

7.2 Radiological/Chemical Data

This section contains the following data/maps:

7.2.1 Radiological Exposure Data for Accident Scenes

HEPA Dose Rate and Airborne/Ground Contamination Map
(+5-15 Minutes After Earthquake)

Tank 43 Siphon and Evaporator and Ground Shine Combined Dose Rate Map
(+15-45 Minutes After Earthquake)

HEPA Dose Rate and Airborne/Ground Contamination Plume Map
(+45 Minutes After Earthquake - Exercise Termination)

Off Hill Evaporator Airborne and Ground Contamination Map

Far East Pump House - Dose Rate Map

7.2.2 Hotspot (projected dose) Runs

7.2.3 WINDS (projected dose) Runs

7.2.4 Field Monitoring Team Data for 10 mile Plume EPZ

FMT Beta-Gamma and Alpha Tables

FMT 10-Mile Plume EPZ Map

FMT H-Area Map

7.2.5 Chemical Data

MSDS For Sodium Chromate

CHRIS Manual Data For Sodium Chromate

SRS EMERGENCY PREPAREDNESS H-TANK FARM/SITE EXERCISE
APRIL 30, 1997

7.2.1 H-Tank Farm Radiological Exposure Data

Controller Notes:

The H-Tank maps provided on the following pages provide exposure rate data to be interpolated by controllers and provided to players, as appropriate, based on the HP instrumentation used on and/or near the hill during the exercise. The data takes into account the relative shielding afforded by area structures. No other shielding is taken into consideration due to its relative size.

Controllers shall conservatively use a directly proportional (dose rate vs. distance) relationship when judging dose rates in a given exposure rate "zone".

Controllers are responsible for determining and providing individual player integrated exposures (DRD doses) ad hoc to players, based on approximate time frames and locations on or near the accident scenes.

Dose and count rate data as a result of the Tank 39 medical scene spill are indicated on the drawing/map included Section 7.5, Medical Data. No VAMPs and/or CAMs are simulated to alarm as a result of the spill of 100 ml of radioactive waste on the tank top, and there is no measurable air activity if an air sample is drawn.

HEPA Dose Rate and Airborne/Ground Contamination Map (+5-15 Minutes After Earthquake):

Approximately 6.7 curies of Cs-137 (and no Plutonium) are simulated to remain in the failed 2H Evaporator HEPA and/or the parallel undamaged HEPA. Dose rates from this source term are indicated on the map included in this section, and will remain in effect for the duration of the exercise, or until the HEPAs are covered with shielding (i.e., lead blankets, lead boxes).

Airborne and ground contamination data are also provided on this map, and should be used in conjunction with the centerline and half-width lines. The airborne release is caused when the evaporator over-pressurizes and steam over-saturates the HEPA filter, resulting in an initial 10-15 minute puff of contamination that blows towards H-Canyon, followed by a smaller plume of contamination that continues until steam to the evaporator is secured. Because this data is time dependent, this map should only be used from 5 to 15 minutes after the earthquake is simulated to occur.

If steam to the evaporator is secured within the first 15 minutes, airborne data will drop to background ("As Read") levels approximately five minutes after it has been secured. Ground contamination data will remain the same as shown on the map regardless of when steam is secured.

Tank 43 Siphon and Evaporator HEPA and Ground Shine Combined Dose Rate Map (+15-45 Minutes After Earthquake):

SRS EMERGENCY PREPAREDNESS H-TANK FARM/SITE EXERCISE
APRIL 30, 1997

Radioactive waste from a simulated Tank 43 siphon event will enter the above-grade Chromate Cooling Water valve house approximately 15 minutes after the earthquake occurs. Dose rates from the siphoning material will increase the dose rates on the East Hill, as indicated on the map combining dose rate data from the 2H Evaporator HEPA filter and the 20 feet of piping filled with 0.71 Ci/gal supernate. Dose rates from shine from the contamination that has deposited on ground on the north side of the East Hill are also included in the map. Numbers representing mrem/hr are placed at various locations around the East Hill map.

Airborne and ground contamination data are also provided on this map, and should be used in conjunction with the centerline and half-width lines. If steam to the evaporator is secured within 45 minutes from the time of the earthquake, controllers should scale airborne data on this map down to background ("As Read") levels approximately five minutes from the time steam is secured. Ground contamination data will remain the same as shown on the map regardless of when steam is secured.

The data on this map are time dependent, so this map should only be used from 15 to 45 minutes after the earthquake is simulated to occur.

HEPA Dose Rate and Airborne/Ground Contamination Map
(+45 Minutes After Earthquake – Exercise Termination):

Approximately 10 minutes from the time the earthquake occurs, the siphon of radioactive material into the chromate return lines at Tank 43 is simulated to stop, and within 45 minutes from the time of the earthquake, all of the radioactive material siphoning through the lines is simulated to go back below ground as it travels to the Far East Pump House. When this occurs, the dose rates at the Chromate Cooling Water Valve House on Tank 43 will drop to background levels. This map shows the same evaporator HEPA filter dose rates as found on the first map in this section. However, the airborne and ground contamination data provided in the charts at the bottom of the map reflect a smaller airborne plume, caused by resuspension of the material in the evaporator cell until steam is secured.

If steam to the evaporator is secured any time after 45 minutes from the time of the earthquake, controllers should scale airborne data shown on this map down to background ("As Read") levels approximately five minutes from the time steam is secured. If steam to the evaporator is never secured, airborne concentration data on this map will remain constant for the duration of the exercise.

