UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

January 29, 1996

Mr. James J. McGovern
President/Plant Manager
Cintichem, Inc.
P.O. Box 816
Tuxedo, New York 10987

Dear Mr. McGovern:

Enclosed is a copy of the trip report summarizing my inspection accompaniment of November 28, 1995. By this letter, I am also sending copies of the report to the Cintichem service list (see below).

If you have any questions, please contact me at (301) 415-6749.

Sincerely,

Dominick A. Orlando, Project Manager
Low-Level Waste and Decommissioning
Projects Branch
Division of Waste Management
Office of Nuclear Material Safety
and Safeguards

Docket Nos.: 70-687 50-54
License Nos.: SNM-639 R-81

Enclosure: As stated

cc: P. Merges
R. Aldridge
A. Dorozynski
Director, Technical
Development Programs
State of NY Energy Office
A. Gartner
B. Youngberg

January 29, [illegible]6

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dose conversion factor

BEDROCK DCF
Hot Lab

Industrial Intruder Scenario - Onsite Worker

- Internal Dose (inhalation/ingestion)

Sr^{90}	1084 pCi/gm per mRem
Cs^{137}	3635 pCi/gm per mRem

> 800 hrs wel std inhalation

- Direct Dose

Sr^{90}	no limit
Cs^{137}	0.63 pCi/gm per mRem/yr
Co^{60*}	0.157 pCi/gm per mRem/yr
Ag^{108m*}	0.228 pCi/gm per mRem/yr

> in hot spot

*Present in one core hole Southwest corner of T1 Room.

BEDROCK DCF
Hot Lab

Industrial Intruder - Offsite Rock User (Driveway)

- Direct Dose

Sr^{90}	N/A
Cs^{137}	2.75 pCi/gm per mRem/yr

- Internal Dose (inhalation/ingestion)

Sr^{90}	815 pCi/gm per mRem/yr
Cs^{137}	2733 pCi/gm per mRem /yr

BEDROCK DCF
Hot Lab

Onsite Resident - no direct dose because soil covers rock

- Internal Dose (drinking water pathway)

Sr^{90}	12.8 pCi/gm per mRem/yr
Cs^{137}	1443 pCi/gm per mRem/yr

HOT LAB BEDROCK DATA SUMMARY
(As of November 17, 1995)

- Bore holes drilled: 42
- Samples obtained: 395

Cs^{137} Data:

- 158 positive out of 395 analyzed
- Mean: 0.76 pCi/gm*
- Range: 0 - 35 pCi/gm

Sr^{90} Data:

- 135 positive out of 363 analyzed
- Mean: 0.18 pCi/gm*
- Range: 0 - 4.43 pCi/gm

*MEAN is biased high, due to inclusion of many biased core samples from a known hot spot fissure.

DOSE ANALYSIS SUMMARY - all Cs^{137}

Industrial Intruder - Onsite Worker

- MEAN Direct Dose: 1.2 mRem/yr
- Hot Spot Direct Dose (~24m^2 area in T1/Evaporator area)
  - from surface, as is : 17 mRem/yr (2000 hr on hotspot)
  - disturbed rock to produce maximum surface contamination: 29 mRem/yr (2000 hr on hotspot)
- Internal Dose (inhalation and ingestion) $3.7E^{-4}$ mRem/yr

Total MEAN Dose = 1.2 mRem/yr*

*One time dose during intrusion for rock removal.

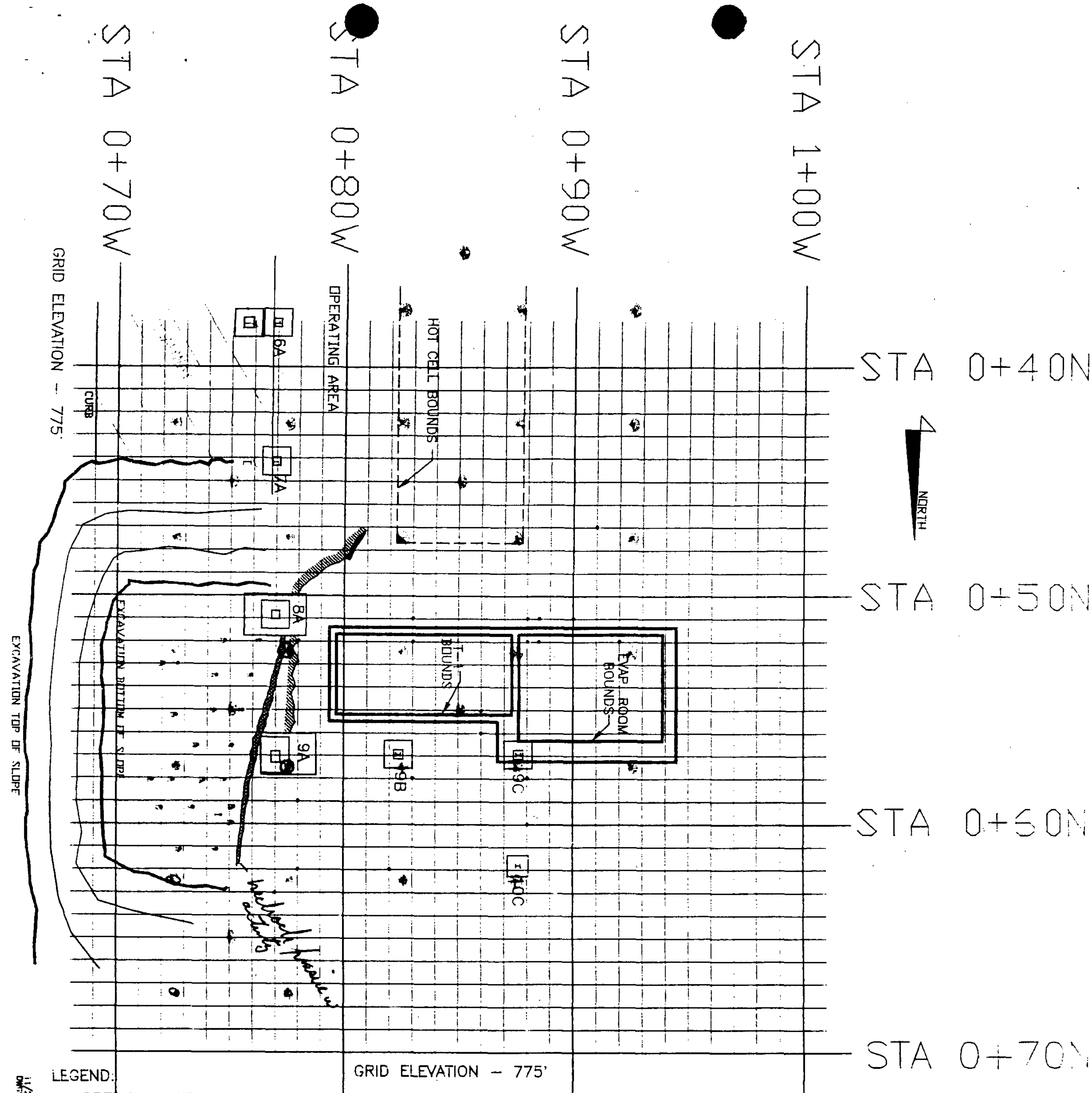
Industrial Intruder - Offsite Rock User (Driveway)

