



Commonwealth Edison

One First National Plaza, Chicago, Illinois
Address Reply to: Post Office Box 767
Chicago, Illinois 60690

May 23, 1985

Mr. William J. Dircks
Executive Director for Operations
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Subject: LaSalle County Station Units 1 and 2
Petition for Disposal of Low Level
Radioactively Contaminated Sludge by
Land Application Under 10 CFR 20.302(a)
Facility Operating Licenses NPF-11 and
NPF-18
NRC Docket Nos. 50-373 and 50-374

Dear Mr. Dircks:

Pursuant to 10 CFR 20.302, Commonwealth Edison is submitting this application for approval of proposed procedures to dispose of licensed material contained in low level radioactivity contaminated sewage treatment plant sludge. We propose to dispose of this material by land application within the restricted area at LaSalle County Station. Justification for approval of this request is provided in attachments to this letter.

Enclosed are the following Attachments as listed:

- Attachments (1): Disposal of Low Level Radioactively Contaminated
Sewage Treatment Plant (STP) Sludge
- (2): System Materials Analysis Department Report on Soil
Samples from Proposed Sewage/Sludge Application
Site at LaSalle County Station (SS 84-17)
- (3): Letter dated December 20, 1984 concerning Proposed
Sewage Sludge Land Application Site at LaSalle
County Station
- (4): Isotopic Summary of Sewage Treatment Plant Sludge
at LaSalle County Station
- (5): Site Plan Drawing Showing Proposed Area for Land
Application

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PDR ADDCK 05000373
P PDR

*A001 w/check \$150⁰⁰
1/40 #0008350*

W. J. Dirck

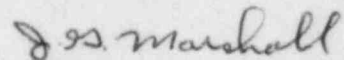
- 2 -

May 23, 1985

Please direct any questions you may have concerning this matter to this office. A fee remittance of \$150.00 is enclosed pursuant to 10 CFR 170.

One signed original and forty (40) copies of this letter are provided for your use.

Very truly yours,



J. G. Marshall
Nuclear Licensing Administrator

lm

Attachments

cc: J. G. Keppler, Region III
Resident Inspector - LSCS
G. Wright - State of Ill.
A. Bournia - NRR
G. J. Diederich - LSCS

0159K

ATTACHMENT 1

DISPOSAL OF LOW LEVEL RADIOACTIVELY CONTAMINATED SEWAGE TREATMENT PLANT (STP) SLUDGE

Introduction

The purpose of this document is to provide the necessary information to obtain NRC approval for the disposal of contaminated STP sludge by land application at LaSalle County Station (LSCS). The LaSalle STP produces approximately 200,000 gallons of sludge at a concentration of about 8000 ppm total suspended solids per year. This corresponds to approximately 500 cubic feet of dried sludge.

This document describes the background of the problem, and evaluation of disposal methods, justification for land application of STP sludge as the preferred method for disposal and a description of the proposed method of disposal.

Background

The disposal of contaminated STP sludge has been a problem since the beginning of the plant's operation. The only isotopes found in the sludge thus far are Co-60, Co-58, and Mn-54.

Evaluation of Disposal Methods

The following alternatives have been considered to deal with the disposal of the contaminated STP sludge:

1. shipment to commercial waste disposal sites as dry active waste (DAW) for disposal
2. on-site land application

The first alternative is costly. Disposal costs are ~ \$35/cubic ft of sludge including DAW box, burial, and transportation.

The second alternative considered was land application. Since the nuclear industry is concerned with saving space at low level disposal sites the most prudent method of disposal is by on-site land application. This method of disposal is the most cost effective and has less environmental impact than disposal in a commercially operated disposal site.

Justification for Land Application

The advantages of land application over disposal as DAW are:

- 1a. Land application reduces the amount of DAW produced and therefore saves the limited disposal site space available to the industry.
- 1b. Commonwealth Edison (CECo) may not be able to use the present disposal sites after 31DEC85.
2. The radiological impact of plant application of STP sludge is insignificant because the total radioactivity content is low.

Environmental Impact

Soil samples were collected to characterize the soils for the proposed site in accordance with Illinois Environmental Protection Agency (IEPA) regulations (Title 35; Subtitle C: Chapter II; Part 391, Design Criteria for Sludge Application on Land). The samples were then sent to Commonwealth Edison Company's (CECo) System Materials and Analysis Department for chemical and physical analyses (See attachment one).

The results of these analyses were reviewed by CECo's Environmental Affairs Department and found to be well suited for land application of sewage sludge. (For a more detailed evaluation see attachment two)

Radiological Impact

To determine the radiological impact due to land application of low level radioactively contaminated sewage sludge at LaSalle Station, CECo hired Sargent and Lundy to perform the necessary calculations. Their calculations indicate that a person continuously occupying the central portion of the land application site would receive approximately 3 mrem/yr which is 0.6% of the 10CFR Part 20 dose limit of 500 mrem/yr for unrestricted areas. For a worker spending 2000 hours/yr in this area, the total whole body dose is reduced to 0.69 mrem/yr. For these calculations a source region of 3 inches to 3 feet thick and a 100 meter radius, no earth shielding was assumed (See attachment three).

Method of Disposal

The STP sludge will be applied to a three acre area near the STP in the restricted area (see the topical Sargent and Lundy drawing attachment four).

