GENERAL ATOMIC

General Atomic Company

RADIOLOGICAL CONTINGENCY PLAN

October 1981

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19804

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1. GENERAL DESCRIPTION OF THE PLANT/LICENSED ACTIVITY

1.1. LICENSED ACTIVITY DESCRIPTION

The licensee at its San Diego site has been engaged for over 25 years in both government and privately-sponsored research and development operations, some involving use of special nuclear material (SNM).

SNM activities cover the conduct of both pure and applied research and process development as well as fabrication of fuel materials in the nuclear energy related fields.

The main activity involving SNM pertains to the High-Temperature Gas-Cooled Reactor (HTGR) system. The HTGR system involves engineering and construction of HTGR reactors, the applicable fuel research, investigations of high-temperature materials, design and fabrication of nuclear reactor system components, and the development and fabrication of nuclear fuel elements. In the production of HTGR fuel elements, uranium, thorium, and uranium-thorium dicarbide or oxide particles are prepared, pyrolytic carbon coated, blended together, made into compacts, and the compacts are assembled and sealed into specially designed graphite blocks.

The TRIGA research reactor systems involve the design, development, fabrication, and installation of research reactors and their fuel elements.

Other activities using SNM include the operation of two TRIGA reactors providing the irradiation services for varying types activities involving physics research, activation analysis, and reactor research and development.

1.2. SITE AND FACILITY DESCRIPTION

The main site of the licensee at San Diego is located at 10955 John Jay Hopkins Drive approximately 13 miles north of downtown San Diego. The site occupies 360 acres.

Component and fuel manufacturing, as well as HTGR fuel production process development, are located in Sorrento Valley at 11220 Flintkote Avenue on 60 acres of property contiguous to the main site.

The site, vacant at the time of selection in 1956, was chosen from within a large industrial research park so our activities could be conducted in a modern university-like environment away from the residentially zoned areas of the city.

The distance from the main site to the closest single residence is presently about one mile with the other nearest housing approximately 1.5 miles. This degree of isolation will probably continue indefinitely due to the nature of the surrounding terrain and land use zoning regulations. The facilities do not interfere with recreational activities in the area, nor do they pose a threat to cultural or historical sites.

The present population within a one mile radius of the main site is primarily of an industrial and university campus makeup, with an estimated daytime total of up to 14,500 people (about 2300 are the licensee's employees). The immediate vicinity surrounding the Flintkote Avenue facilities is zoned for industrial activity. Interstate Highway 5 is located about 1/2 mile to the east of the Component and Fuel Manufacturing building. The location of nearby industrial parks and community facilities are shown in Fig. 1.1.

The majority of the present population to the north is in a series of small, unincorporated towns extending to Oceanside, 25 miles north with a population of 76,700. Escondido, 18 miles northeast of the site, has a population of 62,500. To the south is the metropolitan area of San Diego. The distance and population of surrounding communities is given in Table 1-1.

TABLE 1-1

DISTANCE/POPULATION OF SURROUNDING COMMUNITIES

Community	Distance (Air Miles) and Direction	Population[a]
Del Mar	5 miles north	5,017
Los Penasquitos	8 miles northeast	19,000
Rancho Bernardo	13 miles northeast	16,100
Poway	12 miles east	32,100
Mira Mesa	6 miles east	37,500
University City	4 miles south	28,900
La Jolla	5 miles southwest	27,900
Clairemont	6 miles south	82,400

(a) Population data current as of 1980 census.

No significant fresh water recreation areas exist within the local hydrological area, nor is there significant agricultural activity. Los Penasquitos Creek flows into an area called Sorrento Slough which is part of Torrey Pines State Park and near to the licensee's site (about one mile in distance). The slough is a game refuge and an area of tidal mud flats. All plants and animals in the area are protected and essentially no human use is made of it.

1.2.1. Facility Descriptions

The following is a description of the major facilities at the licensee's site. Fig. 1-2 is a plan view of the site which contains the major facilities.

1.2.1.1. Flintkote Avenue Facilities

SV-A Building

Located at 11220 Flintkote Avenue in Sorrento Valley north of the main complex, the Component and Fuel Manufacturing building contains offices, shops, and an area used for fuel and component fabrication. Four hundred ft long and 120 ft wide, about two-thirds of the building is of high-bay construction. The east side of the building adjoining the high bay area is divided into two floors with offices, laboratories, storerooms and a cafeteria. Nonradioactive tasks in the facility are performed in a machine shop, a sheet metal shop and an assembly area for mechanical parts occupying approximately 2/3 of the building. The remaining building area is devoted to fuel fabrication activities. The fuel fabrication area is bounded by outside walls, a masonry wall and a structural steel wall, which separate it from other areas and activities. Access to the fuel fabrication area is restricted to limit access to authorized personnel, to control SNM, to maintain control and monitoring of personnel and to prevent the spread of contamination. Separate ventilation systems are maintained for facilities and areas involved in SNM processing.

SV-B Building

Process development, pilot scale operations and specialized fabrication work related to fuel production are conducted in a building adjacent to and north of the Component and Fuel Manufacturing building. Process development is performed in the east half of the building.

1.2.1.2. Main Site

The main site is on Torrey Pines Mesa about one mile east of the ocean at an elevation of 300 ft above sea level. The site extends into the adjacent Sorrento Valley at an elevation of between 50 and 75 ft above sea level. The main site contains office and engineering buildings, laboratories, research reactors, hot cells, a research reactor fuel fabrication building and a low-level waste processing facility.

Laboratory Building

The Laboratory building contains offices, shops and laboratories for work with low-levels of radioactivity. Most of the research activities in metallurgy, chemistry and experimental physics are conducted in this building.

Hot Cell

The Hot Cell facility is equipped to perform a wide range of investigation of the physical, metallurgical and chemical properties of irradiated specimens, including examinations of full-size power reactor fuel elements. The facility includes a high-level cell with three operating stations capable of handling activity levels of up to one million Ci of 1 MeV gamma, an adjacent low-level cell that can be used separately or in conjunction with the high-level cell and a metallography cell equipped to provide complete metallurgical investigations including micro-, macro- and stereo-photography. Supporting areas include a service gallery, physical test room, machine shop, manipulator repair, decontamination room and an X-ray room.

TRIGA Reactors

Located north of the Laboratory building, the TRIGA Reactors provide an area for diversified experimental and irradiation studies using the inherently-safe TRIGA Mark I and Mark F reactor facilities. Included within the building area are associated reactor control consoles, a low-level counting room, a small shop, and administrative offices. Specific uses of SNM in this area generally are governed by the terms of Facility Licenses R-38 and R-67.

Experimental Area Building I (EA-1)

This building typically consists of radio-chemistry laboratories and offices. There are about 1100 ft^2 of area located in a nearby underground bunker. The facility is used for general laboratory activities.

TRIGA Building

The TRIGA fabrication building, approximately 60 ft x 125 ft, is constructed of reinforced concrete prefabricated panels. The building contains SNM storage vaults, drum storage area, operations associated offices, locker and restrooms, as well as the fuel fabrication area.

Waste Processing Facility

This facility is located 1000 ft east of the Hot Cell facility. Included in the facility are service buildings, evaporation ponds, an incinerator (currently dismantled), and various storage areas. The evaporation ponds occupy approximately 4800 ft^2.

Experimental Building (E)

This building houses offices, as well as engineering, metallurgical, chemical pilot plant activities. The major activity involving the use of SNM is the chemical pilot plant activity. The metallurgical and chemical pilot plant work areas are subjected to the appropriate controls to minimize the possibility of uncontrolled spread or release of radioactivity to other areas. The support personnel for these activities utilize a fraction of the offices available. The other offices are used by such groups as the Fusion Project, General Engineering, etc.

1.2.1.3. Utilities

Water

Water is supplied by the city of San Diego Department of Utilities.

Sewerage Systems

Sewer service is supplied by the city of San Diego Department of Utilities. Sewage released from the licensee's facilities is processed at the 100 million gallon per day Point Loma Sewage Treatment Plant.

Hold-up tanks are provided for sampling of effluent liquids before release to the sewerage system.

Gas and Electricity

Commercial quantities of gas and electricity are supplied by San Diego Gas and Electric Company.

Emergency and Auxiliary Power

Emergency and auxiliary power generators are available to assure continued operation of critical equipment, lighting, security, fire and other safety alarms, and required surveillance.

An auxiliary 25 kW(e) power system located near the Administration Building automatically engages in case of a power failure. This system supplies power to the main site, fire, criticality, and security alarm systems.

In the event of a power failure in the SV-A building, 2 standby electric generators automatically become energized. They are capable of producing 75 kW(e) of rated electric power thereafter to designated components. The auxiliary power unit supplies emergency power to criticality, fire and security alarms, as well as to certain equipment cooling systems. In addition, wet-cell battery or emergency generator powered emergency lights are located strategically throughout the facility to illuminate evacuation routes and equipment that may require surveillance during power outages.

1.3. PROCESS DESCRIPTION

The detailed descriptions of the processes used in the various facilities are included in detail in Section 3.0 of the Demonstration Volume of the SNM-696 license. A brief description of the processes in the major facilities is given here.

1.3.1. HTGR Fuel Manufacturing

The HTGR fuel production process begins with uranium and thorium oxide particulate material. These materials are mixed with graphite flour and ethylene binder to form a slurry which is subsequently dried, sized into sand sized particles. The oxides are converted to carbides in a vaccum heating step and the particles are spheroidized to form tiny microspheres. In a fluidized bed furnace, the microspheres are coated with five layers of pyrolytic carbon and silicon carbide which form the primary barrier to fission gas release in the reactor core.

The coated particles are charged to a multi-cavity injection mold where a heated mixture of petroleum pitch and graphite powder are injected into the mold, filling the void space around the particles. The mold is then cooled and the solidified, 1/2 in. diameter x 2 in. long fuel rods are ejected from the mold. The rods are packed in finely-ground aluminum oxide and heated to 800° C to carbonize the petroleum pitch. The carbonized rods are then treated with HCl gas at an elevated temperature to leach exposed uranium and thorium from the rods. They are then heated to 1700° C to remove residual HCl and improve heat transfer characteristics of the rods.

The rods are loaded into the fuel holes drilled into graphite fuel elements and the fuel holes sealed with cemented graphite plugs. Each element is then packaged in a sealed double barrel shipping container for transportation to the reactor.

1.3.2. Hot Cell

The Hot Cell is involved in research on irradiated fuels, irradiated components or other large sources of radioactive material. Such fuels, components, and materials are disassembled, dissected, examined using remote manipulators.

