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PINELLAS PLANT: CHILD CARE/PARTNERSHIP SCHOOL SAFETY ASSESSMENT

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PINELLAS PLANT

CHILD CARE/PARTNERSHIP SCHOOL

SAFETY ASSESSMENT

SAFETY ASSESSMENT
CHILD CARE/PARTNERSHIP SCHOOL
NOVEMBER 1989

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Albuquerque Operations Office
Under Contract No. DE-AC04-76DP00656

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School Site (Westinghouse HAZTECH) |
| III | Air Emissions Survey & Plume Modeling
Report (TENERA) |

1.0 INTRODUCTION

The attached Safety Assessment for the Child Care/Partnership School at the Pinellas Plant is submitted in accordance with DOE/AL Order 5481.IB.

The Pinellas Plant is owned by the United States Government and is operated by the Neutron Devices Department of the General Electric Company (GENDD) as a prime contractor to the Department of Energy (DOE). Construction of the Pinellas Plant began in 1956 and production operations started in 1957.

The Pinellas Plant is engaged in the production of equipment for nuclear weapons applications and is part of the nuclear weapons production complex administered by the Albuquerque Operations office of the DOE. The production, research, development and support activities of the plant are performed by a workforce of approximately 1,700 employees. The DOE Pinellas Area Office, located at the plant, includes an additional staff of 27 people.

The benefits of providing on-site child care and elementary education were recognized by Admiral Watkins, U.S. Secretary of Energy, in a DOE memorandum issued July 11, 1989 (Figure 1.1). The Exemplary Contractor Child Care Initiative outlines Admiral Watkin's commitment to the development of programs that will contribute to the quality of the Department's workforce. The Secretary stated that such programs are necessary for the accomplishment of the missions of DOE and will make a substantial contribution to employee welfare and morale; recruitment and retention of highly qualified individuals; increased job satisfaction and attainment of such statutorily established goals as equal employment opportunity; retaining valued employees; reducing absenteeism and tardiness and aid in increasing productivity and efficiency.

GENDD is currently establishing an innovative program combining early childhood development and elementary education. Called the New Directions Child Care/Partnership School, this facility will be built and operated on the Pinellas Plant site. This action by GENDD is timely and in step with the recent DOE policy.

Two distinct operations are planned; a Child Development Center and the Partnership School. The Child Development Center will provide care for children ranging in age from eight weeks through four years. The Partnership School will provide education for children in Kindergarten, first and second grade. The Partnership School is a public school and will be staffed by members of the public school system (Pinellas County, Florida).

The efforts of the Albuquerque Operations Office, through the Pinellas Area Office and General Electric, were featured in Admiral Watkin's Memorandum.

The Child Care/Partnership School is the subject of this Safety Assessment.

memorandum

Figure 1.1

DATE: JUL 11 1989

REPLY TO:
ATTN OF: MA-52

SUBJECT: Exemplary Contractor Child Care Initiative

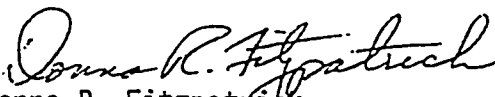
TO: ✓
Manager, Albuquerque Operations Office
Manager, Chicago Operations Office
Manager, Idaho Operations Office
Manager, Nevada Operations Office
Manager, Oak Ridge Operations Office
Manager, Pittsburgh Naval Reactors Office
Manager, Richland Operations Office
Manager, San Francisco Operations Office
Manager, Savannah River Operations Office
Manager, Schenectady Naval Reactors Office
Director, Naval Petroleum & Oil Shale Reserves
in Colorado, Utah, and Wyoming
Director, Naval Petroleum & Oil Shale Reserves
in California
Manager, Bonneville Power Administration
Manager, Western Area Power Administration

Admiral Watkins has publicly stated his personal commitment to the development of programs that will contribute to the quality of the Department's workforce. In his statement announcing the establishment of child care and development centers at headquarters, Admiral Watkins also indicated that such programs were necessary for the accomplishment of the missions of DOE and will make a substantial contribution to employee welfare and morale; recruitment and retention of highly qualified individuals; increased job satisfaction and attainment of such statutorially established social goals as equal employment opportunity; retaining valued employees; reducing absenteeism and tardiness; increasing productivity and efficiency; and improving job satisfaction.

In our continuing efforts to reinforce our commitment to and support for dependent care initiatives, we have attached a summary description of a joint venture to establish a partnership school and daycare facility at the General Electric Pinellas Plant. The attachment describes how one contractor has effectively addressed employee child care concerns.

The General Electric Pinellas initiative is both notable and timely, and DOE recognizes that support for contractor dependent care programs is essential.

In anticipation of this need for support, you will receive for review and coordination the draft policy paper, Contractor Dependent Care Programs, by the middle of July. Operations Office responses, comments and suggestions will be valuable to the establishment of a timely and responsive DOE contractor dependent care policy.


Donna R. Fitzpatrick
Assistant Secretary
Management and Administration

Attachment

JOINT VENTURE TO ESTABLISH A PARTNERSHIP SCHOOL AND DAY CARE
FACILITY AT THE DOE PINELLAS PLANT

The Albuquerque Operations Office through the Pinellas Plant Area Office is involved in a joint venture to establish a Partnership School and a Day Care Facility at the Plant.

The venture is unique in that it is based on a partnership with the local county school system. The county school system will provide the teachers, supplies and classroom furnishings for the operation of the school for pre-kindergarten, kindergarten, first and second grade during regular school hours. The Government will provide the facility and its normal operating and maintenance costs.

A Day Care Facility will also be available for children from infancy through the second grade for outside school hours. The day care will be operated as a non-profit corporation. Fees paid by parents with children in the day care center will cover the cost of staff, food, supplies and liability insurance. Again, the government will provide the facility and its normal operating and maintenance costs.

Between 75 and 90 children are expected in the first year of operation. The Partnership School will consist of one class each for pre-kindergarten, kindergarten and first grade. Second grade will be added in 1990. The total estimated number of children for both the Child Care and Partnership School should not exceed 200 children.

Expected benefits include reduced absenteeism, tardiness and turnover and thus increased productivity. The program will be an asset in recruiting and retaining the best workforce. Other benefits include improved education for the children.

2.0 SUMMARY AND CONCLUSIONS

This document describes the Child Care/Partnership School and its unique relationship to the Pinellas Plant. The school and its operation are described in detail, along with the administrative and engineering controls in place to ensure its safety. Special emphasis is given to analyzing potential risks to school operations and personnel posed by their close proximity to the plant. A recent Safety Systems Management Assay (SSMA), conducted by an independent consultant, was used as a guide in describing both routine operations and potential credible accident scenarios.

Routine operations of the Pinellas Plant pose an acceptable level of risk to the Partnership School and its staff and students. Located in a former parking lot on the far East side of the plant, school operations receive essentially the same degree of protection as the general public.

This risk assessment concludes that although potential accidents at the Pinellas Plant could result in injury to personnel using the school, the low probability of these incidents make operation of the school an acceptable risk. Numerous safeguards are in place to limit the effects of a credible accident on both the Pinellas Plant and the school.

The Partnership School meets the expected needs of the Pinellas Plant for the immediate future. There are plans for possible expansion of the school in fiscal year 1991 and 1992.

In summary, operation of the Pinellas Plant poses an acceptably low level of risk to the Child Care/Partnership School, its operations, staff and students. The risks posed by extreme conditions or credible accidents are mitigated by the extensive system of safeguards in place to limit and control such events. The level of risk has been reduced to a point similar to that routinely accepted by the public. It is expected that the Child Care/Partnership School will provide a substantial benefit to employees of the Pinellas Plant.

3.0 SITE DESCRIPTION AND ASSESSMENT

This Chapter provides a description of the Pinellas Plant site and includes a discussion of the geology, hydrology, meteorology, and population of the area. The information in this Chapter is derived primarily from the draft CEARP Phase I Report (DOE, 1987) and the site Environmental Assessment (DOE, 1983).

3.1 DESCRIPTION OF SITE

The Plant, covering 96.9 acres, is located in central Pinellas County, Florida, midway between the cities of Largo and Pinellas Park. Approximately 65 percent of the site is open space and the remaining 35 percent is occupied by structures, paved areas, etc.

The Plant is located on a relatively flat coastal plain in west Florida on a narrow spit of land separating Tampa Bay from the Gulf of Mexico. The topography of the area is characterized by a level ground surface. This area has a subtropical marine climate and the potential for both hurricanes and tornadoes.

Solid, liquid, and gaseous wastes, both radioactive and nonradioactive, generated at the site are stringently regulated and controlled. This is accomplished by a variety of treatment, control, and monitoring systems. The waste management program for the Plant is discussed in Chapter 12.

3.1.1 Population

Pinellas County contains 24 municipalities. Largo and Pinellas Park are the two closest cities to the plant site. The locations and populations of the five largest municipalities in Pinellas County are shown in Figure 3-1. The county is the most densely populated county in the state, with 2,960 residents per square mile. The 1980 census showed the population to be 728,409 and the 1987 population estimate was 828,700.

3.1.2 Land Use

Pinellas County adopted a comprehensive land use plan in March, 1974. The Plant was then, and still is, in an area designated for industrial use. Figure 3-2, taken from the county land use map dated August, 1989 shows the categories of land use surrounding the Plant Site.

3.1.3 Water Use

The dramatic increase in population in the Tampa Bay area has severely stressed the area's water supply and distribution systems, and periodic restrictions on water use are required. The counties of Hillsborough, Pasco and Pinellas, together with the cities of St. Petersburg and Tampa, form the West Coast Regional Water Supply Authority. This authority, together with the Southwest Florida Water Management District, is developing well fields, expanding supply and distribution systems, and purchasing recharge areas to alleviate water supply and distribution problems.