The following steps will be taken to dispose of the sludge:

1. Environmental Affairs will obtain a land application permit for sewage sludge from the IEPA.
2. The STP sludge will be concentrated in the digester.
3. An isotopic analysis will be performed on a sample of sludge in the digester. This sample will be checked against an administrative limit of less than or equal to $1\text{E}-06$ uCi/cc for each of the following isotopes: Co-60, Co-58, and Mn-54 and less than or equal to $3\text{E}-06$ uCi/cc total gamma activity which is less than 10% of the limits in Table II. Column 2 of 10CFR20 Appendix B. and less than 6% of the limit of 1 for the total MPC.
4. Sludge which meets these limits will be pumped to the drying beds for further volume reduction.
5. Sludge exceeding these limits will be pumped to a roped off drying bed and the dried sludge will be shipped as DAW.
6. Once the sludge has dried to a cake, the sludge will then be broken-up and distributed over a given area of the land application site which will be roped off.
7. The site will be plowed once in the spring and once in the fall. Alfalfa will be planted on the site to stabilize the soil and prevent runoff.
8. Records as to how many gallons of sludge sent to the drying beds, a radionuclide analysis of the sludge and the amount of dried sludge produced in cubic feet will be kept for documentation.

SYSTEM MATERIALS ANALYSIS DEPARTMENT REPORT
ON
SOIL SAMPLES FROM THE PROPOSED SEWAGE/SLUDGE
APPLICATION SITE
LASALLE COUNTY STATION
(SS84-17)

At the request of Mr. M. Knight, Environmental Affairs, four (4) soil samples from the proposed sewage/sludge application site at LaSalle County Station were submitted on June 12, 1984, for various physical and chemical analyses. The first sample was a composite of core samples from sites 1 through 10. Sample 10a was a core from site 10, 0-12 inches below the surface of the soil. Sample 10b was a core from site 10, 12-24 inches below the surface of the soil. Sample 10c was a core from site 10, 24-36 inches below the surface of the soil.

All samples were air dried to constant weight and ground to 60 mesh. The analyses were performed using the procedures listed in Methods of Soil Analysis, Part 2, Chemical and Microbiological Properties, Second Edition, (edited by A. L. Page, R. H. Miller, and D. R. Keeney, American Society of Agronomy, Inc., Soil Science Society of America, Inc., Madison, WI, 1982) and in Field and Laboratory Methods Applicable to Overburdens and Minesoils (U.S.E.P.A., EPA-600/2-78-054, March, 1978).

The results of the analyses are listed on the following pages.

Recheck
Approved by: *Patricia K. K.*

Reported by: *F. Peter (check)*

Copies to: T. E. Hemminger ✓
Station Superintendent
Tech Staff Supervisor

Station Chemist
Chem. Eng. Services - TSN

TABLE 1

<u>PARAMETER</u>	<u>SAMPLE SITE</u>			
	<u>1-10 Composite</u>	<u>10a</u>	<u>10b</u>	<u>10c</u>
pH (10% Slurry)	7.6	7.6	6.5	6.8
Cation Exchange Capacity Sodium Extraction (meq/100 g)	39.1	40.9	41.0	40.4
Soluble Salts by Electrical Conductivity (ug/g)	230	200	90	110
Total Organic Carbon (ug/g)	21,500	21,800	22,100	7,200
Total Kjeldahl Nitrogen (ug/g as N)	< 100	2,100	2,300	1,000
Ammonia Nitrogen (ug/g)	16.6	18.5	28.7	10.4
Total Phosphorus (ug/g as P)	184	101	< 0.25	65.5
Plant Available Phosphorus (ug/g as P)	< 0.25	< 0.25	< 0.25	< 0.25 ←

(SS84-17)

TABLE 2

<u>TOTAL METALS</u>	<u>SAMPLE SITE</u>			
	<u>1-10 Composite</u> (ug/g)	<u>10a</u> (ug/g)	<u>10b</u> (ug/g)	<u>10c</u> (ug/g)
Arsenic, As	17	1	8	14
Barium, Ba	220	150	220	100
Boron, B	< 200	< 200	< 200	< 200
Cadmium, Cd	2	2	2	2
Calcium, Ca	3100	7100	5600	2900
Chromium, Cr	93	65	49	62
Copper, Cu	70	61	43	58
Lead, Pb	30	30	30	30
Mercury, Hg	0.03	0.06	0.03	0.04
Nickel, Ni	205	121	85	105
Potassium, K	9800	12,000	11,000	9800
Selenium, Se	< 2	< 2	< 2	< 2
Zinc, Zn	93	92	76	84

(SS84-17)

TABLE 3PARTICLE SIZE ANALYSIS
(Hydrometer Particle
Sizing)

	<u>SAMPLE SITE</u>			
	<u>1-10 Composite</u>	<u>10a</u>	<u>10b</u>	<u>10c</u>
% Sand	36.6	38.2	34.1	41.6
% Silt	45.2	44.8	50.7	42.2
% Clay	18.2	17.0	15.2	16.2

ATTACHMENT 3

December 20, 1984

To: D. F. Malauskas

Subject: Proposed Sewage Sludge Land Application
Site at LaSalle County Station

The following summarizes the Environmental Affairs Department's activities to date regarding the development of the subject site.

A site, approximately three acres in size, considered geographically and topographically acceptable for sewage sludge application was identified in June, 1984. Soil samples were collected to characterize the soils of the proposed site in accordance with Illinois Environmental Protection Agency (IEPA) regulations (Title 35; Subtitle C; Chapter II; Part 391, Design Criteria for Sludge Application on Land). These samples were submitted to SMAD for chemical and physical analysis.

The results of these analyses are enclosed as Attachment 1. Data from the physical soil analyses indicate that the surficial soils of the proposed site (i.e., 0-24 inches below the surface), as well as the shallow subsoil (24-36 inches below the surface), are all loam soils. The geology of the station area suggests that these soils were probably derived from glacial till and, therefore, should be considered loam tills. Through use of the LaSalle County Soil Survey (Soil Conservation Service, 1972), it has been determined that the soils of the proposed land application site are part of the Flanagan/Drummer/Catlin soil association. These soils are considered very good agricultural soils; the Soil Conservation Service places no restrictions on their use. The soils of this association are also considered acceptable for use as a land application site by the IEPA (Section 391.404j).