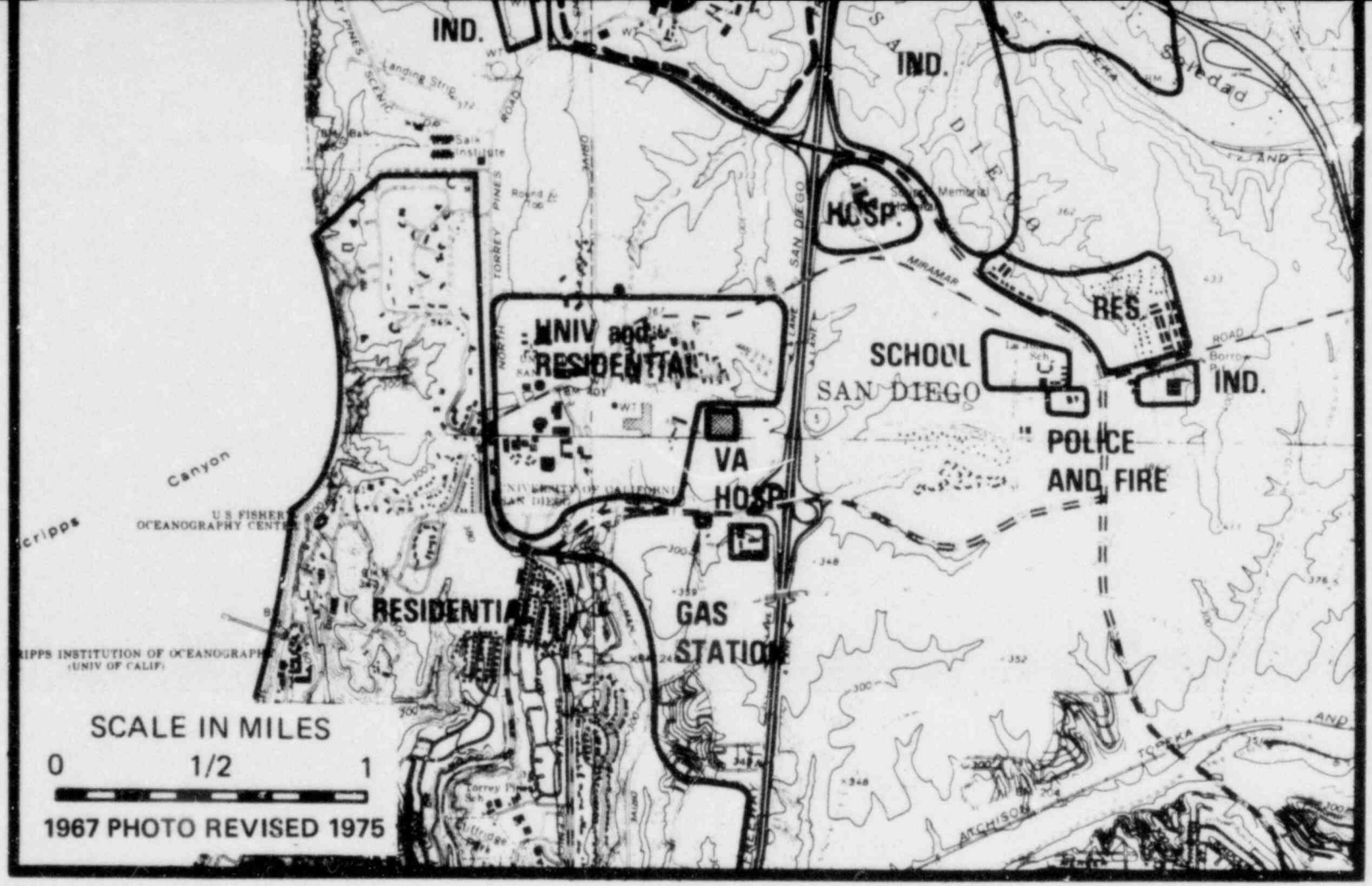
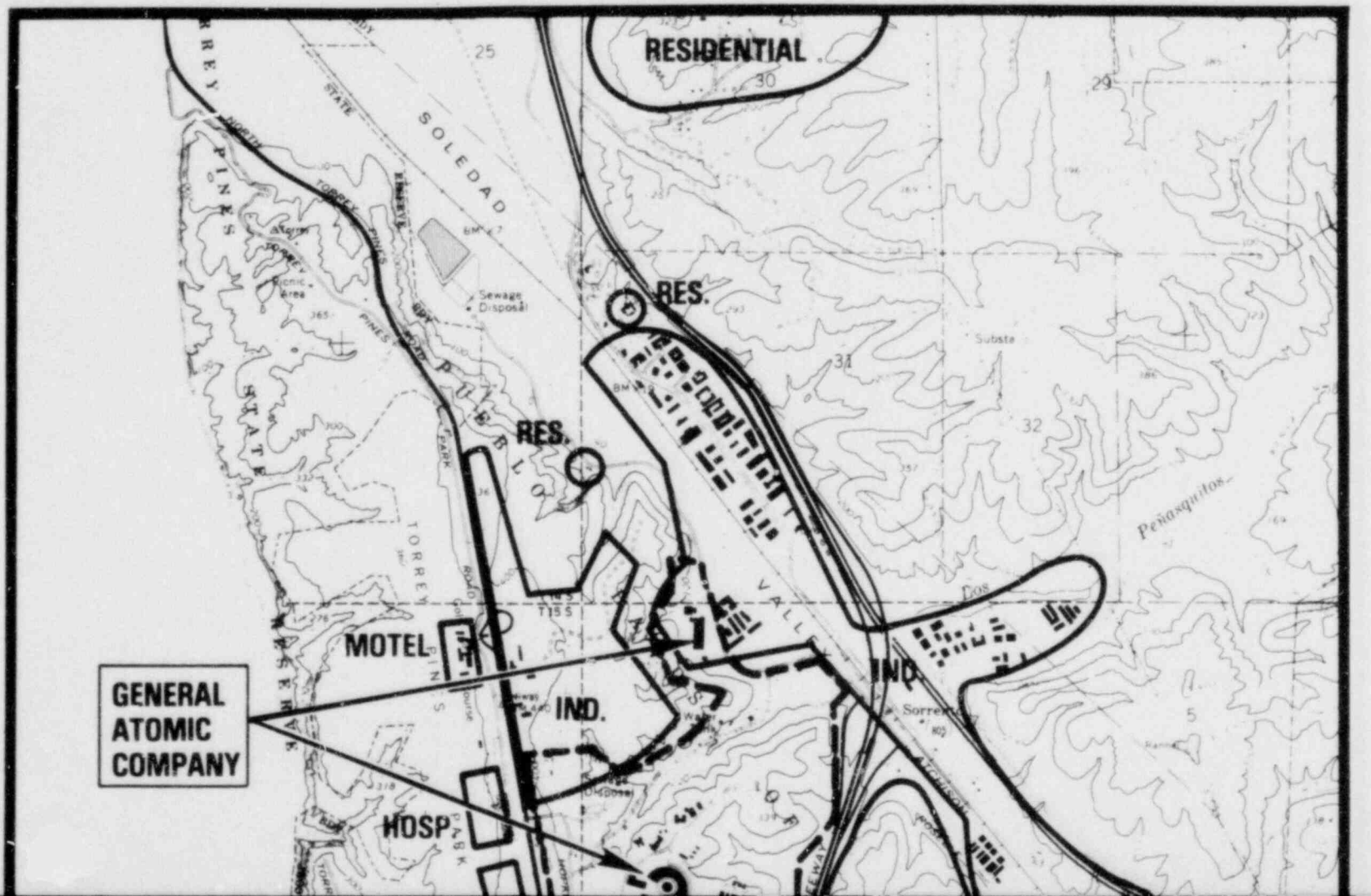


Figure 1-1 Location of nearby Industrial parks and community facilities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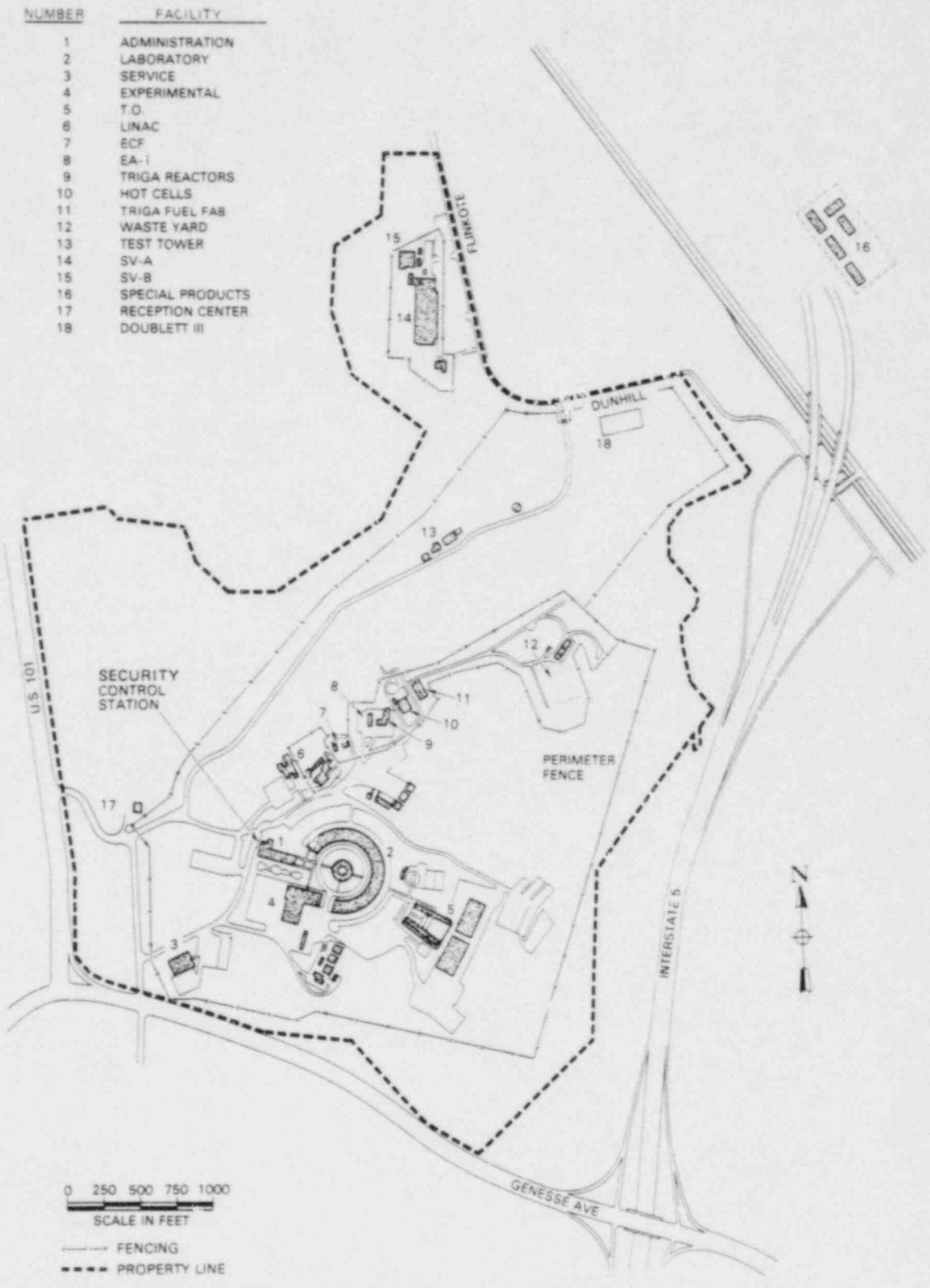


Fig. 1-2 Plan View of Site

2. ENGINEERED PROVISIONS FOR ABNORMAL OPERATIONS

2.1. CRITERIA

Facilities and equipment are designed such that abnormal occurrences will not likely result in the uncontrolled release of significant radioactive material or radiation. This is accomplished by designing facilities such that they can withstand anticipated earthquakes, fires, windstorms or other such occurrences.

Facilities containing significant radioactive material are designed to protect the processes, process material, and process equipment from adverse conditions caused by common environmental hazards. The facilities are equipped with specialized shielding, fire suppression equipment, specialized air control systems fitted in most cases with HEPA filtration or other cleaning systems, e.g., fume scrubber, etc. Facilities and laboratories which routinely generate radioactive liquid wastes are equipped with separate holdup tanks or piping to assure such liquids are disposed of under planned and controlled conditions.

Process equipment or stations are limited to quantities of material which assure criticality safety in any credible situation. In addition such equipment is limited to material inventories which also assure the radiological safety of workers in the area. In some cases, access restrictions are imposed to assure that individuals are not exposed to hazardous radiation or radioactive material. GA maintains a respiratory protection program.

Process equipment and/or their enclosures are designed to contain the inprocess material through normal process upset conditions. Their designs do not allow individual components of process equipment to adversely affect the effluent conditioning or containment features of the respective laboratory or facility. Certain equipment will be fitted with prefilters, dampers, etc., to provide localized containment and assure that facility containment facilities are not compromised.

3. CLASSES OF RADIOLOGICAL CONTINGENCIES

3.1. Class Introduction

The classification scheme is described in Section 3.2. In it, emergency situations are classified into the four categories specified in Section IV of appendix E of 10 CFR Part 50.

The rationale for the notification and alert classes is to provide early and prompt notification of minor events which could lead to more serious consequences given operator error or equipment failure or might be indicative of more serious conditions which are not fully realized.

3.2. EMERGENCY CLASSIFICATION SCHEME

Class - Notification of Unusual Event

Class Description. - Unusual events are in process or have occurred which indicate a potential degradation of the level of safety of the plant. No releases of radioactive material requiring offsite response or monitoring are expected unless further degradation of safety systems occurs.