- Direct Dose: 0.28 mRem/yr
- Internal Dose (inhalation and ingestion): $5E^{-4}$ mRem/yr

Total Dose **0.28 mRem/yr**

Onsite Resident

- Groundwater use 0.015 mRem/yr



11/20/95

LEGEND:

GREEN - CLEAN
YELLOW - < 0.1 Rel.Criteria
MAGENTA - < 1.0 Rel.Criteria
RED - Above Rel.Criteria

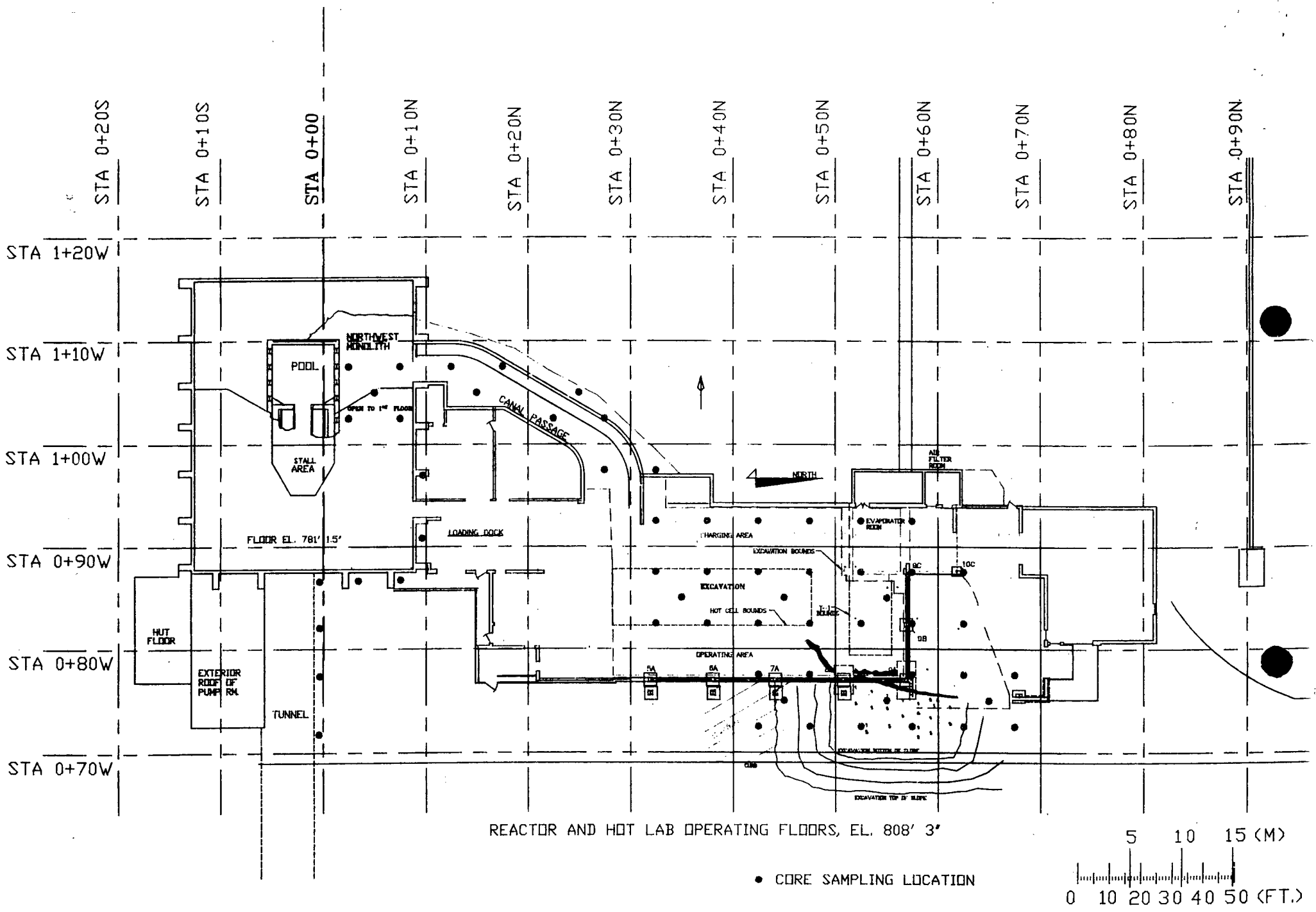


FIG. A TYPICAL SYSTEMATIC BEDROCK SAMPLING LOCATIONS

11/20/95
DWGS\2948A

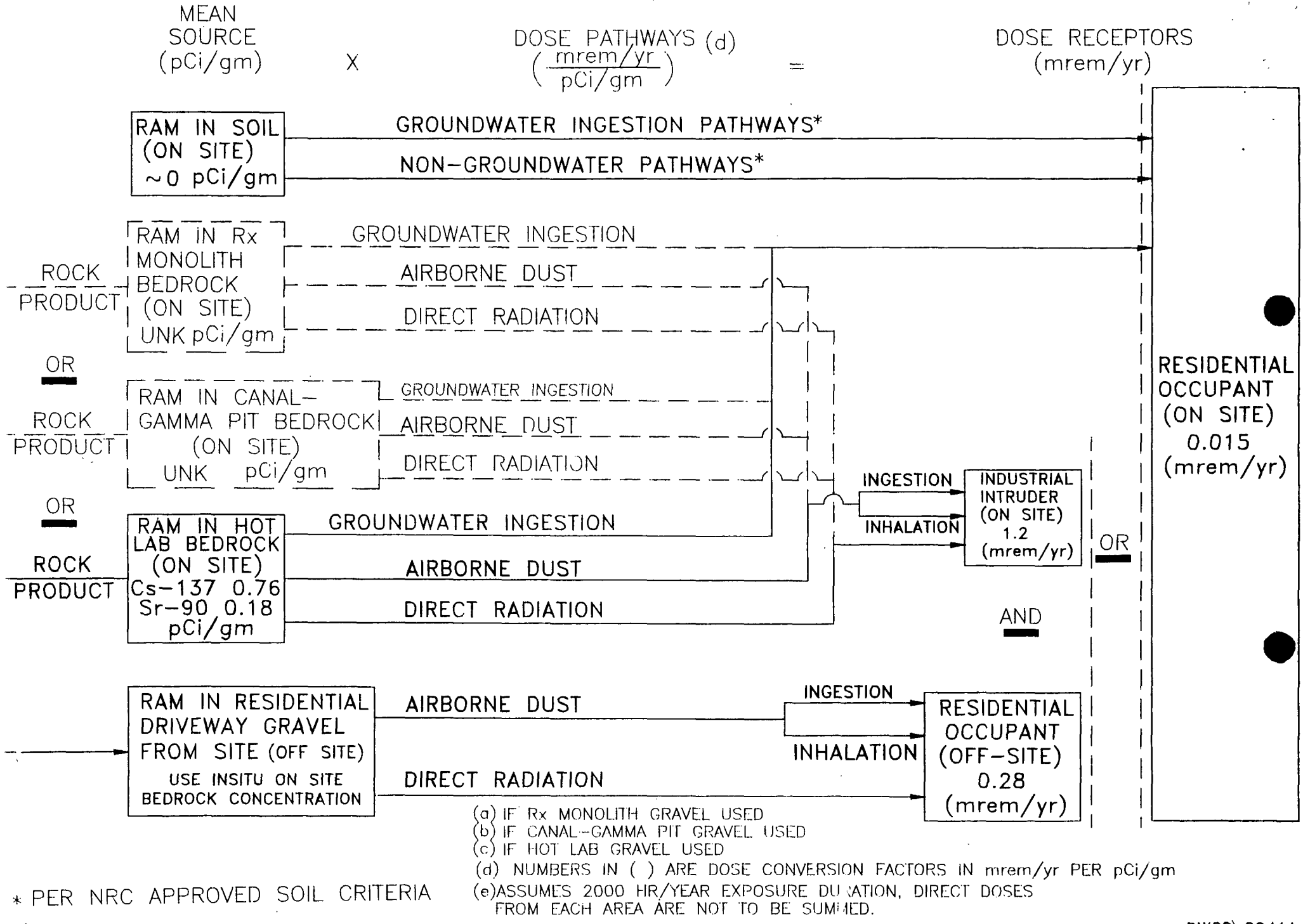


