40." June 28, 1960.

7. Environmental radioactivity in soil and vegetation at the surrounding the Vanowen Facility from 1955 to 1960.

8. "Summary of Results of Sampling and Analysis for Radioactivity in Groundwater – Rocketdyne, Canoga Avenue facility, Canoga Park, California." Groundwater Resources Consultants. March 27, 1990.

9. Memorandum from R. A. Scarano (NRC) to M. F. Weber (NRC), "Rockwell International Site Visit (Operation of the 5-watt Model L-47 Research Reactor)." January 29, 1996.

Reference 1

Attachment 1

UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON 25, D. C.

IN REPLY REFER TO:

CAL:CTK
Docket No. 50-50

Atomics International
A Division of North American Aviation, Inc.
P. O. Box 309
Canoga Park, California

Attention: Dr. C. Starr
Vice President

Gentlemen:

Attached is License R-19 authorizing operation of the L-47 reactor at Canoga Park, California.

Sincerely yours,

H. L. Price
Director
Division of Civilian Application

Enclosure:
License R-19

AIR MAIL

AT DIST: C. Adams, T. Humphrey w/encl, G. Ladd, R. Loftness, A. Martin, W. Parkins, R. Schaert, C. Starr, B. Kramer w/encl.

Recd: 8-7-57 AT

Dist: 8-8-57 rr/md

3340 AT

UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON 25, D. C.

Docket No. 50-50

License No. R-19

L I C E N S E

1. Pursuant to the Atomic Energy Act of 1954 (hereinafter "the Act"), and having considered the record in this matter, the Atomic Energy Commission (hereinafter "the Commission") has found:

   a. That the utilization facility authorized for construction by Construction Permit No. CPRR-14, dated July 2, 1957, and issued to North American Aviation, Inc., has been constructed and will operate in conformity with the application as amended and in conformity with the Act and the rules and regulations of the Commission;

   b. There is reasonable assurance that the facility can be operated without endangering the health and safety of the public;

   c. North American Aviation, Inc. is technically and financially qualified to operate the facility.

2. Subject to the conditions and requirements incorporated herein, the Commission hereby licenses North American Aviation, Inc.:

   a. Pursuant to Section 104(c) of the Atomic Energy Act of 1954, and Title 10, C.F.R., Chapter 1, Part 50, "Licensing of Production and Utilization Facilities," to possess and operate as a utilization facility the nuclear reactor designated below;

   b. Pursuant to the Act and Title 10, C.F.R., Chapter 1, Part 70, "Special Nuclear Material," to receive, possess and use 1200 grams of contained uranium-235 in the form of uranyl sulfate as fuel for operation of the facility;

   c. Pursuant to the Act and Title 10, C.F.R., Chapter 1, Part 30, "Licensing of Byproduct Material," to possess, but not to separate such byproduct material as may be produced in the operation of the facility.

3. This license applies to the facility which is owned by North American Aviation, Inc. and located in Canoga Park, California, and described in North American Aviation's application filed on January 24, 1957, and amendments to the application filed on April 8, 1957, June 20, 1957, and July 29, 1957 (hereinafter "the application").

4. This license shall be deemed to contain and be subject to the conditions specified in Section 50.54 of Part 50 and Section 70.32 of Part 70; is subject to all applicable provisions of the Act and rules, regulations and orders of the Commission now or hereafter in effect; and is subject to any additional conditions specified or incorporated below.

5. The conditions and requirements contained in Appendix "A", attached hereto, are a part of this license.

6. This license is effective as of the date of issuance and shall expire at midnight August 2, 1977, unless sooner terminated.

FOR THE ATOMIC ENERGY COMMISSION

H. L. Price
Director
Division of Civilian Application

Attachment:
Appendix "A"

Date of Issuance: AUG [illegible] 1957

APPENDIX "A"

I. Operating Restrictions

Unless further authorized by the Commission:

a. North American Aviation, Inc. shall operate the facility in accordance with the procedures described in the application.

b. North American Aviation, Inc. shall not operate the facility at thermal power levels in excess of five (5) watts.

II. Records

In addition to those otherwise required under this license and applicable regulations, North American Aviation, Inc. shall keep the following records:

a. Facility operating records, including power levels.

b. Records showing radioactivity released or discharged into the air or water beyond the effective control of North American Aviation, Inc. as measured at the point of such release or discharge.

c. Records of emergency scrams, including reasons for emergency shutdowns.

III. Reports

North American Aviation, Inc. shall immediately report to the Commission any indication or occurrence of a possible unsafe condition relating to the operation of the reactor.

Reference 2

Attachment 2

UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON 25, D. C.

May 17, 1958

Docket 50-94

Atomics International
A Division of North American
Aviation, Inc.
P. O. Box 309
Canoga Park, California

Attention: Dr. C. Starr
Vice President

Gentlemen:

Attached is Facility License No. R-40 authorizing North American Aviation, Inc., to possess and operate at Canoga Park, the research reactor designated as the "L-77" reactor.

Sincerely yours,

H. L. Price
Director
Division of Licensing and Regulation

Attachment:
Facility License No. R-40

AIR MAIL

C. Starr, J. Henrie, R. Kramer
T. Humphrey, A. Martin, S. Siegel, C.
Dist: 5-20-58 rr/gg

AT DIST: C. Adams w/encl.
Recd: 5-20-58 AT

UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON 25, D. C.

DOCKET NO. 50-94
NORTH AMERICAN AVIATION, INCORPORATED

L I C E N S E

License No. R-40

1. The Atomic Energy Commission (hereinafter "the Commission") finds that:

   a. The solution-type 10 watt nuclear research reactor authorized for construction by Construction Permit CPRR-26 issued to North American Aviation, Inc., has been constructed in accordance with the specifications contained in the application;

   b. There is reasonable assurance that the reactor can be operated without endangering the health and safety of the public;

   c. North American Aviation, Inc., is technically and financially qualified to operate the reactor;

   d. Issuance of a license to possess and operate the reactor will not be inimical to the common defense and security or to the health and safety of the public;

   e. North American Aviation, Inc., has submitted proof of financial protection which satisfies the requirements of Commission regulations which are currently in effect.

2. Subject to the conditions and requirements incorporated herein, the Commission hereby licenses North American Aviation, Inc.:

   a. Pursuant to Section 104c of the Act and Title 10, CFR, Chapter 1, Part 50, "Licensing of Production and Utilization Facilities" to possess and operate as a utilization facility the nuclear research reactor designated below;

   b. Pursuant to the Act and Title 10, CFR, Chapter 1, Part 70, "Special Nuclear Material", to possess and use 1.5 kilograms of contained uranium-235 as fuel for operation of the reactor;

c. Pursuant to the Act and Title 10, CFR, Chapter 1, Part 30, "Licensing of Byproduct Material" to possess but not to separate, such byproduct material as may be produced in the operation of the reactor.

3. This license applies to the reactor which is owned by North American Aviation, Inc., and located at Canoga Park, California, and described in North American Aviation, Inc.'s application dated January 17, 1958, and amendments thereto dated March 26, 1958 and April 15, 1958, (all herein "the application"). The reactor is of the solution-type, is moderated by light water and uses as fuel a solution of uranyl sulfate containing uranium enriched to 20% or more in the isotope uranium-235. It is designed to operate at a thermal power level of ten (10) watts and is designated by North American Aviation, Inc., as the "L-77" reactor.

4. This license shall be deemed to contain and be subject to the conditions specified in Section 50.54 of Part 50; is subject to all applicable provisions of the Act and rules, regulations and orders of the Commission now or hereafter in effect; and is subject to the additional conditions specified or incorporated below:

a. Operating Restrictions

(1) North American Aviation, Inc., shall operate the facility in accordance with the application.

(2) North American Aviation, Inc., shall not operate the reactor at a power level in excess of 10 watts (thermal).

Materials having a reactivity value in excess of 0.5% may not be inserted into the exposure tubes.

b. Records

In addition to those otherwise required under this license and applicable regulations, North American Aviation, Inc. shall keep the following records:

Reactor operating records, including power levels.

Records showing radioactivity released or discharged into the air or water beyond the effective control of North American Aviation, Inc., as measured at the point of such release or discharge.

Records of emergency scrams, including reasons for emergency shutdowns.

c. Pursuant to the Act and Title 10, CFR, Chapter 1, Part 30, "Licensing of Byproduct Material" to possess but not to separate, such byproduct material as may be produced in the operation of the reactor.

3. This license applies to the reactor which is owned by North American Aviation, Inc., and located at Canoga Park, California, and described in North American Aviation, Inc.'s application dated January 17, 1958, and amendments thereto dated March 26, 1958 and April 15, 1958, (all herein "the application"). The reactor is of the solution-type, is moderated by light water and uses as fuel a solution of uranyl sulfate containing uranium enriched to 20% or more in the isotope uranium-235. It is designed to operate at a thermal power level of ten (10) watts and is designated by North American Aviation, Inc., as the "L-77" reactor.

4. This license shall be deemed to contain and be subject to the conditions specified in Section 50.54 of Part 50; is subject to all applicable provisions of the Act and rules, regulations and orders of the Commission now or hereafter in effect; and is subject to the additional conditions specified or incorporated below:

a. Operating Restrictions

(1) North American Aviation, Inc., shall operate the facility in accordance with the application.

North American Aviation, Inc., shall not operate the reactor at a power level in excess of 10 watts (thermal).

Materials having a reactivity value in excess of 0.5% may not be inserted into the exposure tubes.

b. Records

In addition to those otherwise required under this license and applicable regulations, North American Aviation, Inc. shall keep the following records:

Reactor operating records, including power levels.

Records showing radioactivity released or discharged into the air or water beyond the effective control of North American Aviation, Inc., as measured at the point of such release or discharge.

Records of emergency scrams, including reasons for emergency shutdowns.

c. Reports

North American Aviation, Inc., shall immediately report to the Commission any indication or occurrence of a possible unsafe condition relating to the operation of the reactor.

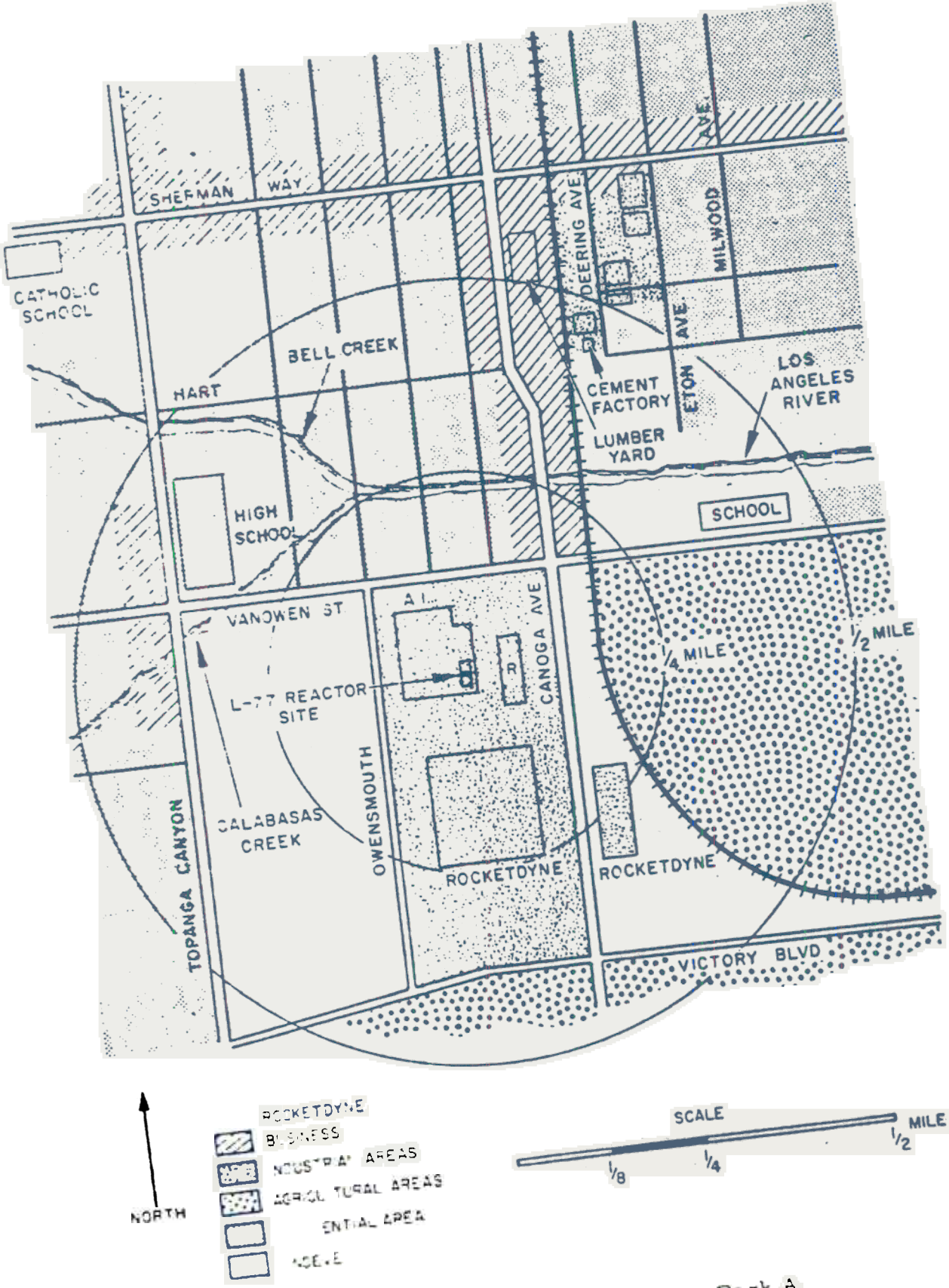
5. This license is effective as of the date of issuance and shall expire at midnight May 16, 1978.