Purpose. - Purpose of offsite notification is to (1) assure that the first step in any response later found to be necessary has been carried out, (2) bring the operating staff to a state of readiness, and (3) provide systematic handling of unusual events information and decisionmaking.

Licensee Actions

1. Promptly inform State and/or local offsite authorities of nature of unusual condition as soon as discovered.
2. Augment on-shift resources as needed.
3. Assess and respond.
4. Escalate to a more severe class, if appropriate.

or

5. Close out with verbal summary to offsite authorities, followed by written summary within 24 hours.

Class - Alert

Class Description. - Events are in process or have occurred which involve an actual or potential substantial degradation of the level of safety of the plant. Any releases are expected to be limited to small fractions of the EPA Protective Action Guide exposure levels.

Purpose. Purpose of offsite alert is to (1) assure that emergency personnel are readily available to respond if situation becomes more serious or to perform confirmatory radiation monitoring if required and (2) provide offsite authorities current status information.

Licensee Actions

1. Promptly inform State and/or local authorities of alert status and reason for alert as soon as discovered.
2. Augment resources and activate onsite operational support emergency facilities and equipment. Bring key emergency personnel to standby status.
3. Assess and respond.
4. Dispatch onsite monitoring teams and associated communications.
5. Provide periodic plant status updates to offsite authorities.
6. Provide periodic meteorological assessments to offsite authorities and, if any releases are occurring, dose estimates for actual releases.
7. Escalate to a more severe class, if appropriate.

or

8. Close out or recommend reduction in emergency class by verbal summary to offsite authorities followed by written summary within 8 hours.

Class - Site Area Emergency

Class Description. Events are in process or have occurred which involve actual or likely major failures of plant functions needed for protection of the public. Offsite releases are not expected to exceed EPA Protective Action Guideline exposure levels except near site boundary.

Purpose. Purpose of the site area emergency declaration is to (1) assure that response centers are manned, (2) assure that monitoring teams are dispatched, (3) assure that personnel required for evacuation of the site areas are at duty stations if situation becomes more serious, (4) provide consultation with offsite authorities, and (5) provide updates for the public through offsite authorities.

Licensee Actions

1. Promptly inform State and/or local offsite authorities of site area emergency status and reason for emergency as soon as discovered.
2. Augment resources by activating onsite emergency response organization.
3. Assess and respond.
4. Dispatch onsite and offsite monitoring teams and associated communications.
5. Dedicate an individual for plant status updates to offsite authorities.
6. Make senior technical and management staff available onsite for consultation with NRC and State on a periodic basis.
7. Provide meteorological and dose estimates to offsite authorities for actual releases via a dedicated individual or automated data transmission.

8. Provide release and dose projections based on available plant condition information and foreseeable contingencies.
9. Escalate to general emergency class, if appropriate.
10. Close out or recommend reduction in emergency class by briefing of offsite authorities followed by written summary within 8 hours of closeout or class reduction.

Class - General Emergency

Class Description. Events are in process or have occurred which involve actual or imminent loss of confinement integrity. Releases can be reasonably expected to exceed EPA Protective Action Guideline exposure levels offsite for more than the immediate site area.

Purpose. Purpose of the general emergency declaration is to (1) initiate predetermined protective actions for the public, (2) provide continuous assessment of information from licensee and offsite organization measurements, (3) initiate additional measures as indicated by actual or potential releases, (4) provide consultation with offsite authorities, and (5) provide updates for the public through offsite authorities.

Licensee Actions

1. Promptly inform State and local offsite authorities of general emergency status and reason for emergency as soon as discovered (Parallel notification of State/local).
2. Augment resources by activating onsite emergency response organization.
3. Assess and respond.
4. Dispatch onsite and offsite monitoring teams and associated communications.
5. Dedicate an individual for plant status updates to offsite authorities.

6. Make senior technical and management staff available onsite for consultation with NRC and State personnel on a periodic basis.
7. Provide meteorological and dose estimates to offsite authorities for actual releases via a dedicated individual or automated data transmission.
8. Provide release and dose projections based on available plant condition information and foreseeable contingencies.

or

9. Close out or recommend reduction of emergency class by briefing of offsite authorities followed by written summary within 8 hours of closeout or class reduction.

3.3. RANGE OF POSTULATED ACCIDENTS

A range of postulated accidents is analyzed in Section 7 of the Demonstration volume of the SNM-696 license. The one with the greatest potential offsite radiological consequences but lowest probability is a criticality in the Fuel Fabrication Facility in Sorrento Valley (Building 37). The greatest potential radiological consequences from this accident would be 0.86 Rem whole body, 0.26 Rem thyroid, 0.015 Rem bone, and 0.023 Rem lung. These doses are well within the protective action guides (PAGs) of the Environmental Protection Agency (1 Rem whole body, 5 Rem thyroid, and 3 Rem other critical organ). Figures 3-1 through 3-5 give the time-dose-distance relationships.

The same accident, i.e. accidental criticality at the process liquid dumping station, has the greatest potential for employee exposure as well. The range of doses received by a worker located at various distances near the accident for five minutes, assuming the more reasonable multiple pulse model, are:

Distance	Gamma (R)	Neutron (Rem)	Total (Rems)
3m	262.	613.	875.
10m	23.	53.2	76.2
20m	5.6	12.6	18.2

In actuality the doses will be smaller since evacuation alarms will sound and evacuation from the facility rapidly decreases the exposure as distance is increased. Time-dose-distance data are shown in Figures 3-6 through 3-8.

More than adequate personnel capability and instrumentation are available to assess and mitigate the consequences of the range of accidents postulated. An emergency would be declared based on the classification scheme of Section 3.2. if a minor event could lead to more serious consequences.