3.2 METEOROLOGY

Average temperatures range from 60.4°F in January to 82.2°F in August. Normal daily fluctuations range from the low 50's to the low 70's during the winter and from the low 70's to the low 90's during the summer. The relative humidity in this area is moderately high, consistently averaging 85 percent during nighttime hours and 57 percent at midday throughout the year.

On average, thundershowers occur 90 days a year, usually in the late afternoons during June, July, August, and September. This season accounts for about 30 inches of the average annual rainfall of 49 inches. April and November are the driest months of the year, averaging 2.1 and 1.7 inches of rainfall, respectively.

Prevailing winds are from the north and northeast during the winter months and predominantly from the east and south during the rest of the year. A westerly sea breeze commonly occurs during summer afternoons. These conditions result in a fairly uniform distribution of wind directions. A summary of ten years of hourly wind speed and direction observations at the Tampa Weather Station is shown in Table 3-1.

Information regarding tornadoes in Pinellas County for the 31-year period from 1950 to 1980 is available from the National Severe Storms Forecast Center. During this period, 50 tornado-like events occurred: 37 were classed as tornadoes and 13 as waterspouts coming onshore (Table 3-2).

Table 3-3 summarizes reported hurricanes that passed within 100 nautical miles of Tampa during the past 117 years (1866 through 1982) and lists their occurrence by month. The greatest potential for hurricanes exists during September and October.

The greatest hazards hurricanes pose to life and property are high winds and tidal flooding. Hurricanes with wind speeds exceeding 100 mph are predicted in UCRL-53526 (Coats and Murray, 1985) as recurring at less than 100 year intervals. The design basis hurricane postulated by the US Corps of Engineers shows tide heights ranging from about 10 feet near the southern part of Tampa Bay to more than 14 feet at the northern end of the Bay. The Pinellas Plant is located about 6.3 miles from the Gulf of Mexico and 4.4 miles from Tampa Bay and has a minimum floor height of 18.5 feet above mean sea level. No Plant damage is expected from hurricane storm surge or tidal flooding.

3.3 GEOLOGY

A generalized geologic cross-section beneath the Plant is shown in Figure 3-3. The surface layer in the vicinity of the Pinellas Plant consists of unconsolidated sands and shelly sands of Pleistocene age (1 million years or younger) ranging in thickness from 25 to 40 feet. These sands are poorly drained and usually associated with a near-surface water table. Beneath the surface layer are hard, clayey sandstones and limestones.

Sinkholes, a fairly common feature in central Florida, are caused by dissolution processes in subterranean limestone. There are collapsed structures in the Tampa Formation that frequently extend up to the surface. Sinkholes occur in the general area but not on the plant site.

The Pinellas Plant is located in a quiet seismic zone. A number of small earthquakes have been recorded, but the closest was about 90 miles east-northeast of the plant site. The seismic-risk map of the United States places central and southern Florida in seismic risk Zone 0, a "no damage" zone as described in Algermissen (1969).

3.4 HYDROLOGY

The greatest amount of water utilized in Pinellas County comes from well fields which tap the Floridan Aquifer. The fields are located in northeastern Pinellas County and in the two adjacent counties, Pasco and Hillsborough, which lie north and east of Pinellas.

3.4.1 Surface Water

There is no natural surface water at the Pinellas Plant. Two man-made ponds (East and West ponds) were formerly used to contain treated industrial and sanitary effluent. Assessment & corrective action is in the five year Environmental Restoration Plan. In addition, there are two storm water retention basins (South and Southeast ponds) sized

to collect a 0.5 inch rainfall runoff, in compliance with Florida and Pinellas County regulations.

The Plant lies on a surface water divide of two drainage subbasins (Figure 3-4). Water in the Starkey Road subbasin flows west, and water in the Cross Bayou subbasin flows southeast. Both subbasins empty into Boca Ciega Bay and the Gulf of Mexico.

3.4.2 Groundwater

There are two aquifers underlying the Pinellas Plant; the surficial Aquifer and the Floridan Aquifer. The Floridan Aquifer is the principal source for municipal, industrial, and agricultural water supplies in the area. The two aquifers are separated by a confining bed of clay and marl.

The surficial aquifer is unconfined, consisting of fine to very fine sands and shells, indicated by the undifferentiated sands in the geologic cross-section (Figure 3-3). It ranges from 25 to 40 feet thick. Depth to water is approximately three to four feet. The surficial aquifer is not commonly used because of its poor quality and low yield.

The general direction of groundwater flow in the surficial aquifer is to the southwest and southeast in the vicinity of the Plant. A comparison of water levels between the surficial aquifer and the Floridan Aquifer indicates a potential downward movement of water from the surficial aquifer to the Floridan.

3.5 ECOLOGY

The Pinellas Plant is located in an area of pine flatwoods, an extensive habitat type in the area found on relatively level areas with poorly drained sandy soils. The vegetation has a typical two-layered look; the overstory is composed of varying densities of slash and longleaf pines, and the understory is composed of saw palmetto grasses and a few herbs.

The poor soil drainage often results in the development of small hardwood hammocks, cypress stands, marshes, and prairies scattered in a mosaic throughout the vegetation type.

The site itself, which was once a dairy farm, falls into the cultivated lands category of improved pasture. Improved pasture offers food for various species of wildlife, however few animals actually breed in the area due to lack of cover. Threatened and endangered species probably do not exist at the Pinellas site, except for the Eastern Indigo snake (*Drymarchon corias couperi*), which may live in the area but has not been recorded at the Plant.

Sensitive environments include wetlands and critical habitats for threatened and endangered species. The U.S. Department of the Interior, Fish and Wildlife Service, and the National Wetlands Inventory have designated the two manmade ponds formerly used to contain treated industrial and sanitary effluent as wetlands. Based on this classification, all water retention ponds not contained in concrete basins created by the Pinellas Plant should probably be given similar consideration.

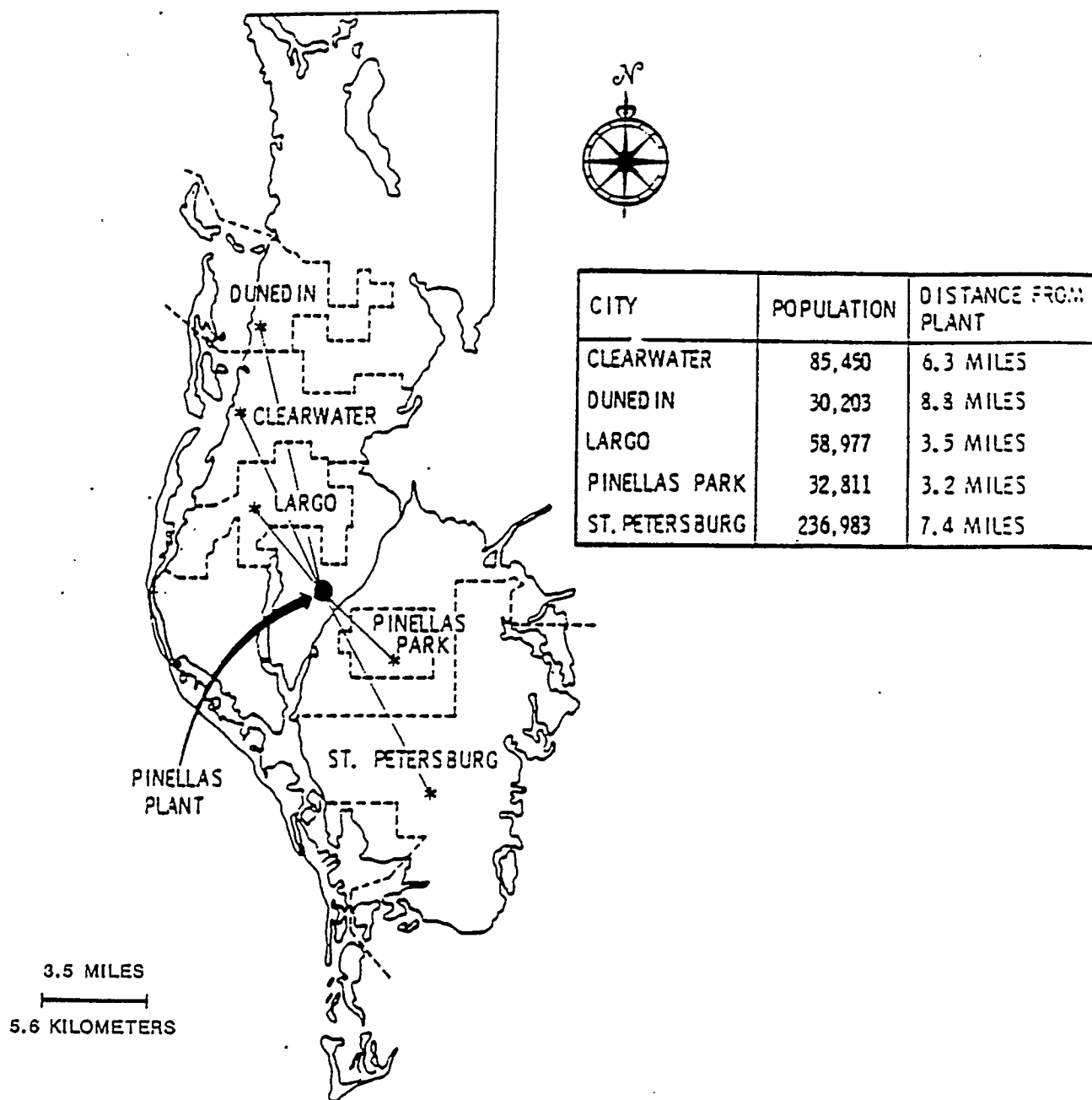


FIGURE 3-1. LOCATION AND POPULATION OF FIVE LARGEST CITIES IN PINELLAS COUNTY
From: DOE Environmental Assessment, 1983