Consideration of the chemical analyses performed on the soils of the proposed site also suggests that the site is acceptable for land application of sewage sludge. Soil pH levels of all samples are equal to or in excess of the IEPA limit of 6.5 (Section 391.404d). The cation exchange capacity of all soil samples is far in excess of the minimum required for sewage sludge application (5 meq/100 g). The soluble salt content of the soils is not considered excessive by agronomic standards.

The concentrations of the principal plant nutrients (nitrogen, phosphorus, and potassium) measured in these soils are, for the most part, considered normal. Of some concern, however, are those measurements of total Kjeldahl nitrogen, total phosphorus, and plant-available phosphorus determined to be below the detection limit of the analytical procedure employed. When compared to the ample amounts of Kjeldahl nitrogen and phosphorus detected in the other soil samples, such low levels are surprising. While the cause of these low levels is unclear, it may be prudent to collect additional soil samples for analysis of these parameters at some time in the future.

To summarize, it would appear that the proposed site is well suited as a location for the land application of sewage sludge. However, without a complete analysis of the sewage sludge itself, estimates of the capacity of the proposed site to accept/absorb sewage sludge cannot be made. Such estimates are required as part of a land application permit application. Since the amounts of sludge that would be land applied annually are thought to be relatively small (approximately 45,000 g/yr), it is unlikely that the capacity of the proposed site would be exceeded.

At this point in time, we do not feel we can pursue the permitting of this land application site further until the status of the sewage sludge is clarified by the Nuclear Regulatory Commission (NRC). If the material can be exempted from being considered as trace-contaminated by the NRC and land applied as sewage sludge without special precautions, we will then prepare the agronomic calculations and sludge management plan required as part of the IEPA application.

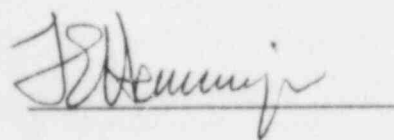
To complete the sludge management plan, the following analyses of sewage sludge from the LaSalle County Station will eventually have to be conducted:

- | | | |
|---|--------------------|------------------------|
| - % Total Solids | - Total Phosphorus | - Ni Content |
| - % Volatile Solids | - Total Potassium | - Zn Content |
| - pH | - As Content | - Radionuclide Content |
| - Volatile Acids (if
anaerobic digestion
is used) | - Cd Content | - PCB Content |
| - Total Kjeldahl Nitrogen | - Cr Content | |
| - Ammonia Nitrogen | - Cu Content | |
| | - Hg Content | |
| | - Mn Content | |

Should you have any questions regarding this matter, please contact me.



Mark J. Knight

Approved: 

6177E
MJK:dd

cc: S. K. Winship
J. Arand
P. Noska
File: 12-PER-N4

Isotopic Summary of Sewage Treatment Plant Sludge
at LSCS

TABLE 1

Isotope	uCi/ml (AVG)	uCi/ml (High)
Co-60	7.3×10^{-8}	1.0×10^{-7}
Co-58	3.6×10^{-8}	4.0×10^{-8}
Mn-54	8.1×10^{-8}	2.0×10^{-7}

Calculation for dose to person occupying center of land application area.

Refer to pages 3,4 and 5 of this attachment for dose due to individual isotope.

Source radius R = 100 m
 Earth Shielding = 0 inches
 Source Thickness = 3 feet (sludge applied > 3ft thick does not affect dose rates because of self shielding effects from the sludge)

Dose rate for 10^{-6} uCi/cc source (Administrative limit)		Normalized dose rate for isotopic source (Table 1 column 3 above)
Co-60	2.7×10^{-3} mrad/hr	2.7×10^{-4} mrad/hr
Co-58	2.0×10^{-3} mrad/hr	4.8×10^{-5} mrad/hr
Mn-54	9.8×10^{-3} mrad/hr	2.6×10^{-5} mrad/hr

Total 13.5×10^{-3} mrad/hr Total 3.4×10^{-4} mrad/hr

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Total ~ 3.4×10^{-4} mrad/hr

SARGENT LUNDYENGINEERS
CHICAGO

Calcs. For

Calc. No.

PR

Rev.

Date

Safety-Related

Non-Safety-Related

Page

of

Client

Prepared by

Date

Project

Reviewed by

Date

Proj. No.