FIGURE 1: RADIATION DOSE PATHWAY LOGIC DIAGRAM FOR RAM IN BEDROCK

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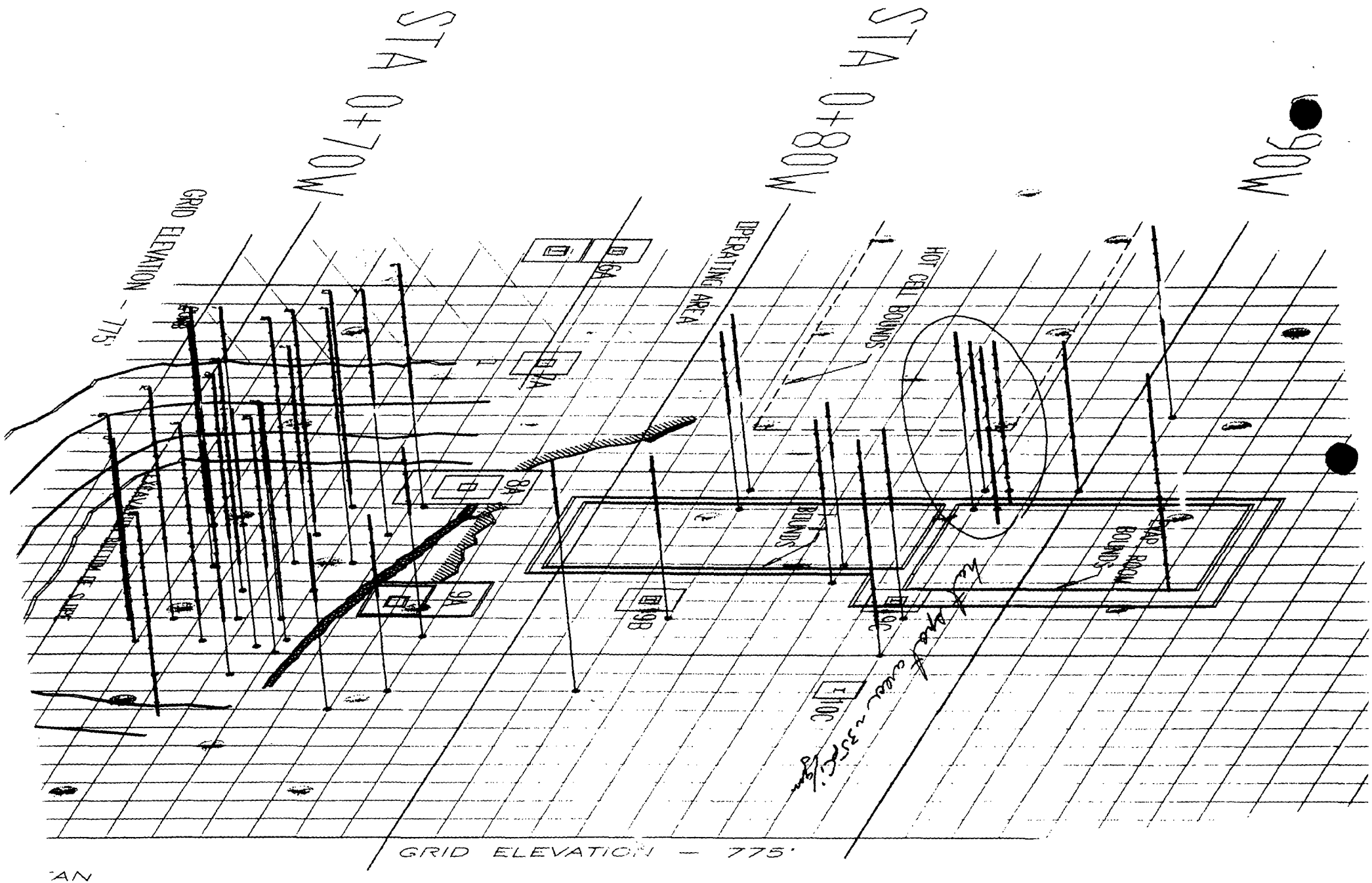
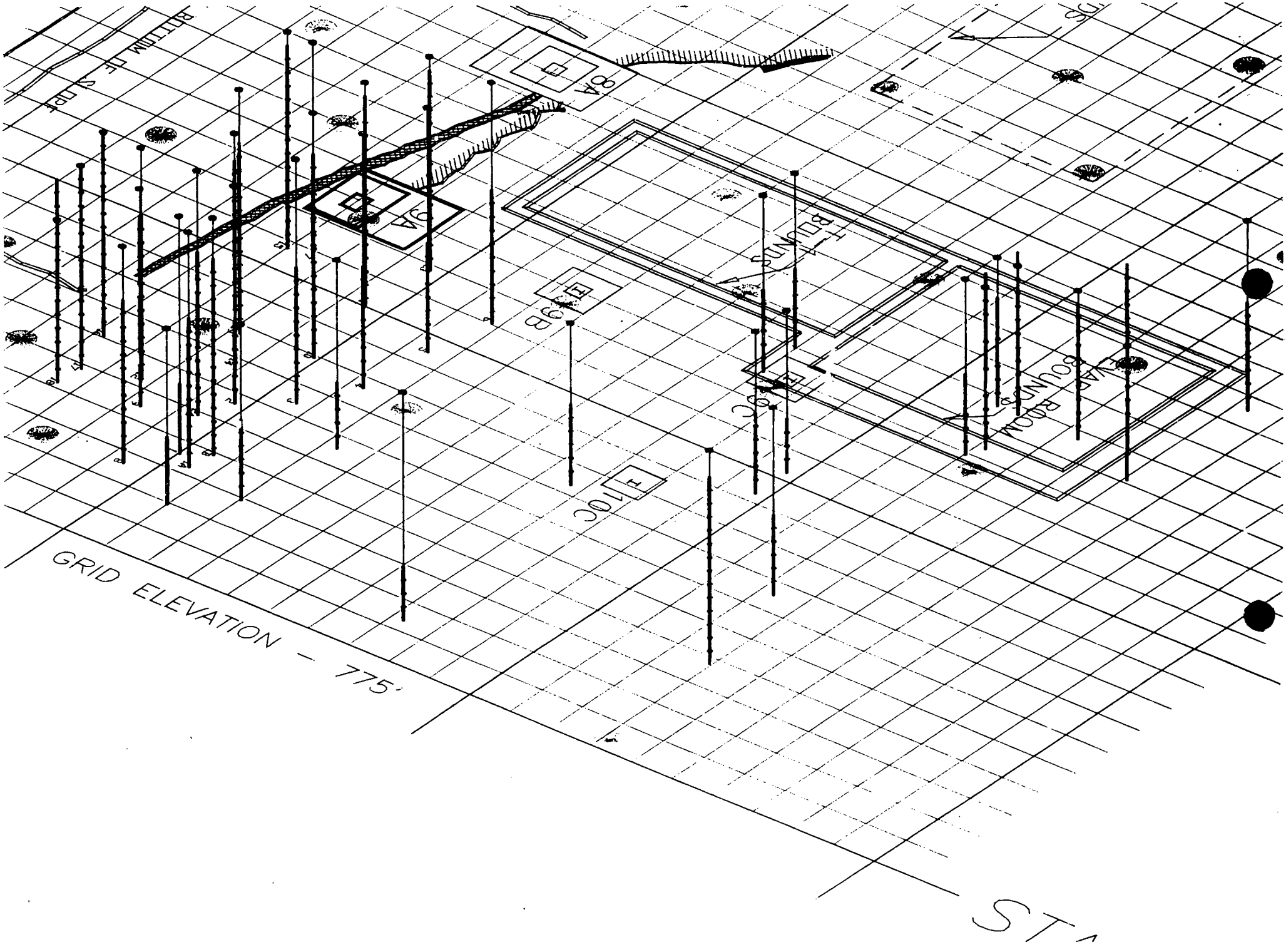
11/22/95


STA 0+70W
STA 0+80W
90W
GRID ELEVATION - 775'
OPERATING AREA
HOT CELL BOUNDS
GRID ELEVATION — 775'


GRID ELEVATION – 775'
8A
9A
9B
10C
10C
SQUASH COURTS
SQUASH COURTS

New York State Department of Environmental Conservation
Division of Hazardous Substances Regulation

Technical
Administrative
Guidance
Memorandum

TAGM

Insert in

TECHNICAL MANUAL

Memorandum: 4003	Page 1 of 6
Subject: Cleanup Guideline for Soils Contaminated with Radioactive Materials	
Date: SEP 14 1993	
☒ New ☐ Obsolete ☐ Supersedes Memo No. _____	

I. PURPOSE

This TAGM describes the policy and procedure to be followed by Division of Hazardous Substances Regulation, Bureau of Radiation staff in evaluating cleanup plans for soils contaminated with radioactive materials.