FOR THE ATOMIC ENERGY COMMISSION

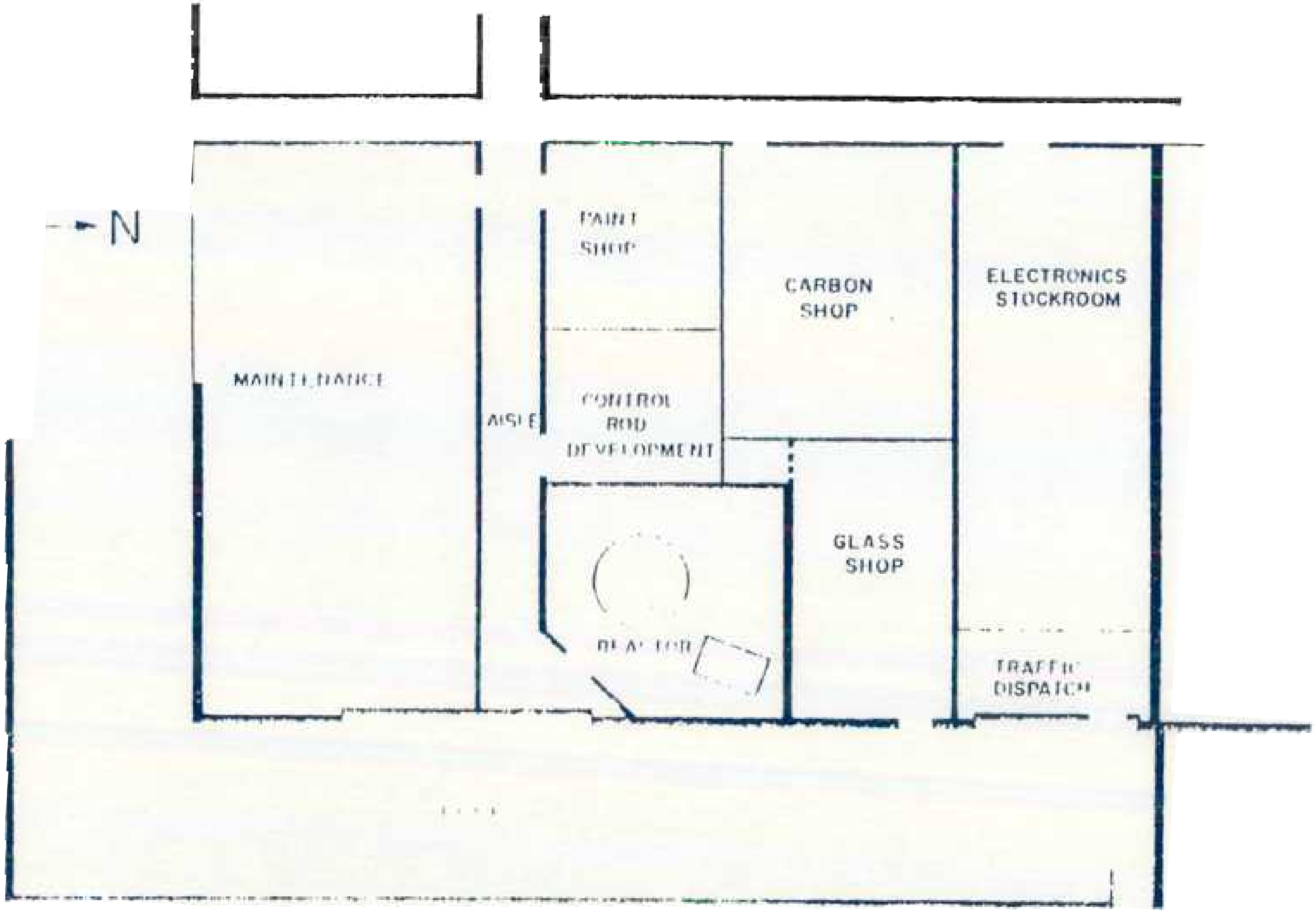
H. L. Price
Director
Division of Licensing and Regulation

Date of Issuance: May 17, 1958

Reference 3



Real ocation Canoga Park A



[illegible] Vanowen Facility

Reference 4

U.S. ATOMIC ENERGY COMMISSION

REGULATORY GUIDE

DIRECTORATE OF REGULATORY STANDARDS

June 1974

REGULATORY GUIDE 1.86

TERMINATION OF OPERATING LICENSES FOR NUCLEAR REACTORS

A. INTRODUCTION

Section 50.51, "Duration of license, renewal," of 10 CFR Part 50, "Licensing of Production and Utilization Facilities," requires that each license to operate a production and utilization facility be issued for a specified duration. Upon expiration of the specified period, the license may be either renewed or terminated by the Commission. Section 50.82, "Applications for termination of licenses," specifies the requirements that must be satisfied to terminate an operating license, including the requirement that the dismantlement of the facility and disposal of the component parts not be inimical to the common defense and security or to the health and safety of the public. This guide describes methods and procedures considered acceptable by the Regulatory staff for the termination of operating licenses for nuclear reactors. The Advisory Committee on Reactor Safeguards has been consulted concerning this guide and has concurred in the regulatory position.

B. DISCUSSION

When a licensee decides to terminate his nuclear reactor operating license, he may, as a first step in the process, request that his operating license be amended to restrict him to possess but not operate the facility. The advantage to the licensee of converting to such a possession-only license is reduced surveillance requirements in that periodic surveillance of equipment important to the safety of reactor operation is no longer required. Once this possession-only license is issued, reactor operation is not permitted. Other activities related to cessation of operations such as unloading fuel from the reactor and placing it in storage (either onsite of offsite) may be continued.

A licensee having a possession-only license must retain, with the Part 50 license, authorization for special nuclear material (10 CFR Part 70, "Special Nuclear Material"), byproduct material (10 CFR Part 30, "Rules of General Applicability to Licensing of Byproduct Material"), and source material (10 CFR Part 40, "Licensing of Source Material"), until the fuel, radioactive components, and sources are removed from the facility. Appropriate administrative controls and facility requirements are imposed by the Part 50 license and the technical specifications to assure that proper surveillance is performed and that the reactor facility is maintained in a safe condition and not operated.

A possession-only license permits various options and procedures for decommissioning, such as mothballing, entombment, or dismantling. The requirements imposed depend on the option selected.

Section 50.82 provides that the licensee may dismantle and dispose of the component parts of a nuclear reactor in accordance with existing regulations. For research reactors and critical facilities, this has usually meant the disassembly of a reactor and its shipment offsite, sometimes to another appropriately licensed organization for further use. The site from which a reactor has been removed must be decontaminated, as necessary, and inspected by the Commission to determine whether unrestricted access can be approved. In the case of nuclear power reactors, dismantling has usually been accomplished by shipping fuel offsite, making the reactor inoperable, and disposing of some of the radioactive components.

Radioactive components may be either shipped offsite for burial at an authorized burial ground or secured

on the site. Those radioactive materials remaining on the site must be isolated from the public by physical barriers or other means to prevent public access to hazardous levels of radiation. Surveillance is necessary to assure the long term integrity of the barriers. The amount of surveillance required depends upon (1) the potential hazard to the health and safety of the public from radioactive material remaining on the site and (2) the integrity of the physical barriers. Before areas may be released for unrestricted use, they must have been decontaminated or the radioactivity must have decayed to less than prescribed limits (Table I).

The hazard associated with the retired facility is evaluated by considering the amount and type of remaining contamination, the degree of confinement of the remaining radioactive materials, the physical security provided by the confinement, the susceptibility to release of radiation as a result of natural phenomena, and the duration of required surveillance.

C. REGULATORY POSITION

1. APPLICATION FOR A LICENSE TO POSSESS BUT NOT OPERATE (POSSESSION-ONLY LICENSE)

A request to amend an operating license to a possession-only license should be made to the Director of Licensing, U.S. Atomic Energy Commission, Washington, D.C. 20545. The request should include the following information:

a. A description of the current status of the facility.

b. A description of measures that will be taken to prevent criticality or reactivity changes and to minimize releases of radioactivity from the facility.

c. Any proposed changes to the technical specifications that reflect the possession-only facility status and the necessary disassembly/retirement activities to be performed.

d. A safety analysis of both the activities to be accomplished and the proposed changes to the technical specifications.

e. An inventory of activated materials and their location in the facility.

2. ALTERNATIVES FOR REACTOR RETIREMENT

Four alternatives for retirement of nuclear reactor facilities are considered acceptable by the Regulatory staff. These are:

a. **Mothballing.** Mothballing of a nuclear reactor facility consists of putting the facility in a state of protective storage. In general, the facility may be left intact except that all fuel assemblies and the radioactive fluids and waste should be removed from the site. Adequate radiation monitoring, environmental surveillance, and appropriate security procedures should be established under a possession-only license to ensure that the health and safety of the public is not endangered.

b. **In-Place Entombment.** In-place entombment consists of sealing all the remaining highly radioactive or contaminated components (e.g., the pressure vessel and reactor internals) within a structure integral with the biological shield after having all fuel assemblies, radioactive fluids and wastes, and certain selected components shipped offsite. The structure should provide integrity over the period of time in which significant quantities (greater than Table I levels) of radioactivity remain with the material in the entombment. An appropriate and continuing surveillance program should be established under a possession-only license.

c. **Removal of Radioactive Components and Dismantling.** All fuel assemblies, radioactive fluids and waste, and other materials having activities above accepted unrestricted activity levels (Table I) should be removed from the site. The facility owner may then have unrestricted use of the site with no requirement for a license. If the facility owner so desires, the remainder of the reactor facility may be dismantled and all vestiges removed and disposed of.

d. **Conversion to a New Nuclear System or a Fossil Fuel System.** This alternative, which applies only to nuclear power plants, utilizes the existing turbine system with a new steam supply system. The original nuclear steam supply system should be separated from the electric generating system and disposed of in accordance with one of the previous three retirement alternatives.

3. SURVEILLANCE AND SECURITY FOR THE RETIREMENT ALTERNATIVES WHOSE FINAL STATUS REQUIRES A POSSESSION-ONLY LICENSE

A facility which has been licensed under a possession-only license may contain a significant amount of radioactivity in the form of activated and contaminated hardware and structural materials. Surveillance and commensurate security should be provided to assure that the public health and safety are not endangered.

a. Physical security to prevent inadvertent exposure of personnel should be provided by multiple locked barriers. The presence of these barriers should make it extremely difficult for an unauthorized person to gain access to areas where radiation or contamination levels exceed those specified in Regulatory Position C.4. To prevent inadvertent exposure, radiation areas above 5 mR/hr, such as near the activated primary system of a power plant, should be appropriately marked and should not be accessible except by cutting of welded closures or the disassembly and removal of substantial structures

and/or shielding material. Means such as a remote-readout intrusion alarm system should be provided to indicate to designated personnel when a physical barrier is penetrated. Security personnel that provide access control to the facility may be used instead of the physical barriers and the intrusion alarm systems.

b. The physical barriers to unauthorized entrance into the facility, e.g., fences, buildings, welded doors, and access openings, should be inspected at least quarterly to assure that these barriers have not deteriorated and that locks and locking apparatus are intact.

c. A facility radiation survey should be performed at least quarterly to verify that no radioactive material is escaping or being transported through the containment barriers in the facility. Sampling should be done along the most probable path by which radioactive material such as that stored in the inner containment regions could be transported to the outer regions of the facility and ultimately to the environs.

d. An environmental radiation survey should be performed at least semiannually to verify that no signficant amounts of radiation have been released to the environment from the facility. Samples such as soil, vegetation, and water should be taken at locations for which statistical data has been established during reactor operations.

e. A site representative should be designated to be responsible for controlling authorized access into and movement within the facility.

f. Administrative procedures should be established for the notification and reporting of abnormal occurrences such as (1) the entrance of an unauthorized person or persons into the facility and (2) a significant change in the radiation or contamination levels in the facility or the offsite environment.

g. The following reports should be made:

(1) An annual report to the Director of Licensing, U.S. Atomic Energy Commission, Washington, D.C. 20545, describing the results of the environmental and facility radiation surveys, the status of the facility, and an evaluation of the performance of security and surveillance measures.

(2) An abnormal occurrence report to the Regulatory Operations Regional Office by telephone within 24 hours of discovery of an abnormal occurrence. The abnormal occurrence will also be reported in the annual report described in the preceding item.

h. Records or logs relative to the following items should be kept and retained until the license is terminated, after which they may be stored with other plant records:

(1) Environmental surveys;

(2) Facility radiation surveys,

(3) Inspections of the physical barriers, and

(4) Abnormal occurrences.

4. DECONTAMINATION FOR RELEASE FOR UNRESTRICTED USE

If it is desired to terminate a license and to eliminate any further surveillance requirements, the facility should be sufficiently decontaminated to prevent risk to the public health and safety. After the decontamination is satisfactorily accomplished and the site inspected by the Commission, the Commission may authorize the license to be terminated and the facility abandoned or released for unrestricted use. The licensee should perform the decontamination using the following guidelines:

a. The licensee should make a reasonable effort to eliminate residual contamination.

b. No covering should be applied to radioactive surfaces of equipment or structures by paint, plating, or other covering material until it is known that contamination levels (determined by a survey and documented) are below the limits specified in Table I. In addition, a reasonable effort should be made (and documented) to further minimize contamination prior to any such covering.

c. The radioactivity of the interior surfaces of pipes, drain lines, or ductwork should be determined by making measurements at all traps and other appropriate access points, provided contamination at these locations is likely to be representative of contamination on the interior of the pipes, drain lines, or ductwork. Surfaces of premises, equipment, or scrap which are likely to be contaminated but are of such size, construction, or location as to make the surface inaccessible for purposes of measurement should be assumed to be contaminated in excess of the permissable radiation limits.

d. Upon request, the Commission may authorize a licensee to relinquish possession or control of premises, equipment, or scrap having surfaces contaminated in excess of the limits specified. This may include, but is not limited to, special circumstances such as the transfer of premises to another licensed organization that will continue to work with radioactive materials. Requests for such authorization should provide:

(1) Detailed, specific information describing the premises, equipment, scrap, and radioactive contaminants and the nature, extent, and degree of residual surface contamination.

(2) A detailed health and safety analysis indicating that the residual amounts of materials on surface areas, together with other considerations such as the prospective use of the premises, equipment, or scrap, are unlikely to result in an unreasonable risk to the health and safety of the public.

e. Prior to release of the premises for unrestricted use, the licensee should make a comprehensive radiation survey establishing that contamination is within the limits specified in Table I. A survey report should be filed with the Director of Licensing, U.S. Atomic Energy Commission, Washington, D.C. 20545, with a copy to the Director of the Regulatory Operations Regional Office having jurisdiction. The report should be filed at least 30 days prior to the planned date of abandonment. The survey report should:

(1) Identify the premises;

(2) Show that reasonable effort has been made to reduce residual contamination to as low as practicable levels;

(3) Describe the scope of the survey and the general procedures followed; and

(4) State the finding of the survey in units specified in Table 1.

After review of the report, the Commission may inspect the facilities to confirm the survey prior to granting approval for abandonment.

5. REACTOR RETIREMENT PROCEDURES

As indicated in Regulatory Position C.2, several alternatives are acceptable for reactor facility retirement. If minor disassembly or "mothballing" is planned, this could be done by the existing operating and maintenance procedures under the license in effect. Any planned actions involving an unreviewed safety question or a change in the technical specifications should be reviewed and approved in accordance with the requirements of 10 CFR §50.59.

If major structural changes to radioactive components of the facility are planned, such as removal of the pressure vessel or major components of the primary system, a dismantlement plan including the information required by §50.82 should be submitted to the Commission. A dismantlement plan should be submitted for all the alternatives of Regulatory Position C.2 except mothballing. However, minor disassembly activities may still be performed in the absence of such a plan, provided they are permitted by existing operating and maintenance procedures. A dismantlement plan should include the following:

a. A description of the ultimate status of the facility

b. A description of the dismantling activities and the precautions to be taken.

c. A safety analysis of the dismantling activities including any effluents which may be released.

d. A safety analysis of the facility in its ultimate status.

Upon satisfactory review and approval of the dismantling plan, a dismantling order is issued by the Commission in accordance with §50.82. When dismantling is completed and the Commission has been notified by letter, the appropriate Regulatory Operations Regional Office inspects the facility and verifies completion in accordance with the dismantlement plan. If residual radiation levels do not exceed the values in Table I, the Commission may terminate the license. If these levels are exceeded, the licensee retains the possession-only license under which the dismantling activities have been conducted or, as an alternative, may make application to the State (if an Agreement State) for a byproduct materials license.