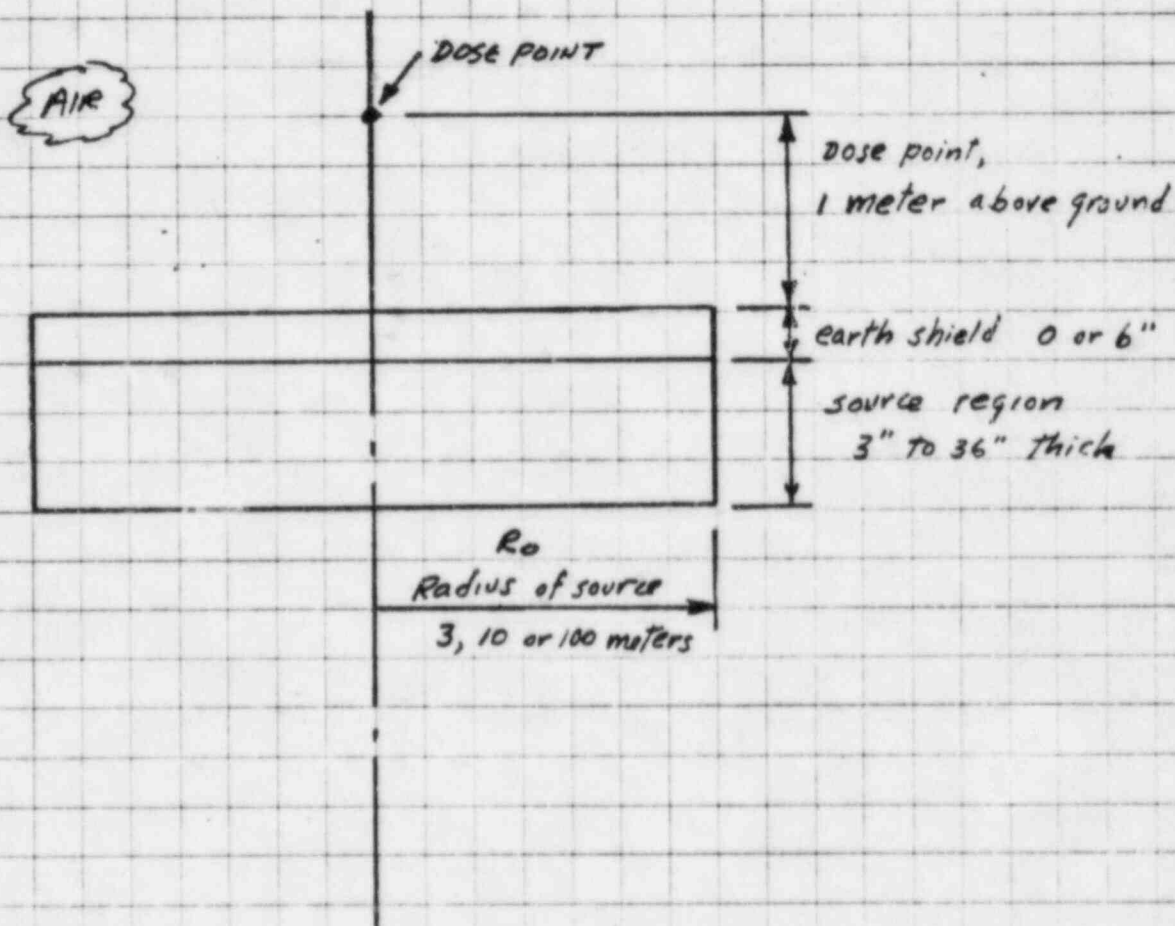
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Approved by