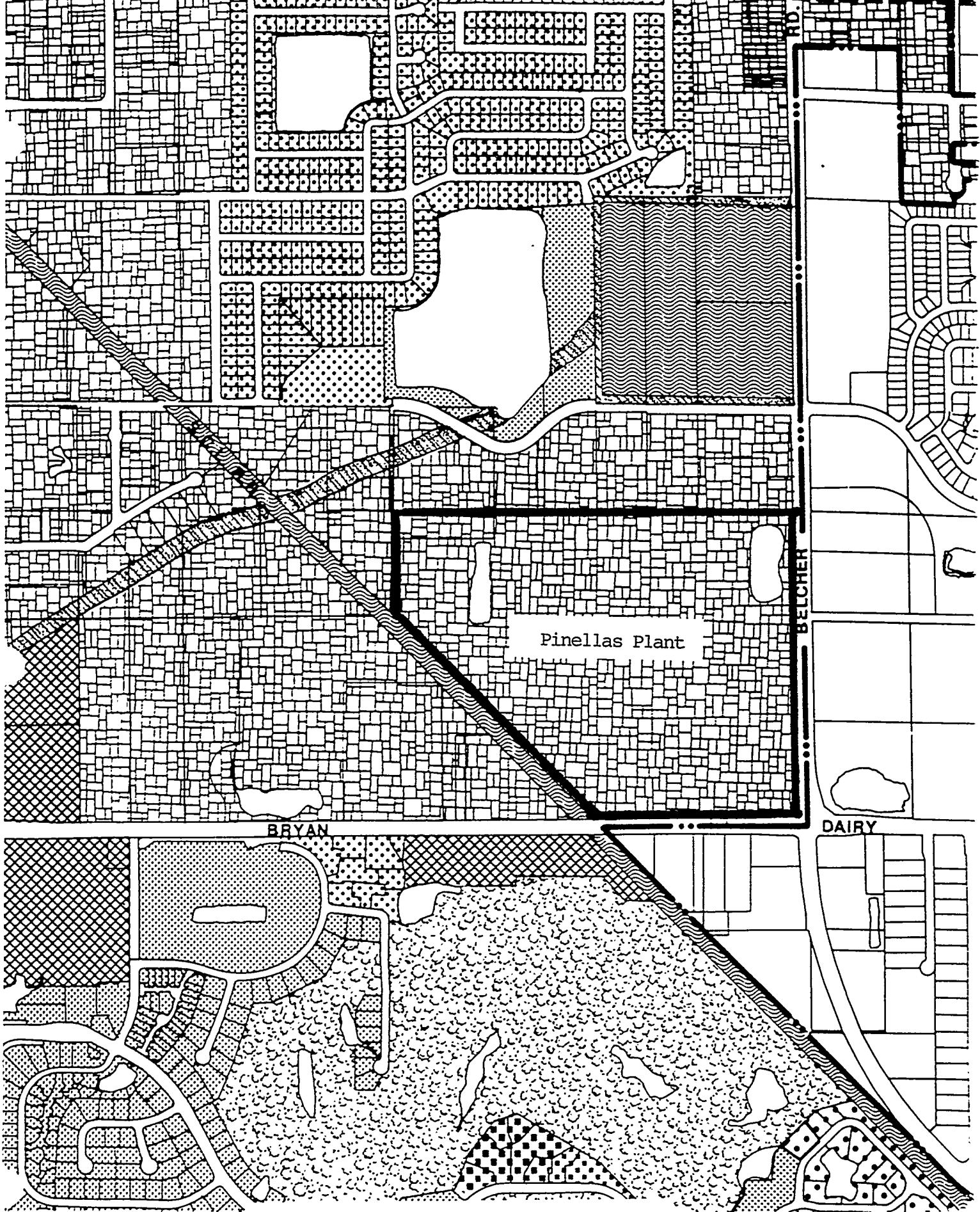


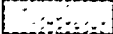












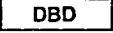



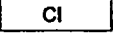


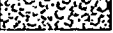
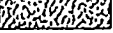




Figure 3-2

PINELLAS COUNTY LAND USE MAP

FUTURE LAND USE ELEMENT PINELLAS COUNTY, FLORIDA

LEGEND

	Preservation
	Rural Residential (0.5 u.p.a. max.)*
	Residential Conservation (1.0 u.p.a. max.)*
	Suburban Low Density Residential (2.5 u.p.a. max.)*
	Low Density Residential (5.0 u.p.a. max.)*
	Urban Low Density Residential (7.5 u.p.a. max.)*
	Low Medium Density Residential (10.0 u.p.a. max.)*
	Medium Density Residential (15.0 u.p.a. max.)*
	High Density Residential (30.0 u.p.a. max.)*
	Permanent Tourist Facility (Overlay)
	Temporary Tourist Facility (Overlay)
	Restricted Commercial (Overlay)
	Office
	Residential/Office
	Residential/Office/Retail
	Downtown Business District
	Central Business District
	Neighborhood Commercial
	General Commercial
	Commercial Industrial
	Light Industrial
	Heavy Industrial
	Open Space
	Recreation Facilities
	Public/Semi-Public
	Existing and Planned Water Supply Wells
	Drainage Features **

* Residential density is expressed in terms of a ratio of the number of dwelling units per gross acre of land. Gross acreage includes street rights-of-way that lie within a site and/or a proportionate share of adjacent street rights-of-way.

** For more information, consult the Pinellas County Drainage Element.

FIGURE 3-2 (Cont.)