The purpose of this cleanup guideline is to provide for:

(1) protection of public health and the environment, and

(2) consistency in implementing remedial actions at sites contaminated with radioactive materials.

II. POLICY

The total effective dose equivalent to the maximally exposed individual of the general public, from radioactive material remaining at a site after cleanup, shall be as low as reasonably achievable and less than 10 mrem above that received from background levels of radiation in any one year.

The radiation dose received from an exposure to soils contaminated by radionuclides will strongly depend on the time of exposure and pathways by which the radionuclides or their decay products can come in contact with an individual. For this reason, the estimated annual dose resulting from exposure to any residual radionuclides in the contaminated area is the basis for establishing site-specific cleanup criteria. The dose estimate is to be based on the contaminating radionuclides, but not on background concentrations of any radionuclides that may be at the site. Background radiation refers to:

(1) local area concentrations of naturally occurring radionuclides,

(2) cosmic radiation, and

(3) radionuclides of anthropogenic origin which have been regionally dispersed and are present at low concentrations (such as fallout from the testing of nuclear weapons).

III. PROCEDURE

The process of determining the appropriate cleanup requirements will generally involve measurements of radioactivity at the site, laboratory analysis of soil samples for concentrations of radioactive materials, modeling of expected doses based on the measurements and analyses performed, and evaluation of site remediation alternatives. The modeling will require determination of site characteristics critical to the migration of radionuclides, and will need to be referenced to reasonable scenarios for current and plausible future uses of the land. Consideration of the time period during which the radioactive material is expected to persist at the site will be important in the selection of scenarios for land use. The estimated dose limit of 10 mrem/year refers to land released for unrestricted use. If unrestricted use scenario calculations result in dose estimates that are greater than 10 mrem/year, it may be necessary to invoke institutional controls and/or deed restrictions so that actual doses from allowed uses are not likely to exceed 10 mrem/year.

A. Dose Analysis Methods

Analysis methods used must be acceptable to the DEC Division of Hazardous Substances Regulation, Bureau of Radiation. The methods used should be appropriate to the complexity of the contaminated site and to the potential for harm. The primary criterion is that the analysis yield conservative results, i.e., the results of the analysis, must predict doses no lower than are likely to actually occur. This principle should be applied to both

the analysis methods and to the site-specific inputs required for any models used in the evaluation.

All reasonable pathways of exposure shall be considered when determining the estimated dose to individuals. Approval of the procedures used in, and the interpretation of, each step of the analysis must be obtained from NYSDEC. The steps to be followed are:

1. Perform a site assessment. This involves determining exposure levels at the site, the extent of the contamination, and concentrations of radionuclides in the contaminated areas. Care must be taken that the appropriate instrumentation is used for detecting radiation at the site (gamma, beta, alpha, or neutrons). Concentration profiles as a function of depth in the soil should be determined. Where possible, the chemical and physical forms of the radionuclides should be determined. It should be possible from this data to characterize the locations and concentrations of all radionuclides which can significantly contribute to the dose potentially received from the site. When modeling the site characteristics, and the migration of radionuclides within and from the site, it will be necessary to show that the site parameters used will cause the dose estimates to be conservative.

   During on-site investigation, staff and contractors must abide by all appropriate requirements and Departmental policies related to personal protection and by any applicable health and safety plans. At sites where non-radioactive contaminants are known to be present, staff should contact appropriate persons from other involved Bureaus, Divisions, or Agencies as to health

and safety and coordination of activities. If non-radioactive chemical contamination (where not previously known) is suspected at a site, be it by observation and/or analysis, the appropriate regulatory staff should be notified.

2. Provide a review of current land use and a rationale for potential use of the site. Use this information to estimate possible occupancies for the site and review how different plausible uses of the site can contribute to exposures. Keep in mind that the maximally exposed individual of concern is a member of the general public not associated with the use of radioactive materials. This is usually a resident, but may also be a worker at a business not licensed to used radioactive materials. Radiation exposure to workers at facilities with radioactive materials is regulated by the licensing agency under the New York State Industrial Code (New York State Department of Labor) or the New York State Sanitary Code (New York State Department of Health).

3. Analyze all reasonable pathways. Only when pathways can be shown to contribute insignificantly to the dose, can they be eliminated from further consideration. Pathways that must be considered are:

   (a) Doses from direct exposure to radiation emitted from the contaminated soil and, where applicable, from contaminated ground or surface water.

   (b) Doses from internal exposure - including inhalation of contaminated dust (including radon progeny if present), ingestion of contaminated soil, ingestion of food raised on contaminated

soil, and ingestion of drinking water (both aquifer and surface waters) or contaminants from irrigation water.

B. Analysis of Remediation Alternatives

Remediation techniques should be evaluated for effectiveness at meeting the 10 mrem/year dose limit, at keeping radiation doses as low as reasonably achievable, and at minimizing the creation of radioactive waste. If site remediation is needed to achieve the 10 mrem/year dose limit, it will be necessary to prepare a work plan that is acceptable to NYSDEC and other cognizant agencies (NYSDOL, NYSDOH).

Acceptable remediation procedures might include:

(1) Removal of contaminated soil for disposal at a licensed facility.

(2) Isolation of contamination such as covering the contamination with clean soil. This technique may be acceptable for short-lived isotopes assuming that restrictions to land use are used until the radionuclides no longer pose a threat.

(3) Other remediation techniques, if applicable, considered and approved on a case-by-case basis.

Remediation alternatives should be evaluated for exposures which will occur to workers, staff and the general public during corrective action/remedial activities. Appropriate health and safety plans should be prepared or referenced for construction and monitoring activities (see also item C.(1) below).