TABLE I

ACCEPTABLE SURFACE CONTAMINATION LEVELS

NUCLIDE[a]	AVERAGE[b c]	MAXIMUM[b d]	REMOVABLE[b e]
U-nat, U-235, U-238, and associated decay products	5,000 dpm α/100 cm^2	15,000 dpm α/100 cm^2	1,000 dpm α/100 cm^2
Transuranics, Ra-226, Ra-228, Th-230, Th-228, Pa-231, Ac-227, I-125, I-129	100 dpm/100 cm^2	300 dpm/100 cm^2	20 dpm/100 cm^2
Th-nat, Th-232, Sr-90, Ra-223, Ra-224, U-232, I-126, I-131, I-133	1000 dpm/100 cm^2	3000 dpm/100 cm^2	200 dpm/100 cm^2
Beta-gamma emitters (nuclides with decay modes other than alpha emission or spontaneous fission) except Sr-90 and others noted above.	5000 dpm β-γ/100 cm^2	15,000 dpm β-γ/100 cm^2	1000 dpm β-γ/100 cm^2

[a]Where surface contamination by both alpha- and beta-gamma-emitting nuclides exists, the limits established for alpha- and beta-gamma-emitting nuclides should apply independently.

[b]As used in this table, dpm (disintegrations per minute) means the rate of emission by radioactive material as determined by correcting the counts per minute observed by an appropriate detector for background, efficiency, and geometric factors associated with the instrumentation.

[c]Measurements of average contaminant should not be averaged over more than 1 square meter. For objects of less surface area, the average should be derived for each such object.

[d]The maximum contamination level applies to an area of not more than 100 cm^2.

[e]The amount of removable radioactive material per 100 cm^2 of surface area should be determined by wiping that area with dry filter or soft absorbent paper, applying moderate pressure, and assessing the amount of radioactive material on the wipe with an appropriate instrument of known efficiency. When removable contamination on objects of less surface area is determined, the pertinent levels should be reduced proportionally and the entire surface should be wiped.

Reference 5

JUL

UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON 25, D. C.

IN REPLY REFER TO:

FACILITY LICENSES

JUL 3 1958

CORRESPONDENCE

Attachment 5

LRL:CEE
Docket No. 50-50

North American Aviation, Inc.
Atomics International Division
Canoga Park, California

Attention: Mr. T. F. Humphrey
Director, Contract Administration

Gentlemen:

North American Aviation, Inc. having by letter dated May 26, 1958, requested the termination of its Facility License No. R-19, the Atomic Energy Commission hereby terminates said license. This action is taken without prejudice to the filing of a new application for license to construct and operate the facility at a later date.

Attached is a copy of a notice of this action which is being filed with the Federal Register Division for publication.

Sincerely yours,

E. H. Price
Director
Division of Licensing and Regulation

Enclosure:
Notice to Federal Register

AIR MAIL

Recd: 7-3-58 AT Dist: 7-3-58 rr/BB

AT DISP: C. Adams w/encl. T. Humphrey

2974 AT

UNITED STATES ATOMIC ENERGY COMMISSION

DOCKET NO. 50-50

NOTICE OF TERMINATION OF UTILIZATION FACILITY LICENSE

ISSUED TO NORTH AMERICAN AVIATION, INC.

L-47 License Termination

Please take notice that, North American Aviation having requested the termination of its Facility License No. R-19, the Atomic Energy Commission has, this date, terminated said license, which was issued to North American Aviation, Inc. on August 15, 1957.

North American Aviation, Inc. has informed the Commission that it has dismantled the five (5) watt research reactor which it had operated at Canoga Park, California as authorized under License No. R-19.

This action is taken by the Commission without prejudice to the filing of a new application for license to construct and operate the facility at a later date.

50-45 on

D. C.

FOR THE ATOMIC ENERGY COMMISSION

E. R. Price

E. R. Price
Acting Director
Division of Licensing and Regulation

Dated at Germantown, Maryland
this 30th day of June, 1958.

Reference 6

Attachment 6

C

2 copies Kramer Remley

UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON 25, D.C.

File

JUN 28 1960

– copies to those concerned?
– In any event, make sure operating limitations are called to attention of those concerned.

Atomics International
A Division of North American
Aviation, Inc.
P. O. Box 309
Canoga Park, California

Attention: Mr. T. F. Humphrey, Director
Contract Administration

Gentlemen:

Transmitted herewith is Amendment No. 1 to your Facility License No. R-40. The amendment authorizes North American Aviation, Inc. to possess and operate the 10 watt (thermal) nuclear research reactor designated as the "L-77" at a new location at the Company's DeSoto facility in Canoga Park, California, as requested in its applications for license amendments dated February 8, 1960 and March 29, 1960.

Also enclosed is a related notice which has been submitted to the Office of the Federal Register for filing and publication.

Sincerely yours,

H. L. Price

Director
Division of Licensing and Regulation

Enclosures:
1. Amendment No. 1 to License No. R-40
2. Notice to Office of the Federal Register

Air Mail

A. DIST: C. Brous, ?.
Dist: 7-1-60 rr/s3

384SFT

UNITED STATES ATOMIC ENERGY COMMISSION

DOCKET NO. 50-94

NORTH AMERICAN AVIATION, INC.

NOTICE OF ISSUANCE OF UTILIZATION FACILITY LICENSE AMENDMENT

Please take notice that the Atomic Energy Commission has issued Amendment No. 1, set forth below, to License No. R-40. The amendment authorizes North American Aviation, Inc. to possess and operate the 10 watt (thermal) nuclear research reactor designated as the "L-77" at a new location at the DeSoto facility of North American Aviation, Inc., in Canoga Park, California as requested in its applications for license amendments dated February 8, 1960 and March 29, 1960. Prior public notice of the proposed issuance of this amendment was published in the Federal Register on June 10, 1960, 25 FR 5192

In accordance with the Commission's "Rules of Practice" (10 CFR 2) the Commission will direct the holding of a formal hearing on the matter of the issuance of the license amendment upon receipt of a request therefor from the licensee or an intervener within thirty days after issuance of the license amendment. Petitions for leave to intervene or requests for formal hearing shall be filed by mailing a copy to the Office of the Secretary, Atomic Energy Commission, Washington 25, D. C., or by delivery of a copy in person to the Office of the Secretary, Germantown, Maryland, or the AEC's Public Document Room, 1717 H Street, Washington, D. C. For further details see (1) the applications for license amendments dated February 8, 1960 and March 29, 1960, submitted by North American Aviation, Inc. and (2) a hazards analysis

of the proposed operation prepared by the Hazards Evaluation Branch of the Division of Licensing and Regulation, both on file at the AEC's Public Document Room. A copy of item (2) above may be obtained at the AEC's Public Document Room or upon request addressed to the Atomic Energy Commission, Washington 25, D. C., Attention: Director, Division of Licensing and Regulation.

FOR THE ATOMIC ENERGY COMMISSION

H. L. Price
Director
Division of Licensing & Regulation

Dated at Germantown, Maryland
this 28th day of June, 1960.

UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON 25, D. C.

NORTH AMERICAN AVIATION, INC.

DOCKET NO. 50-94

AMENDMENT TO UTILIZATION FACILITY LICENSE

License No. R-40
Amendment No. 1

License No. R-40 is revised in its entirety to read as follows:

1. The Atomic Energy Commission (hereinafter "the Commission") finds that:

   A. The solution-type 10 watt nuclear research reactor authorized for construction by Construction Permit CPRR-54 issued to North American Aviation, Inc., has been constructed in accordance with the specifications contained in the application;

   B. There is reasonable assurance that the reactor can be operated without endangering the health and safety of the public;

   C. North American Aviation, Inc., is technically and financially qualified to operate the reactor;

   D. Issuance of a license to possess and operate the reactor will not be inimical to the common defense and security or to the health and safety of the public;

   E. North American Aviation, Inc., has submitted proof of financial protection which satisfies the requirements of Commission regulations which are currently in effect.

2. Subject to the conditions and requirements incorporated herein, the Commission hereby licenses North American Aviation, Inc:

A. Pursuant to Section 104c of the Act and Title 10, CFR, Chapter 1, Part 50, "Licensing of Production and Utilization Facilities" to possess and operate as a utilization facility the nuclear research reactor designated below;

B. Pursuant to the Act and Title 10, CFR, Chapter 1, Part 70, "Special Nuclear Material", to possess and use 1.5 kilograms of contained uranium-235 as fuel for operation of the reactor;

C. Pursuant to the Act and Title 10, CFR, Chapter 1, Part 30, "Licensing of Byproduct Material" to possess but not to separate such byproduct material as may be produced in the operation of the reactor.

3. This license applies to the reactor which is owned by North American Aviation, Inc., and located at Canoga Park, California, and described in North American Aviation, Inc.'s application dated January 20, 1958, and amendments thereto dated March 26, 1958, April 15, 1958, September 25, 1959, February 8, 1960, and March 29, 1960, (herein referred to as "the application"). The reactor is of the solution-type, is moderated by light water and uses as fuel a solution of uranyl sulfate containing uranium enriched to 20% or more in the isotope uranium-235. It is designed to operate at a thermal power level of ten (10) watts and is designated by North American Aviation, Inc., as the "L-77" reactor.

4. This license shall be deemed to contain and be subject to the conditions specified in Section 50.54 of Part 50; is subject to all applicable provisions of the Act and rules, regulations and orders of the Commission now or hereafter in effect; and is subject to the additional conditions specified or incorporated below:

a. Operating Restrictions

(1) North American Aviation, Inc., shall operate the facility in accordance with the application.

(2) North American Aviation, Inc., shall not operate the reactor at a power level in excess of 10 watts (thermal)

(3) Materials having a reactivity value in excess of 0.5% may not be inserted into the exposure tubes.

b. Records

In addition to those otherwise required under this license and applicable regulations, North American Aviation, Inc., shall keep the following records:

(1) Reactor operating records, including power levels.

(2) Records showing radioactivity released or discharged into the air or water beyond the effective control of North American Aviation, Inc., as measured at the point of such release or discharge

(3) Records of emergency scrams, including reasons for emergency shutdowns

c. Reports

North American Aviation, Inc., shall immediately report to the Commission any indication or occurrence of a possible unsafe condition relating to the operation of the reactor.