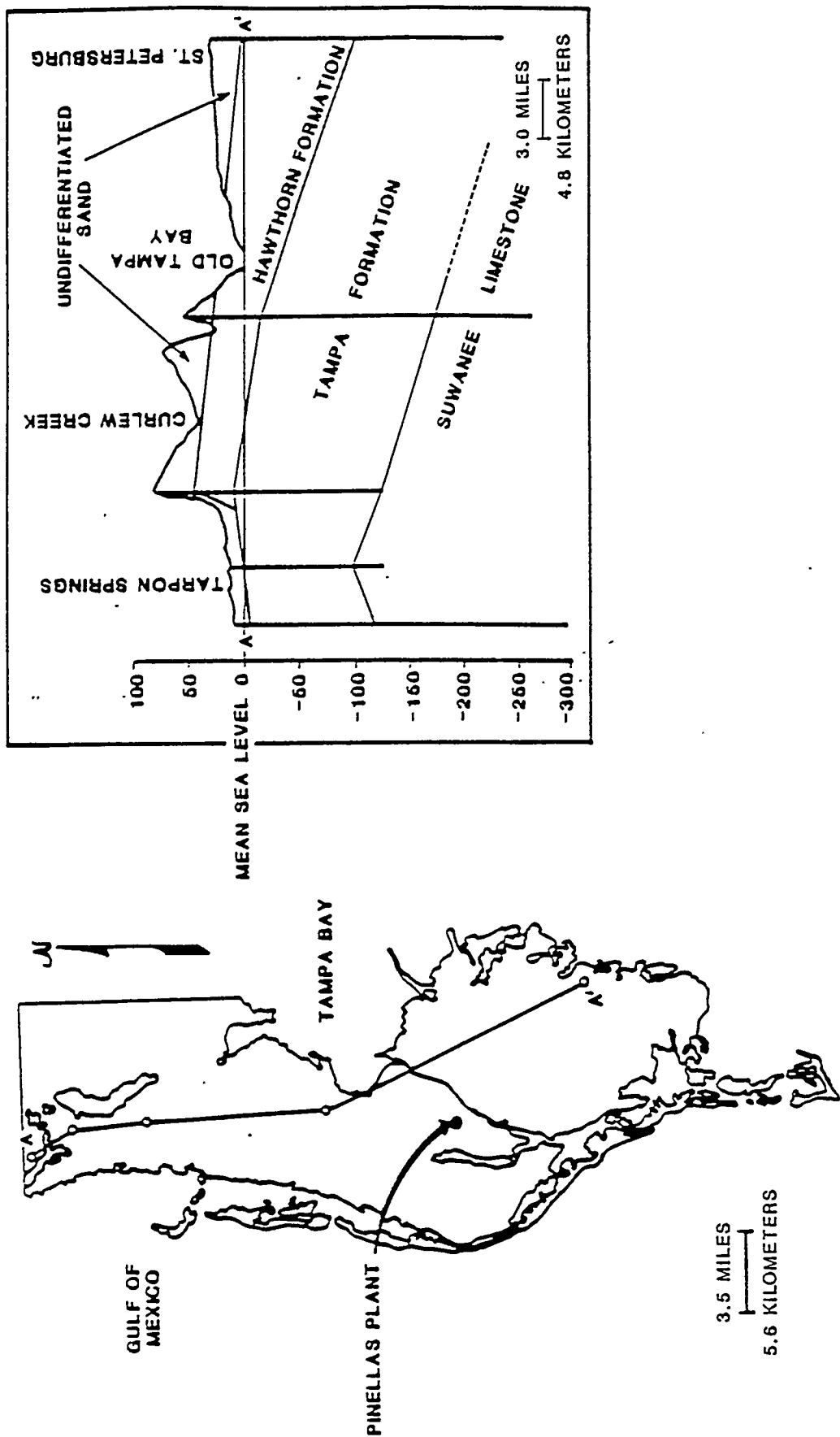


FIGURE 3-3. GEOLOGIC CROSS SECTION BENEATH PINELLAS PLANT

From: *Pinellas Plant Corp Phase I Review Draft (Revision 0) May, 1987*

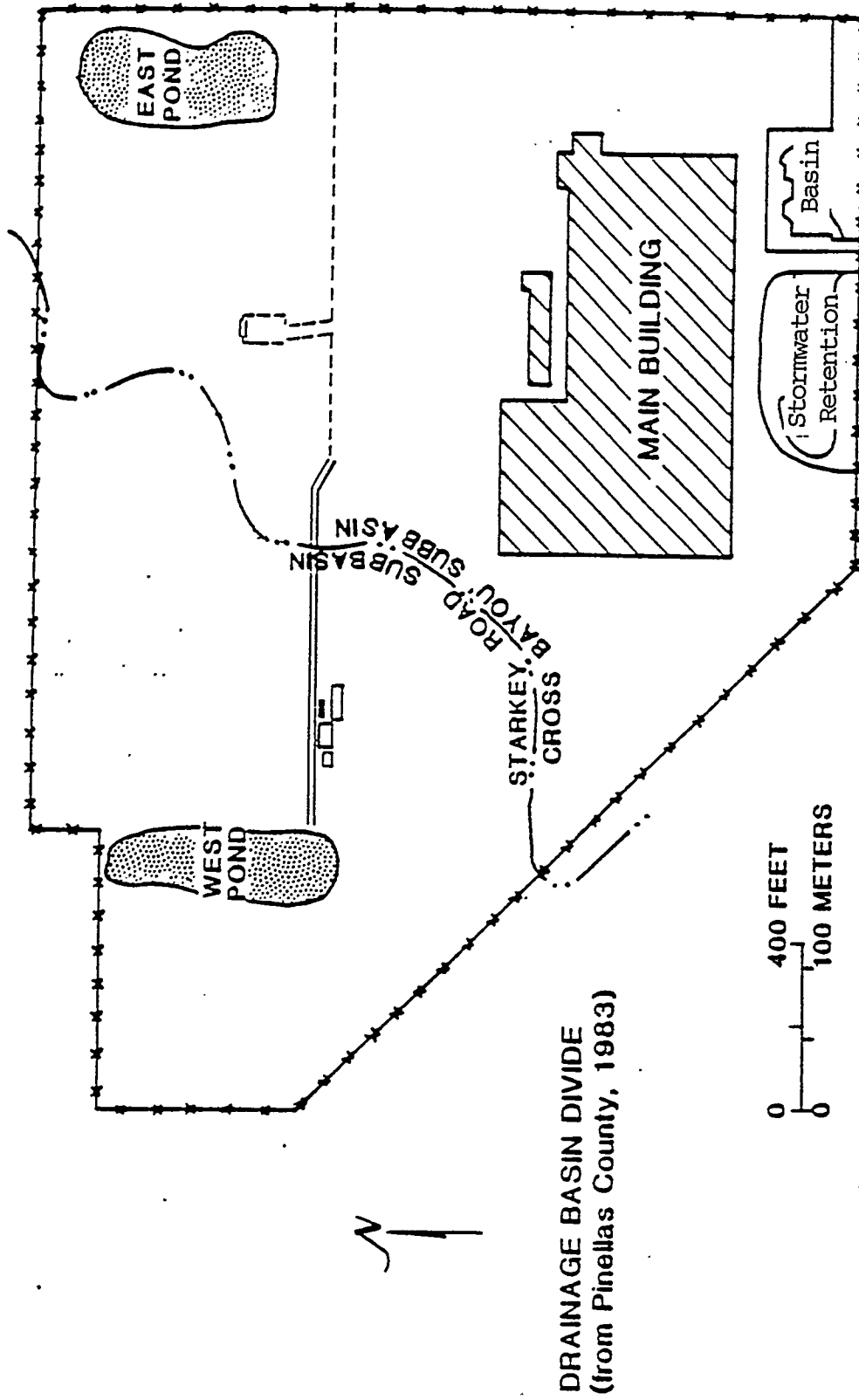


FIGURE 3-11. SURFACE DRAINAGE DIVIDE AND PONDS

From: Pinellas Plant CEARP Phase 1 Review Draft (Review 0) May, 1987

TABLE 3-1
PERCENTAGE FREQUENCIES OF WIND DIRECTION
AND SPEED OVER A TEN-YEAR PERIOD

DIRECTION	FREQUENCY (%)	AVERAGE SPEED MILES PER HOUR (MPH)
N	8	8.7
NNE	8	9.2
NE	8	8.4
ENE	9	8.9
E	10	8.2
ESE	6	8.5
SE	5	8.4
SSE	5	9.2
S	6	10.0
SSW	4	10.3
SW	4	8.9
WSW	5	9.6
W	5	9.9
WNW	5	10.6
NW	4	10.0
NNW	4	9.5
CALM	3	--

From: DOE Environmental Assessment, 1983.

TABLE 3-2
TORNADO OCCURRENCE BY MONTH, PINELLAS COUNTY
1950 - 1980

MONTH	NUMBER
January	3
February	1
March	2
April	4
May	9
June	8
July	4
August	8
September	4
October	2
November	2
December	3

From: DOE Environmental Assessment, 1983.

TABLE 3-3
OCCURRENCE BY MONTH OF HURRICANES
WITHIN 100 NAUTICAL MILES
(1866 THROUGH 1982)

MONTH	NUMBER
June	2
August	4
September	10
October	8
November	1

4.0 DESCRIPTION OF FACILITY - GEND CHILD CARE/PARTNERSHIP SCHOOL

4.1 Location and Layout of Facility

The school buildings are located approximately 150 feet east of buildings 100 and 300 in the northern end of the east parking area, as shown in Figures 4.1 and 4.2. The Child Care/Partnership School is comprised of two separate modular buildings (as shown in Figure 4.3 and Figure 4.4) The total area of the school is 12,786 square feet. The buildings are connected by an open, covered walk.

A four foot high chainlink fence surrounds the school grounds and playground area. A gate, wide enough to admit emergency vehicles, is attached to the fence.

A landscaped buffer zone ten feet in width lies along the outside perimeter of the fence and separates the school site from vehicle traffic lanes and parking areas. Traffic lanes exist on three sides of the school site with two-way traffic on both the east and west side.

The main entrance to the school is on the east side. A curb island and circle driveway in front of the main entrance, comprise a pick-up and drop-off zone for students. A concrete sidewalk of standard width runs along the east side and provides access to the main entrance. A painted pedestrian walkway is in place along the south side of the site.

4.2 Structural and Design Criteria

The buildings are steel frame Type IV construction with raised concrete floors. The roof is steel/bar joists and metal decking with rigid insulation and a single ply membrane roof. Foundations are spread footing/piers with a continuous perimeter foundation wall and footing.

Design is based upon the Standard Building Code, NFPA 101, Pinellas County Licensing Board requirements for child care centers, and certain requirements of The School Board of Pinellas County. The buildings are designed to be fully accessible to handicapped persons. Structural design is based upon the Standard Building Code, including the design parameters of ANSI A58.1 for the 100 year mean recurrence wind. Wiring is in accordance with the National Electric Code and lightning protection is in accordance with NFPA #13. Additional and more specific information regarding building specifications may be found in the project manual.

Materials include light gage metal framing exterior walls with plywood sheathing and an exterior insulation and finish system (Dryvit). Interior partitions are drywall. Floor finish is carpet and vinyl composition tile.

The HVAC system includes multiple DX units with fan coil units in the ceiling. Outside air is brought in from a dampered duct at each fan coil unit. The kitchen has a residential type exhaust hood. Each toilet has an exhaust fan automatically activated by the light switch.

Both buildings are fully fire sprinklered and equipped with smoke and heat detection systems tied to the main plant alarm system.

Electrical service includes ground fault receptacles on the exterior walls and near water sources, with child proof receptacles where they may be accessed by children. There are intercom speakers in all rooms which are wired back to the school director's office if any emergency announcements are required. All rooms include emergency lighting and required exit signs.

The school is built upon a raised foundation. The floor slab is approximately 24 inches above the level of the parking lot. The school is a single story structure. Walls are ten feet high.

The walls are built of fire resistant gypsum board. The roof is metal pan covered with fiberglass insulation board and a single-ply membrane roof.

The school is grounded to earth ground and a lightning protection system is in place.

4.3 Fire Protection

The school structure is fully protected by a wet-pipe sprinkler system with dedicated fire riser. This fire system will be added to the GENDD fire equipment preventive maintenance schedule. Flow testing of the fire system will be conducted on an annual basis. A fire hydrant has been added to the school site.

4.4 Alarm Systems

Water flow alarms have been included in the wet-pipe sprinkler system. The opening of one or more sprinkler heads sends an alarm directly to the main plant alarm panel. Heat detectors are in place in each room of the school and are wired into a signal circuit leading to the main plant alarm panel. Free standing smoke detectors are located in each room and sound an audible local alarm.

4.5 Heating, Ventilating and Air Conditioning (HVAC) System

Special motorized Fail-Safe intake air dampers are being installed on the HVAC system. In the event that toxic gas or smoke is released from the main plant the dampers will be closed to prevent entry of contaminated air. The dampers are set to close automatically in the event of power failure or may be closed by a manually activated switch located in the school Director's office. This safety system allows isolation of the Child Care/Partnership school from the environment.

HVAC heating is accomplished through resistance heating coils (fan coils). There are no boilers or pressure vessels on the school site.

4.6 Emergency Egress & Exit Lighting

The school is a one-story structure. To provide maximum protection, each classroom has its own exit door leading directly outside the building. Each room also has a ground level window.

Emergency exit lights are installed on all exterior doors. Illuminated exit signs are also placed throughout the structure in key points to direct traffic flow to the exits. All exit signs are battery powered and will turn on automatically in the event of power failure.

Battery operated emergency lights are mounted throughout the interior of the facility in accordance with fire code requirements.