Remedial alternatives should also be evaluated for the potential to cause significant damage to sensitive environmental or historical areas (see also item C.(2) below).

Special consideration must be given to sites contaminated with non-radioactive chemicals as to remedial alternatives and disposition of the resultant hazardous or "mixed" waste.

Before a site can be released for unrestricted use it will be necessary to confirm that the approved work plan has been completed successfully. This confirmation will include measuring exposure rates and/or measurements of residual radionuclide concentrations. The final modeling step will need to show that release of the site, with any radionuclide concentrations still remaining after remediation, will not cause the dose limit to be exceeded.

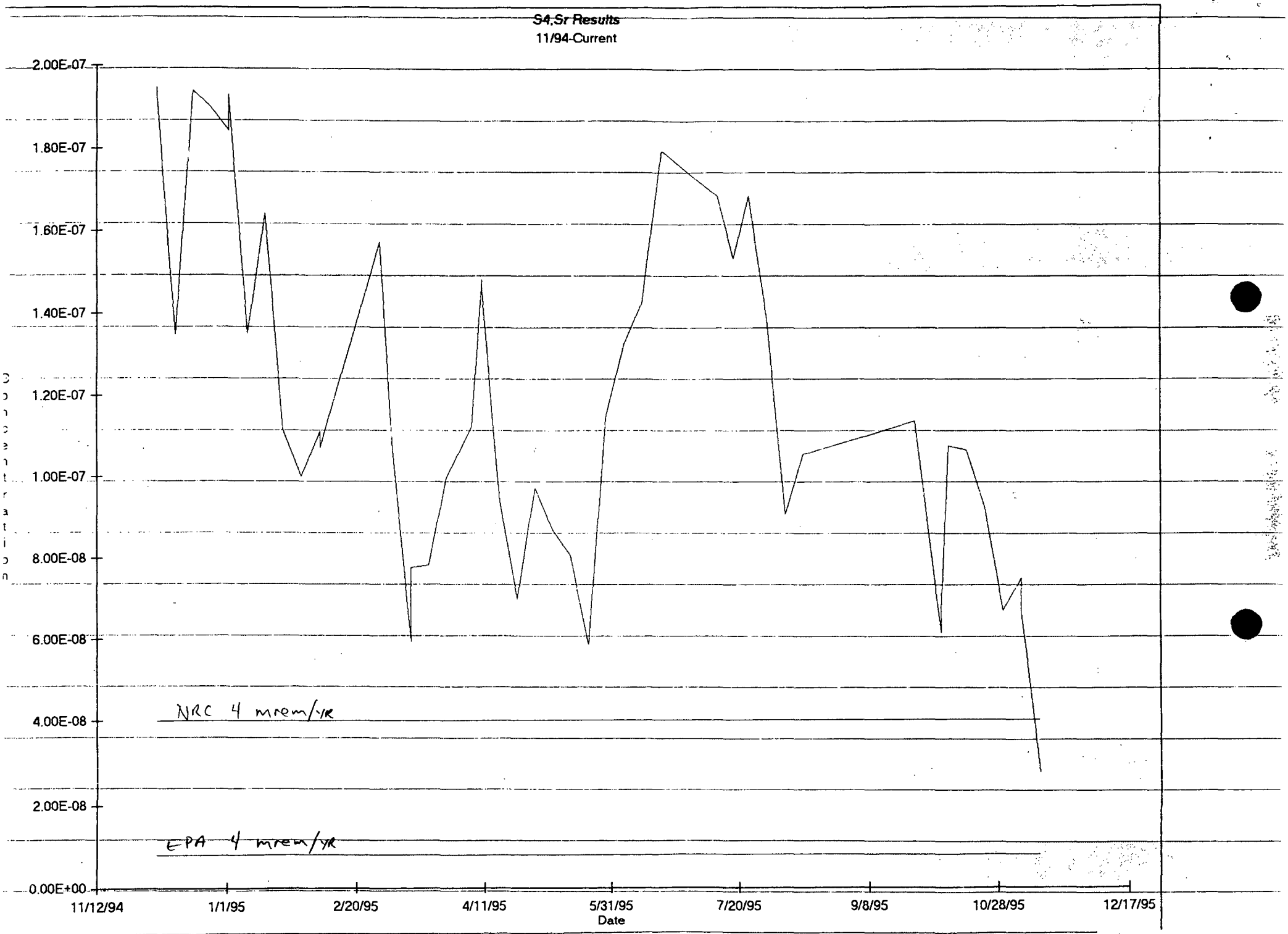
C. Alternative Procedures

There may be incidents/situations whereby:

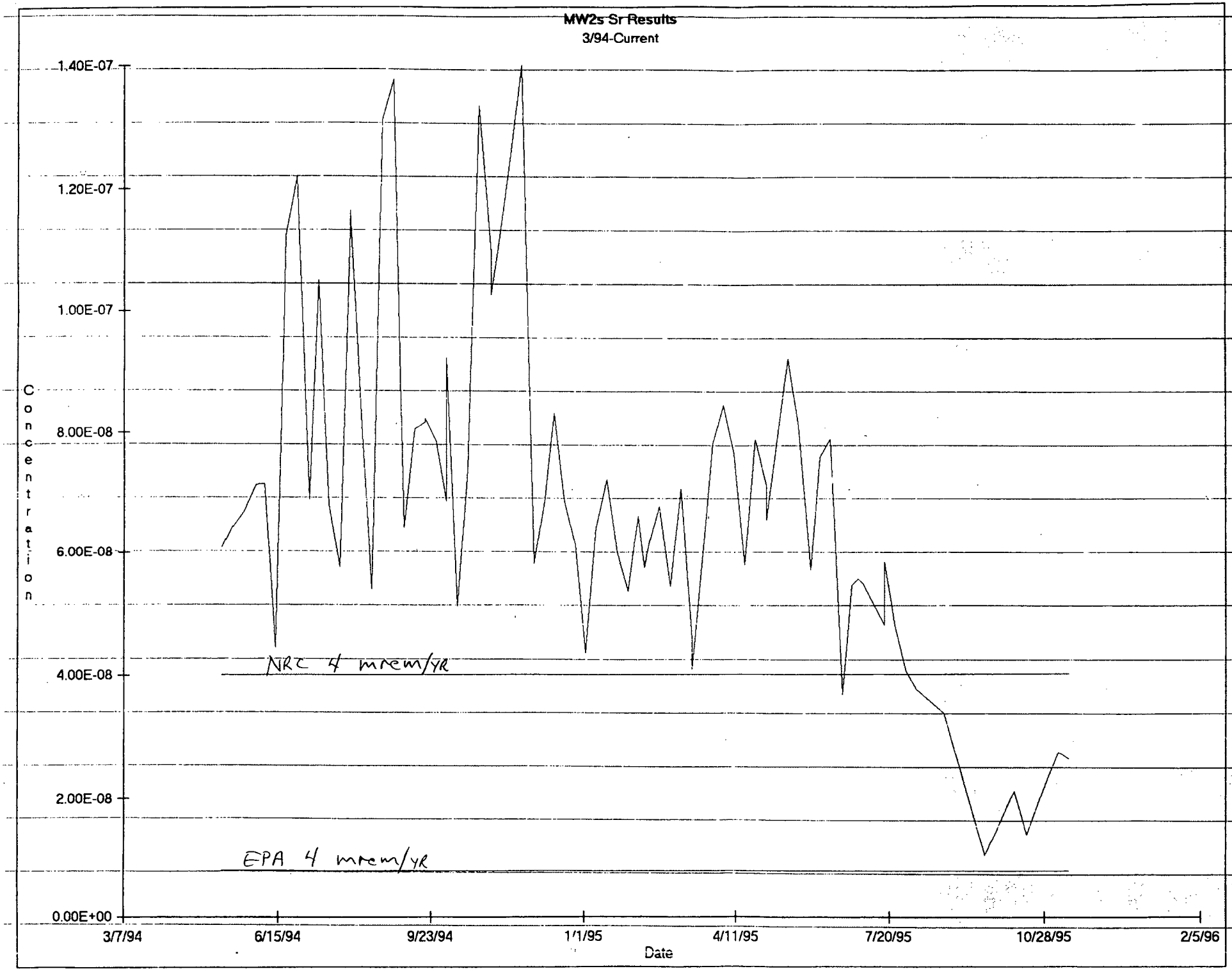
(1) the health and safety of individuals involved in a cleanup may necessitate acceptance of a dose greater than 10 mrem/year to the maximally exposed individual, or

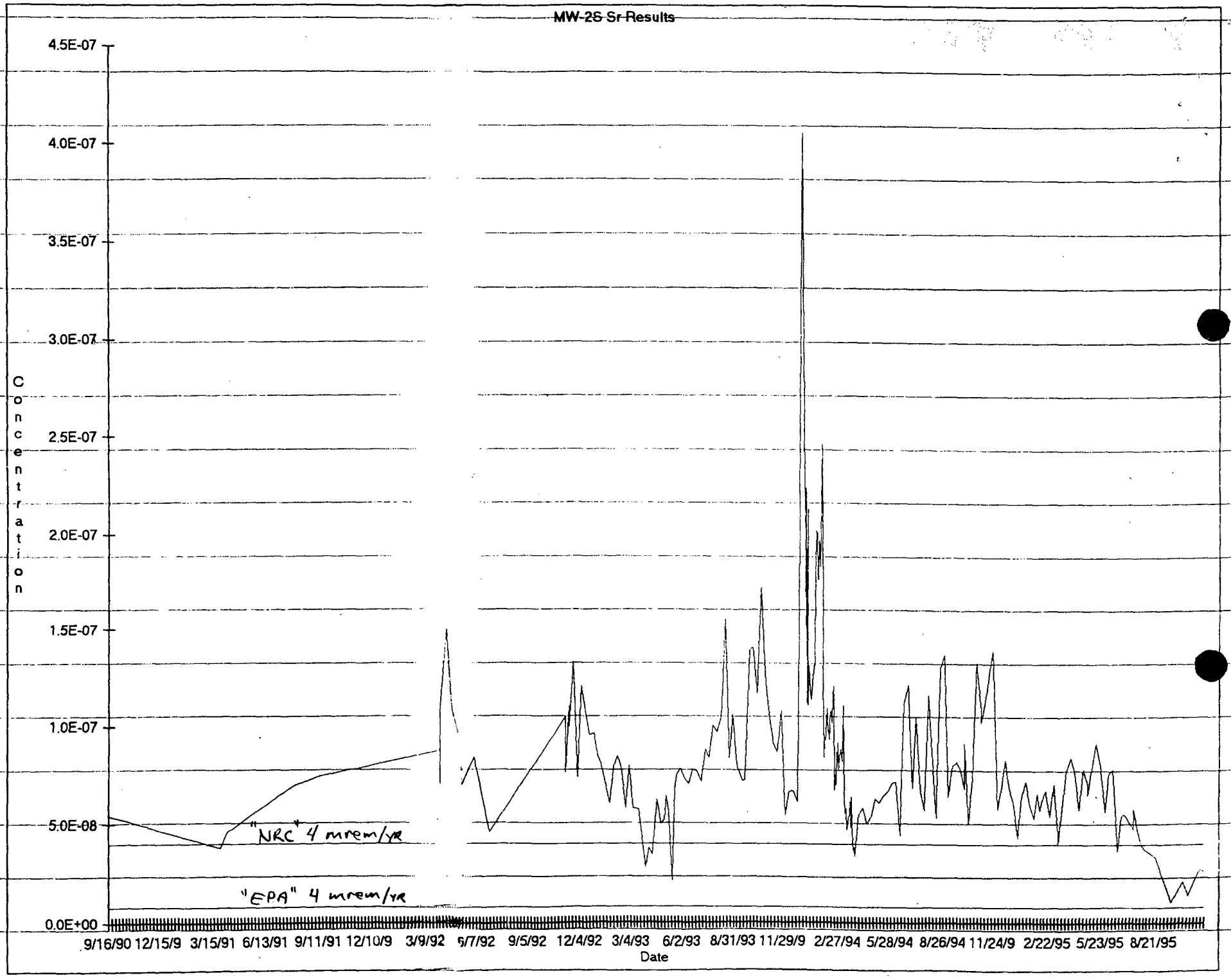
(2) the cleanup may cause irreversible destruction or loss of environmental habitat.