The ground contamination data on this map will be applicable until the exercise terminates, regardless of when or if steam is secured.

Off Hill Evaporator Airborne and Ground Contamination Map:

This map is to be used for contamination readings taken between the East Hill and H-Canyon. Data must be issued in conjunction with the centerline and half-width lines drawn on the map. Airborne release data for the evaporator are also indicated on maps and Field Monitoring Team tables in this section.

SRS EMERGENCY PREPAREDNESS H-TANK FARM/SITE EXERCISE
APRIL 30, 1997

Whenever steam to the evaporator is secured, controllers should scale airborne data on this map down to background ("As Read") levels approximately five minutes from the time steam is secured. If steam to the evaporator is never secured, airborne concentration data on this map will remain constant for the duration of the exercise. However, ground contamination data on this map will remain constant (per the two time periods indicated) for the duration of the exercise, regardless of when or if steam is secured.

Far East Pump House Dose Rate Map:

Data for the spill of radiological waste in the Far East Pump House does not take effect until 130 minutes after the earthquake. During the 30-minute period when radioactive material is simulated to be pouring into the FEPH, controllers should scale the data on this map up over time. After 2¹/₂ hours from the earthquake, the dose rates from the 300-gallon spill will remain in effect for the duration of the exercise or until actions are taken to cover the spill with shielding. No airborne contamination is simulated to occur from the spill due to small evaporation release fractions and the relatively short duration of the spill before exercise termination. Mitigative actions that could be taken include "actual" delivery of sand bags/diking material and placing them/it to contain the spill, if this is the strategy determined by the ERO. Another example is for the delivery of actual dump trucks to the spill scene. Dirt will not actually be dumped.

Radiological data for actions taken to mitigate the spill/rad levels will be determined ad hoc by the FEPH Lead Controller based on the specific actions taken at the time. It is not anticipated that sufficient drill time exists for actions to actually be demonstrated, as described in the previous paragraph, which would warrant such ad hoc data creation.

Personnel Contamination Data:

If players track through or handle items where contamination is simulated to be present, controllers are responsible for determining and providing individual player contamination data, based on approximate time frames and locations. As an example, 10-50% of the contamination swipe data simulated to be present at a given location, per scenario maps/tables, is appropriate for foot contamination if a player traverses through a contaminated area. Controllers should also provide "ad hoc" data if necessary to indicate that contamination has been tracked into clean areas.

Ad hoc cross-contamination data must be closely coordinated throughout the area controller organization. The Area Lead Controller and East Hill and/or FEPH Scene Lead Controllers are responsible for coordination/authorization of inputting ad hoc cross-contamination data.

Habitability Data:

Dose rate /survey data for both the North (707-H) and South (704-56H) Shelter and Rally Points will be "As Read" for the duration of the exercise due to their location relative to the airborne radioactive plume wind direction.

SRS EMERGENCY PREPAREDNESS H-TANK FARM/SITE EXERCISE
APRIL 30, 1997

ERF Habitability Surveys:

Due to the wind direction, as well as the radiological source term, all survey data for the exercise duration is "As Read", (background) for the following Emergency Response facilities:

SRS Operations Center
Emergency Operations Center
Joint Information Center

Habitability survey data for both H-Tank Farm Control Rooms (1H and 28H) and are "As Read" for the duration of the exercise, with the possible exception of the creation of ad hoc cross-contamination data, which must be authorized/coordinated with the Area Lead and Scene Lead Controllers. Habitability data for the ITP Control Room (82H) are to be interpolated (1-2 mrem/hr) based on the exposure rate data presented on the dose rate maps found in Section 7.2.1.