4.7 Exterior Lighting

Night-time illumination is provided from two sources. Floodlights are mounted directly to the school structure at appropriate intervals to provide exterior lighting. Additional lighting is provided by high-intensity sodium vapor parking lot lights serving the main plant. A parking lot light pole is in place on the school site.

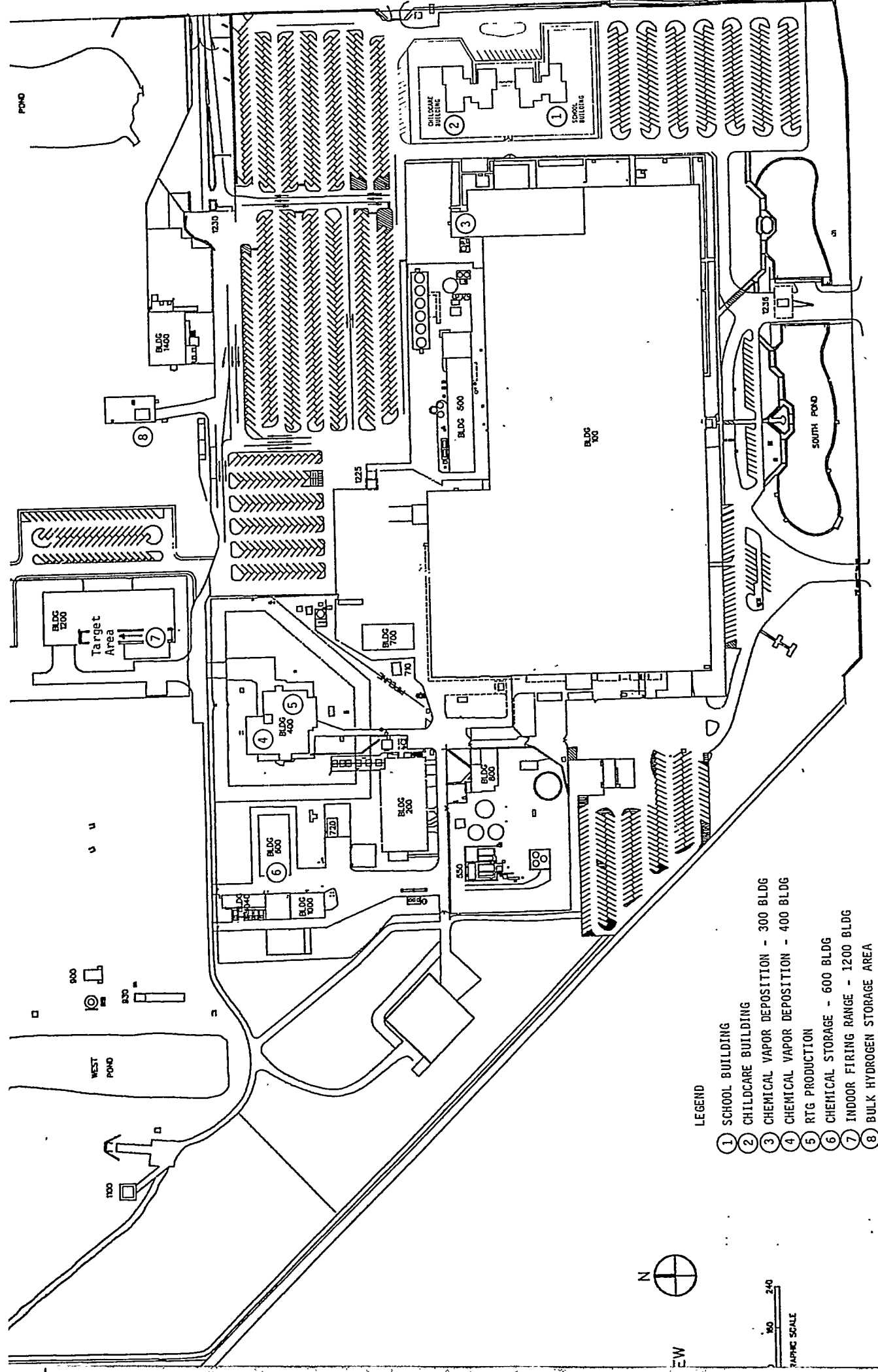
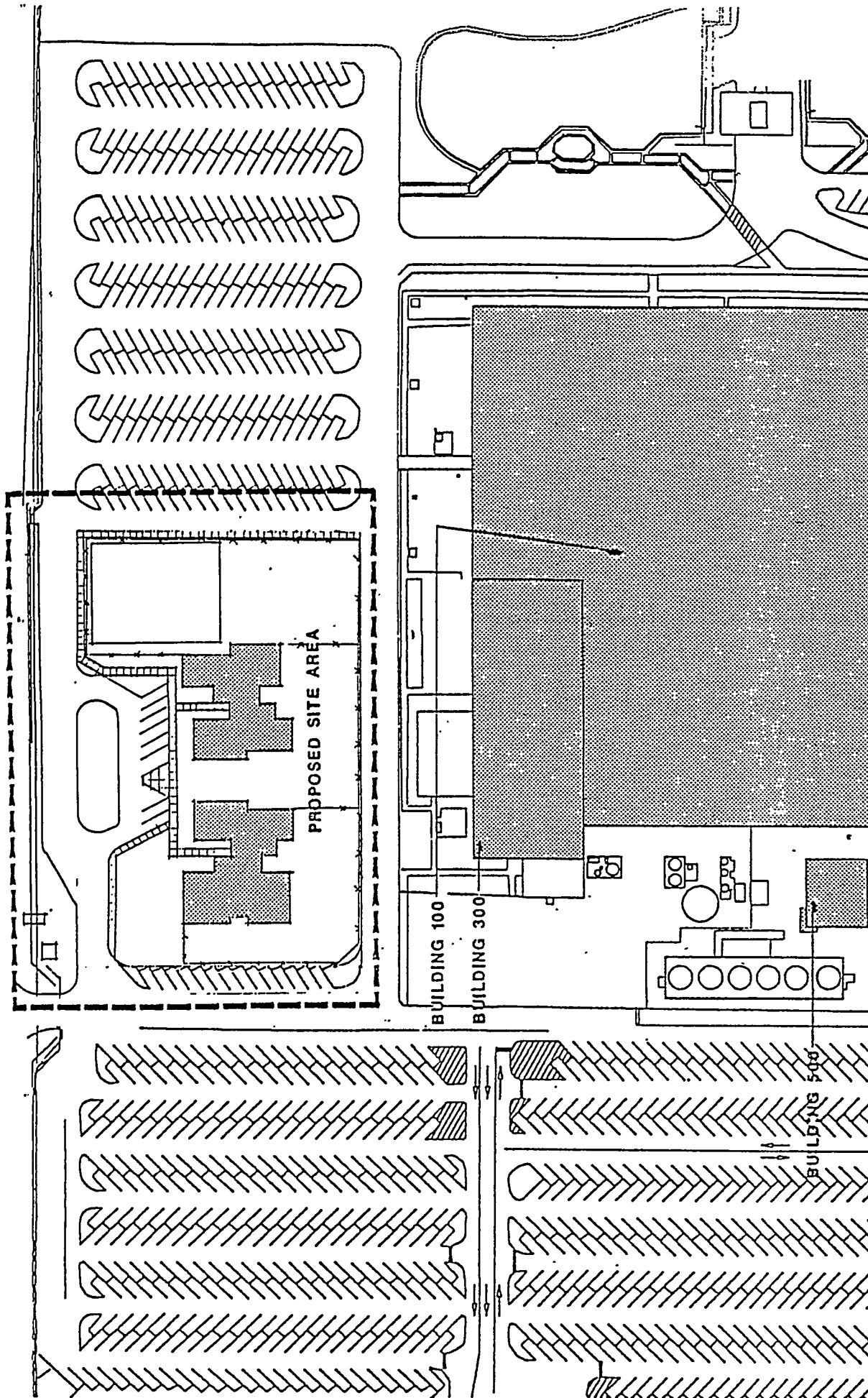