Date

DOSE RATE CALCULATIONS: FOR BURIAL OF WASTE SLUDGE

GEOMETRY



SOURCE

 10^{-6} $\mu\text{Ci/cc}$

Co-58

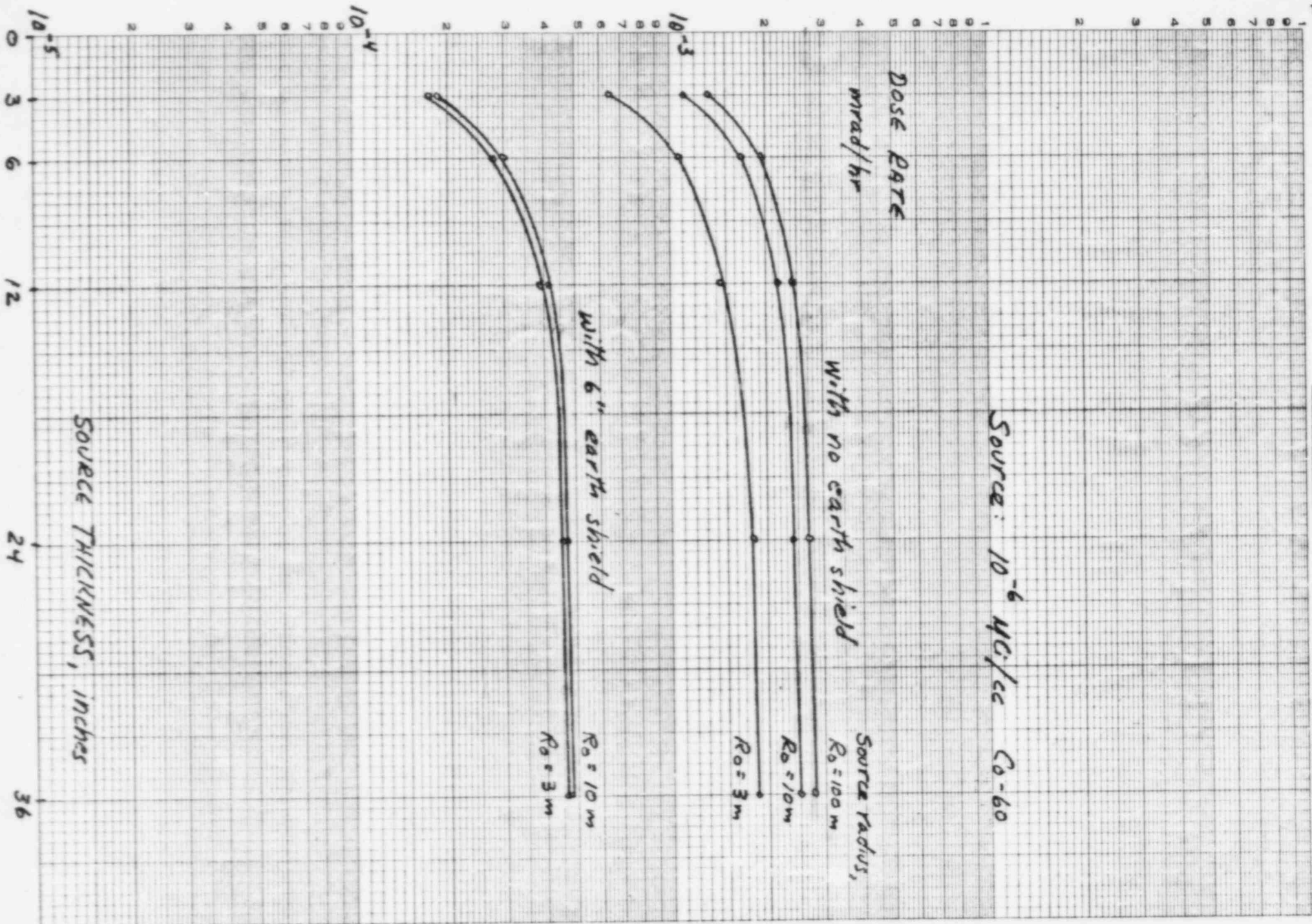
Co-60

Mn-54

Zn-65

Cs-134

Cs-137



Source: 10^{-6} $\mu\text{Ci/cc}$ Co-58

DOSE RATE
mrad/hr

with no earth shield

Source radius R_0

$R_0 = 100\text{ m}$

$R_0 = 10\text{ m}$

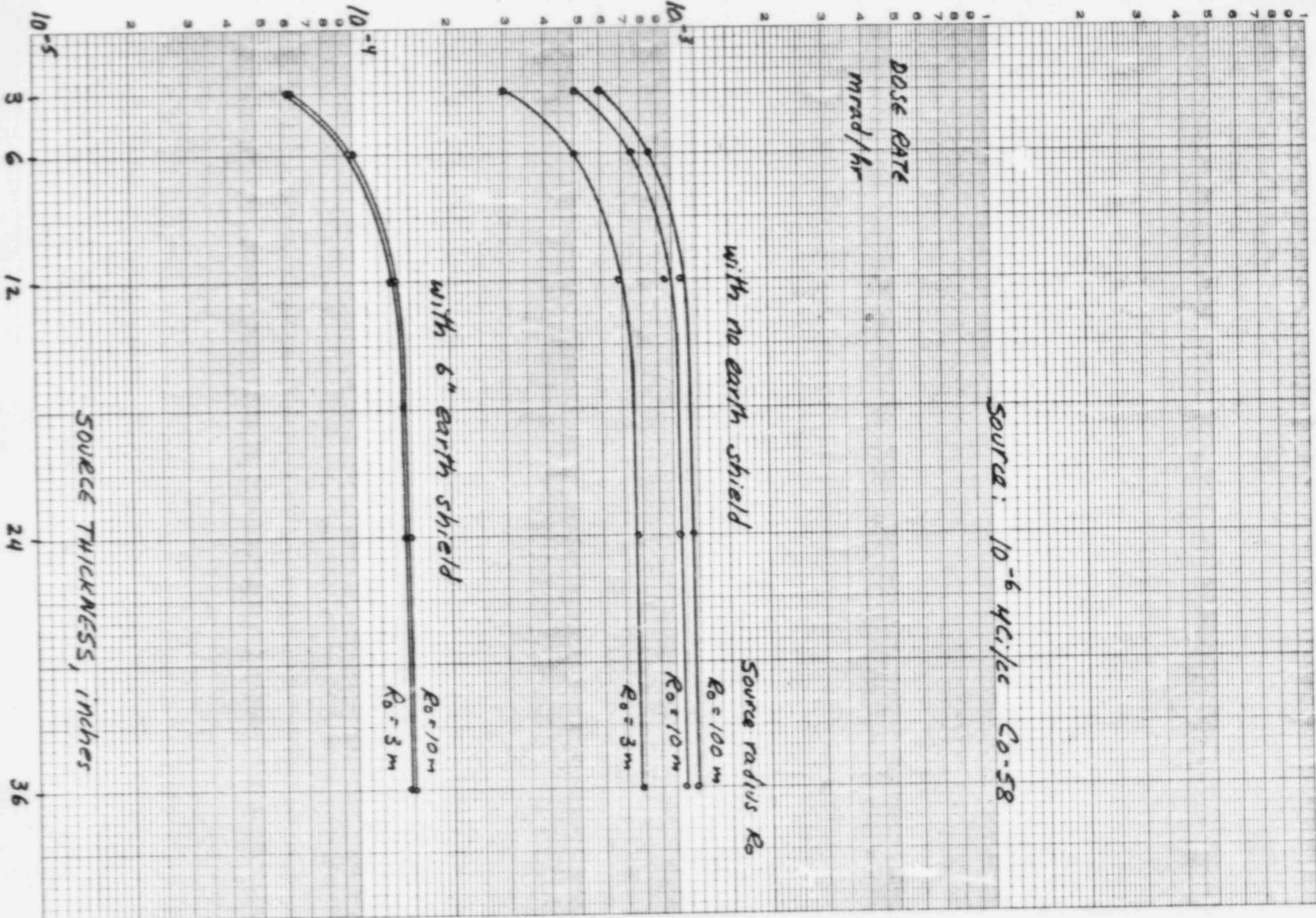
$R_0 = 3\text{ m}$

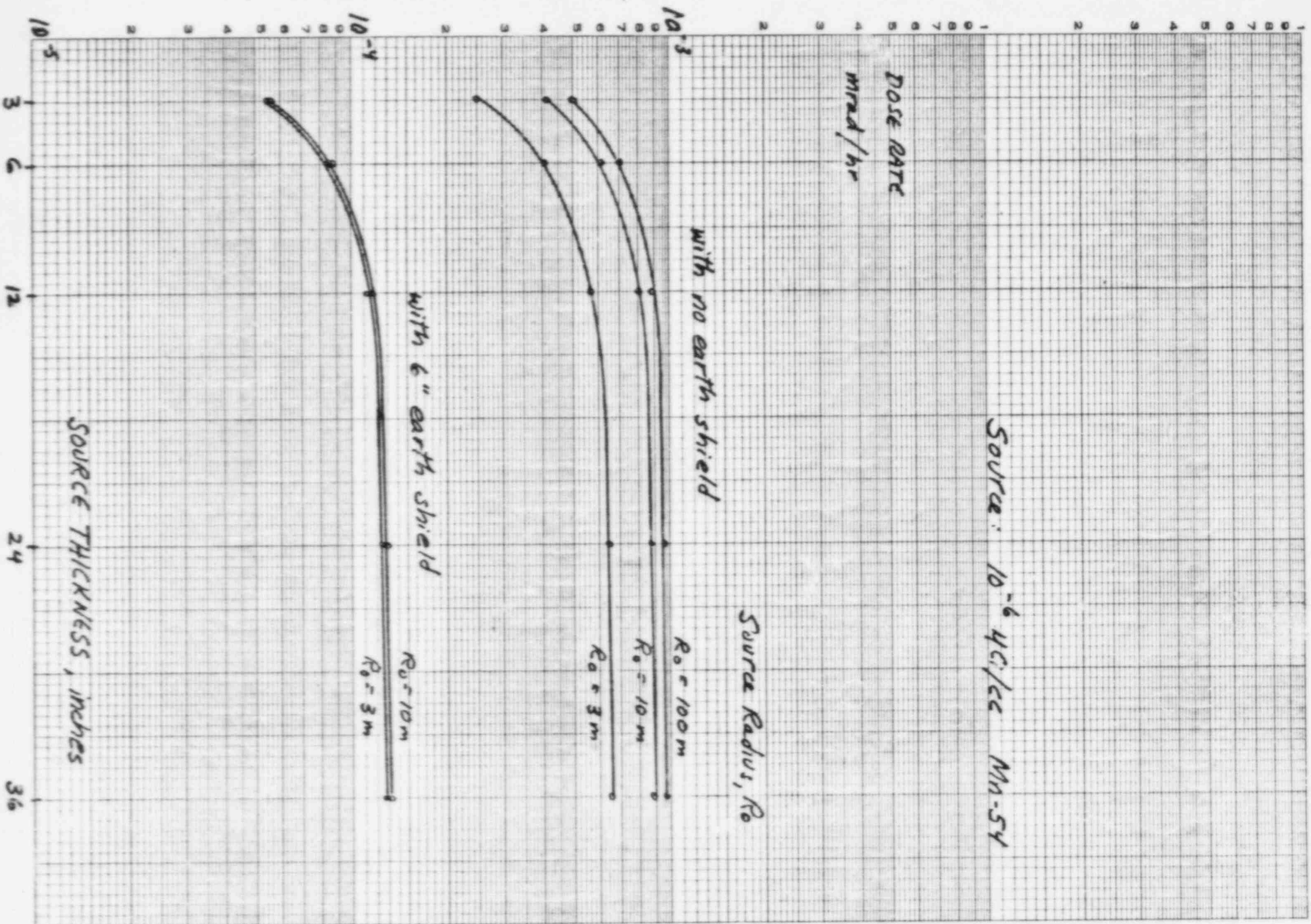
with 6" earth shield

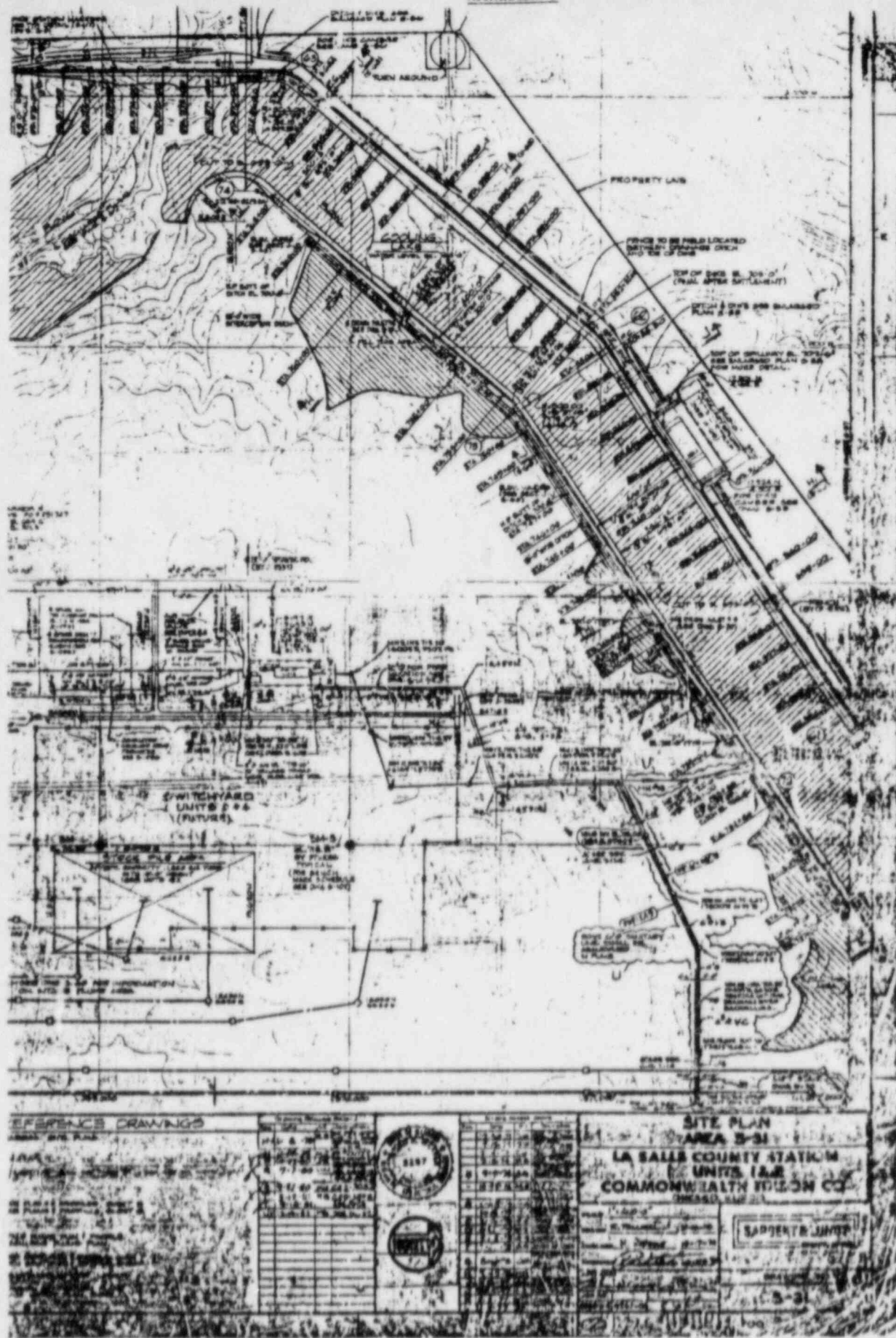
$R_0 = 10\text{ m}$

$R_0 = 3\text{ m}$

SOURCE THICKNESS, inches