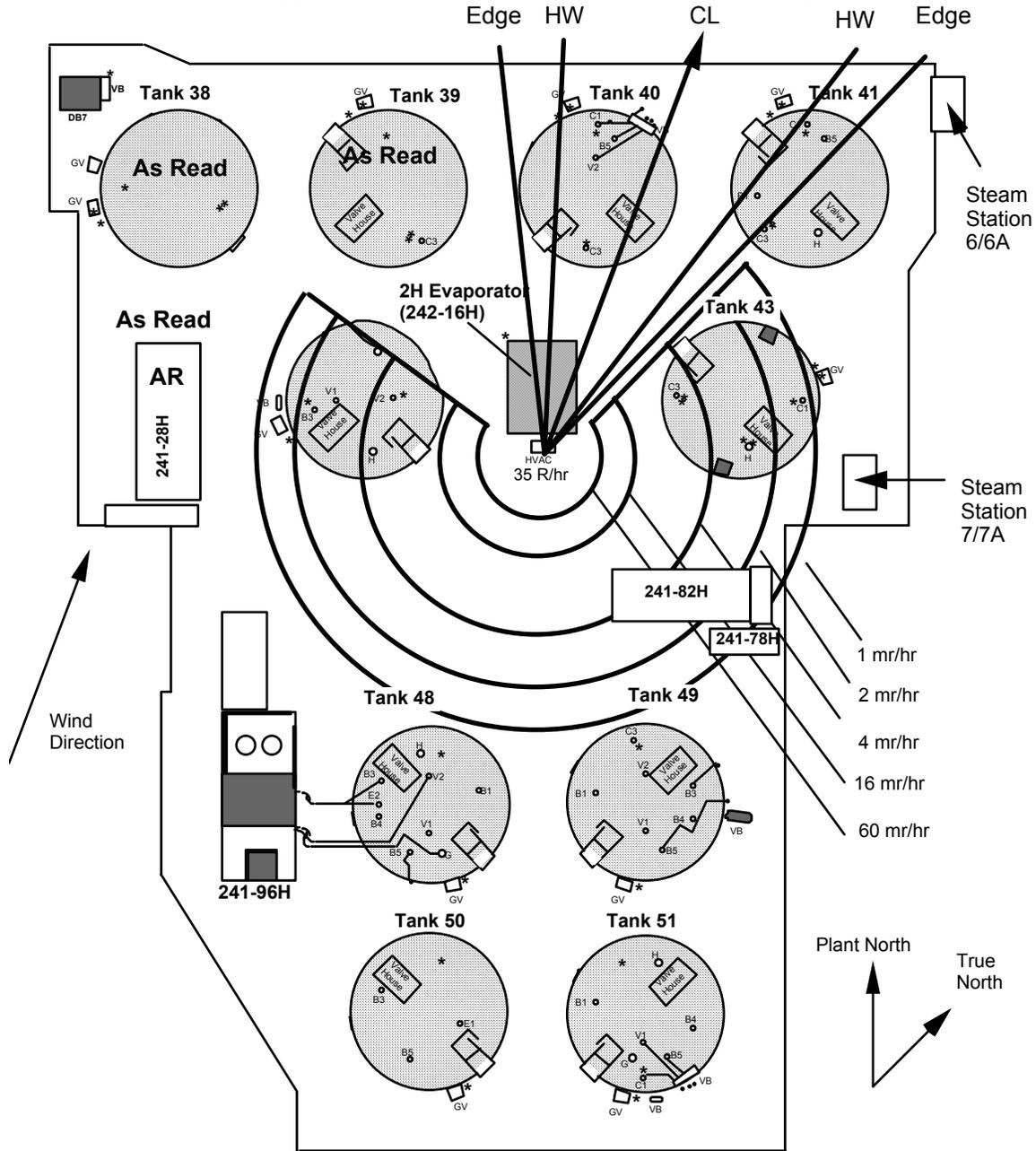
SRS Perimeter Monitors:

Due to the wind direction, as well as the radiological source term, all perimeter monitor data for the exercise duration is "background". Following is a list of all SRS perimeter monitors:

Aiken Barricade, Hwy 21/167, 400D, Green Pond, East Talatha, Windsor road, Dark Horse, Barnwell Gate, Rd A18 Patter Mill, Allendale Gate, West Jackson and Road A14.

**SRS EMERGENCY PREPAREDNESS H-TANK FARM/SITE EXERCISE
APRIL 30, 1997**

**HEPA Dose Rate and Airborne/Ground Contamination Plume Map
(Applicable From +5-15 Minutes After Earthquake)**



NOTES:

* The data tables above and at left should be used in conjunction with the Centerline (CL) and Half-Width lines on the drawing.

* To issue air sample data, controllers should ask players how many cubic feet of air were drawn and then multiply feet of air drawn by the number under "cpm/cuft". The result of that calculation will be the total number of counts per minute on the sample paper.

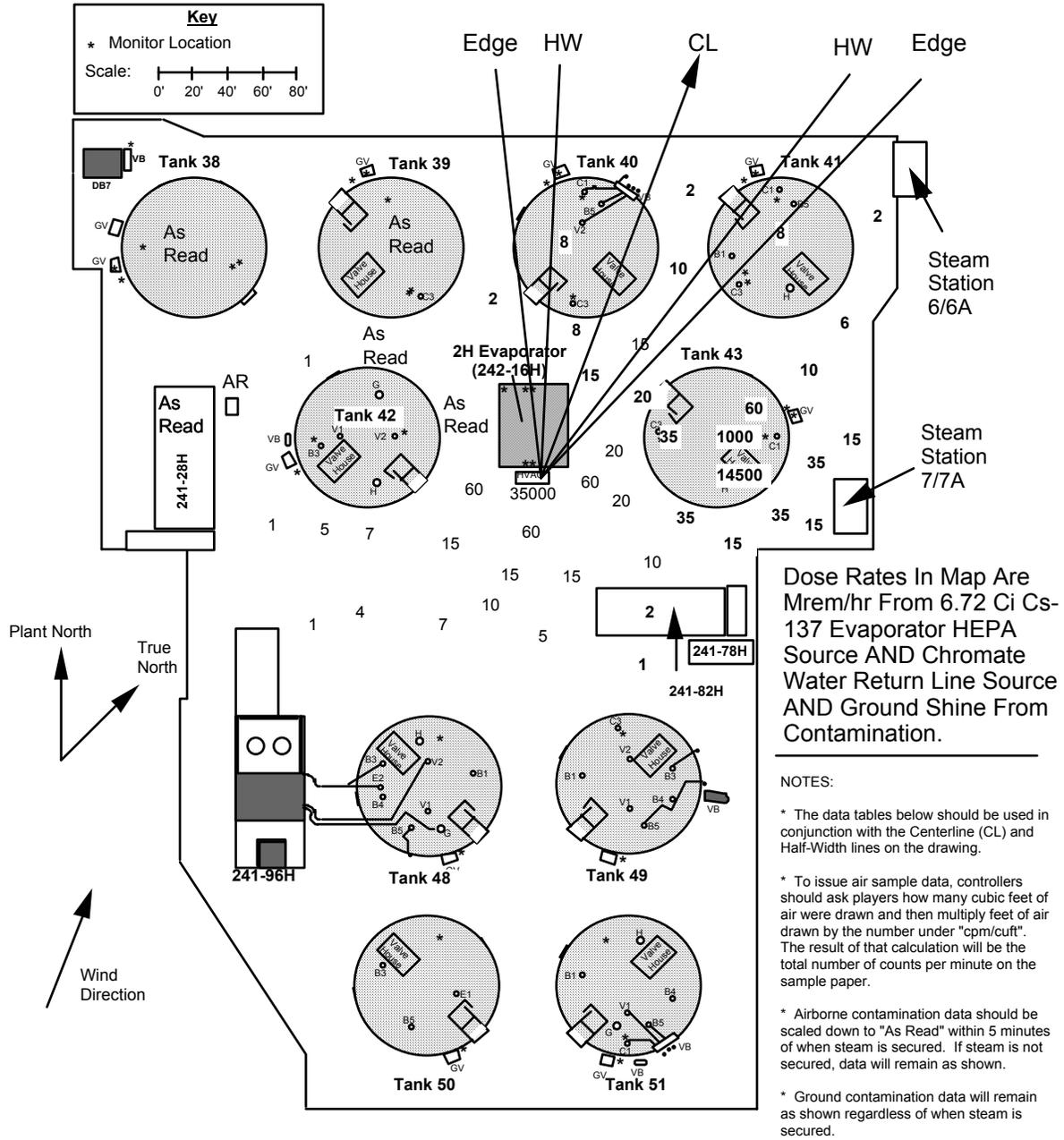
Key
Monitor Location
Scale: 0' 20' 40' 60' 80'