5. This license is effective as of the date of issuance and shall expire at midnight May 16, 1978.

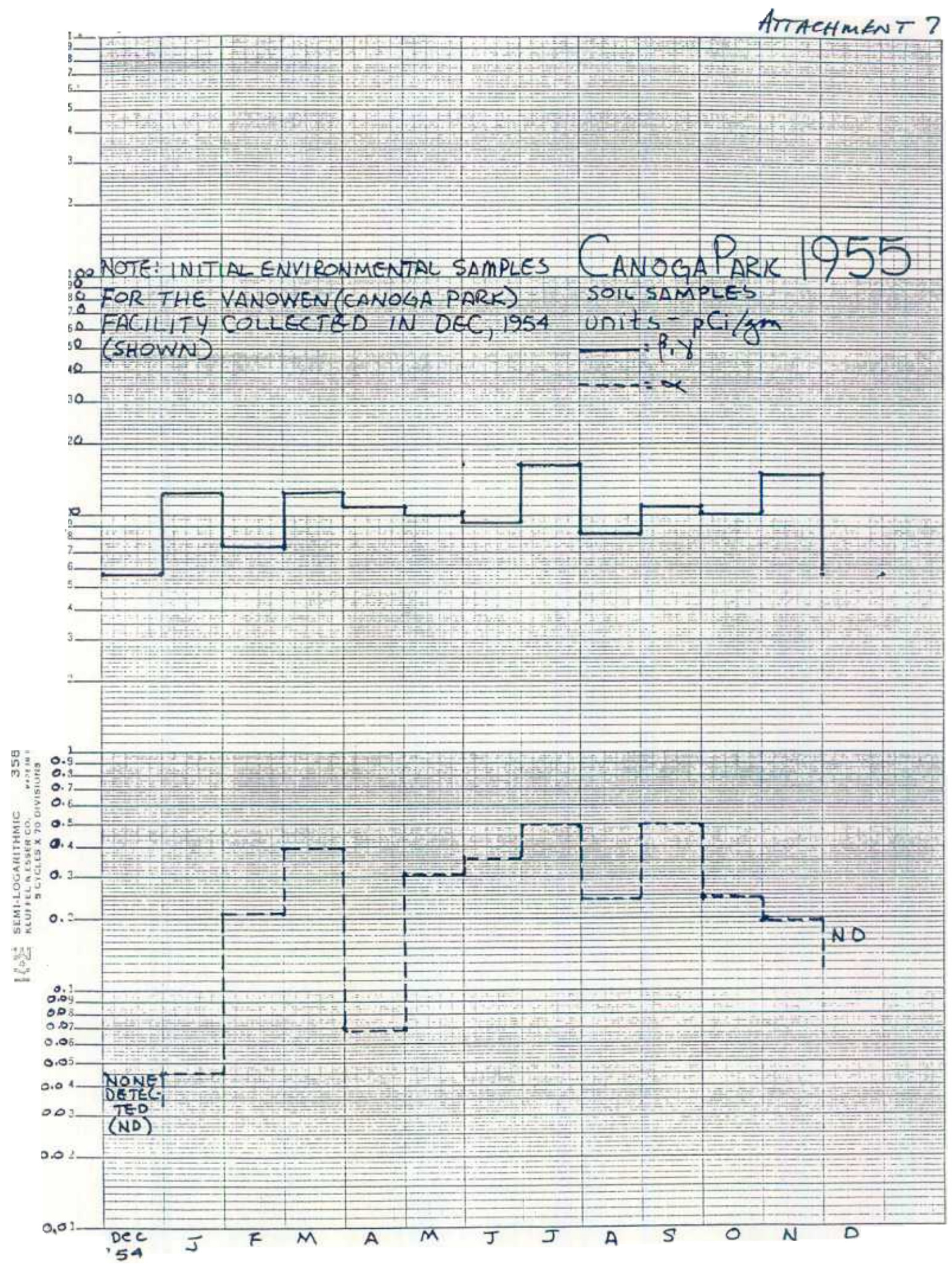
FOR THE ATOMIC ENERGY COMMISSION

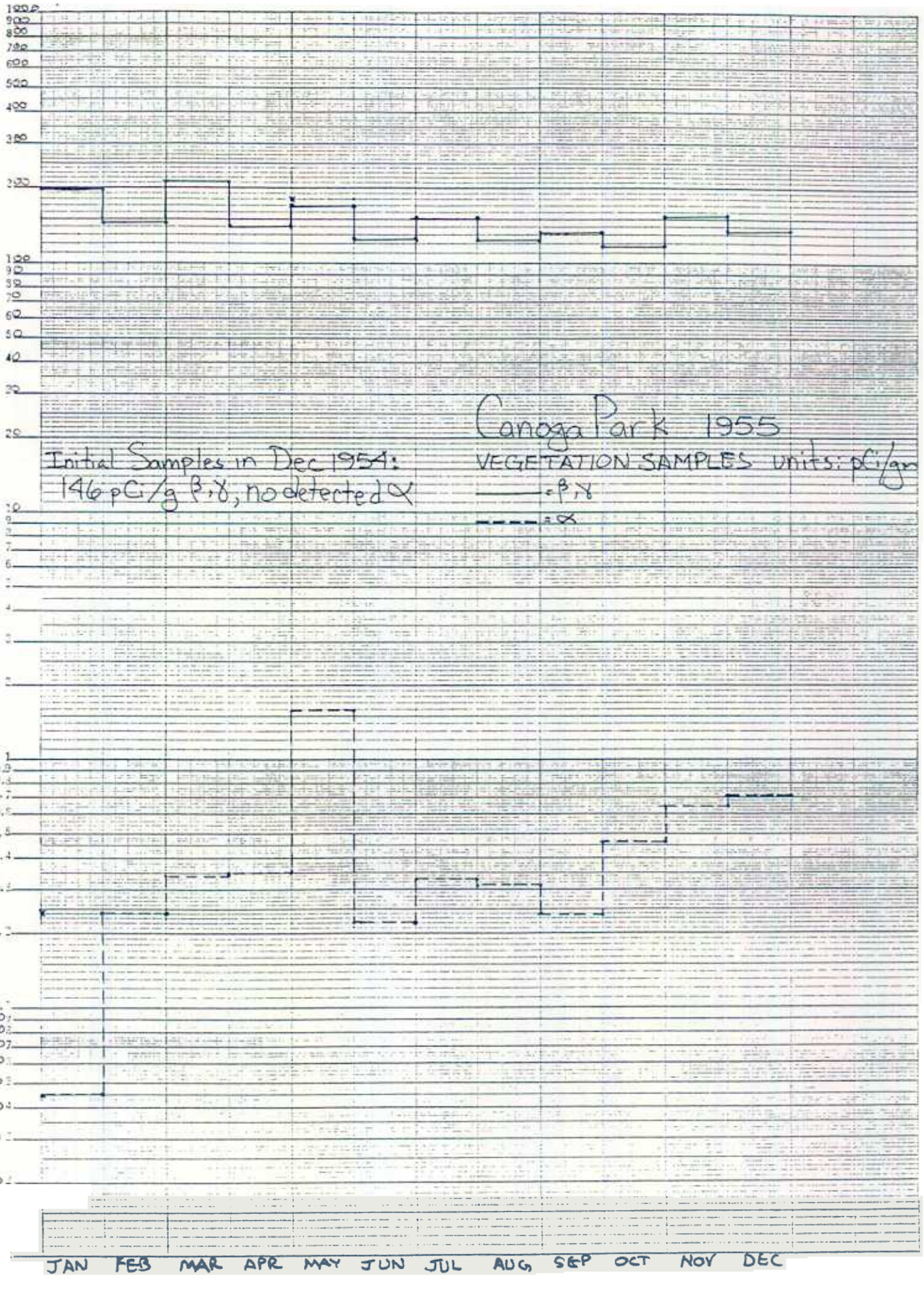
H. L. Price
Director
Division of Licensing & Regulation

Date of Issuance: JUN 28 1960

Reference 7

ATTACHMENT 7




Canoga Park 1955
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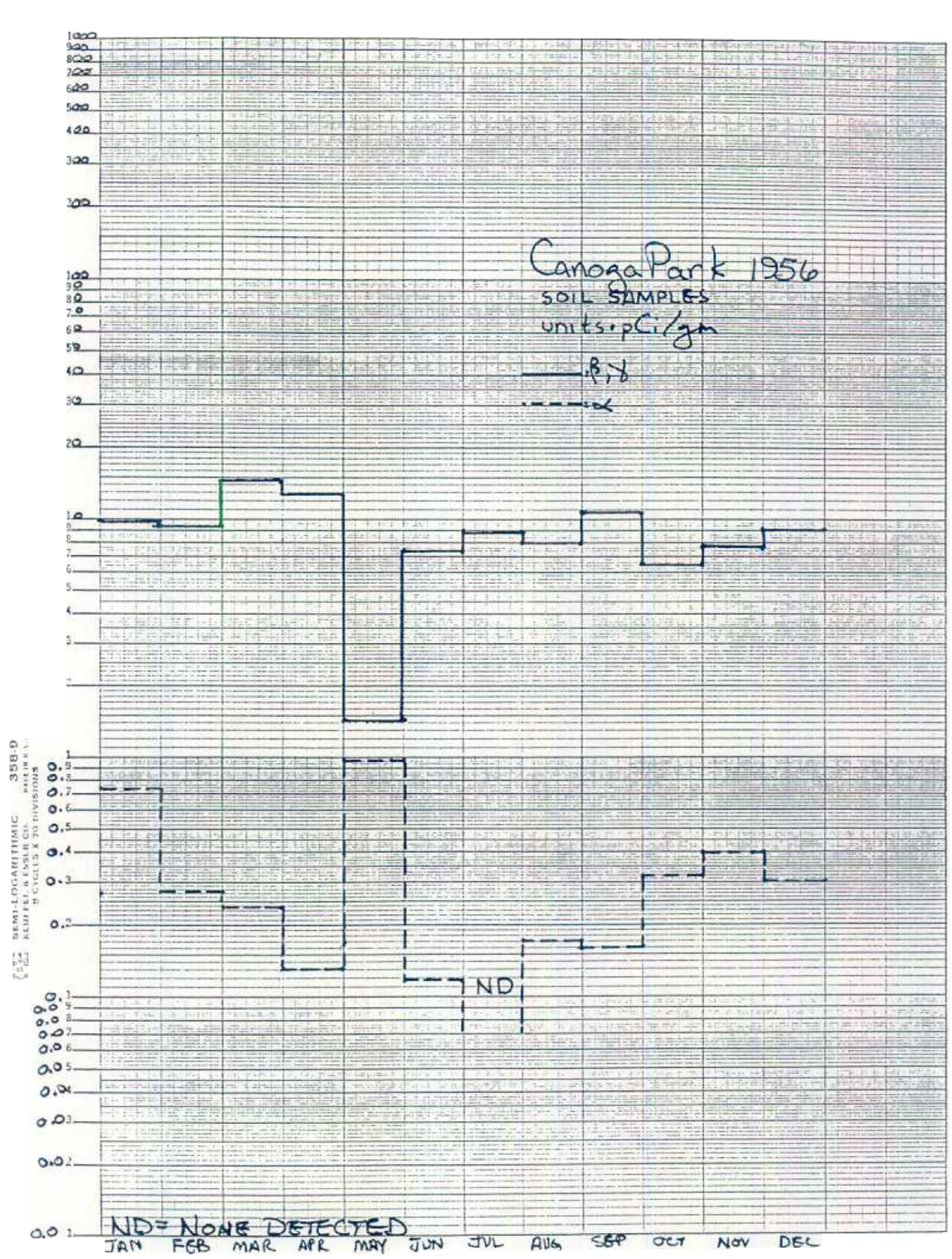
Canoga Park 1956
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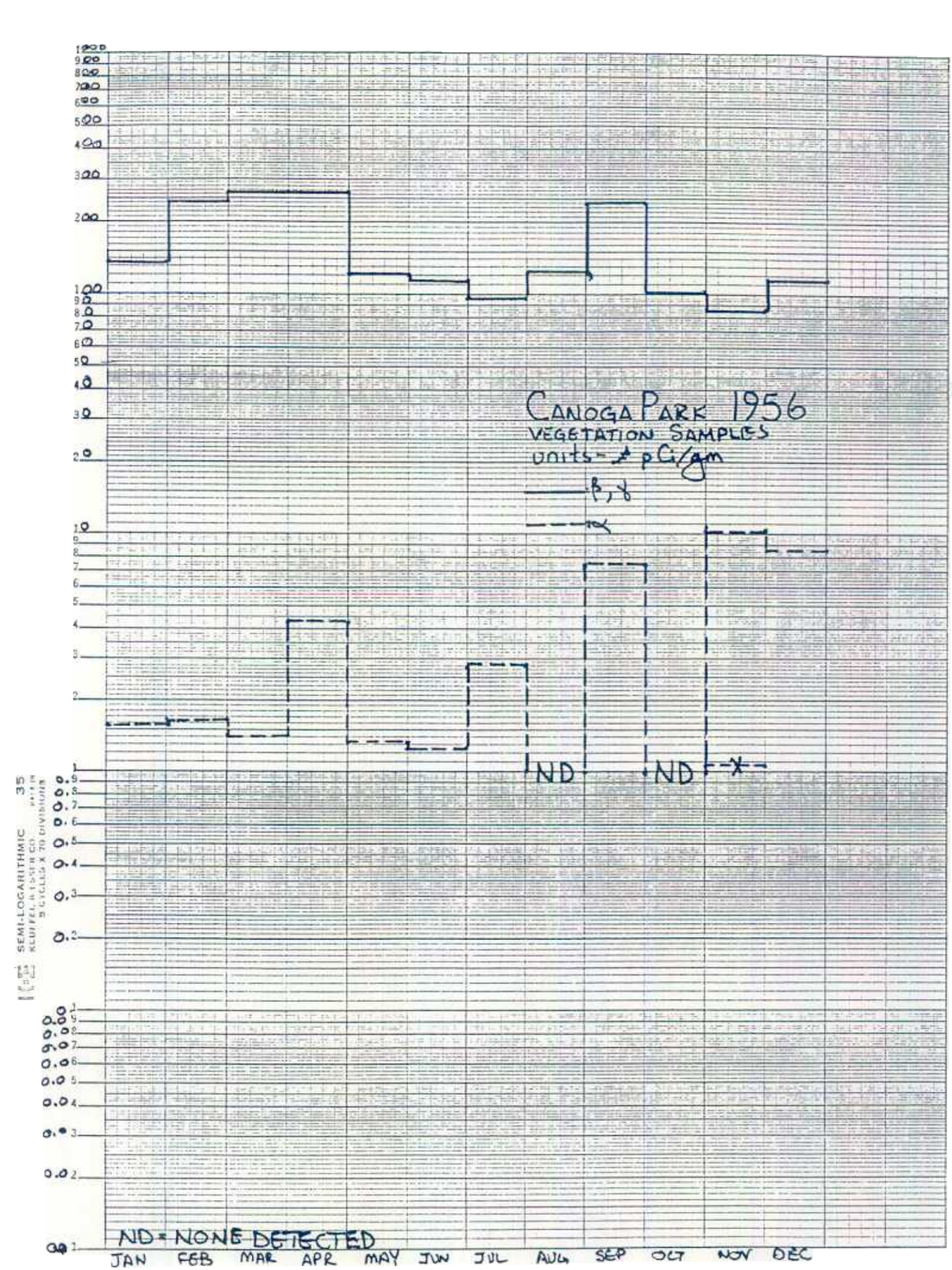
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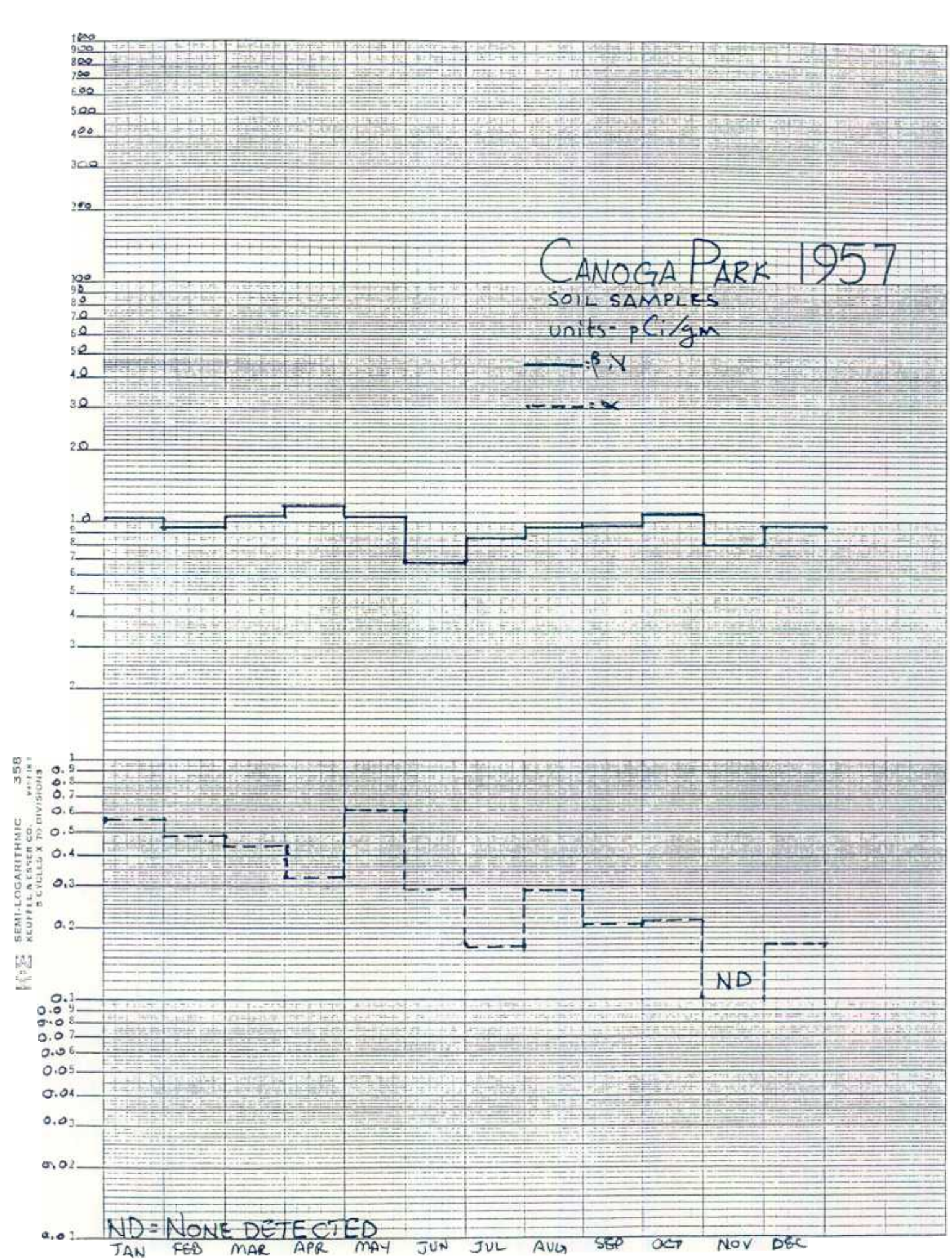
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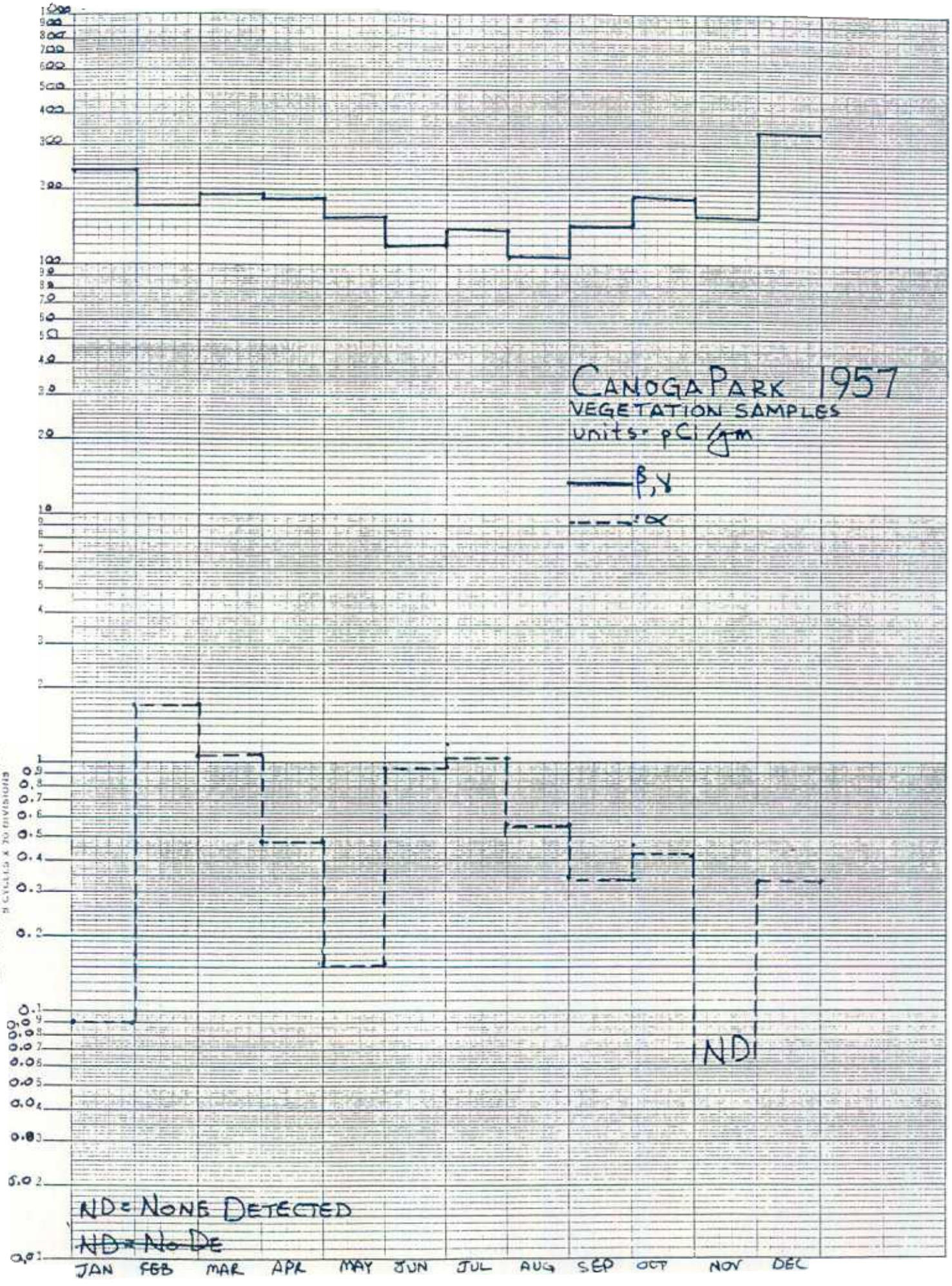