FIG 3-1, 10 MIN DOSE, 3.0+E18 FISSION CRITICALITY

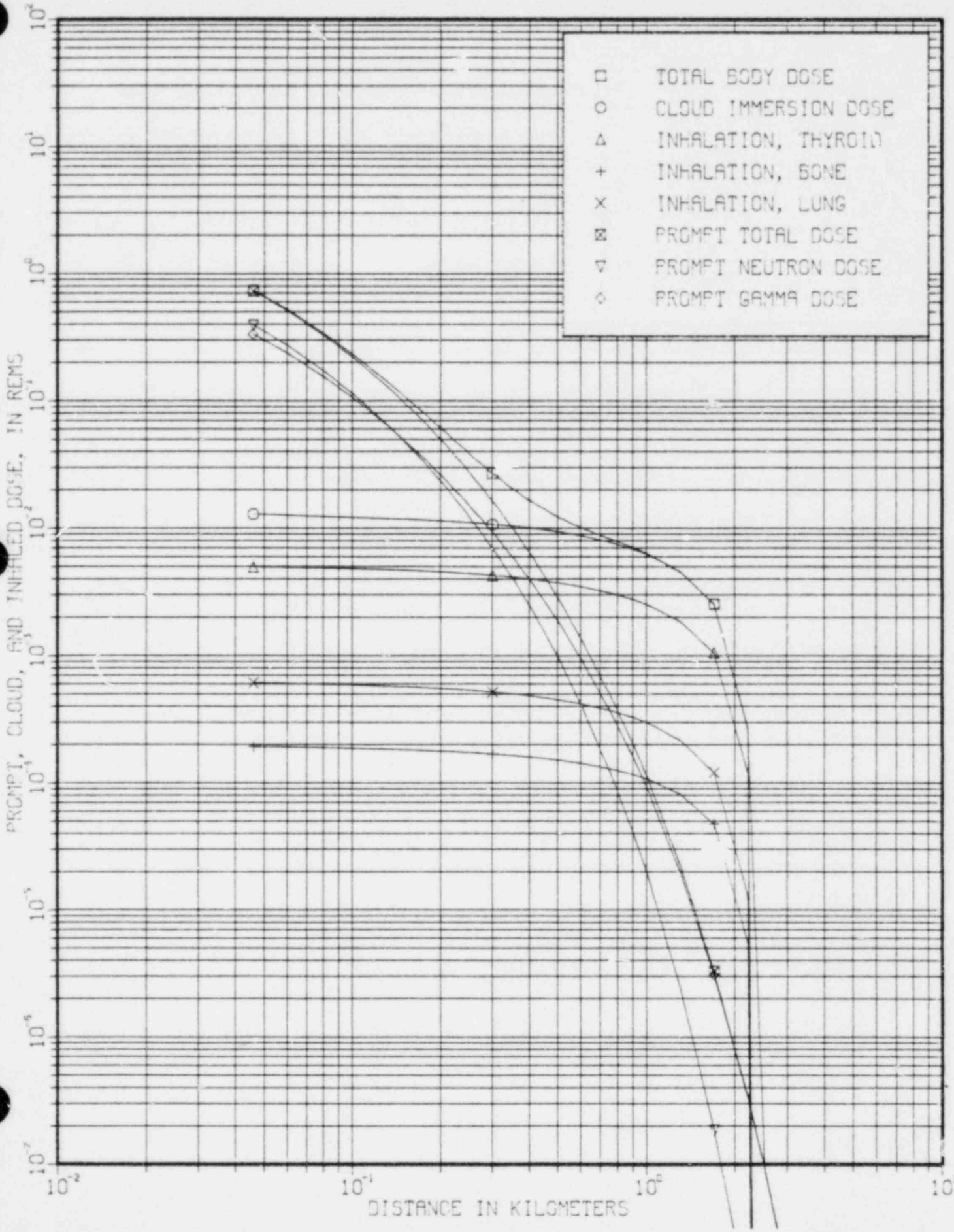


FIG 3-2, 30 MIN DOSE, 3.0*E18 FISSION CRITICALITY

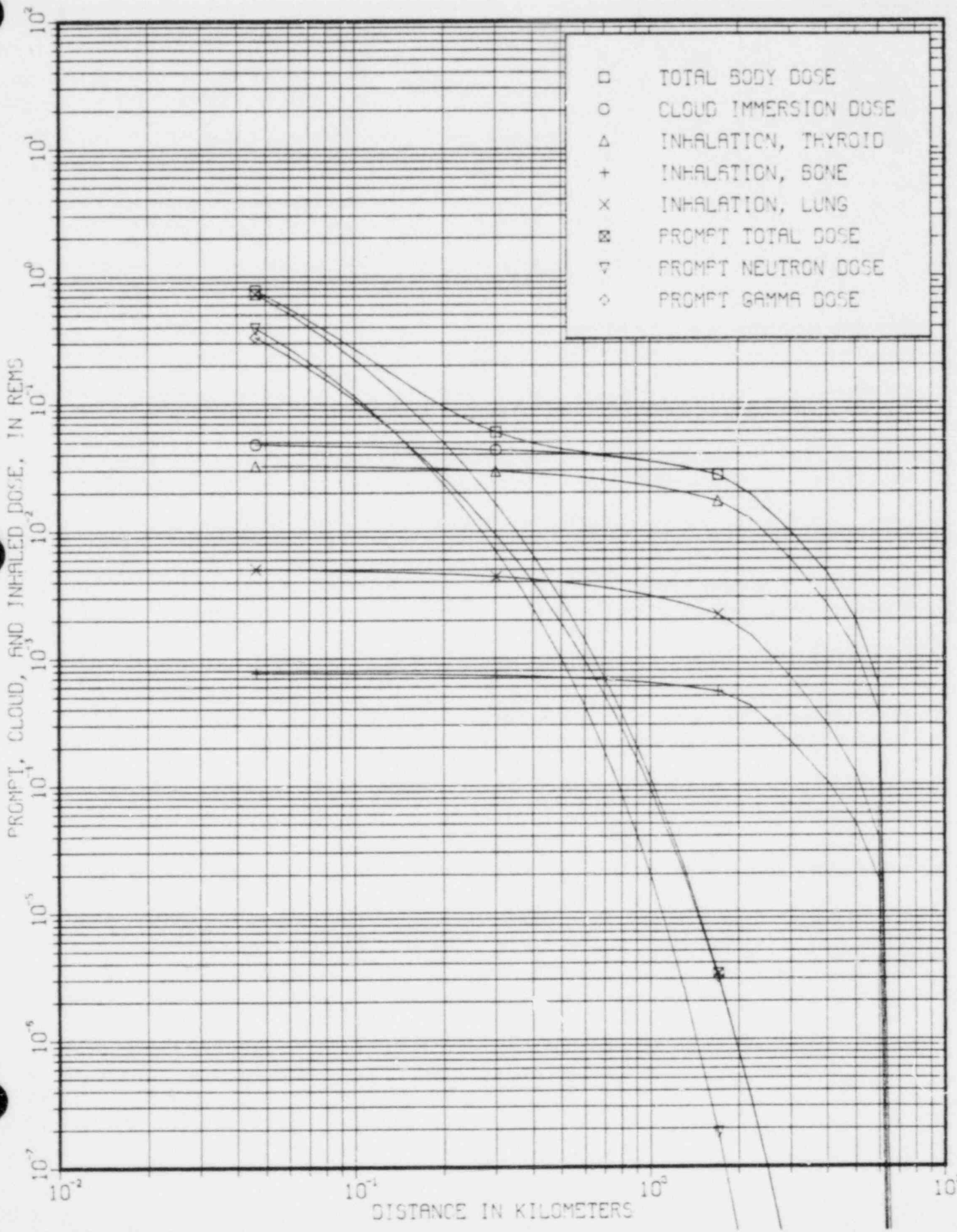


FIG 3-3, 1 HR DOSE, 3.0*E18 FISSION CRITICALITY

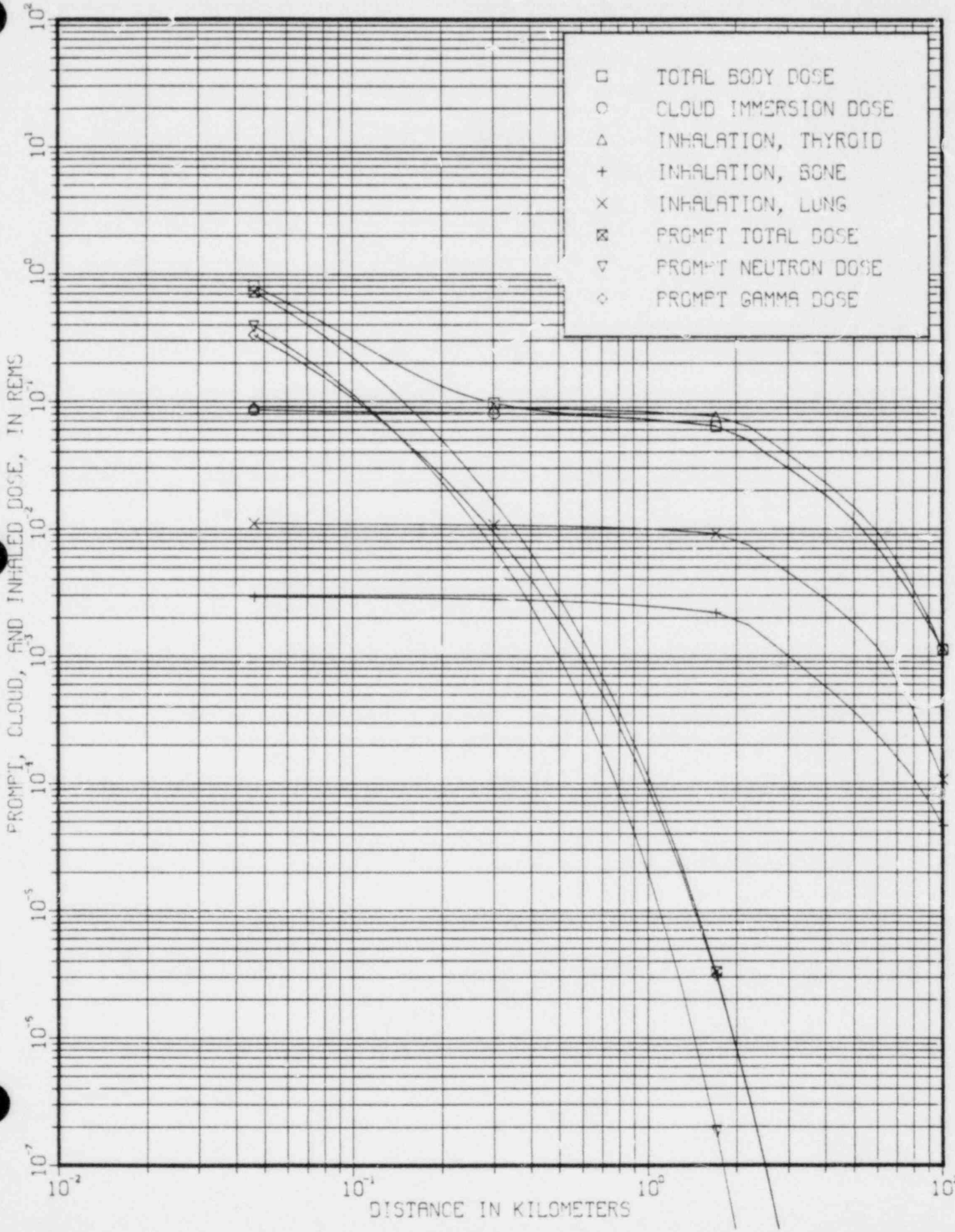


FIG 3-4, 3 HR DOSE, 3.0×E18 FISSION CRITICALITY

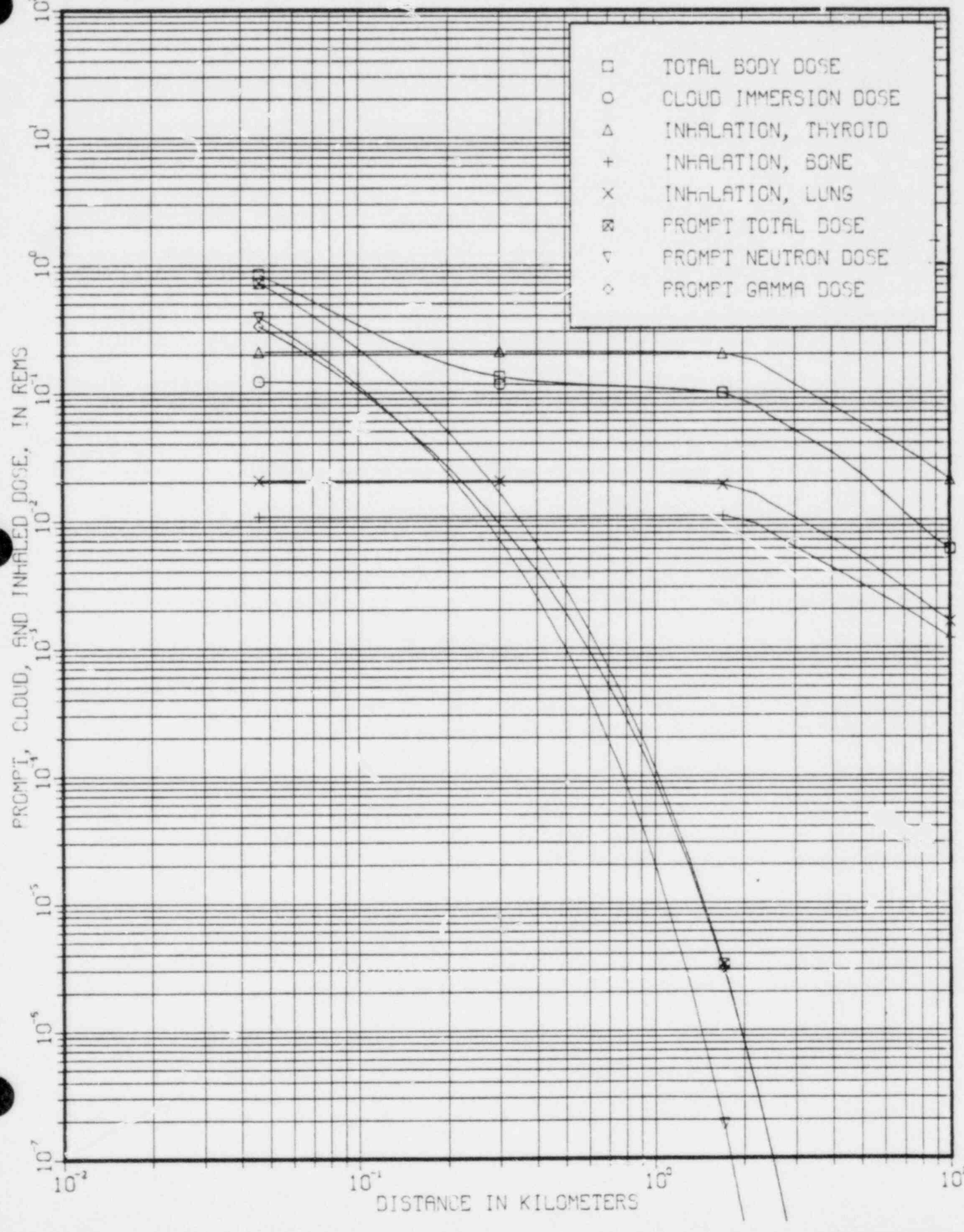


FIG 3-5, 8 HR DOSE, 3.0*E18 FISSION CRITICALITY

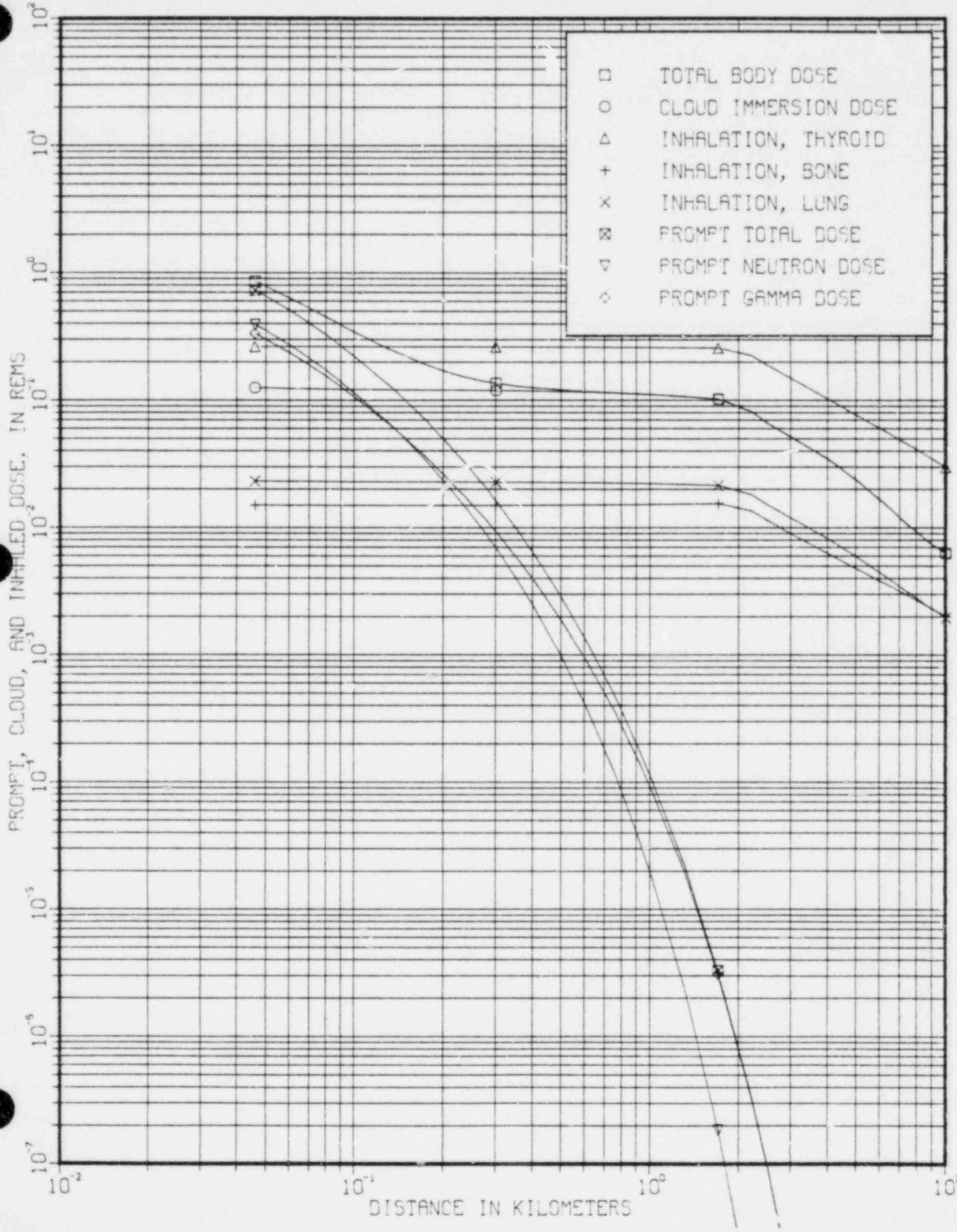


FIG 3-6, GAMMA DOSE IN FACILITY DUE TO 12 PULSE 3.0*E16 EVENT

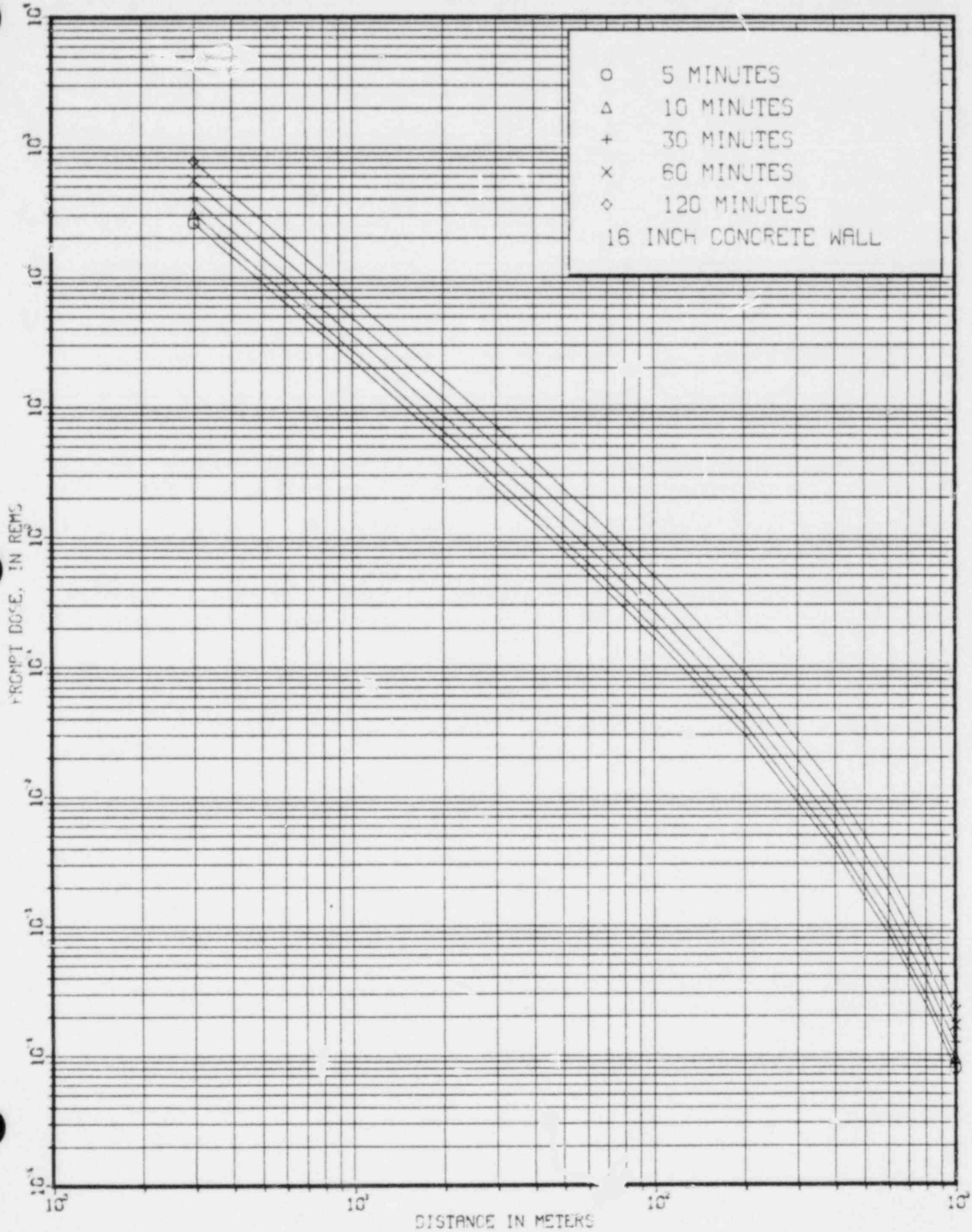