* Airborne contamination data should be scaled down to "As Read" within 5 minutes of when steam is secured. If steam is not secured, data will remain as shown.

* Ground contamination data will remain as shown regardless of when steam is secured.

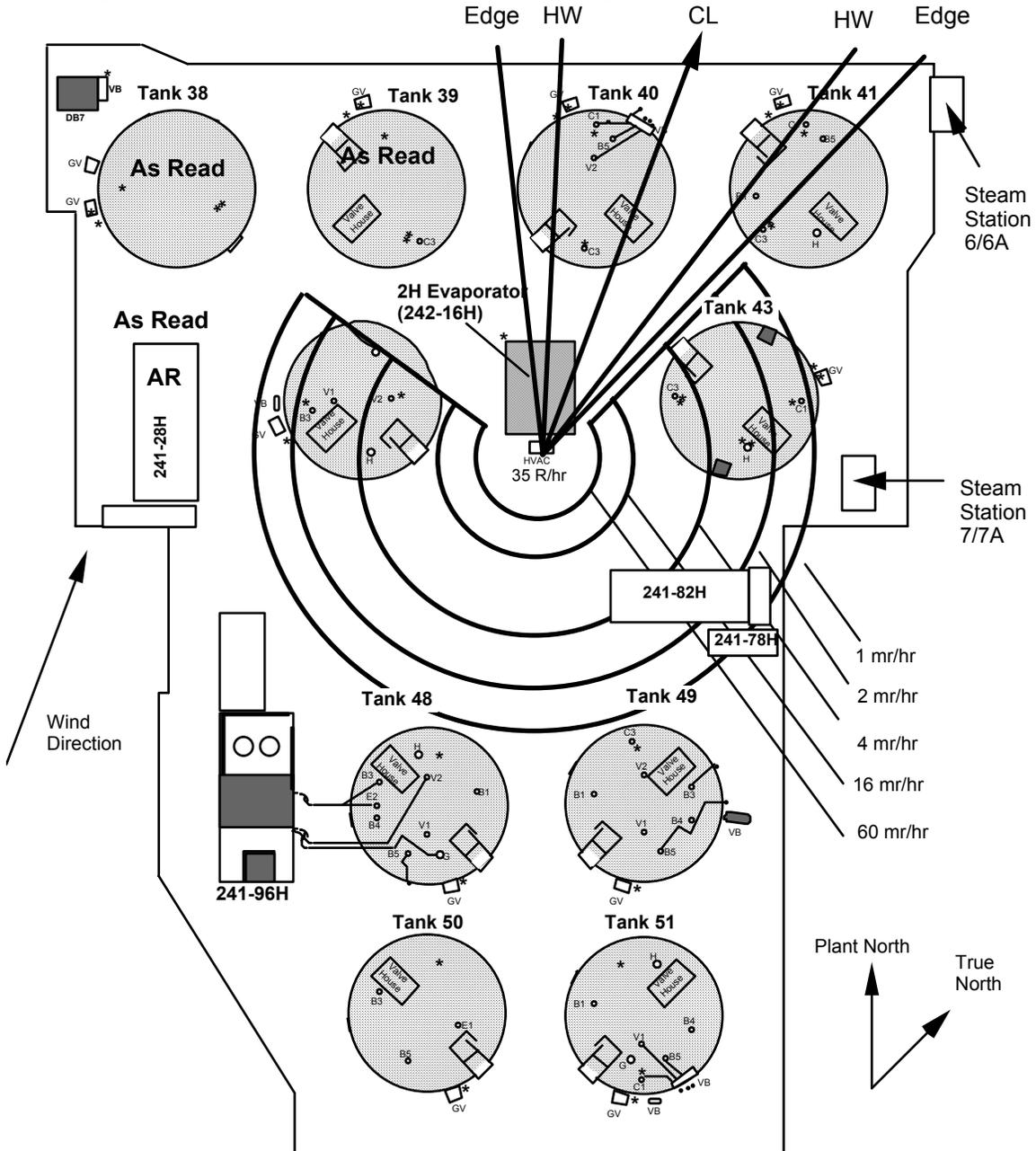
SRS EMERGENCY PREPAREDNESS H-TANK FARM/SITE EXERCISE
APRIL 30, 1997

Tank 43 Siphon and Evaporator and Ground Shine Combined Dose Rate Map
(Applicable +15-45 From Time Of Earthquake)