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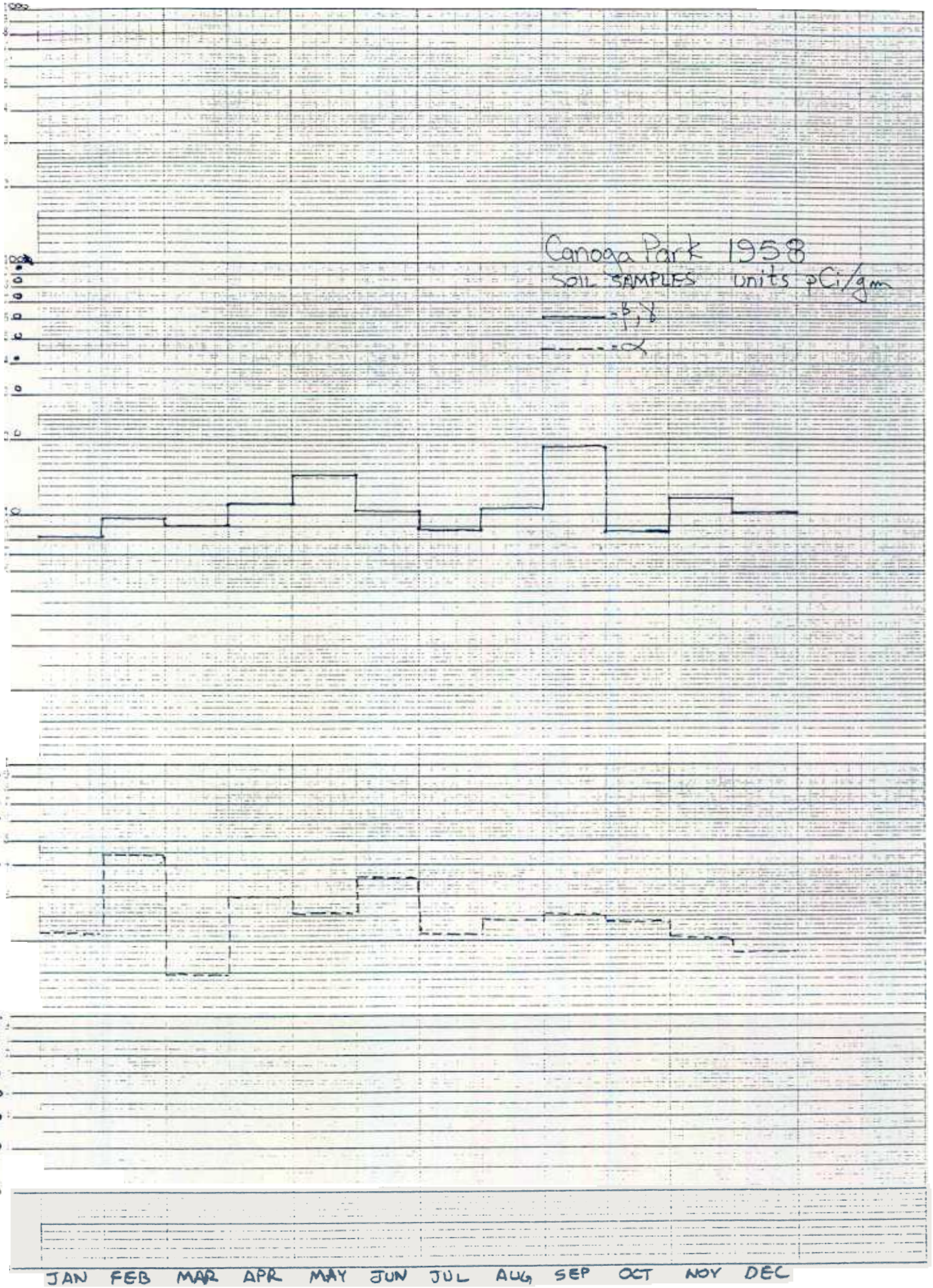
Canoga Park 1958
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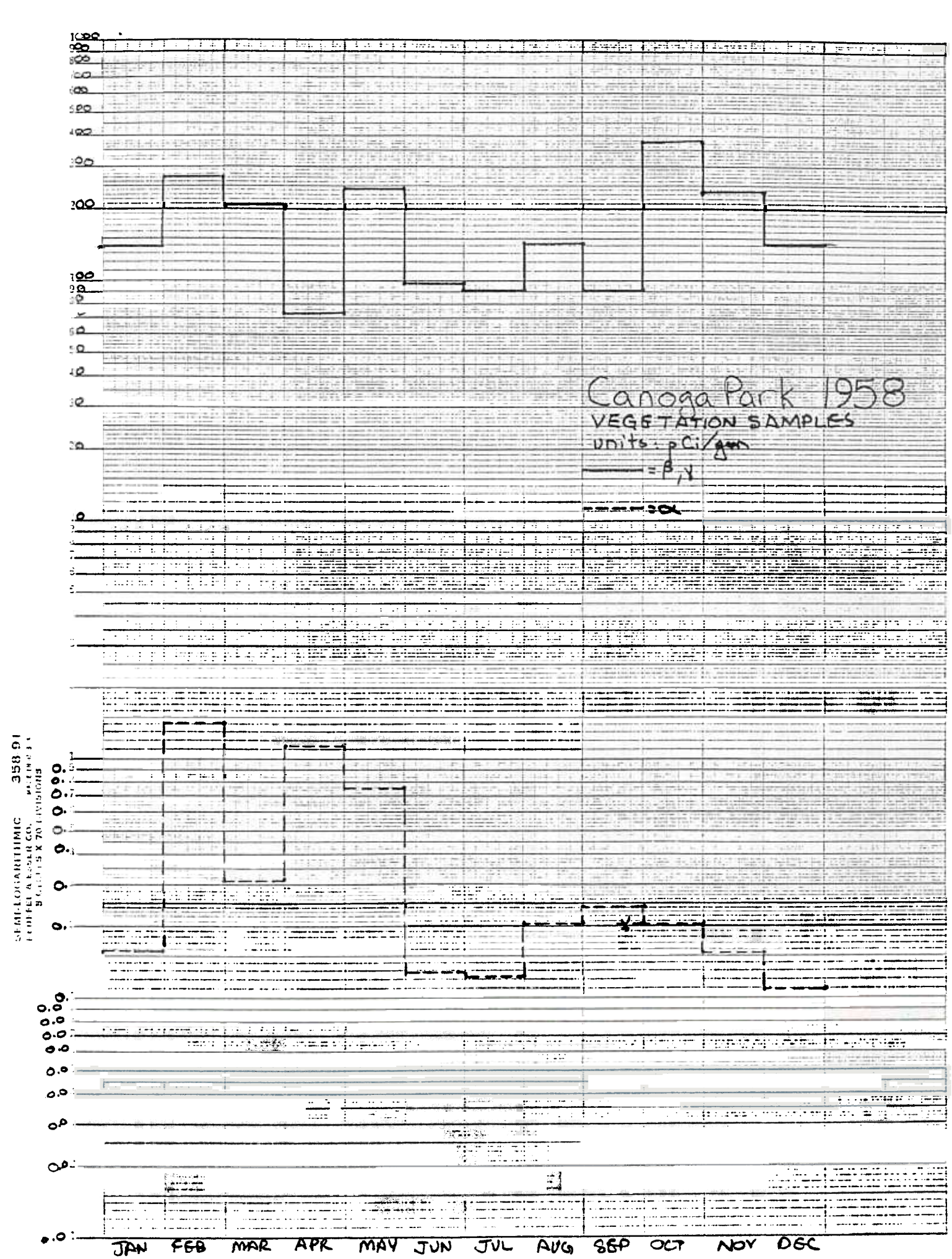
Canoga Park 1958
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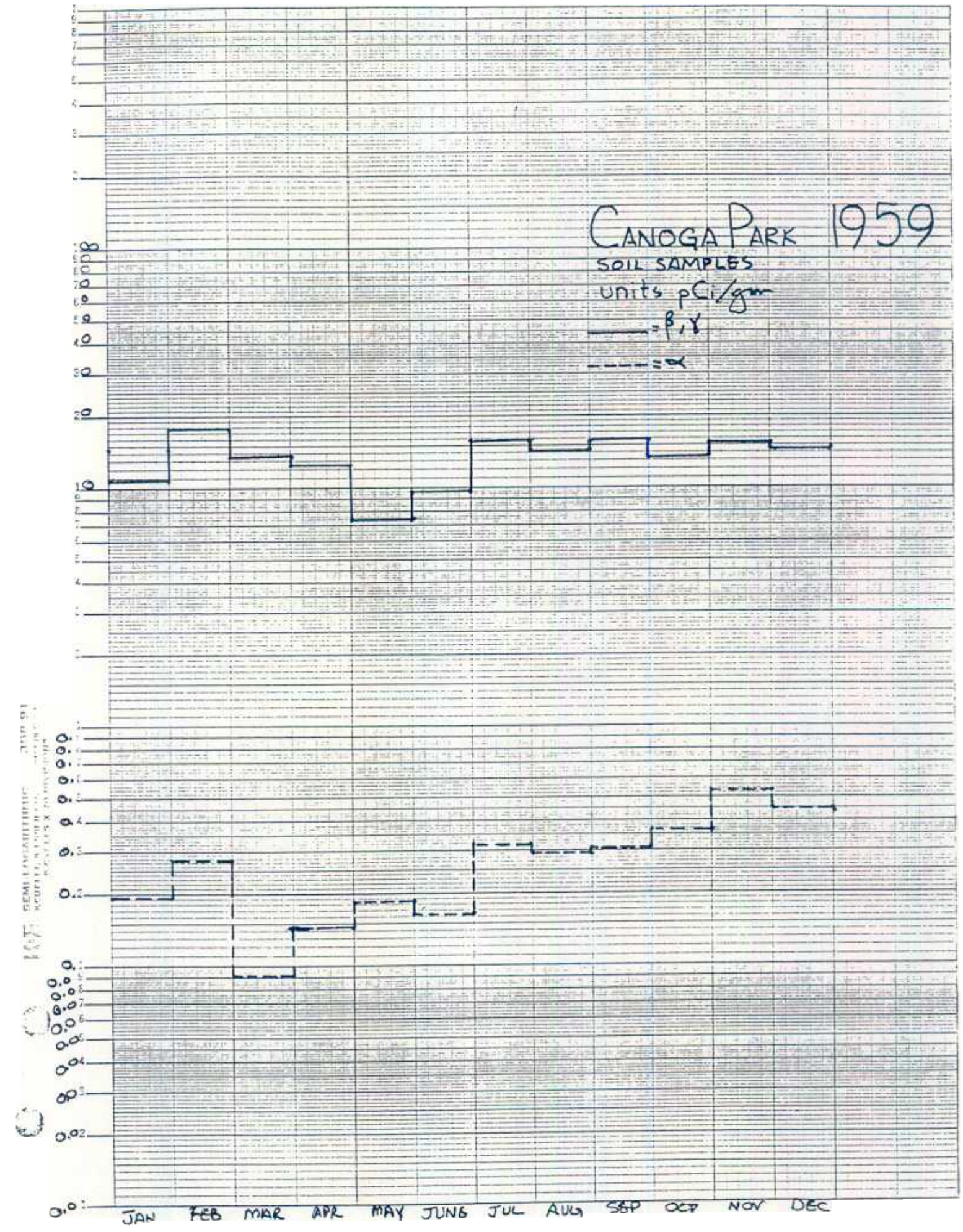
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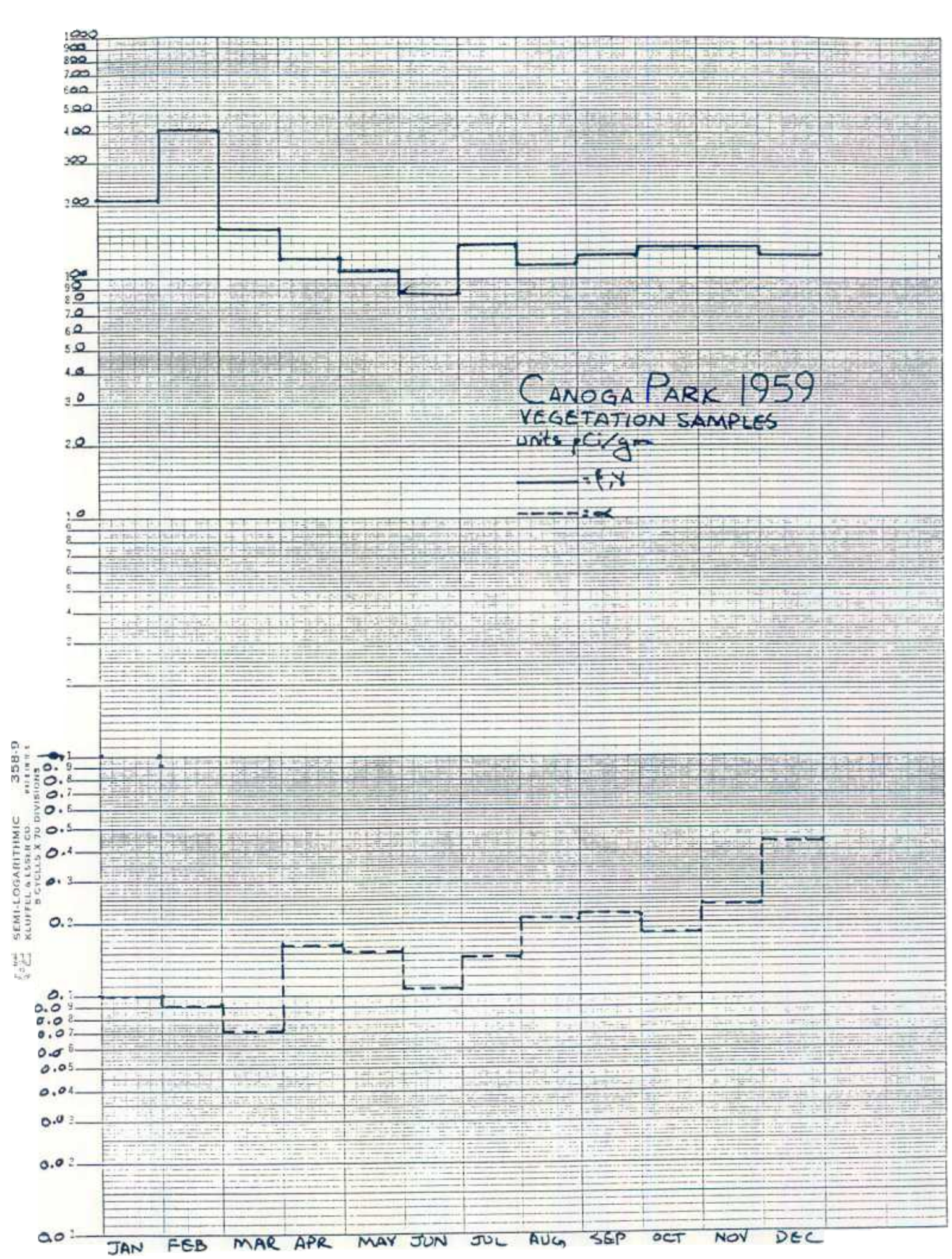
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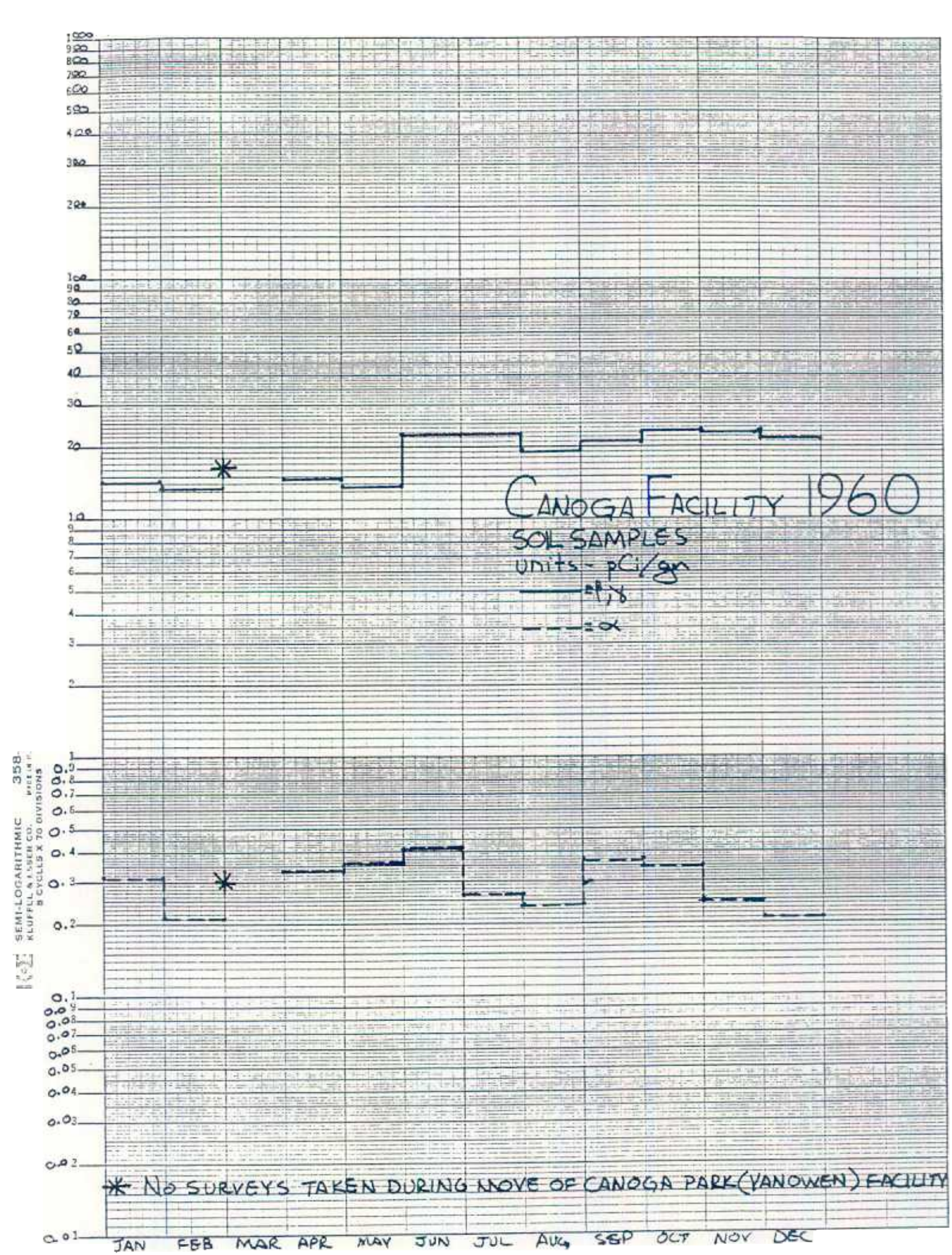
CANOGA FACILITY 1960
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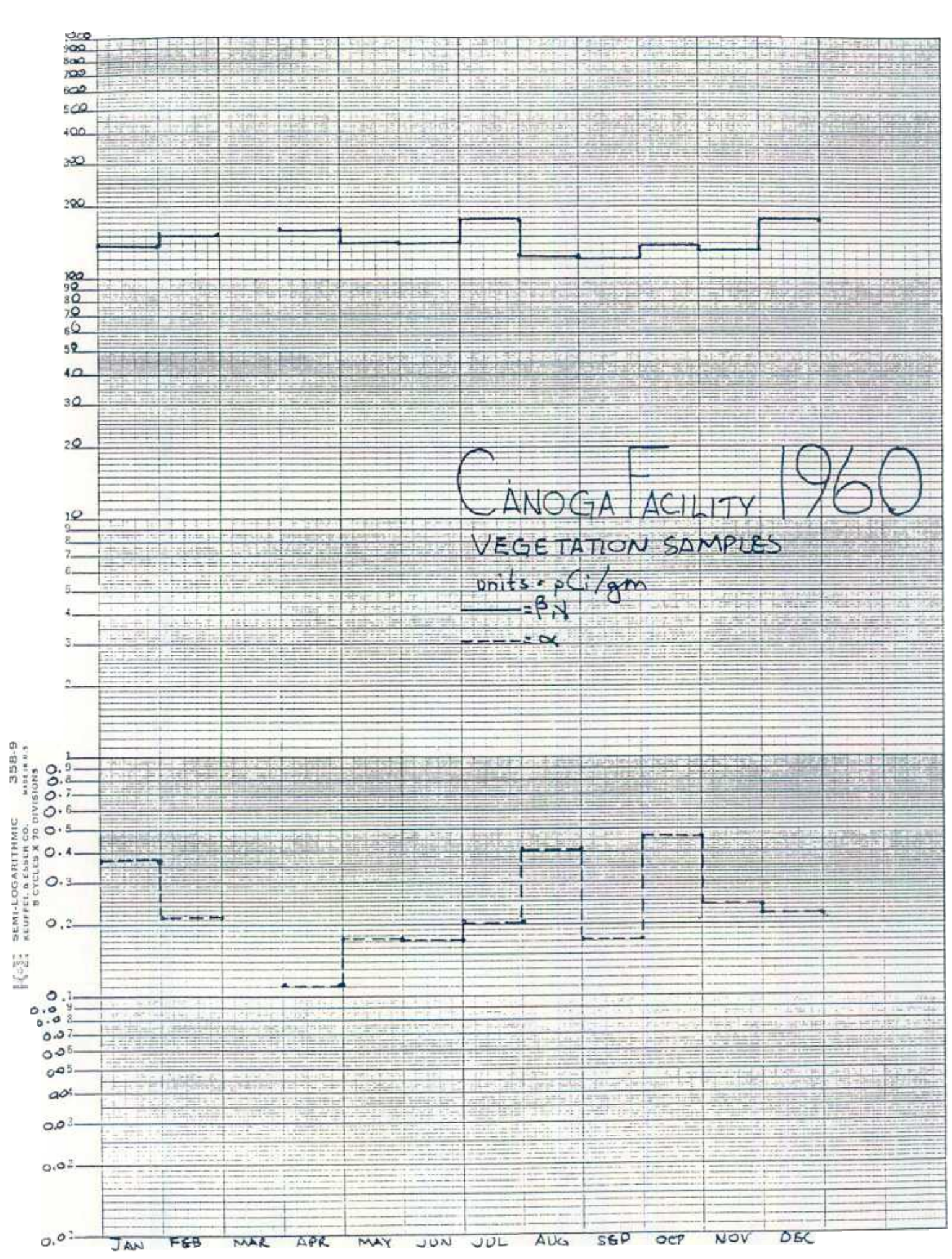
CANOGA FACILITY 1960
VEGETATION SAMPLES
units: pCi/gm
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Reference 8