Figure 4.1

BELCHER ROAD



SITE LOCATION PLAN

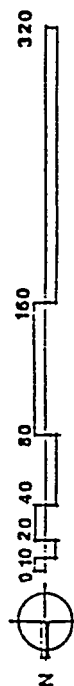
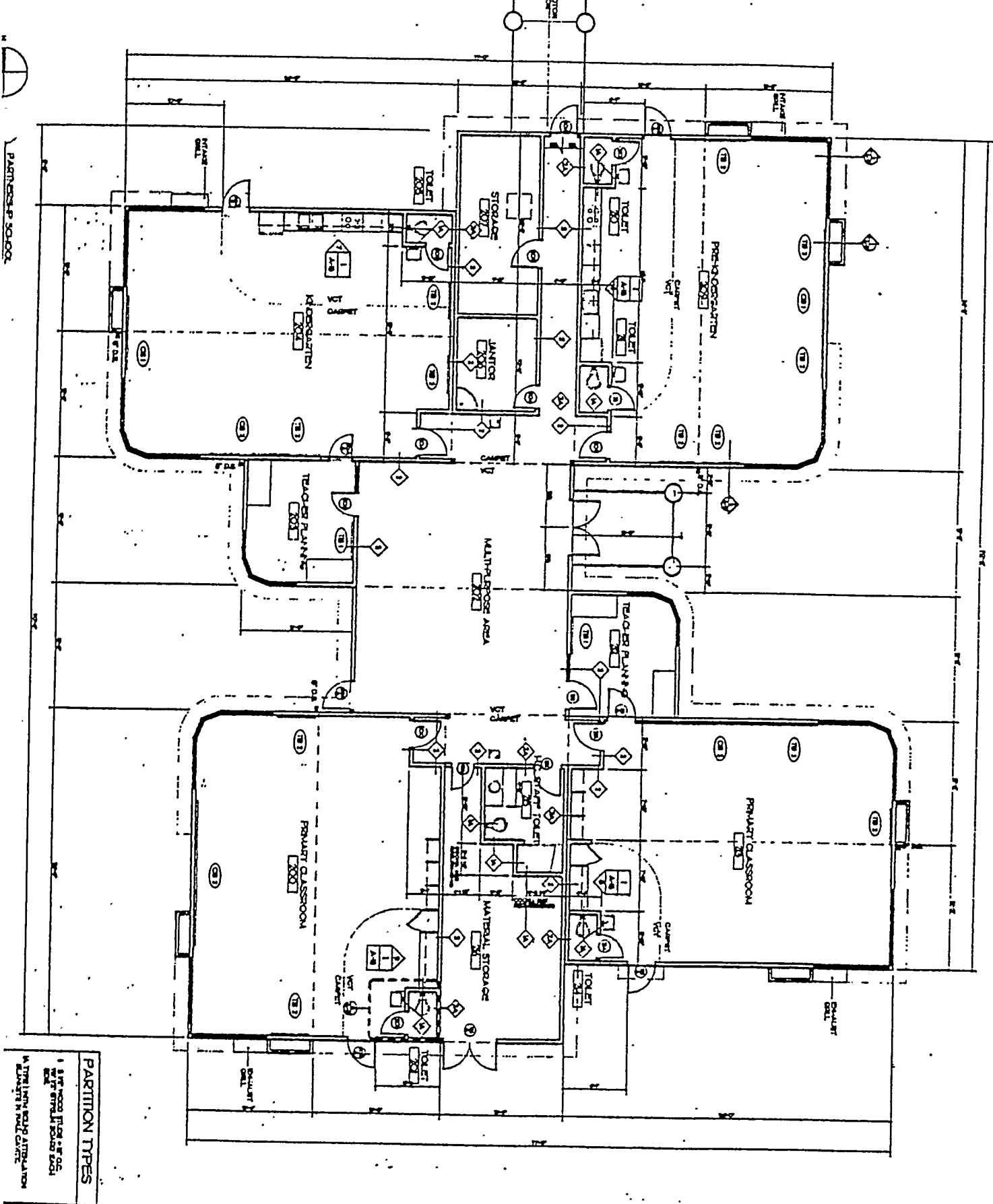


Figure 4.2



PARTITION TYPES

1. 8" x 8" GRID AT 4" O.C.
2. 12" x 12" GRID AT 4" O.C.
3. 16" x 16" GRID AT 4" O.C.

Figure 4.4

5.0 DESCRIPTION OF OPERATIONS - OVERVIEW

Known as New Directions, the Child Care/Partnership School is composed of two distinct operations - the Child Development Center and the Partnership School.

The Child Care Center is for the care of children from infants to 4 years of age. Facilities include classrooms, laundry, storage, directors office, toilets, quiet rooms for children that are not feeling well and a kitchen for distributing food. Food will be prepared in the main plant cafeteria and catered to the school.

The Partnership School is for the care and teaching of children from pre-kindergarten up to the second grade. Facilities include classrooms, storage, toilets, teacher planning and multi-purpose room.

The Partnership School schedule parallels that of GENDD first shift operations. The school will be open on all days that GENDD is open for business. The school will not operate on weekends and on GENDD holidays or shutdown days. Maximum occupancy of the school is 270 students and 25 to 30 staff members. Children at the facility range in age from 8 weeks to approximately 8 years. The combination school and daycare center accepts students through the second grade.

A full emergency plan has been prepared for the school (see Appendix I). An intercom system connects each room with the director's office. The GENDD plant emergency public address alert system is connected to the school director's office. Additionally, a dedicated emergency telephone line links the school director's office directly to the main plant Communication Center. The school building meets all construction standards of the Pinellas County School System for school structures. The entire building will be equipped with automatic fire sprinklers, smoke detectors and fire extinguishers. Lightning protection for the structure will be provided through a standard system of air terminal lightning rods and grounding wires.

Chemical use and storage within the school will be minimal and consistent with the operation of a typical elementary school and daycare center. The inventory is expected to include items such as duplicating fluid and non-toxic art materials. No hazardous operations will be performed.

5.1 DESCRIPTION OF OPERATIONS - GEND CHILD CARE/PARTNERSHIP SCHOOL

The Child Development Center will provide care and development for children ranging in age from eight weeks through four years. The facility has the capacity to house thirty children in each age:

8 wks. - 1 yr.	30 children
1 yr. - 2 yrs.	30 children
2 yrs. - 3 yrs.	30 children
3 yrs. - 4 yrs.	30 children
4 yrs. - 5 yrs.	<u>30 children</u>
Total	150 children

Additionally, the Child Development Center will offer before and after school care for children that are in Kindergarten, First and Second Grade. This program could have a maximum enrollment of 120.

Assuming full capacity enrollment, the Child Development Center will require a staff of 25 to 30 early childhood development professionals.

The Partnership School will provide education for children in Kindergarten, First and Second Grade. The facility has the capacity to house thirty children in each grade.

Kindergarten	30 children
First Grade	30 children
Second Grade	<u>30 children</u>
Total	120 children

These are the same 120 children that will be eligible for the before and after school program mentioned above.

The Partnership School is a public school and will be staffed with employees of the public school system. There will be one teacher for each grade.

The hours of operation for the entire center will be 6:00 am to 6:00 pm. The elementary school day will begin at 8:50 am and end at 1:50 pm. The center will be open Monday through Friday and will be closed on all weekends and also on days that the GE plant is closed (Holidays, etc.).

Summary

If the entire center was filled to capacity, approximately 270 children would be enrolled and would require a staff of approximately 33 adults.

The estimated enrollment at opening is approximately 80 to 120 students and 15 to 20 teachers (depending on the age distribution of the children).

5.2 Environmental Concerns:

There is no history of waste handling, treatment or disposal at the site of the Child Care/Partnership School. The site was chosen primarily because it was one of the areas of the plant site for which there were no concerns identified during Environmental Restoration investigations, the DOE Environmental Survey and a survey conducted by an independent consultant, Westinghouse HAZTEC in April, 1989 (see Appendix II). The following additional analyses were performed at the school site:

1. Pesticides/PCB's in groundwater: none detected
2. Acid extractable organics in groundwater: none detected
3. Base/Neutral extractable organics in groundwater: none detected
4. Volatile organic compounds in ground water: none detected
5. Metals Determination: see Appendix II
6. Radiological Analysis: see Appendix II

6.0 SYSTEM RISK ANALYSIS

A Failure Modes and Effects Analysis (FMEA) was performed for the Child Care/Partnership School. The goal of this analysis is to determine the effects of failure incidents at the GENDD plant on the school facility.

In evaluating the magnitude of a risk and its tolerability, two factors must be considered. The seriousness of effects (severity of consequences) is the first consideration. Second, the probability of the unwanted event's occurring must be considered. The tolerability of a risk is determined by balancing the probability of the event's occurrence with the estimated seriousness of its effects.

This FMEA analysis considers the probability of occurrence at the source and considers the severity of effects at the school site.

The FMEA indicates that there are risks associated with plant operation for the Child Care/Partnership School. However, sufficient administrative and engineering controls exist to reduce the risk to a manageable and acceptable level.

TABLE 6.1**QUALITATIVE ACCIDENT PROBABILITIES**

DESCRIPTIVE WORD	SYMBOL	NOMINAL RANGE OF FREQUENCY PER YR.
<i>Likely</i>	<i>A</i>	$Pe > 10^{-2}$
<i>Unlikely</i>	<i>B</i>	$Pe = 10^{-2} \text{ to } 10^{-4}$
<i>Extremely Unlikely</i>	<i>C</i>	$Pe = 10^{-4} \text{ to } 10^{-6}$
<i>Incredibly UNLIKELY</i>	<i>D</i>	$Pe < 10^{-6}$

Pe = Probability of event occurring per year

TABLE 6.2

QUALITATIVE ACCIDENT HAZARD SEVERITY

HAZARD CATEGORIES	CONSEQUENCES TO THE PUBLIC, WORKERS, OR ENVIRONMENT
<i>Category I - Catastrophic</i>	<i>May cause deaths, or loss of the facility/operation, or severe impact on the environment.</i>
<i>Category II - Critical</i>	<i>May cause severe injury, or severe occupational illness, or major damage to a facility/operation, or major impact on the environment.</i>
<i>Category III - Marginal</i>	<i>May cause minor injury, or minor occupational illness, or minor impact on the environment.</i>
<i>Category IV - Negligible</i>	<i>Will not result in a significant injury, or occupational illness, or provide a significant impact on the environment.</i>

POSTULATED ACCIDENTS
FAILURE MODES & EFFECTS ANALYSIS

ASSUMED FAILURE	PROBABLE CAUSE	POSSIBLE CONSEQUENCES	COMPENSATING PROVISIONS	PROBABILITY OF OCCURANCE	HAZARD SEVERITY
Uncontrolled Fire/Explosion in Building 600 (Chemical Storage).	Static spark Lightening strike	Release of toxic smoke Release of toxic chemicals to immediate Bldg. environment. Injury to Chemi- cal storage bldg. personnel. Damage & lost stock materials. personnel. Damage & lost stock materials.	Bonding/Grounding system in place. Automatic fire sprinkler system. Blow-out panels. Lightening pro- tection system. Segregated chemi- cal storage rooms. Graded floors with chemical drain & sumps. Plant fire brigade response. City Fire Dept. response. Floor-to-ceiling reinforced fire resistent walls. Distance (400 me- ters) from school.	UNLIKELY Category B	CRITICAL Category II

POSTULATED ACCIDENTS
FAILURE MODES & EFFECTS ANALYSIS

ASSUMED FAILURE	PROBABLE CAUSE	POSSIBLE CONSEQUENCES	COMPENSATING PROVISIONS	PROBABILITY OF OCCURRENCE	HAZARD SEVERITY
Area 353 CVD Incident- Release of WF6 (Tungsten Hexa- fluoride) and 100% conversion to Hydrogen Fluoride (HF). HF travels to school site.	Failure of engin- eering system cannister (1 lb) or piping. Damage to spare gas cylinder (1 pound).	Corrosive HF gas is produced and travels to school site. Adverse health effects to staff and students. Acute respiratory distress with eye and skin irrit- ation occurs.	Only small amounts of chemicals re- leased (maximum amount of HF formed is 274 grams if reaction complete.	UNLIKELY Category B	MARGINAL Category III
			School is air conditioned.		
			Low pressure in system (17.1 psig).		
			Partial contain- ment provided by Area 353.		
			Cylinders designed and tested to hold 5000 psig.		
			Distance between school and Bldg. 353 is more than 70 meters.		
			Majority of school activity indoors.		