FIG 3-7, NEUTRON DOSE IN FACILITY DUE TO 12 PULSE 3.0*E16 EVENT

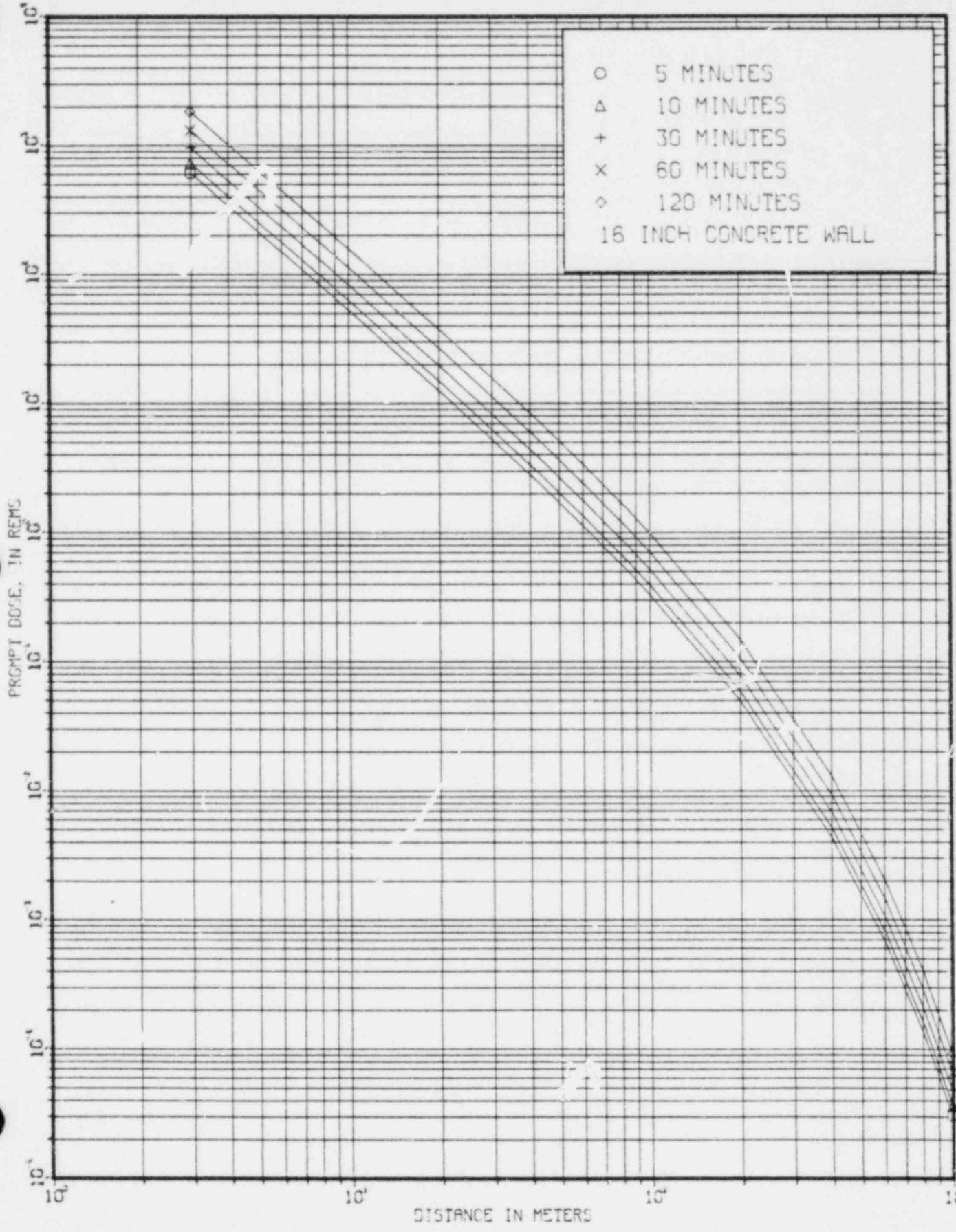
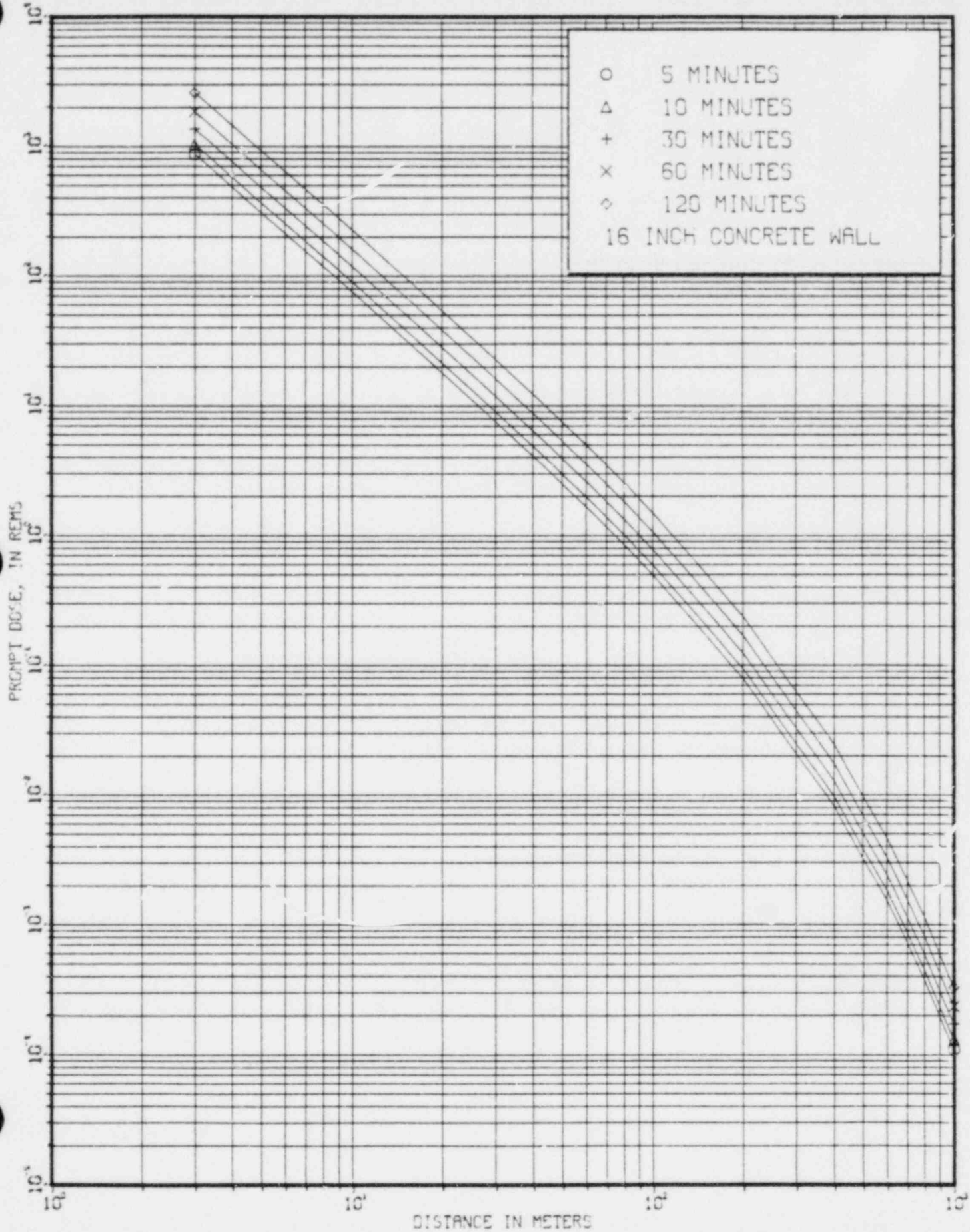


FIG 3-8, TOTAL DOSE IN FACILITY DUE TO 12 PULSE 3.0*E18 EVENT



4. ORGANIZATION FOR CONTROL OF RADIOLOGICAL CONTINGENCIES

This chapter describes the radiological contingency organization to be activated for events resulting in abnormal radiological releases from the license facilities. The augmentation and support from offsite services and local agencies is also described.