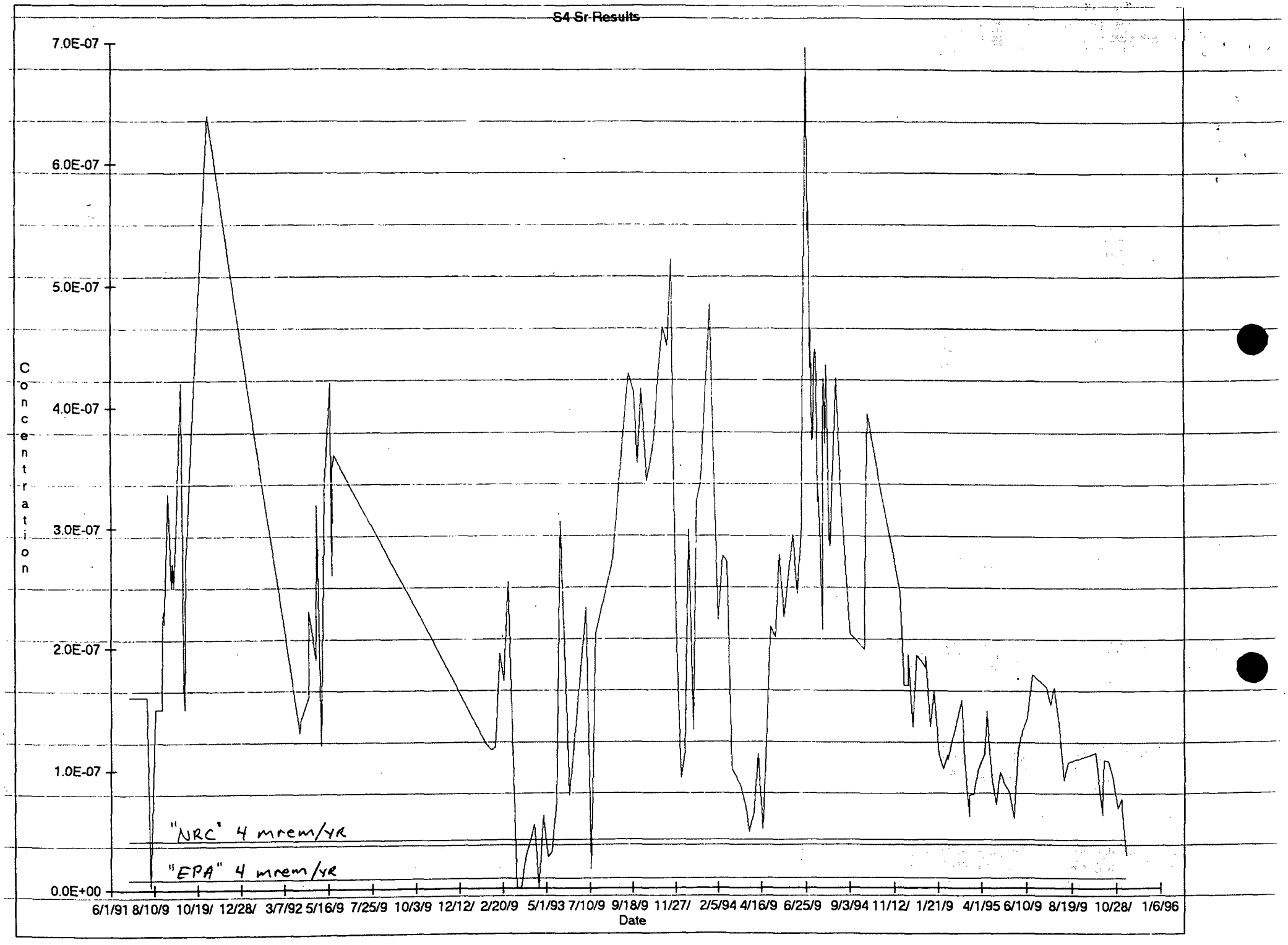
In such situations, remedial options will be evaluated on a case-by-case basis. Final decisions will be made by the Chief, Bureau of Radiation.



Attachment 3


MW2s Sr Results
3/94-Current
1.40E-07
1.20E-07
1.00E-07
8.00E-08
6.00E-08
4.00E-08
2.00E-08
0.00E+00
Concentration
NRC 4 mrem/yr
EPA 4 mrem/yr
3/7/94
6/15/94
9/23/94
1/1/95
4/11/95
7/20/95
10/28/95
2/5/96
Date


MW-2S Sr Results
4.5E-07
4.0E-07
3.5E-07
3.0E-07
2.5E-07
2.0E-07
1.5E-07
1.0E-07
5.0E-08
0.0E+00
Concentration
"NRC" 4 mrem/yr
"EPA" 4 mrem/yr
9/16/90 12/15/9 3/15/91 6/13/91 9/11/91 12/10/9 3/9/92 6/7/92 9/5/92 12/4/92 3/4/93 6/2/93 8/31/93 11/29/9 2/27/94 5/28/94 8/26/94 11/24/9 2/22/95 5/23/95 8/21/95
Date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6.0E-07
5.0E-07
4.0E-07
3.0E-07
2.0E-07
1.0E-07
0.0E+00
Concentration
"NRC" 4 mrem/yr
"EPA" 4 mrem/yr
6/1/91 8/10/9 10/19/ 12/28/ 3/7/92 5/16/9 7/25/9 10/3/9 12/12/ 2/20/9 5/1/93 7/10/9 9/18/9 11/27/ 2/5/94 4/16/9 6/25/9 9/3/94 11/12/ 1/21/9 4/1/95 6/10/9 8/19/9 10/28/ 1/6/96
Date