GROUNDWATER RESOURCES
CONSULTANTS, INC.
TUCSON, ARIZONA

SUMMARY OF RESULTS OF SAMPLING AND ANALYSIS FOR RADIOACTIVITY IN GROUNDWATER ROCKETDYNE CANOGA AVENUE FACILITY CANOGA PARK, CALIFORNIA

March 27, 1990
8630M-46

GROUNDWATER RESOURCES CONSULTANTS, INC.

CONSULTING HYDROGEOLOGISTS • ENVIRONMENTAL SPECIALISTS

6200 EAST 14TH STREET
SUITE A200
TUCSON, ARIZONA 85711
PHONE (520) 326-1898

CHUCK M. DICKENS, P.G.
DAVID B. HAWKINS, P.G.
SHELDON D. CLARK
KURT J. BLUST, P.G.
ALAN S. CUDDY, P.G.

March 27, 1990

Ms. Jennifer Crone
Facilities and Plant Operations
Rocketdyne Division
ROCKWELL INTERNATIONAL CORPORATION
6633 Canoga Avenue
Dept. 543, Mail Stop JA-16
Canoga Park, California 91303

RE: Summary of Results of Sampling And Analysis
For Radioactivity in Groundwater
Rocketdyne Canoga Avenue Facility,
Canoga Park, California

Dear Ms. Crone:

Submitted herewith is the final report regarding radioactivity in groundwater samples from the vicinity of the Rocketdyne Canoga Avenue Facility.

Presented are results of analyses for gross alpha radioactivity, gross beta radioactivity, radium-226, radium-228, isotopic uranium, gamma spectroscopy and strontium-90 in groundwater.

The results indicate that the uranium radioactivity exceeds drinking water standards in groundwater in the vicinity of the Facility. This is indicated to be a naturally occurring phenomena with no relationship to the Rocketdyne facility. Radioactivity in groundwater other than the uranium alpha activity was insignificant and no other drinking water standards were indicated to be exceeded.

If you have any questions or desire discussion of this document, please contact our office.

Respectfully submitted,

GROUNDWATER RESOURCES CONSULTANTS, INC

Kurt J. Blust
Associate Hydrogeologist

GROUNDWATER RESOURCES CONSULTANTS, INC.

CONSULTING HYDROGEOLOGISTS • ENVIRONMENTAL SPECIALISTS

6200 EAST 14TH STREET
SUITE A200
TUCSON, ARIZONA 85711
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SUMMARY OF RESULTS OF SAMPLING AND ANALYSIS FOR RADIOACTIVITY IN GROUNDWATER ROCKETDYNE CANOGA AVENUE FACILITY CANOGA PARK, CALIFORNIA

March 27, 1990
8630M-46

GROUNDWATER RESOURCES CONSULTANTS, INC.

SUMMARY OF RESULTS OF SAMPLING AND ANALYSIS FOR RADIOACTIVITY IN GROUNDWATER ROCKETDYNE CANOGA AVENUE FACILITY CANOGA PARK, CALIFORNIA

CONTENTS

TABLES

ILLUSTRATIONS

GROUNDWATER RESOURCES CONSULTANTS, INC.

SUMMARY OF RESULTS OF SAMPLING AND ANALYSIS FOR RADIOACTIVITY IN GROUNDWATER ROCKETDYNE CANOGA AVENUE FACILITY CANOGA PARK, CALIFORNIA

INTRODUCTION

Pursuant to the request of the Rocketdyne Environmental Control Unit, groundwater samples were collected from Shallow Zone and Upper Zone monitor wells in the vicinity of the Rocketdyne Canoga Avenue Facility and analyzed for the determination of radioactivity (Figure 1).

The purpose of the sampling was to determine if radioactivity in the groundwater beneath the vicinity of the facility had been impacted by the operation of a research reactor formerly located in the northwestern portion of the plant.

This report summarizes the results of analyses for radioactivity in groundwater samples collected by Groundwater Resources Consultants, Inc., filtered and preserved by BC Analytical and analyzed by U.S. Testing Company, Inc. (Table 1). Also presented are results of analyses for gross alpha and gross beta radioactivity in samples analyzed or preserved by other laboratories (Tables 2 and 3).

SAMPLE COLLECTION AND ANALYSIS

Groundwater samples were collected for analysis from 15 Shallow Zone monitor wells designated B-1, B-2, B-9, B-10, B-11, B-28, B-35, B-36, B-39, B-44, B-46, B-47, B-48, B-49 and B-52 and from five Upper Zone monitor wells designated U-6, U-7, U-10, U-11 and U-14.