SRS EMERGENCY PREPAREDNESS H-TANK FARM/SITE EXERCISE
APRIL 30, 1997

HEPA Dose Rate and Airborne/Ground Contamination Plume Map
(Applicable From +45 Minutes After Earthquake Until Drill Termination)



NOTES:

* The data tables above and at left should be used in conjunction with the Centerline (CL) and Half-Width lines on the drawing.

* To issue air sample data, controllers should ask players how many cubic feet of air were drawn and then multiply feet of air drawn by the number under "cpm/cuft". The result of that calculation will be the total number of counts per minute on the sample paper.

Key

Monitor Location

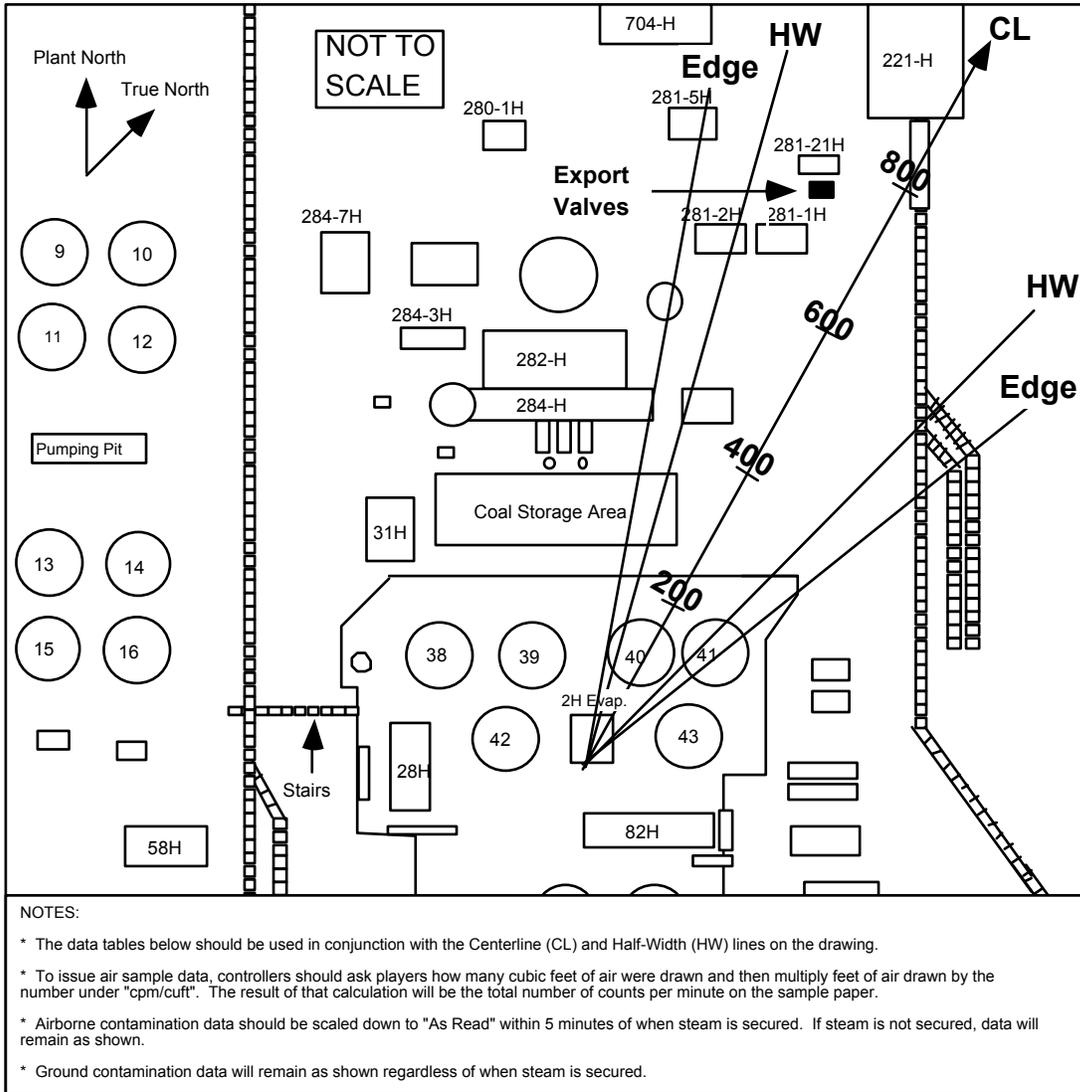
Scale: 0' 20' 40' 60' 80'

* Airborne contamination data should be scaled down to "As Read" within 5 minutes of when steam is secured. If steam is not secured, data will remain as shown.

* Ground contamination data will remain as shown regardless of when steam is secured.