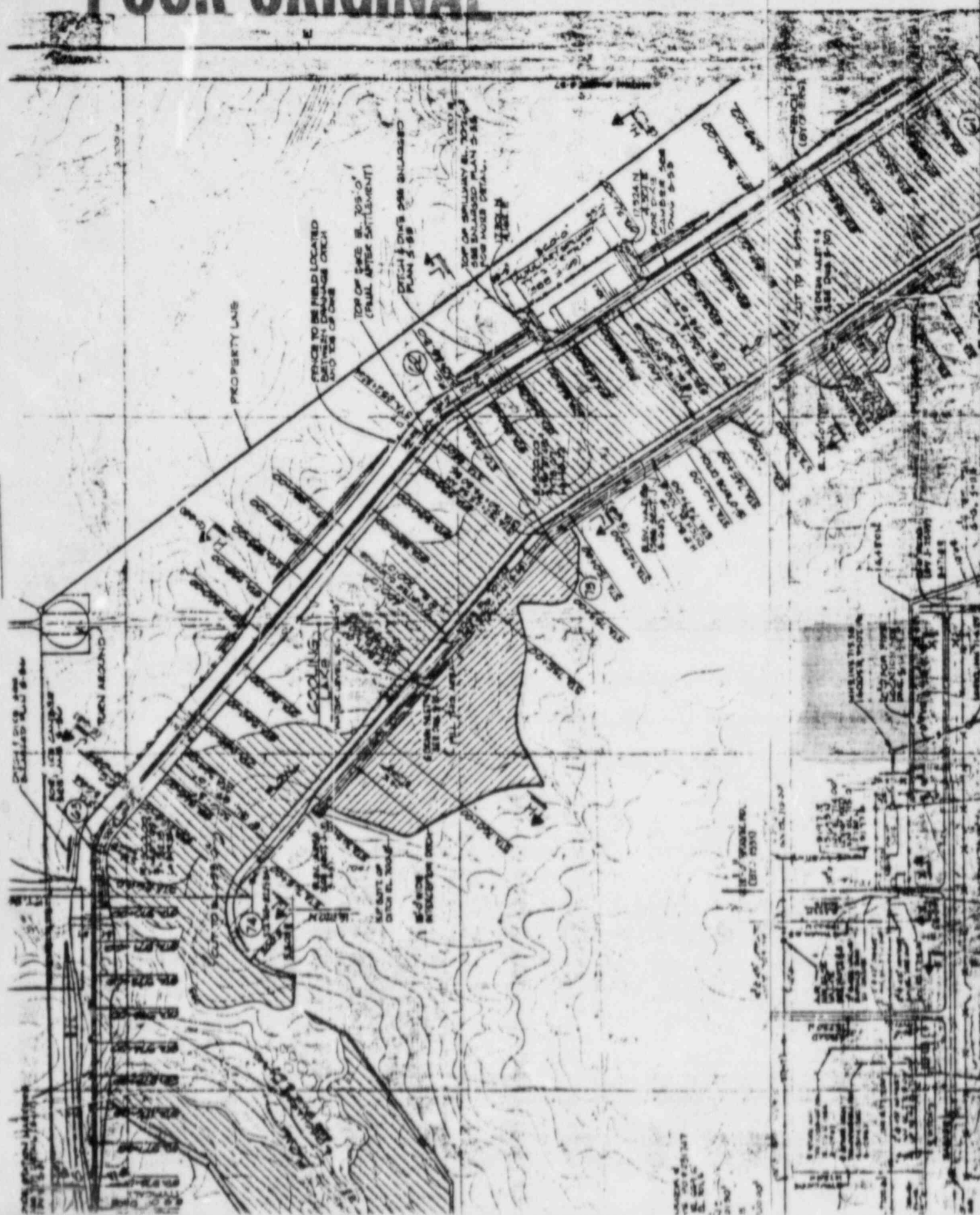


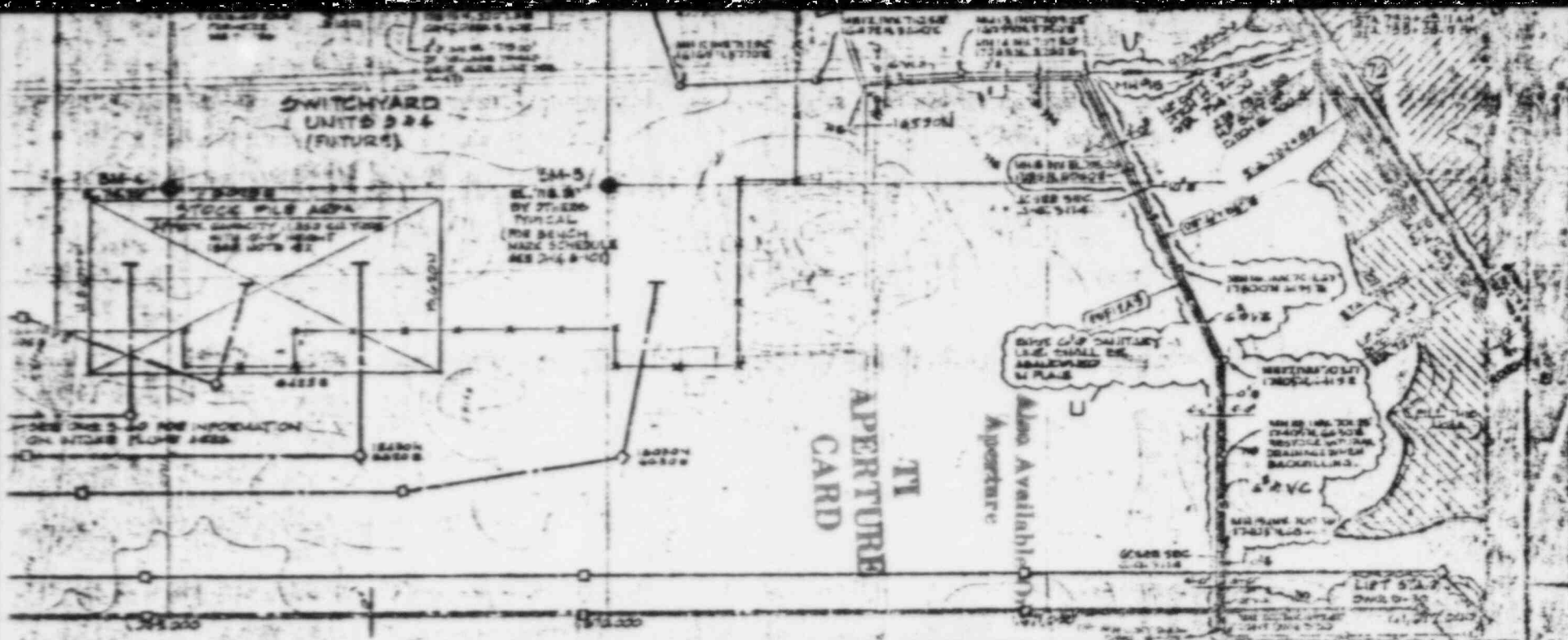




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ATTACHMENT 5





REFERENCE DRAWINGS		Drawing Number		Drawing Number		SITE PLAN	
Area	Drawing Number	Area	Drawing Number	Area	Drawing Number	Area	Drawing Number
AREA 1	1-1	AREA 2	2-1	AREA 3	3-1	AREA 4	4-1
AREA 5	5-1	AREA 6	6-1	AREA 7	7-1	AREA 8	8-1
AREA 9	9-1	AREA 10	10-1	AREA 11	11-1	AREA 12	12-1
AREA 13	13-1	AREA 14	14-1	AREA 15	15-1	AREA 16	16-1
AREA 17	17-1	AREA 18	18-1	AREA 19	19-1	AREA 20	20-1
AREA 21	21-1	AREA 22	22-1	AREA 23	23-1	AREA 24	24-1