4.1 ORGANIZATION WITHIN GA

4.1.1. Staff Functions

Each facility at GA is staffed with experienced operating personnel, one of whom is designated as the facility emergency director. These individuals are well qualified to recognize conditions that may result in an emergency situation and are capable of instituting remedial actions to mitigate the abnormal condition. If these remedial actions would be insufficient to deal with a situation, the employees have been trained to make emergency notifications and to perform those planned emergency actions that provide for the immediate control over most situations.

4.1.2. Responsibility

Senior operating employees present in a facility are responsible for actions during normal operations and during any emergency condition at the facility. Each operating organization designates its own responsible personnel and their internal notification requirements. The responsible employee present notifies the Security Department (Ext. 2000) and his supervisor immediately, and directs appropriate remedial actions and/or evacuation until the responsibility is transferred to the Facility Emergency Director or the designated GA Emergency Director.

4.1.3. Notification

The basic sequence of notification is shown in Fig. 4-1. The Security Supervisor is the focal point for the notification sequence.

4.1.4. Financial

All support groups assigned to the emergency organization consider their particular needs for equipment and supplies for emergencies. These needs are reflected in their budgets, and items are procured by the individual support groups. The responsibility for the readiness of the equipment and supplies for each group is assigned to the manager of each group.

4.1.5. Primary Support Groups Within GA

4.1.5.1. Security Department

This department includes the Manager of Security, two security administrators, three captains, five sergeants, and security guards, plus an administrative staff. Security guard service is provided for the entire site 24 hours a day, 7 days a week. The Manager of Security takes charge in civil disturbances and bomb threats. Calls for outside assistance are handled by a Security Supervisor.

4.1.5.2. Health Physics Department

This group consists of the Manager, Health Physics Department, professional personnel, Health Physics Technicians, and administrative personnel. During routine operations, technicians are assigned to separate facilities or work as roving technicians.

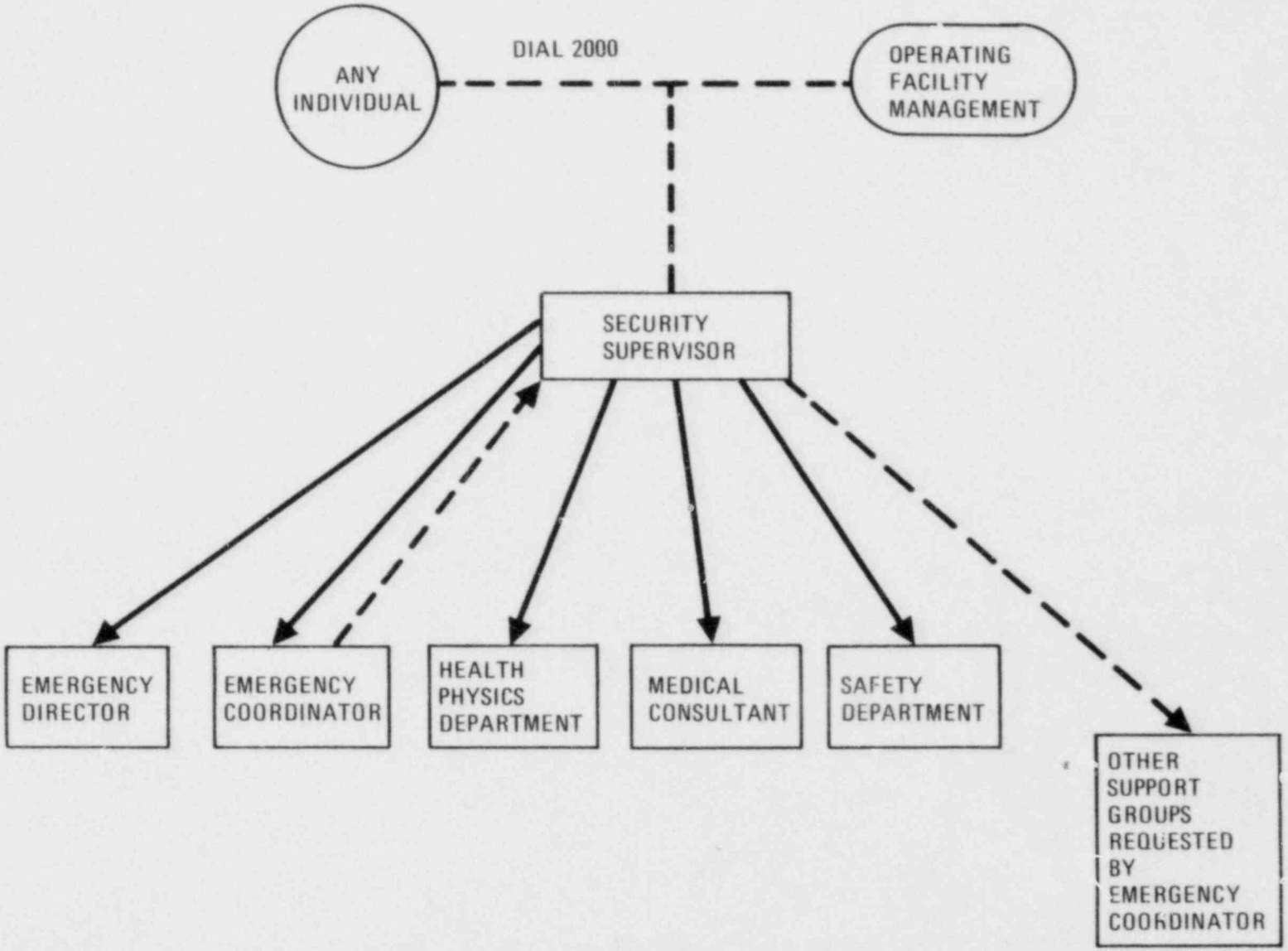


Fig. 4-1. Notification Responsibilities

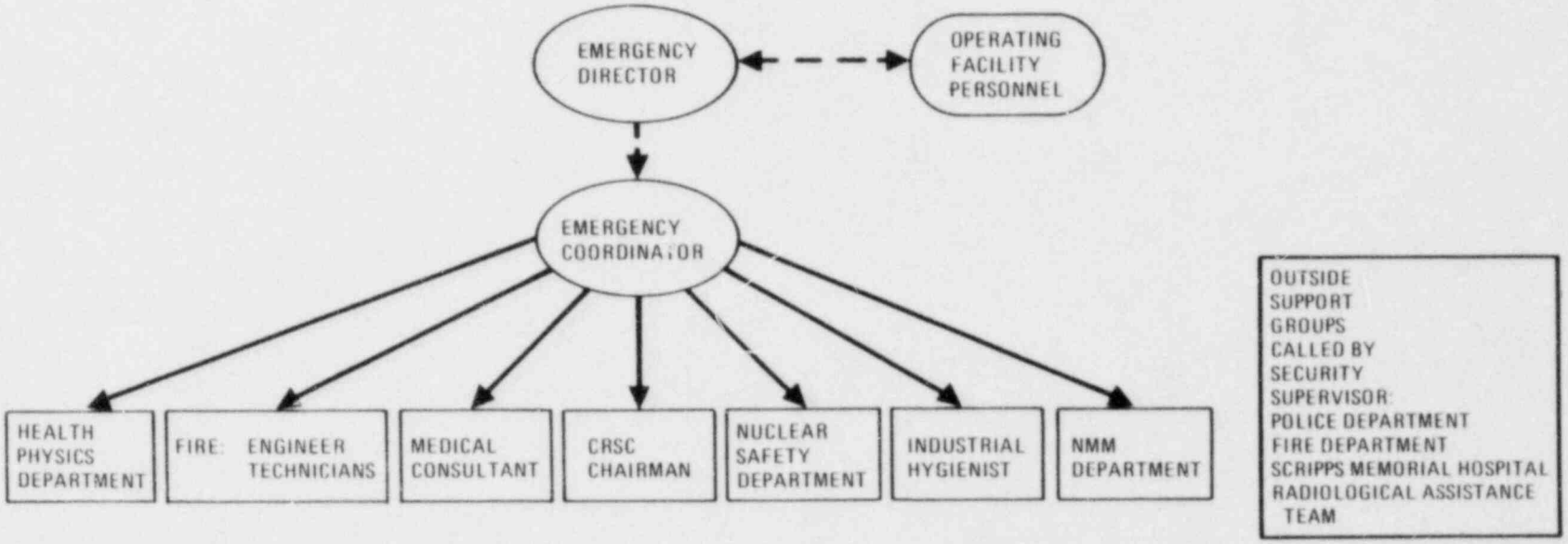


Fig. 4-2. Emergency Organization on the Scene

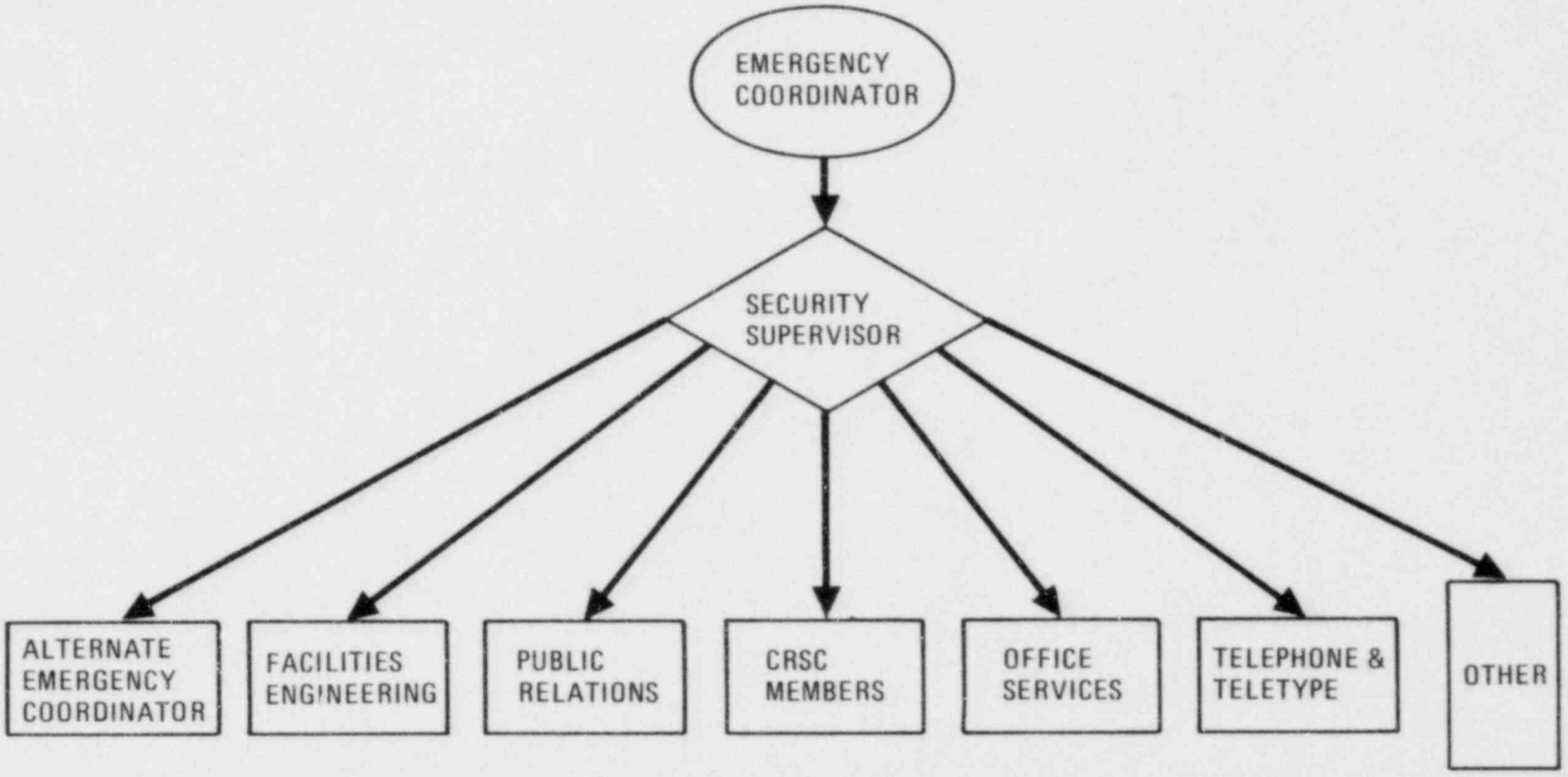


Fig. 4-3. Emergency Organization - Security Control Center

4.1.5.3. Medical Department

This department is staffed with a medical consultant, a registered nurse, and a medical technician. These individuals are available on the site during normal working hours and are on call for emergencies.