**SRS EMERGENCY PREPAREDNESS H-TANK FARM/SITE EXERCISE
APRIL 30, 1997**

**Off Hill
Evaporator Airborne and Ground Contamination (Plume) Map**



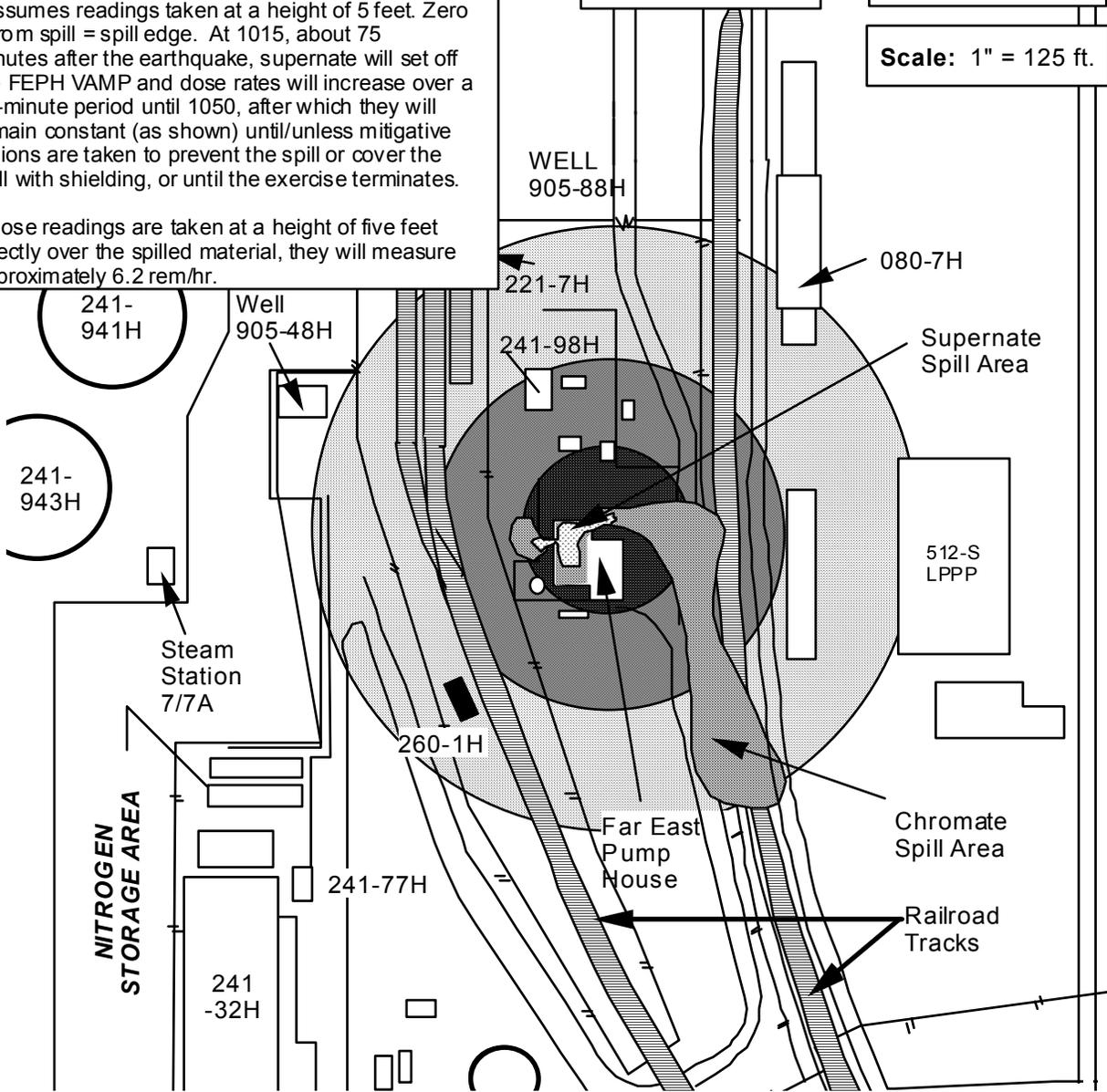
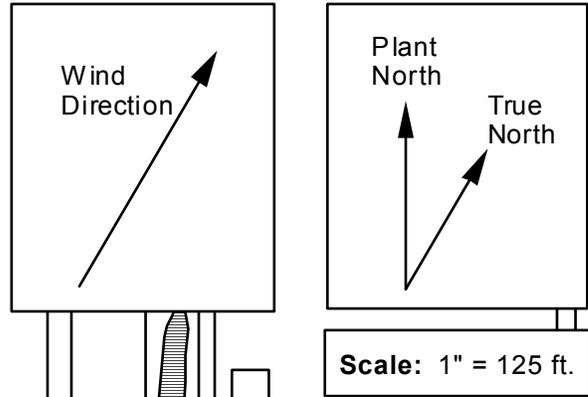
**SRS EMERGENCY PREPAREDNESS H-TANK FARM/SITE EXERCISE
APRIL 30, 1997**

**Far East Pump House
Dose Rate Data**

Dose Rates vs. Distance For 300 gl. Spill of Supernate		
Area	Dose Rates	Dist. from Spill*
	2.3 rem/hr - 60 mrem/hr	0-60 ft.
	60 mrem/hr - 17 mrem/hr	60-100 ft.
	17 mrem/hr - 1 mrem/hr	100-250 ft..