AREA 25	25-1	AREA 26	26-1	AREA 27	27-1	AREA 28	28-1
AREA 29	29-1	AREA 30	30-1	AREA 31	31-1	AREA 32	32-1
AREA 33	33-1	AREA 34	34-1	AREA 35	35-1	AREA 36	36-1
AREA 37	37-1	AREA 38	38-1	AREA 39	39-1	AREA 40	40-1
AREA 41	41-1	AREA 42	42-1	AREA 43	43-1	AREA 44	44-1
AREA 45	45-1	AREA 46	46-1	AREA 47	47-1	AREA 48	48-1
AREA 49	49-1	AREA 50	50-1	AREA 51	51-1	AREA 52	52-1
AREA 53	53-1	AREA 54	54-1	AREA 55	55-1	AREA 56	56-1
AREA 57	57-1	AREA 58	58-1	AREA 59	59-1	AREA 60	60-1
AREA 61	61-1	AREA 62	62-1	AREA 63	63-1	AREA 64	64-1
AREA 65	65-1	AREA 66	66-1	AREA 67	67-1	AREA 68	68-1
AREA 69	69-1	AREA 70	70-1	AREA 71	71-1	AREA 72	72-1
AREA 73	73-1	AREA 74	74-1	AREA 75	75-1	AREA 76	76-1
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AREA 81	81-1	AREA 82	82-1	AREA 83	83-1	AREA 84	84-1
AREA 85	85-1	AREA 86	86-1	AREA 87	87-1	AREA 88	88-1
AREA 89	89-1	AREA 90	90-1	AREA 91	91-1	AREA 92	92-1
AREA 93	93-1	AREA 94	94-1	AREA 95	95-1	AREA 96	96-1
AREA 97	97-1	AREA 98	98-1	AREA 99	99-1	AREA 100	100-1

LA SALLE COUNTY STATION
UNITS 1 & 2
COMMONWEALTH Edison CO.
CHICAGO, ILL. 60601

DATE: 1-1-60
DRAWING NO. 3-31

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