4.1.5.4. Safety Department

This department includes the Manager, Safety and Accident Prevention, a fire chief, four technicians, and a volunteer fire brigade. This department provides fire protection services.

4.1.6. Secondary Support Groups

Other support groups are available within GA which augment the normal operations and also may be assigned to the emergency organization if needed. These groups include but are not limited to: Facilities Engineering. Criticality and Radiation Safeguards Committee, Public Communication, Industrial Hygiene, Decontamination Services, and Nuclear Material Management.

4.1.7. Employees and Other Persons with Special Qualifications for Coping With Emergency Conditions

A list of employees, other than those assigned to the emergency organization, and a similar list of other persons whose assistance may be needed and who have special qualifications for coping with emergency conditions are maintained by the Emergency Coordinators.

4.2. OUTSIDE RADIOLOGICAL CONTINGENCY RESPONSE ORGANIZATIONS

4.2.1. Emergency Director

The Emergency Director for a facility is a senior staff member of the operating organization managing that facility. In facilities that do not contain work involving toxic, fissionable, or radioactive materials, the Manager, Facilities Engineering, has been designated as the Emergency Director.

The Emergency Director is responsible for the overall direction of all activities at the scene of the emergency (See Fig. 4-2). He acts with the full authority of the President of the Company. He determines when the facility or area may be re-entered and accounts for all personnel present in the facility at the time of the emergency.

4.2.2. Emergency Coordinator

The Emergency Coordinator is the Manager, Health Physics Department. Four alternate Emergency Coordinators have been designated. The Emergency Coordinator is responsible for coordinating the activities of the various emergency response groups (see Fig. 4-3). When informed that an emergency condition exists, he reports to the Emergency Director at the scene of the emergency and assists the Emergency Director in controlling the situation. All support groups report to the Emergency Coordinator. The alternate Emergency Coordinators report to the Control Center.

4.2.3. Security Department

4.2.3.1. Manager

The Manager of Security reports to the Control Center as an alternate Emergency Coordinator. If required, he directs the establishment of road

blocks at the entrance of the site and provides for traffic control on the site and at the scene of the emergency.

4.2.3.2. Supervisor

A Security Supervisor is continuously on duty at the Control Center (Ext. 2000) which is located in the Administration Building, Room O-103. During the initial phases an emergency the Security Supervisor acts as the Emergency Director until the designated Emergency Director arrives at the scene. He institutes the notification and emergency procedures required to cope with the situation until relieved by the Emergency Director at the scene. Fig. 4-1 presents the notification responsibilities.

4.2.4. Health Physics Department

The Health Physics Technicians are assigned to the emergency operations during an emergency. They report to the Emergency Coordinator at the scene of the emergency.

4.2.5. Safety Department

4.2.5.1. Manager

The Manager of Safety reports to the Control Center as an alternate Emergency Coordinator. He provides coordination between the Control Center and areas, departments, and personnel not directly involved with the emergency.

4.2.4.2. Fire Department

The Fire Chief, fire technicians, and Fire Brigade are assigned to the emergency operations during an emergency.

Fire Chief

The Fire Chief reports to the Emergency Coordinator at the scene of the emergency to evaluate fire hazards. He notifies the Control Center to have the Fire Brigade report to the scene or requests that they summon the SDFD.

Fire Technicians

Fire technicians report to the scene with the fire fighting vehicles and equipment. If no Health Physics personnel are present and entry into a Controlled Area is necessary, the technicians shall determine the extent of the radiation hazard with appropriate radiation detection equipment prior to facility entry. If radiation levels exceed 5 R/hr at the facility entrance and no lifesaving actions are required, no entry shall be made until Health Physics personnel are present to evaluate hazards. If radiation levels at any location within the facility exceed 5 R/hr and no lifesaving actions are required, all personnel shall immediately withdraw from the facility until Health Physics personnel are present to evaluate the radiation hazards. If lifesaving actions are required, personnel effecting the rescue shall limit their dose to 75 Rems.

Scott Air Packs or equivalent self-contained breathing devices will be worn on all entries until airborne radioactivity or other airborne hazardous materials have been evaluated by Health Physics and Industrial Hygiene. Hazard evaluation shall be relayed to the Control Center as soon as possible.

4.2.6. Medical Department

The Medical Consultant reports to the scene of the emergency. He directs all medical activities and advises the Emergency Coordinator as to the medical aspects of the emergency.

4.2.7. Other Support Groups

4.2.7.1. Industrial Hygienist

The Industrial Hygienist reports to the Emergency Coordinator at the scene of the emergency. He evaluates health hazards of toxic nonradioactive materials and recommends controls to protect personnel.

4.2.7.2. Facilities and Plant Engineering

The Manager of Facilities Engineering reports to the Emergency Coordinator at the Control Center and directs all Facilities Engineering personnel who are available for assignment to the emergency organization if they are needed. These include electricians, plumbers, maintenance engineers, and laborers.

4.2.7.3. Public Communications

The Director of Public Relations and Advertising will establish a public information office at a designated location and shall be responsible for all public relations aspects of the emergency.

4.2.7.4. Criticality, Radiation, and Safeguards Committee

The Chairman of the Criticality and Radiation Safeguards Committee reports to the Emergency Coordinator at the scene of the emergency. Other members of the Criticality and Radiation Safeguards Committee report to the Control Center, pending instructions from the Chairman.

4.2.7.5. Manager, Nuclear Safety

The Manager, Nuclear Safety reports to the Emergency Coordinator at the scene of the emergency.

4.2.7.6. Office Services

The Manager, Office Services reports to the Emergency Coordinator at the Control Center, where he makes arrangements to perform decontamination and/or other cleanup services as required.

4.2.7.7. Telephone and Teletype Communications

The Supervisor of Telephone and Teletype Communications is responsible for expediting telephone communications. Only those outside calls directly related to the emergency are put through to the Control Center. Calls from the news media will be put through to the Manager of Public Communications.

4.2.7.8. Nuclear Materials Management

The Manager of Nuclear Materials Management reports to the Emergency Coordinator at the scene of the emergency.

4.3. OFFSITE ASSISTANCE TO SITE

4.3.1. Scripps Memorial Hospital

Scripps Memorial Hospital has agreed to accept victims of accidents. Scripps, however, relies on GA to provide the necessary health physics equipment and personnel to assess and monitor radiation and contamination levels of their facilities, personnel, and patients.

4.3.2. San Diego Police Department

The San Diego Police Department has agreed to provide assistance to GA in an emergency. This assistance includes coordination with other civil authorities as necessary, traffic control, and additional service if needed.

4.3.3. San Diego Fire Department

The San Diego Fire Department responds to emergency calls at GA. If the response is for a fire involving radioactive material, the GA Health Physics Department provides the necessary monitoring to protect Fire Department personnel.

4.3.4. DOE Radiological Assistance Team

The DOE Radiological Assistance Team for the San Diego-Imperial County area is comprised of health physics, medical, and public information specialists. All members of this team, except the medical personnel, are employees of GA and belong to the GA emergency organization. During an emergency at GA, they would function as part of the GA emergency organization. The medical members of the San Diego Radiological Assistance Team would be available, however, and additional assistance would be rendered by the Los Angeles based Radiological Assistance Team should it be necessary.

4.4. COORDINATION WITH PARTICIPATING AGENCIES

Training is provided to the participating agencies. This training is usually a simulated accident with simulated accident victims. A scenario is prepared and the participating agencies are requested to take part as players or observers.

Approximately once each year, senior members of the participating agencies are invited to General Atomic Company for a program update.

5 RADIOLOGICAL CONTINGENCY MEASURES

5.1. ACTIVATION OF RADIOLOGICAL CONTINGENCY RESPONSE ORGANIZATION

The Emergency Coordinator is responsible for activating the radiological contingency personnel for each class of radiological contingency as defined in Section 3.1.

5.2. ASSESSMENT ACTIONS

For each class of emergency the radiological contingency personnel will determine the extent of the problem assisted by the applicable facility personnel.

5.3. CORRECTIVE ACTIONS

The response actions that will be taken will be determined by the facility and extent of the emergency.

5.4. PROTECTIVE ACTIONS

The nature of protective actions and the criteria for implementing action are discussed in the following sections.

5.4.1. Personnel Evacuation from Site and Accountability

Where criticality alarms are involved, personnel evacuation routes and reassembly areas are specified. Health Physics personnel check the affected areas and radiological monitoring of evacuees is handled by trained individuals. Decontamination and selection for medical attention are done by GA personnel (H.P. and Medical Dept.).

5.4.1.1. On-Site Personnel

In the event of an incident, the safety of personnel is the primary consideration of the emergency staff. Evacuation of all personnel not directly involved with emergency operations will, in most cases, provide adequate protection. The site is sufficiently large that evacuation from any facility can be accomplished by utilizing facilities not affected. Shielding from radiation associated with a nuclear incident can be provided on the site by using features of the natural terrain.

5.4.1.2. Routes

The primary evacuation routes and control points have been established and posted. Alternate routes and control points would be designated by the emergency coordinator if required.

5.4.1.3. Off-Site Personnel

An incident which would create radiation levels sufficient to become a health hazard to individuals at an off-site location is improbable. Should an incident occur, however, which could possibly create any external or internal radiation hazard to the general public, they would be subject to evacuation as a precautionary measure.

5.4.2. Use of Protective Equipment and Supplies

The Health Physics Department maintains an emergency van with maintained and inventoried equipment such as radiation detection and measurement equipment, respirators and protective clothing. This vehicle has a radio communications system and is kept in a central location.

5.4.3. Contamination and Control Measure

Any unusual event involving radioactive materials is evaluated by the responsible Health Physics personnel and a determination is made on isolation and area access control on the basis of the applicable NRC limits for controlled and uncontrolled areas.

5.5. EXPOSURE CONTROL IN RADIOLOGICAL CONTINGENCIES

5.5.1. Emergency Exposure Control Program

5.5.1.1. Exposure Guidelines

The EPA Emergency Worker and Lifesaving Activity Protective Actions Guides (EPA 520/1-75/001) are the basic guidelines for exposure control in emergency situations. Lifesaving dose is limited to 75 rems whole body and 25 rems where it is desirable to enter an area in order to protect facilities, eliminate further escape of effluents, or to control fires. The basic aim is to stay within the dose limits of 10 CFR Part 20 wherever feasible.

5.5.1.2. Radiation Protection Program

The Emergency Coordinator with the advice of Health Physics personnel will authorize workers to receive emergency doses.

5.5.1.3. Monitoring

GA has Health Physics personnel on duty whenever work with radioactivity is in progress. Monitoring instruments, dosimeters, wipes, as well as the Health Physics Counting Room are available whenever needed. An in-vivo total body counter is also available onsite. Records are kept of any measurements made.

5.5.2. Decontamination of Personnel

Any contaminated individual is decontaminated to natural background. Any seriously injured personnel are transported to the hospital in the company of Health Physics personnel. Lifesaving takes precedence over decontamination.

5.6. MEDICAL TRANSPORTATION

GA maintains its own onsite ambulance which is used for transporting injured personnel who may be contaminated. Commercial ambulance service, including paramedics, is also available.

5.7. MEDICAL TREATMENT

Arrangements have been made with Scripps Memorial Hospital to treat contaminated or irradiated accident victims.