*Assumes readings taken at a height of 5 feet. Zero ft from spill = spill edge. At 1015, about 75 minutes after the earthquake, supernate will set off the FEPH VAMP and dose rates will increase over a 35-minute period until 1050, after which they will remain constant (as shown) until/unless mitigative actions are taken to prevent the spill or cover the spill with shielding, or until the exercise terminates.

If dose readings are taken at a height of five feet directly over the spilled material, they will measure approximately 6.2 rem/hr.



SRS EMERGENCY PREPAREDNESS H-TANK FARM/SITE EXERCISE
APRIL 30, 1997

7.2.2. H-Tank Farm Radiological Plume Data (Hotspot runs)

CONTROLLER NOTES:

The following Hotspot dose projection runs are provided on the following pages for information purposes.

- 10 ci Pu-238 - Expected STE and/or LSR evaporator source term
- 3.29E-04 ci Pu-238 - Possible LSR source term for 300 gallon spill at FEPH

Both source terms shown, 10 ci Pu-238 and 3.29E-04 ci Pu-238, are based on formulas provided in the "F/H Tank Farm Emergency Response Data" document, which is available to both the STE and TSR personnel.

- The 10 ci Pu-238 source term is derived from the formula found in Accident Reference Number 7, "Evaporator Breach (DBAA 3.4.2.11) Overpressurization/Cracks", as follows:

— Source Term = (Volume x 8.4E-02) + (1.33E-06 x Volume) x Curies/gallon

- The 3.29E-04 ci Pu-238 source term is derived from the formula found in Accident Reference Number 4, "Liquid Leaks and Spills" (DBAA 3.4.2.7), as follows:

— Source Term = (Volume x 1.4E-04) + (1.33E-05 x Volume) x Curies/gallon

SRS EMERGENCY PREPAREDNESS H-TANK FARM/SITE EXERCISE
APRIL 30, 1997

10 ci Pu-238 - Expected STE and/or LSR Evaporator Source Term

SRS EMERGENCY PREPAREDNESS H-TANK FARM/SITE EXERCISE
APRIL 30, 1997

SRS EMERGENCY PREPAREDNESS H-TANK FARM/SITE EXERCISE
APRIL 30, 1997

SRS EMERGENCY PREPAREDNESS H-TANK FARM/SITE EXERCISE
APRIL 30, 1997

3.29E-04 ci Pu-238 - Possible LSR Source Term For 300 Gallon Spill at FEPH

SRS EMERGENCY PREPAREDNESS H-TANK FARM/SITE EXERCISE
APRIL 30, 1997

SRS EMERGENCY PREPAREDNESS H-TANK FARM/SITE EXERCISE
APRIL 30, 1997

SRS EMERGENCY PREPAREDNESS H-TANK FARM/SITE EXERCISE
APRIL 30, 1997

7.2.3. H-Tank Farm Radiological Plume WINDS Run

CONTROLLER NOTES:

The following WINDS dose projection runs are provided on the following pages for information purposes.

- 10 ci Pu-238 - Expected STE and/or LSR evaporator source term
- 3.29E-04 ci Pu-238 - Possible LSR source term for 300 gallon spill at FEPH

Both source terms shown, 10 ci Pu-238 and 3.29E-04 ci Pu-238, are based on formulas provided in the "F/H Tank Farm Emergency Response Data" document, which is available to both the STE and TSR personnel.

- The 10 ci Pu-238 source term is derived from the formula found in Accident Reference Number 7, "Evaporator Breach (DBAA 3.4.2.11) Overpressurization/Cracks", as follows:
 - Source Term = (Volume x 8.4E-02) + (1.33E-06 x Volume) x Curies/gallon
- The 3.29E-04 ci Pu-238 source term is derived from the formula found in Accident Reference Number 4, "Liquid Leaks and Spills" (DBAA 3.4.2.7), as follows:
 - Source Term = (Volume x 1.4E-04) + (1.33E-05 x Volume) x Curies/gallon

SRS EMERGENCY PREPAREDNESS H-TANK FARM/SITE EXERCISE
APRIL 30, 1997

10 ci Pu-238 - Expected STE and/or LSR Evaporator Source Term

SRS EMERGENCY PREPAREDNESS H-TANK FARM/SITE EXERCISE
APRIL 30, 1997

SRS EMERGENCY PREPAREDNESS H-TANK FARM/SITE EXERCISE
APRIL 30, 1997

**SRS EMERGENCY PREPAREDNESS H-TANK FARM/SITE EXERCISE
APRIL 30, 1997**

3.29E-04 ci Pu-238 - Possible LSR Source Term For 300 Gallon Spill at FEPH

SRS EMERGENCY PREPAREDNESS H-TANK FARM/SITE EXERCISE
APRIL 30, 1997

SRS EMERGENCY PREPAREDNESS H-TANK FARM/SITE EXERCISE
APRIL 30, 1997

SRS EMERGENCY PREPAREDNESS H-TANK FARM/SITE EXERCISE
APRIL 30, 1997

7.2.4 Field Monitoring Team (FMT) Data

CONTROLLER NOTES:

Field monitoring data is provided on the data tables and two radiological plume maps, which follow. Controllers are to interpolate data within close margins of that presented in the tables to ensure consistency of information to players.

The FMT data tables provide time-dependent/location-dependent data for ground swipes, dose rate data from ground shine, ground probes, air samples, and dose rate data from airborne activity.