POSTULATED ACCIDENTS
FAILURE MODES & EFFECTS ANALYSIS

ASSUMED FAILURE	PROBABLE CAUSE	POSSIBLE CONSEQUENCES	COMPENSATING PROVISIONS	PROBABILITY OF OCCURRENCE	HAZARD SEVERITY
Uncontrolled Fire In LAMB Battery Room	Spark Source	Release of Sulfur Dioxide inside Bldg. 100	Automatic Fire Sprinkler System	UNLIKELY Category B	MARGINAL Category III
	Chemical Reaction		Separate dedicated exhaust ventilation system.		
	Reaction with water.	Release of corrosive smoke and vapor inside Bldg. 100.	Sulfur Dioxide detection & alarm system.		
			Redundant safety controls on test equipment.		
			Trained in-plant Fire Brigade.		
			Fire would be contained within Bldg. 100.		
			Battery cases designed to vent excess gas pres- sure.		

POSTULATED ACCIDENTS
FAILURE MODES & EFFECTS ANALYSIS

ASSUMED FAILURE	PROBABLE CAUSE	POSSIBLE CONSEQUENCES	COMPENSATING PROVISIONS	PROBABILITY OF OCCURANCE	HAZARD SEVERITY
Uncontrolled fire in Thermal Battery area (Bldg. 100).	Water contact with reactive metals.	Toxic decompo- sition products (chlorine gas & sulfur dioxide) released.	Heat powder dry room is a totally enclosed aluminum structure.	UNLIKELY: Category B	MARGINAL: Category III
	Ignition of hydro- gen gas.	Gas and smoke escape Bldg. 100 and enter environment.	Dry-pipe sprink- ler system covers dry room.		
	Ignition of an explosive powder.	Injury to ther- mal battery room personnel.	Wet pipe sprink- lers throughout Bldg. 100 limit spread of fire.		
		Heat powder ex- plosion may lead to secondary fires.	Humidity detectors.		
			Plant Fire Brigade response.		
			Fire-walls of Bldg. 100 limit & contain fire to Bldg. 100.		
			Remote location of school (70 meters from Bldg. 100) make fire propa- gation unlikely.		
			Limited quantities of materials stored in area.		

POSTULATED ACCIDENTS FAILURE MODES & EFFECTS ANALYSIS

ASSUMED FAILURE	PROBABLE CAUSE	POSSIBLE CONSEQUENCES	COMPENSATING PROVISIONS	PROBABILITY OF OCCURRENCE	HAZARD SEVERITY
Uncontrolled fire in Hydro- gen bulk storage or piping system.	Lightening strikes tanks. Leaking valves or piping system. Over-pressure condition in bulk storage tank.	Fire at bulk H2 storage site or inside plant. Explosion at bulk storage site or in main plant.	Bulk storage site isolated from school (> 400 meters distant). H2 piping system is underground and does not pass near school site. Audible & visible low pressure (leak condition) alarms. Pressure-sensing automatic closing valve in-line. Manually activated valves allow any part of system to be isolated. Pressure relief valves & burst disks on tanks. System is under low pressure (45 to 55 psig). High diffusion rate of H2 make travel of gas unlikely. Hydrogen stored as a liquid.	UNLIKELY Category B	MARGINAL Category III

FAILURE MODES & EFFECTS ANALYSIS

ASSUMED FAILURE	PROBABLE CAUSE	POSSIBLE CONSEQUENCES	COMPENSATING PROVISIONS	PROBABILITY OF OCCURANCE	HAZARD SEVERITY
Loss of tritium from one processing bed to exhaust stack.	Breach of processing bed (broken valve stem).	Release of tritium to outside atmosphere.	Limited quantity of tritium at Pinellas Plant. Maximum credible loss is one gram (10,000 Curies).	UNLIKELY: Category B	MARGINAL: Category III
	Uncontrolled fire in tritium work area.	Exposure of personnel in the plant near the release point.	Automatic fire sprinklers in tritium use area.		
	Failure of tritium processing equipment.	Exposure of personnel outside the plant and at the school site.	Tritium monitoring alarm systems in work area.		
			Maximum off-site dose (10,000 Ci loss) is estimated to be 25 mrem at 1000-1500 meters from plant.		
			Processing Equipment is stainless steel built to withstand ultrahigh vacuum conditions.		

POSTULATED ACCIDENTS
FAILURE MODES & EFFECTS ANALYSIS

ASSUMED FAILURE	PROBABLE CAUSE	POSSIBLE CONSEQUENCES	COMPENSATING PROVISIONS	PROBABILITY OF OCCURANCE	HAZARD SEVERITY
Hurricane strikes school site with dama- ging winds.	Natural weather Phenomenon.	Damage to school structures. Injury to school staff & students. Damage to GENDD site. Release of toxic chemicals from GENDD site.	Early warning (36-48 hours) usually possible. Total evacuation of students to safe refuge prior to storm strike. No loss of student life at site. School site & GENDD are above expected flood height. On-site medical help available. School built to code for straight wind loading.	LIKELY: Category A	NEGLIGIBLE Category IV

FAILURE MODES & EFFECTS ANALYSIS

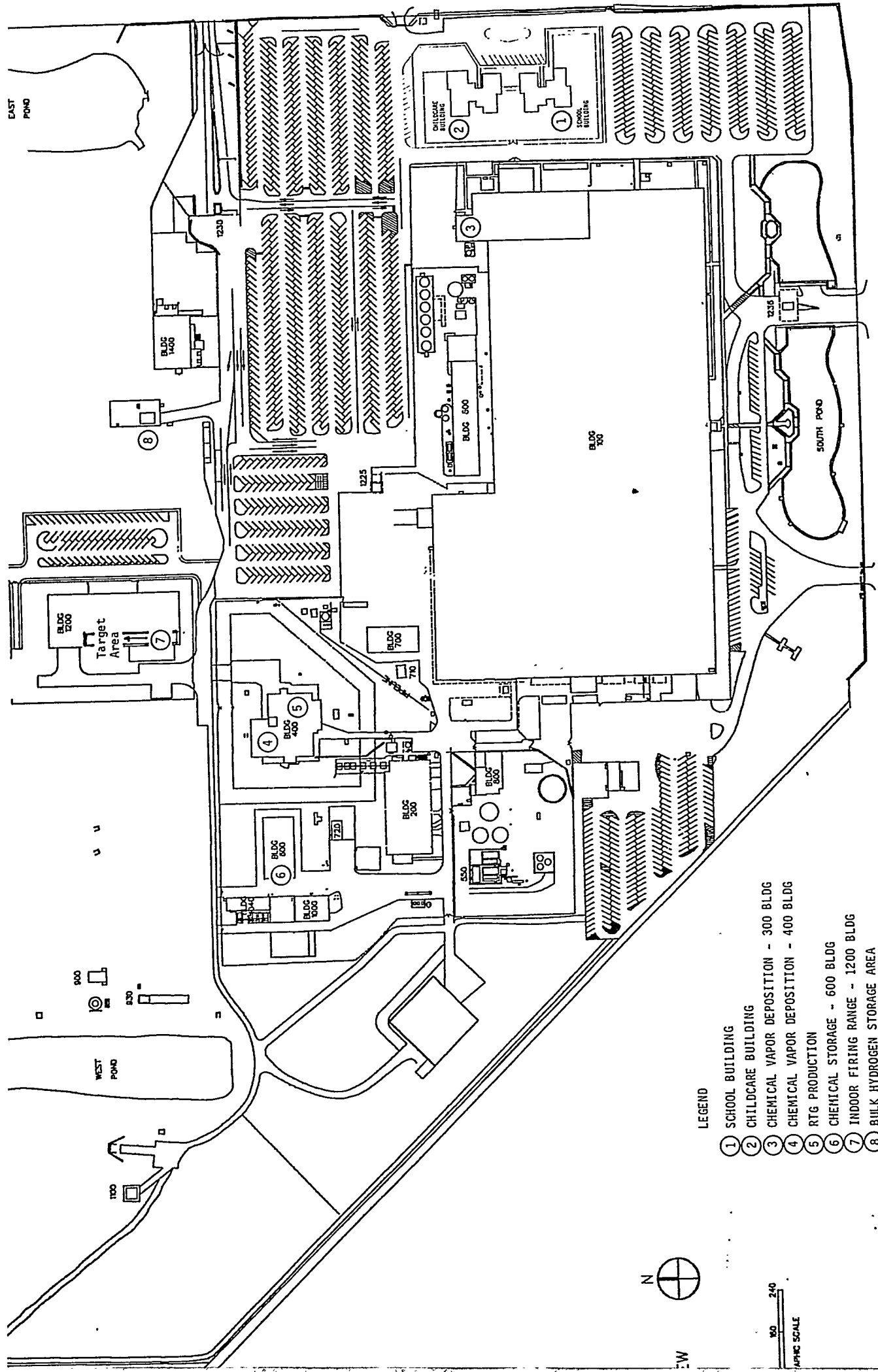
ASSUMED FAILURE	PROBABLE CAUSE	POSSIBLE CONSEQUENCES	COMPENSATING PROVISIONS	PROBABILITY OF OCCURANCE	HAZARD SEVERITY
Tornado strikes school site with damaging winds. Damage to GENDD may cause toxic material to be released.	Natural weather Phenomenon.	Damage to school structures. Injury to school staff & students. Damage to GENDD site.	Early warning (15-60 minutes) usually possible. Total evacuation of students to GENDD main bldg. prior to strike.	UNLIKELY: Category B	CATASTROPHIC Category I
		Release of toxic chemicals from GENDD site.	Tornado strike usually of short duration.		
			On-site medical help available.		
			School built to code for straight wind loading.		
			Low probability of tornado occurrence.		