Groundwater samples were collected from the Shallow Zone monitor wells and Upper Zone monitor well U-6 on December 4 to 5, 1989. Samples were collected from Upper Zone monitor wells U-7, U-10, U-11 and U-14 on January 9, 1990

Groundwater samples collected from each monitor well were analyzed for the determination of gross alpha radioactivity, gross beta radioactivity, radium-226, radium-228, uranium-234, uranium-235 and uranium-238. Groundwater samples collected from the Shallow Zone monitor wells and Upper Zone monitor well U-6 were analyzed to determine gamma radioactivity. Groundwater samples collected from monitor wells B-1, B-9, B-28, B-39, B-49 and B-52 were also analyzed for the determination of strontium-90.

Each monitor well was sampled following the extraction of a minimum of three well volumes of groundwater. The groundwater samples were collected in 1-liter plastic bottles, filtered through a 0.45 micro-meter filter and acidified with nitric acid to a pH less than 2 by BC Analytical in Glendale,

California. The samples were then submitted for analyses to United States Testing Company, Inc., Richland Division in Richland, Washington.

RESULTS OF ANALYSES

Results of analyses indicated gross alpha radioactivity ranged from 65.0 ± 15.0 picocuries per liter (pCi/l) to 20.9 ± 8.23 pCi/l in the samples. The average gross alpha radioactivity was approximately 41 ± 12 pCi/l

Results of analyses indicated gross beta radioactivity of the groundwater samples ranged from 4.60 ± 2.51 pCi/l to 17.7 ± 3.91 pCi/l. The average gross beta radioactivity was approximately 9 ± 3 pCi/l.

Radium-226 radioactivity of the groundwater samples ranged from 0.0297 ± 0.0860 pCi/l to 0.184 ± 0.0986 pCi/l. Radium-228 radioactivity ranged from 0.0561 ± 0.275 pCi/l to 1.29 ± 0.542 pCi/l. All of the radium-226 counts reported and 18 of the 20 radium-228 counts reported were less than the method detection levels of 1 pCi/l. The calculated uncertainties were greater than the reported counts for many of the radium results

Uranium-234 ranged from 14.6 ± 1.46 pCi/l to 31.2 ± 3.04 pCi/l in the groundwater samples. Uranium-235 ranged from 0.525 ± 0.0868 pCi/l to 1.17 ± 0.150 pCi/l in the groundwater samples. Uranium-238 ranged from 14.4 ± 1.44 pCi/l to 29.5 ± 2.87 pCi/l in the groundwater samples. The average uranium isotope radioactivities were approximately 22 ± 2 pCi/l for uranium-234, 0.9 ± 0.15 pCi/l for uranium-235 and 22 ± 2 pCi/l for uranium-238.

Gamma radioactivity in the groundwater samples was reported to have ranged from -3.70 ± 5.83 pCi/l to 4.53 ± 3.76 pCi/l. Gamma radioactivity was reported based upon a photon yield commensurate with cesium-137. The overall analytical uncertainty exceeded the reported gamma count in 15 of the 16 samples and all of the results were below the detection limit of 10 pCi/l reported by the laboratory. The potential for reporting positive gamma activities not present increases when reporting levels below the detection limits.

Strontium-90 was reported in the six samples analyzed to range from -0.0517 ± 0.323 pCi/l to 0.0533 ± 0.345 pCi/l. The uncertainty exceeded the calculated count and the results were less than the detection limit of 1 pCi/lfor all of strontium-90 results.

DRINKING WATER STANDARDS

Reported radioactivities of the groundwater samples were contrasted with the maximum contaminant levels (MCLs) for public water systems in California (Title 22, California Administrative Code, Section 64441). This was performed because these MCLs are an established criteria for assessment of acceptable levels of radioactivity in groundwater for potable purposes with which to compare those levels reported in the samples collected.

The radioactivities of all groundwater samples were less than the MCL of 15 pCi/l for gross alpha radioactivity excluding radon and uranium, less than the MCL of 5 pCi/l for combined radium-226 and radium-228, less than the MCL of 50 pCi/l for gross beta radioactivity and less than the MCL of 8 pCi/l for strontium-90. The MCL of 20 pCi/l for uranium was exceeded in all of the groundwater samples.

COMPARISON OF RESULTS OF GROSS ALPHA AND GROSS BETA RADIOACTIVITY ANALYSES

Tables 2 and 3 present results for all gross alpha and gross beta analyses performed by independent laboratories on groundwater samples collected from Rocketdyne monitor wells

The samples submitted to Fruit Growers laboratory were collected September 7, 1989 and analyzed by the laboratory without filtration and acidification. These samples were collected and analyzed to perform an initial screen for radioactivity in groundwater beneath the vicinity of the former research reactor area.

The filtered and unfiltered samples analyzed by BC Laboratories were collected October 30, 1989. These samples were collected to determine the effects of the removal of suspended sediments that could effect analytical results from the groundwater. The results indicated that a suspended sediment component of the samples could have contributed to the initial results determined by Fruit Growers Laboratory on unfiltered samples. However, filtering did not consistently reduce the values determined by B.C. Laboratories with respect to unfiltered samples.

The second set of results of analyses presented for samples from monitor wells U-7, U-10, U-11 and U-14 analyzed by U.S. Testing Company, Inc. were samples collected December 12, 1989 at the request of Rocketdyne.

These samples were filtered and preserved by the Rocketdyne SSFL analytical laboratory. Groundwater Resources Consultants, Inc. resampled those Upper Zone wells on January 9, 1990 and the samples were prepared and analyzed by the identical procedures as the samples collected December 4 and 5, 1990. This resampling was performed to reduce the variability possible when using different laboratories for sample preparation

These additional results are presented strictly to illustrate the ranges of results for gross alpha and gross beta radioactivity that have been obtained for samples from single locations. In some instances, the variability in reported counts between different laboratories for samples from one location exceeds 50 to 100%. The variability between results for a single lab for samples from one location also exceeds 50 to 100% in some instances. The cause of this variability cannot be isolated based on the limited sampling. Laboratory or method precision and accuracy, sample collection procedures, sample preparation procedures and the natural distribution of radioactivity in the groundwater are potential factors contributing to the wide range of values. Due to these variabilities, only those samples and analyses handled by one consistent process are interpreted in this report.

CONCLUSION

The results of analyses indicate that the radioactivity identified in the groundwater samples from the vicinity of the Facility is naturally occurring. None of the radioactivity identified is considered as being attributable to Facility activities

Analytical results indicate radioactivity from radium-228, radium-226, gamma radioactivity and strontium-90 radioactivity were all insignificant in the groundwater samples collected. These results were consistently less than or near laboratory's reported detection level at all the locations sampled and the method errors exceed the reported results in most cases. Based on the analytical results gamma radioactivity and strontium-90 radioactivity appears to be absent or at levels so low they cannot be identified.

The gross beta radioactivity in the groundwater at all locations sampled was considerably less than drinking water standards and no consistent anomalies were observed in any particular region of the study area with respect to other parts or with respect to the average gross beta radioactivity observed in the vicinity of the Facility.

The gross alpha radioactivity in the groundwater samples collected can be dominately attributed to uranium isotope decay. The occurrence of those uranium isotopes is considered to be naturally occurring and a regional

phenomena in the vicinity of the Facility. The interpretation that the uranium component of the groundwater is natural is supported by the absence of any indications of manmade radioactive isotopes in the gamma radioactivity scans performed on the groundwater samples. The interpretation that the uranium is naturally occurring is also supported by the isotope activity distributions observed in the samples. The ratios of uranium-234 to uranium-238 and uranium-238 to uranium-235 are consistent with those for the natural abundances of the isotopes which are approximately 1:1 and 22:1, respectively.

No additional sampling and analyses for radioacitivity is indicated to be warranted at the Facility based on the results presented here.

TABLE 1

RESULTS OF ANALYSIS FOR RADIOACTIVITY IN GROUNDWATER

WELL IDENTIFIER	DATE SAMPLED	GROSS ALPHA (pCi/l)	GROSS BETA (pCi/l)	RADIUM-226 (pCi/l)	RADIUM-228 (pCi/l)	URANIUM-234 (pCi/l)	URANIUM-235 (pCi/l)	URANIUM-238DA (pCi/l)	GAMMA RADIOACTIVITY CESIUM-137 (pCi/l)	STRONTIUM-90 (pCi/l)
SHALLOW ZONE										
B-1	12/04/89	46.4 ± 12.6	5.95 ± 2.77	0.149 ± 0.107	1.05 ± 0.525	24.6 ± 2.35	0.952 ± 0.122	24.0 ± 2.30	0.378 ± 3.63*	0.0427 ± 0.339*
B-2	12/04/89	57.3 ± 16.0	9.15 ± 3.19	0.137 ± 0.0883	0.0561 ± 0.275*	24.5 ± 2.36	0.883 ± 0.118	24.3 ± 2.34	-3.70 ± 5.83*	N/A
B-9	12/04/89	44.2 ± 12.4	4.60 ± 2.51	0.0814 ± 0.0785	0.307 ± 0.336*	20.4 ± 1.98	0.774 ± 0.108	20.0 ± 1.94	0.941 ± 4.49*	-0.0517 ± 0.328*
B-10	12/04/89	65.0 ± 15.0	10.1 ± 3.19	0.125 ± 0.0847	0.475 ± 0.429	31.2 ± 3.04	1.17 ± 0.150	29.5 ± 2.87	-1.22 ± 4.58*	N/A
B-11	12/04/89	37.7 ± 10.9	7.07 ± 2.91	0.154 ± 0.0832	0.357 ± 0.319	22.8 ± 2.20	0.939 ± 0.123	22.8 ± 2.20	-3.45 ± 5.50*	N/A
B-28	12/05/89	20.9 ± 8.23	5.72 ± 2.88	0.125 ± 0.0806	0.342 ± 0.474*	14.6 ± 1.46	0.525 ± 0.0868	14.4 ± 1.44	-1.49 ± 4.72*	0.0533 ± 0.345*
B-35	12/05/89	41.4 ± 11.7	6.19 ± 2.70	0.184 ± 0.0986	0.720 ± 0.509	22.8 ± 2.43	1.01 ± 0.162	23.1 ± 2.47	3.04 ± 5.01*	N/A
B-36	12/04/89	45.2 ± 15.1	6.72 ± 2.84	0.134 ± 0.0789	0.322 ± 0.499*	20.7 ± 2.03	0.816 ± 0.115	20.7 ± 2.03	4.53 ± 3.76	N/A
B-39	12/04/89	46.2 ± 12.2	12.1 ± 3.42	0.0297 ± 0.0860*	0.345 ± 0.315	18.0 ± 1.77	0.667 ± 0.0987	17.4 ± 1.71	2.12 ± 3.75*	-0.0372 ± 0.338*
B-44	12/05/89	38.6 ± 10.8	6.63 ± 2.79	0.0739 ± 0.0850*	0.263 ± 0.339*	18.4 ± 1.79	0.787 ± 0.109	18.3 ± 1.79	-1.31 ± 4.06*	N/A
B-46	12/05/89	40.4 ± 10.9	10.5 ± 3.19	0.0326 ± 0.0747*	0.301 ± 0.340*	23.9 ± 2.55	0.907 ± 0.151	24.0 ± 2.56	-3.57 ± 4.18*	N/A
B-47	12/05/89	30.3 ± 10.2	6.83 ± 2.89	0.0326 ± 0.0789*	0.476 ± 0.353	18.3 ± 1.85	0.700 ± 0.112	17.8 ± 1.81	0.0590 ± 4.49*	N/A
B-48	12/05/89	36.2 ± 11.1	4.85 ± 2.76	0.0936 ± 0.0773	0.245 ± 0.321*	20.4 ± 1.99	0.766 ± 0.125	19.8 ± 1.93	0.531 ± 4.16*	N/A
B-49	12/05/89	54.0 ± 13.8	6.85 ± 2.78	0.159 ± 0.0807	1.29 ± 0.542	26.9 ± 2.64	1.08 ± 0.143	26.7 ± 2.61	4.42 ± 5.28*	-0.0214 ± 0.348*
B-52	12/05/89	46.2 ± 11.9	12.5 ± 3.43	0.0588 ± 0.0699*	0.235 ± 0.328*	23.2 ± 2.30	0.828 ± 0.120	22.4 ± 2.22	2.84 ± 4.82*	0.0288 ± 0.404*
UPPER ZONE										
U-6	12/05/89	45.8 ± 12.5	8.86 ± 3.08	0.105 ± 0.0819	0.399 ± 0.482	20.6 ± 2.00	0.851 ± 0.116	20.4 ± 1.98	-2.20 ± 4.18*	N/A
U-7	01/09/90	32.1 ± 10.4	12.4 ± 3.40	0.0535 ± 0.0938*	0.218 ± 0.363*	19.5 ± 2.24	0.950 ± 0.273	19.1 ± 2.20	N/A	N/A
U-10	01/09/90	45.1 ± 14.7	17.7 ± 3.91	0.165 ± 0.113	0.583 ± 0.452	28.6 ± 3.08	1.16 ± 0.354	28.4 ± 3.05	N/A	N/A
U-11	01/09/90	27.9 ± 9.18	11.2 ± 3.36	0.0465 ± 0.0658*	0.290 ± 0.411*	18.5 ± 1.97	0.824 ± 0.211	19.1 ± 2.02	N/A	N/A
U-14	01/09/90	24.4 ± 8.98	12.1 ± 3.42	0.115 ± 0.0991*	0.681 ± 0.414	17.8 ± 2.00	0.840 ± 0.247	19.0 ± 2.11	N/A	N/A
DETECTION LIMIT		1	1	1	1	0.4	0.4	0.4	10	1

(-) = Negative value calculated
(N/A) = Not analyzed
(pCi/l) = Picocuries per liter
* = Indicates the calculated uncertainty exceeds the reported count

TABLE 2
SUMMARY OF RESULTS OF ANALYSES FOR
GROSS ALPHA RADIOACTIVITY IN GROUNDWATER

Sample Identifier	Fruit Growers Lab (unfiltered) pCi/l	B.C. Laboratories (unfiltered) pCi/l	B.C. Laboratories (filtered) pCi/l	U.S. Testing (filtered) pCi/l
B-1	18 ± 5	39.9 ± 4.0	39.1 ± 3.9	46.4 ± 12.6
B-2	35 ± 9	49.1 ± 5.8	48.7 ± 8	57.3 ± 16.0
B-9	25 ± 7	38 ± 4.9	37.8 ± 4.4	44.2 ± 12.4
B-10	34 ± 9	52.1 ± 5.1	51.9 ± 5.1	65.0 ± 15.0
B-11	99 ± 25	44.8 ± 5.5	34.5 ± 5.2	37.7 ± 10.9
B-28				20.9 ± 8.23
B-35				41.1 ± 11.7
B-36	24 ± 6 19.5 ± 5	41.1 ± 3.4	34.1 ± 2.9	45.2 ± 15.1
B-39				46.2 ± 12.2
B-44				38.6 ± 10.8
B-46				40.4 ± 10.9
B-47				30.3 ± 10.2
B-48				36.2 ± 11.1
B-49				54.0 ± 13.8
B-52				46.2 ± 11.9
U-6	17 ± 4			45.8 ± 12.5
U-7				32.1 ± 10.4 20.3 ± 5.97*
U-10				45.1 ± 14.7 39.8 ± 13.1*
U-11				27.9 ± 9.18 36.0 ± 8.06*
U-14				24.4 ± 8.98 16.6 ± 5.18*

(*) = Indicates samples collected December 12, 1989.