Map coordinate locations are provided and should be used in conjunction with the radiological plume maps. Centerline and half-width data is also provided. "Half-width" data is one-tenth of centerline data. Controllers should use their best judgment to determine and approximate (player) vehicle locations for purposes of providing data.

Each plume map has three isopleths drawn on it, representing centerline, 1/2 centerline (half width) and plume edge. Controllers are to interpolate exposure rate (and DRD) data based on their geographical location relative to the corresponding isopleth. The "plume edge" isopleth represents approximate locations, beyond which, "As Read" exposure rate readings only, are observed.

Determine and provide readings to players (if they look at their instruments) based on data interpolation, using the appropriate data on the tables and approximate time frames they (players) are in the plume or contamination area.

SRS EMERGENCY PREPAREDNESS H-TANK FARM/SITE EXERCISE
APRIL 30, 1997

Field Monitoring Team Table (+5-15 Minutes)

SRS EMERGENCY PREPAREDNESS H-TANK FARM/SITE EXERCISE
APRIL 30, 1997

Field Monitoring Team Table (+15-30 Minutes)

SRS EMERGENCY PREPAREDNESS H-TANK FARM/SITE EXERCISE
APRIL 30, 1997

Field Monitoring Team Table (+30-45 Minutes)

SRS EMERGENCY PREPAREDNESS H-TANK FARM/SITE EXERCISE
APRIL 30, 1997

Field Monitoring Team Table (+45-60 Minutes)

**SRS EMERGENCY PREPAREDNESS H-TANK FARM/SITE EXERCISE
APRIL 30, 1997**

Field Monitoring Team Table (+60-90 Minutes)

SRS EMERGENCY PREPAREDNESS H-TANK FARM/SITE EXERCISE
APRIL 30, 1997

Field Monitoring Team Table (+90-120 Minutes)

**SRS EMERGENCY PREPAREDNESS H-TANK FARM/SITE EXERCISE
APRIL 30, 1997**

Field Monitoring Team Table (+120 Minutes - Drill Termination)

SRS EMERGENCY PREPAREDNESS H-TANK FARM/SITE EXERCISE
APRIL 30, 1997

Field Monitoring Map 1 - 10 Mile EPZ Map

SRS EMERGENCY PREPAREDNESS H-TANK FARM/SITE EXERCISE
APRIL 30, 1997

Field Monitoring Map 2 - H-Area Map

SRS EMERGENCY PREPAREDNESS H-TANK FARM/SITE EXERCISE
APRIL 30, 1997

7.2.5 Chemical Data

For controller information, following are data on sodium chromate, which is a chemical used in the cooling water system for High Level Waste Tanks in H-Tank Farm. Unless mitigative actions are taken to plug the ruptured CCW return line, approximately 3,000 gallons (or more if tank headers are not isolated) of chromate water are simulated to pour into the Far East Pump House and to the environment in this scenario.

Also included in this section are the MSDS and CHRIS Manual data for Sodium Chromate.

Description/Appearance:

Sodium chromate is a yellow, efflorescent solid used as a corrosion inhibitor. No data are available on chemical odor or odor thresholds. The chromate water spilled from the ruptured return line in this scenario is a solution of approximately 6% sodium chromate.

Health Hazards:

In the solid form, this product can cause irritation of the eyes, nose, throat, and skin. Lacrimation (tearing) and dermatitis (skin inflammation) may result from eye and skin exposure. In the form of a 6% solution, however, the health risks are minimal and the main concern is environmental contamination. Due to the tumorigenic, mutagenic, and potential carcinogenic effects of this sodium chromate, splash suits and face shields should be utilized to avoid contact with the liquid. In the event of exposure to this chemical, the recommended first aid is to remove clothing and wash the affected area(s) with soap or mild detergent and large amounts of water (for at least 15-20 minutes) until no trace of the chemical remains. If the material gets into eyes, immediate flushing/irrigation of the eyes with large amounts of water is suggested, and medical attention should be called.

Environmental Hazards:

An environmental spill of 1,000 pounds of sodium chromate is a Reportable Quantity (RQ) and requires notification of applicable state and local agencies. Because stopping the leak may not be feasible in this scenario, efforts may be directed at containment and neutralization. Emergency responders may decide to dam/dike culverts in drainage ditches to ensure chromate does not reach area outfalls. Several possible agents may be used to neutralize the spill: agricultural lime, slaked lime, crushed limestone, or sodium bicarbonate. Per the MSDS, sodium bisulfate may also be used as a neutralizer.

Detectability:

The measurement devices available to the SRS FD are the HNU, CGI, and Dräger tube. This solution would not produce any reading on these devices. Furthermore, the H-Tank Farm facility does not have any instrumentation that can detect chromate.

SRS EMERGENCY PREPAREDNESS H-TANK FARM/SITE EXERCISE
APRIL 30, 1997

SRS EMERGENCY PREPAREDNESS H-TANK FARM/SITE EXERCISE
APRIL 30, 1997

MSDS For Sodium Chromate

SRS EMERGENCY PREPAREDNESS H-TANK FARM/SITE EXERCISE
APRIL 30, 1997

SRS EMERGENCY PREPAREDNESS H-TANK FARM/SITE EXERCISE
APRIL 30, 1997

SRS EMERGENCY PREPAREDNESS H-TANK FARM/SITE EXERCISE
APRIL 30, 1997

CHRIS Manual Data For Sodium Chromate

SRS EMERGENCY PREPAREDNESS H-TANK FARM/SITE EXERCISE
APRIL 30, 1997