6. EQUIPMENT AND FACILITIES

6.1. CONTROL POINT

The principal emergency control point for radiological emergencies is the Health Physics Laboratory which has communications links with the other onsite emergency facilities and vehicles.

6.2. EMERGENCY COMMUNICATIONS NETWORK

Emergency communications at GA consist of telephone, FM radio, evacuation alarms, and sound power horns and public address systems on emergency vehicles.

6.2.1. Telephone

Extension 2000/2001 are the emergency numbers at GA. These telephones are uniquely connected to the Control Center, Medical Department, Safety (Fire) Department, and Health Physics Department.

6.2.2. Radio

GA maintains a private line, frequency modulated radio network for emergency communications. This radio communications network has fixed station transmitter/receivers in the Control Center, Medical office, Health Physics office, Safety (Fire) office, and the Security stations. Mobile transmitter/receivers are available to Emergency Support groups. This system is routinely used and tested on a daily basis.

6.2.3. Public Address System

Public address systems are installed on the Health Physics and Fire Department emergency vans. Portable power sound horns are available on the fire truck and at the Control Center.

6.2.4. Alarms

6.2.4.1. Criticality

Each facility that uses or has authorization to use fissionable material has radiation sensing devices that automatically alarm at the preset level as required by 10 CFR 70.24. These monitors activate klaxon horns which are audible throughout the interior and exterior of the particular facility. Each of these monitors is connected to a separate alarm at the Control Center which identifies to the Security Supervisor the facility and area affected.

6.2.4.2. Fire

All facilities at GA are equipped with fire alarm systems which code into the Control Center. These alarms may be activated manually or by heat sensing devices, special detectors, or the activation of the sprinkler system.

6.3. FACILITY FOR ASSESSMENT TEAMS

Adequate laboratory and office space exists on the site for use by staff assigned to post-accident and recovery assessment and protective action functions.

6.4. ONSITE MEDICAL FACILITIES

See Section 4.1.5.3. for a discussion of the onsite medical facilities.

Supplies and equipment routinely on hand for emergency first aid are given below:

For team personnel:

Identification tags for injured persons (on which will be listed the victim's name, nature of injuries, contamination information, rescuer's initials, and the date and time).

Dust respirators with suitable filters. Extra filters should be provided.

6.5. EMERGENCY MONITORING EQUIPMENT

6.5.1. Health Physics Department

The Health Physics emergency vehicle has a custom designed interior which carries all major necessary items of equipment for coping with a major nuclear emergency. This equipment includes, but is not limited to, self-contained breathing apparatus, portable air samplers, portable radiation monitoring equipment, and the necessary protective clothing for members of the emergency team. Health Physics also maintains an environmental survey vehicle equipped with a 70 W transmitter/receiver. A 2.5 kW gasoline powered portable generator is available to be towed by the survey vehicle.

Other monitoring equipment is available from onsite operations which can be shutdown or are not critical to the operation. The use of this monitoring equipment would depend on the extent of the emergency.

Maintenance and calibration of monitoring equipment is done on a routine schedule determined by past experience and manufacturers specifications. This maintenance and calibration of the monitoring equipment is a license required activity.

A typical inventory of emergency monitoring equipment and supplies is given below:

Anticontamination clothing (per team member):

Item

Coveralls (anticontamination)
Gloves (rubberized)
Shoe covers (rubber)
Head covers (hoods)
Self-contained breathing apparatus
2-inch masking tape

(Additional quantities of anticontamination clothing may be kept in large plastic bags placed near the control point, main gate, etc.)

Radiation Detection Instruments and Accessories (per team)

Item

Alpha detection instruments
Low-energy gamma detector
Low-level beta-gamma detectors
Head phones
High-level beta-gamma detectors (at least 1000 R/hr full scale)
Air samplers
Filter paper (Whatman No. 41)
Dosimeter charger
Dosimeters (0-200mR and 0-200 R)
Neutron activation detectors, (indium foils)
Flashlights with batteries
Spare flashlight batteries

Area and Personnel Control Equipment

Item

Health Physics handbook (with reference tables)

Notebook

Retractable pens

Grease pencils

Area access log

Survey log

Survey grid map

Rand-McNally Road Atlas (U.S.A.) or equivalent (for offsite monitoring)

Telephone list for control and evaluation point(s)

Nasal swabs

Swab containers

Smear papers

Envelopes for samples

Reel of barricade ribbon (bright color, 5000 feet)

Contaminated material stickers

Radiation area signs

Large plastic bags

First aid kit

Antifog solution

Radiation signs:

Caution: High Radiation Area.

Caution: Radiation Area.

Caution: Radioactive Materials.

Caution: Airborne Radioactivity Area.

500 feet of rope.

Personnel dosimeters and dosimeter charger, 200 mR and 200 R levels.

Flashlight and batteries, screwdriver, pocketknife, pliers.
Scissors
Clean clothes
Blankets
Foot covers
Cloth or plastic bags - large
Tags and gummed labels
Crayons, pencils, and chalk
Notebook, paper
1-pint and 1-quart containers
Swabs, cotton with envelopes

Survey meters:

Portable beta-gamma survey meter
Portable alpha detector
Portable air sampler
Extra batteries for each instrument. Extra Geiger-muller tubes.
Screwdriver

7. MAINTENANCE OF RADIOLOGICAL CONTINGENCY PREPAREDNESS CAPABILITY

7.1. WRITTEN PROCEDURES

A manual of "Emergency Procedures" has been published at GA to guide the emergency staff in handling emergencies. Members of the emergency organization are issued a copy of this manual.

7.2. TRAINING

7.2.1. Operating personnel

All individuals at GA who routinely work with radioactive material are required to attend a Radiological Safety Course and pass an examination at the end of the course. Typical course content is as follows:

1. Definitions and Units of Radiation Dose and Quantity of Radioactivity.
2. Types of Radiation, etc.
3. External Radiation Hazards
4. Internal Radiation Hazards
5. Biological Effects of Radiation
6. Permissible Exposure Levels
7. Protection from External Radiation
   a. Time
   b. Distance
   c. Shielding
8. Protection from Internal Radiation
   a. Enclose the Source
   b. Enclose the Individual
9. Contamination/Decontamination

10. Protective Clothing and Equipment
    a. Purpose and Use
    b. Demonstration
    c. Limitation
11. Criticality
12. Radiation Instrumentation
    a. Use of Radiation Survey Instruments
        (1) Maintenance and Calibration
        (2) Operation
        (3) Limitations
    b. Radiation Survey Techniques Using Sources
    c. Characteristics and Use of Personnel Monitoring Equipment
        (1) Film Badges
        (2) Self-Reading Pocket Dosimeters
        (3) Finger Film Badges
13. 10 CFR 19, 20, Regulatory Guides, Title 17, CAC.
14. Respiratory Protection
    a. Self-contained Breathing Apparatus
        (1) Policy and Procedures
        (2) Fitting and Use

7.2.2. GA Emergency Organization

Personnel in the emergency organization receive on-the-job or additional specialized periodic training particular to their discipline.

7.2.3. Non-GA support personnel

Off-site support organizations or personnel are periodically briefed on site activities.

7.3. TESTS AND DRILLS

7.3.1. Evacuation

Evacuation drills are conducted at each facility that uses special nuclear material. The interval between drills is dependent on the inventory of material but does not exceed six months.

7.3.2. Other

Fire drills are conducted periodically at each facility. Special drills are scheduled at various times to provide training for the emergency organization in implementing procedures for incidents at GA.

7.4. REVIEWING AND UPDATING OF THE PLAN AND PROCEDURES

The primary Emergency Coordinator is responsible for an annual review and updating of the Emergency Plan and a semiannual review and updating of the Emergency Procedures.

The usual method of updating will be to publish revision pages for distribution to all holders of the GA Emergency Plan and Emergency Procedures Manual.

7.5. MAINTENANCE OF INVENTORY OF RADIATION EMERGENCY EQUIPMENT

The schedule for maintenance and inventory checks for equipment and supplies required for responding to a radiological contingency will be:

1. Radiation detection instruments will be operationally checked monthly, inventoried quarterly, and calibrated quarterly.

2. Auxiliary lighting will be checked quarterly.

3. Protective breathing equipment and protective clothing will be checked quarterly for proper function and intact inventory.

4. Other supplies designated for emergency use will be checked quarterly.

5. All equipment and supplies will be immediately replaced or repaired if found missing from the inventory or not functioning properly.

6. Essential emergency equipment will be kept secured to prevent pilfering and misappropriation.

8. RECORDS AND REPORTS

8.1. RECORDS OF INCIDENTS

Records of radiological contingencies as defined by the classification system of Section 3.2. will be retained until the license is terminated. The records will include at least the following:

1. The cause of the event. This record will include both the direct cause as well as any indirect cause.

2. The extent of any injury and/or damage.

3. Radiological data such as area surveys, effluent releases, calculated and measured doses, and contamination measured on surfaces and personnel.

4. The number and type of personnel and/or equipment involved.

5. The corrective action taken to terminate the event and an identification of personnel responsible for making those decisions.

6. The offsite support assistance that was requested as well as actual assistance received.

7. The extent to which response equipment was used.

8. The dates and times that any accident situation is reported offsite and the names of organizations and individuals contacted.

9. The personnel and their titles who are designated to be responsible for maintaining records will be identified.

8.2. RECORDS OF PREPAREDNESS ASSURANCE

Records will be kept confirming that preparedness is maintained to respond to radiological contingencies. The following records will be kept:

Records of training (including the type and time spent during the training, and names of individuals trained).

Records of drills and tests (including the results of critiques and any commitment to change the plans).

Records of inventories and locations of emergency equipment and supplies.

Records on the maintenance, surveillance, and testing of equipment and supplies.

Documentation of the reviews and updates of the radiological contingency plan, as well as any personnel changes.

8.3. REPORTING ARRANGEMENTS

The Emergency Coordinator is responsible for reporting accidents and reporting to local, state, and federal agencies. The Director of Public Relations is responsible for reports to keep the public informed.

9. RECOVERY

The procedures for recovery and re-entry in the event of an emergency situation are as follows:

1. A complete analysis of the circumstance leading up to and resulting from the situation, together with recommendations to prevent a recurrence, shall be prepared by Criticality and Rediation Safeguards Committee.

2. Although an emergency situation transcends the normal requirements of limiting exposure, there are suggested levels for exposure to be accepted in emergencies. However, every reasonable effort to minimize exposure must be made, even in emergencies.

   a. Four categories of risk versus benefit must be considered:

      Saving human life.
      Recovery of the dead.
      Protection of health and safety of the public.
      Protection of property.

   b. In order to avoid restricting actions that may be necessary to save lives, it shall be left to the judgment of the Emergency Director to determine the amount of exposure that will be permitted in order to perform the emergency mission. However, in no case will the exposure be permitted to exceed 75 rem.

c. In situations where the bodies of accident victims are in areas inaccessible because of high radiation fields, special planning and remote recovery devices should be used to retrieve the bodies. Exposure of recovery personnel should not exceed 12 rem.

d. When emergency on-site action is necessary to reduce a hazard potential to acceptable levels or to prevent substantial loss of property, an exposure up to 12 rem may be received by participating individuals. However, volunteers, under special circumstances, may receive up to 25 rem exposure. When the risk of hazard is such that life would be in jeopardy or there would be severe effects on the health of the public, volunteers may receive up to 75 rem.

e. Once the hazard potential has passed, steps shall be taken to recover from the incident. All actions shall be preplanned in order to limit exposures. Areas will be roped off and posted with radiation levels and stay times based on results of surveys. During any plant restoration operations personnel exposures to radiation will be maintained with 10 CFR Part 20 limits and as low as can be reasonably achieved. Portable shielding material should be used whenever possible. Access to the area shall be controlled and exposures of personnel documented.

f. The Criticality and Radiation Safeguards Committee shall be the designated technical group responsible for evaluating re-entry advisability depending on existing conditions.

g. Current operating records and other essential information necessary for evaluating the emergency shall be readily available.

h Site documents and plans which may be necessary for recovery/ re-entry may be obtained from Facilities Engineering.

i. Vehicles or equipment which may be needed to effect recovery/ re-entry are also available from Facilities and Plant Engineering.

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