TABLE 3
SUMMARY OF RESULTS OF ANALYSES FOR
GROSS BETA RADIOACTIVITY IN GROUNDWATER

Sample Identifier	Fruit Growers Lab (unfiltered) pCi/l	B.C. Laboratories (unfiltered) pCi/l	B.C. Laboratories (filtered) pCi/l	U.S. Testing (filtered) pCi/l
B-1	21 ± 5	22.4 ± 1.6	19.7 ± 1.5	5.95 ± 2.77
B-2	12 ± 3	5.9 ± 2.1	12.9 ± 3	9.15 ± 3.19
B-9	11 ± 3	10.4 ± 1.8	1.6 ± 1.7	4.60 ± 2.51
B-10	44 ± 11	13.7 ± 1.9	9.3 ± 1.8	10.1 ± 3.19
B-11	113 ± 29	7.5 ± 1.9	5.5 ± 1.7	7.07 ± 2.91
B-28				5.72 ± 2.88
B-35				6.19 ± 2.70
B-36	9 ± 3 6 ± 3	26.7 ± 1.3	13.5 ± 1	6.72 ± 2.84
B-39				12.1 ± 3.42
B-44				6.63 ± 2.79
B-46				10.5 ± 3.19
B-47				6.83 ± 2.89
B-48				4.85 ± 2.76
B-49				6.85 ± 2.78
B-52				12.5 ± 3.43
U-6	23 ± 6			8.86 ± 3.08
U-7				12.4 ± 3.40 3.77 ± 2.20*
U-10				17.7 ± 3.91 11.1 ± 3.00*
U-11				11.2 ± 3.36 15.2 ± 3.70*
U-14				12.1 ± 3.42 8.19 ± 3.02*

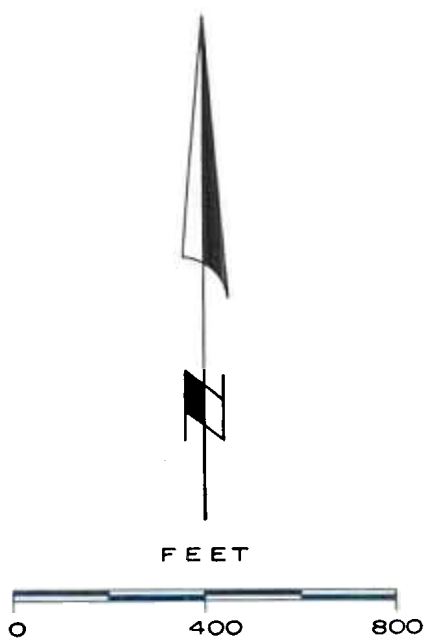
(*) = Indicates samples collected December 12, 1989

E X P L A N A T I O N

ROCKETDYNE MONITOR WELLS

■ B-31 SHALLOW ZONE MONITOR WELL

▲ U-7 UPPER ZONE MONITOR WELL



DESOTO AVE.

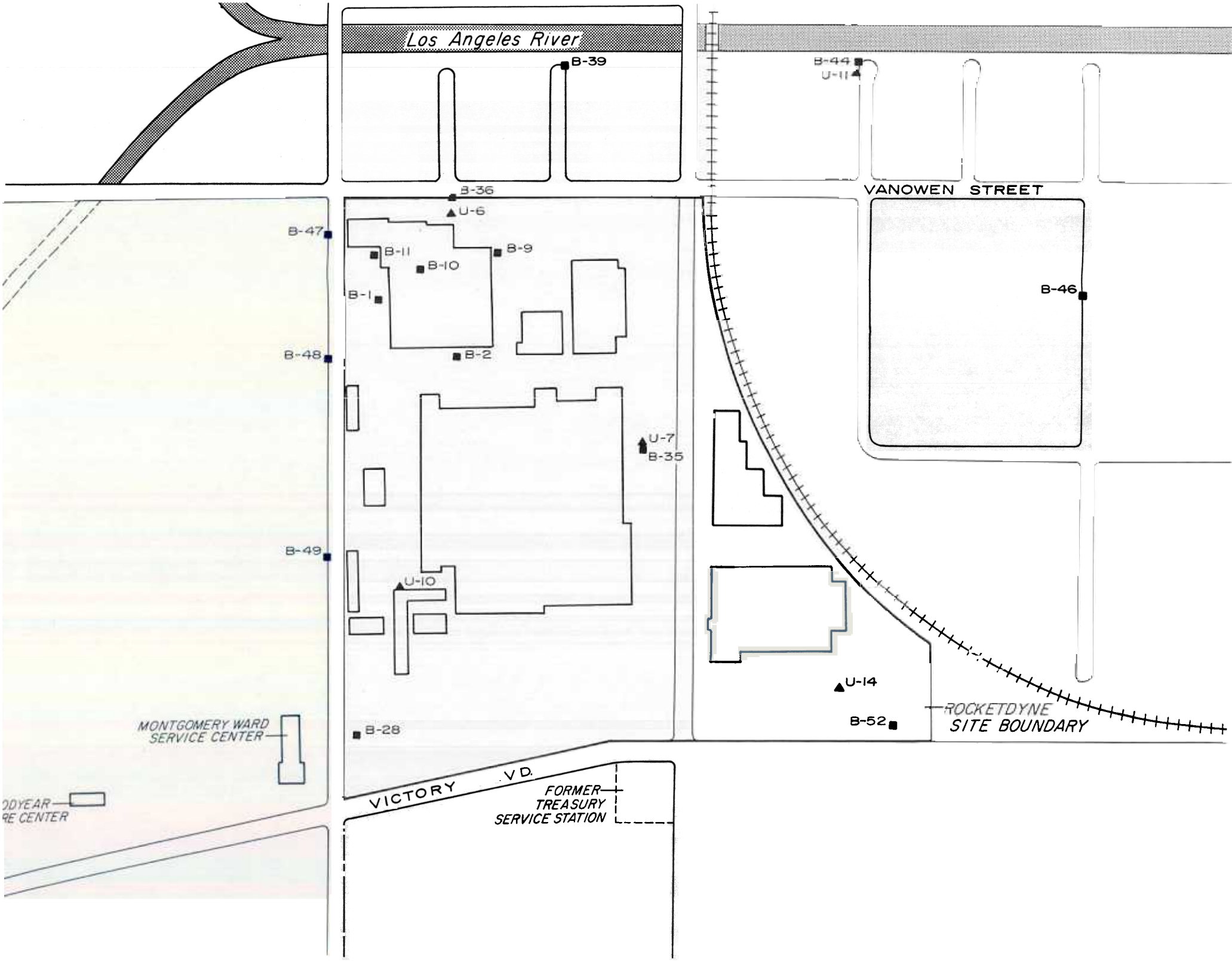
ROCKETDYNE CANOGA AVENUE FACILITY
CANOGA PARK, CALIFORNIA

LOCATION OF MONITOR WELLS

GROUNDWATER RESOURCES CONSULTANTS, INC.
CONSULTANTS IN HYDROGEOLOGY
TUCSON, ARIZONA

8630M-46

FIGURE 1


Los Angeles River
B-39
B-44
U-11
VANOWEN STREET
B-36
U-6
B-47
B-11
B-9
B-10
B-1
B-46
B-48
B-2
U-7
B-35
B-49
U-10
U-14
ROCKETDYNE
SITE BOUNDARY
B-52
MONTGOMERY WARD
SERVICE CENTER
B-28
VICTORY
V.D.
FORMER
TREASURY
SERVICE STATION

Reference 9

UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV
611 RYAN PLAZA DRIVE, SUITE 400
ARLINGTON, TEXAS 76011-8064

January 29, 1996

MEMORANDUM TO: Michael F. Weber, Chief
Low-Level Waste and Decommissioning Projects Branch
Division of Waste Management/NMSS

FROM: Ross A. Scarano, Director
Division of Nuclear Materials Safety

SUBJECT: ROCKWELL INTERNATIONAL SITE VISIT

As you are aware, Oak Ridge Associated Universities (ORAU) recently reviewed 59 terminated research and test reactor license docket files. ORAU concluded that 30 files did not contain sufficient decommissioning and disposition information. One of the 30 files was Docket 50-50, License R-19.

License R-19 was issued to Atomics International, a Division of North American Aviation, for the L-47 reactor. This reactor operated between 1957-1958 at a Atomics International facility located in Canoga Park, California. The facility is now controlled by Rockwell International.

In an attempt to gather more information about the reactor, a member of our staff, Mr. Robert Evans, visited Rockwell International on November 15-16, 1995. In summary, the where-abouts of the reactor were not identified although disposition information was located for some of the reactor fuel. Also, the former reactor room was visited and surveyed for radioactive contamination and none was identified.

Records obtained during the site visit consist mainly of documents related to the license application and early operational records. Little disposition or decommissioning information was identified for this reactor although some radiological and environmental records were found for the building that housed the reactor.

In addition, several individuals (including W. L. Fisher, former NRC Region IV Branch Chief) who worked with the reactor were interviewed and none could recall what happened to the reactor.

Atomics International and its predecessors operated many unique reactors for decades in and around Canoga Park. The facility had a well-defined waste disposal program. The reactor was most likely properly disposed of in the late 1950's through Atomic International's normal waste processing and disposal programs.

Attachment 1 provides additional information about the history of the reactor and the site visit. Affixed to Attachments 2 through 4 are copies of documentation that were found in Rockwell's files. Attachment 5 is a copy of the ORAU review of Docket File 50-50. We recommend that the information be added to the NRC's archive file for Docket No. 50-50.

No further action is planned by the Region for this license file unless NMSS recommends or requests that additional action be taken.

If you have any questions concerning this memorandum or its enclosures, please call Ms. Linda L. Howell of my staff at (817) 860-8213.

Attachments:
As stated

ATTACHMENT 1

License No.: R-19

Docket No.: 50-50

Licensee Name: Atomics International
A Division of North American Aviation, Inc.

License Active: August 5, 1957 - June 30, 1958

Business Address: P.O. Box 309
Canoga Park, California

Location: Reactor Room
Vanowen Facility
21600 Vanowen Street
Canoga Park, California

Activity: Operation of the 5-Watt Model L-47 Research Reactor

Background Information

Atomics International was formed as a Division of North American Aviation, Inc., in 1955. During the late 1950's, Atomics International performed a number of atomic energy-related activities. Under contract to the Atomic Energy Commission (AEC) since 1948, North American Aviation/Atomics International developed several prototype reactors, including sodium and organic moderated reactors. Other projects in progress during the 1957-1958 time frame included research into the SNAP-II satellite power system and the Project Pluto ramjet engine. In addition, Atomics International fabricated and installed several research reactors.

(In 1966, North American Aviation merged with Rockwell-Standard to form North American Rockwell. The corporation's name was subsequently changed to Rockwell International. Rockwell still has one NRC-licensed site in Canoga Park, the Rockwell International Hot Laboratory under License SNM-21.)

During December 1956-January 1957, Atomics International apparently submitted three applications to the AEC to construct, manufacture, possess, and use a 5-watt nuclear research reactor. Atomics International wanted to construct a prototype reactor, the Model L-47, for demonstration, experimentation, and sales purposes. (A complete copy of the application package dated January 10, 1957, was obtained from Rockwell International's files; a partial copy of the December 7, 1956, application package was obtained; the application package dated January 24, 1957, that was referenced in the construction permit could not be located.)

Construction Permit No. CPRR-14 was issued on August 2, 1957 (the license for this reactor erroneously stated that the Permit was issued on July 2, 1957), to North American Aviation for construction of the 5-watt (thermal) utilization facility. The facility was a "homogeneous solution-type reactor utilizing highly enriched uranyl sulfate as fuel in distilled light water."

The Model L-47 laboratory reactor was considered by some to be a "poor man's reactor;" the original name of the reactor was the "Penny Ante." This model was quickly replaced with the more popular, and more powerful model, the 10-watt Model L-77.

The L-47 reactor was installed in the Reactor Room of the Vanowen Building in Canoga Park. The operating license No. R-19 was issued on August 5, 1957. Records indicate that the L-47 reactor began operating on August 29, 1957, and operated for 73 watt-hours in 1957 (operations data was not located for 1958).

On May 26, 1958, the AEC was informed that the licensee had "dismantled its L-47 laboratory reactor and placed it in storage." In addition, the licensee requested that the AEC terminate the R-19 license. The reactor was placed into storage because the licensee thought that the reactor might be reused at a later date. Regardless, License R-19 was terminated by the AEC on June 30, 1958.

Records were identified that stated that the recommended amount of fuel to be purchased for the reactor was 2000 grams of fully enriched uranium-235 in the form of uranyl sulfate. The amount of fuel actually purchased was not clearly identified. Records also indicate that the remaining L-47 reactor fuel (201 grams) was transferred to the Armour Research Foundation in June 1958.

In mid-1958, North American Aviation replaced the L-47 reactor with an L-77 reactor (License No. R-40, issued May 17, 1958; Docket 50-94). This second reactor was located in the same Reactor Room of the Vanowen facility as the L-47 reactor. The L-77 reactor operated at the Vanowen facility until February 1960.

On March 29, 1960, Atomics International requested that license No. R-40 be revised to allow them to relocate the L-77 reactor from the Vanowen facility to their new Desoto facility, Laboratory Building 004, in Canoga Park. Construction Permit No. CPRR-54 was issued on June 27, 1960, which authorized the transfer to take place. The revised operating license was issued the next day. The L-77 reactor was permanently shut down in September 1974.

Rockwell International Site Visit

On November 15, 1995, the former Reactor Room (Room 914 on older facility maps, current maps identify the area as Room 554) of the Vanowen Building was toured. The NRC inspector was escorted by the Radiation Protection/Health Physics Services Manager for Rockwell International/Rocketdyne. The area was being used as office space for an adjacent warehouse at the time of the visit. A Ludlum Model 19 microR meter was used to scan the area for radioactive materials. No readings above background were identified in or around the former Reactor Room.

A records review was performed during the site visit. A limited amount of decommissioning records were identified for the Vanowen site. Unfortunately, records indicating the where-abouts of the L-47 reactor were not identified. In addition, the Radiation Protection/Health Physics Services Manager was not aware of any additional records related to the L-47 reactor.

Several former employees of Atomics International were interviewed, including W. L. Fisher, former Branch Chief of the Nuclear Materials Licensing Branch in Region IV. None could recall the final disposition of the L-47 reactor.

Records were located that indicated that Atomics International had a well defined radioactive waste handling and disposal program, including a method of disposing of spent reactor fuel. Atomics International most likely disposed of the reactor and the spent fuel through their normal waste disposal channels in compliance with AEC regulations in effect at the time.

Summary

Additional information related to the L-47 reactor, Docket File 50-50, was obtained during the site visit. This information included limited amounts of construction, operation, environmental monitoring, and decommissioning records. Unfortunately, records associated with the disposal of the L-47 reactor were not located. Records were identified that provided disposition information for some of the reactor fuel.

The former Reactor Room was toured and was found to be free of radioactive materials which indicated that the area had been successfully remediated by either Atomics International or Rockwell International in the past.