FAILURE MODES & EFFECTS ANALYSIS

ASSUMED FAILURE	PROBABLE CAUSE	POSSIBLE CONSEQUENCES	COMPENSATING PROVISIONS	PROBABILITY OF OCCURANCE	HAZARD SEVERITY
Thunderstorms strike school site with rain, strong winds and lightning.	Natural weather Phenomenon.	Damage to school structures. Injury to school staff & students. Damage to GENDD site. Release of toxic chemicals from GENDD site. Lightening strike may start fire or injure personnel.	Early warning (15-60 minutes) usually possible. Students may be evacuated if neces- sary. School site is grounded for light- ening protection. Thunderstorms are usually of short duration. On-site medical help available. School built to code for straight wind loading.	LIKELY: Category A	NEGLIBIBLE Category IV

FAILURE MODES & EFFECTS ANALYSIS

ASSUMED FAILURE	PROBABLE CAUSE	POSSIBLE CONSEQUENCES	COMPENSATING PROVISIONS	PROBABILITY OF OCCURANCE	HAZARD SEVERITY
Seismic activity Natural at school site. Phenomenon.		Damage to school structures.	School is in a zero seismic activity zone.	INCREDIBLE Category D	CRITICAL: Category II
		Injury to school staff & students.	School could be quickly evacuated following seismic episode.		
		Damage to GENDD structures.			
		Release of toxic chemicals from GENDD site.	Students could be quickly removed from GENDD site.		



- LEGEND
- ① SCHOOL BUILDING
 - ② CHILDCARE BUILDING
 - ③ CHEMICAL VAPOR DEPOSITION - 300 BLDG
 - ④ CHEMICAL VAPOR DEPOSITION - 400 BLDG
 - ⑤ RTG PRODUCTION
 - ⑥ CHEMICAL STORAGE - 600 BLDG
 - ⑦ INDOOR FIRING RANGE - 1200 BLDG
 - ⑧ BULK HYDROGEN STORAGE AREA

Figure 6.1

7.0 ACCIDENT ANALYSIS

This chapter presents an analysis of credible accidents of a serious nature resulting from plant operation which may impact the Child Care/Partnership School. Detailed analysis is made of the possible adverse effects of plant operations on the nearby school facility. The possible effects of natural phenomenon on the school are also considered. Credible accidents are defined as having an annual probability greater than 1:1,000,000 per year.

A comprehensive Systems Safety Management Assay (SSMA) was performed at the GENDD site by an independent consulting firm (TENERA, Inc.) in 1988. The observations and risk assessments contained in the SSMA report were incorporated into this Safety Assessment document.

7.1 ROUTINE OPERATIONS

Risks associated with routine operations at the Pinellas Plant (GENDD) are similar to those encountered by many small-scale electronics assembly factories, plus the use of small amounts of tritium and deuterium.

In one area of the plant (Area 108), tritium and deuterium are deposited in the hydride form on a cathode and anode. In another area a 200 KeV linear accelerator, similar to that used by many universities, is used in production of neutron generators. The only other nuclear activities are associated with the handling of sealed sources. The most important of these is the RTG assembly operation in which electronic devices are attached to the triply encapsulated Pu-238 heat sources to produce a power generating device.

Overall risks to the public from accidental radiation releases at the Pinellas Plant are low relative to other DOE facilities. For example, tritium is generally stored as a hydride in quantities less than 10,000 curies.

During the recent SSMA, after considering both chemical and radiological scenarios, the auditor concluded that, "No events were identified that were truly catastrophic in dimension." (TENERA p.2).

However, there are operations that, if involved in an accident could possibly result in life threatening quantities or concentrations of toxic chemicals to plant workers and to the public in the immediate vicinity of the plant. These scenarios, their consequences and compensating provisions are discussed in the following sections.

A. RADIOLOGICAL:

Nearly all of the radiological exposure to the public is attributed to tritium emissions. Based on calendar year 1988 tritium releases, and as reported in the Pinellas Plant Site Environmental Report for Calendar 1988, the dose to children and adults at the school site has been calculated to be essentially equivalent to the fence line dose of .00635 mrem/yr. This EPA AIRDOS derived calculation assumes continuous occupancy for 365 days/yr., 24 hours/day and is significantly below the maximum allowable dose to the general public (including children) of 25 mrem/yr. or 100 mrem/yr. for the EPA & DOE respectively.

Of lesser concern are plutonium (Pu-238 oxide) and krypton (Kr-85 gas). Pu-238 is received at the site triply encapsulated and there is no release of Pu-238 during routine operations. Kr-85 is used for leak checking of completed components and subassemblies and the estimated doses to the school children from routine discharges are 16 times less than those from tritium described above.

B. Chemical

By volume, Volatile Organic Compounds (VOC's) comprise the largest group of chemical emissions at GENDD. In 1988, mass balance calculations showed VOC emissions from all fugitive and plant sources to be approximately 343 pounds released daily. Volatile organics released by GENDD include: trichloroethylene, methylene chloride, Freon 113, and trichloroethane. The largest percentage of air emissions come from 300 separate exhaust stacks distributed over more than 600,000 square feet of roof area on Building 100. Low levels of VOC may also be released from the Chemical Storage Building (Bldg. 600).

The majority of rooftop emission points serve laboratory fume hoods. Chemical discharge from these systems is affected by laboratory usage patterns and is intermittent rather than continuous. Vapor emissions are usually low volume and diluted with large volumes of exhaust air. Approximately 100 exhaust points are directly connected to process machinery and release continuous or nearly continuous emissions.

Prevailing winds provide mixing and dispersion of rooftop emissions. Most rooftop exhaust points are located approximately 30 feet above ground level. The school site is located 70 meters from the eastern edge of Building 100. There are no visible emissions from GENDD at the school site.

Maximum ground level concentrations of chemical emissions are expected to occur when wind conditions are calm. An analysis of wind direction and speed over a ten year period (Table 3.1) shows that calm wind conditions exist only five (5) percent of the time. Prevailing winds at the site are from the north in winter and from the east and south for the remainder of the year. A westerly seabreeze is common during the afternoon in summer months. These conditions result in a fairly uniform distribution of wind direction.

Ground level concentrations of chemicals emitted from stack exhausts can be estimated by use of the Gaussian dispersion equation. A feature of this dispersion modeling is the fact that doubling the wind speed halves the ground level concentration. The average overall windspeed at the Partnership School site is 8.8 mph. This velocity provides significant mixing and dispersion of stack emissions.

An independent consultant, Westinghouse Haztech, Inc., was retained to perform a site selection and background assessment report for the partnership school. Air sampling was performed at the school site and an Airborne Volatile Organics Report produced in April, 1989. Sampling was performed for the following VOC's: methylene chloride, trichloroethane and trichloroethylene. All results were reported as "none detectable" (see Table II).

A second consulting firm (TENERA) was hired in October, 1989 to conduct monitoring for ground level VOC concentrations and to perform airborne plume modeling of chemicals emitted from the vent stacks of Building 100. Lead emissions from the vent stack of the onsite Indoor Firing Range (IFR) and fugitive emissions of volatiles from the Chemical Storage Building (Bldg. 600) were also measured and air flow dispersion patterns modeled.

An indoor firing range is located on site in Building 1200. This building is 400 meters northwest of the school site. The firing range ventilation system is single pass-through with 100 percent air replacement. With total air replacement on each pass the recirculation of potentially contaminated air is avoided. Exhaust air is discharged to the atmosphere through a rooftop stack. The lead content of exhaust air has been measured and found to fully comply with EPA requirements for lead air emissions (TENERA, Appendix III). The ventilation system is only operated while the IFR is in operation. Quarterly samples for airborne lead are taken inside the firing range. Blood samples for lead are taken annually from Security Inspectors using the firing range. Test results from both types of samples have been consistently below OSHA Permissible Exposure Levels (PEL).

Extensive calculations based on meteorological data and emission rates were performed to predict the direction of movement and concentration of lead particles and chemical vapors at the Child Care/Partnership School site. The Industrial Source Complex Short-Term (ISCST) Dispersion Model was used for risk assessment. This model is designed to consider such factors as isolated stack emissions, fugitive emissions and aerodynamic building wake effects. Meteorological source and receptor data were used to calculate hourly concentrations.

These data demonstrate that ambient concentrations of VOC at the Child Care/Partnership School site are far below OSHA permissible exposure limits (Appendix III). The highest measured VOC concentration at the school site was 2 parts per million (ppm). Making the worst case assumption that this is entirely trichloroethylene (OSHA PEL 50 ppm), a safety factor of 25 is present.

Source sampling for lead emissions at the IFR and subsequent modeling of ambient air concentrations at the school site indicate that airborne lead concentrations are also far below OSHA standards. The calculated maximum air concentration of lead at the school site ranged from 0.051 to 0.099 ug/m³ for average conditions to 0.86 ug/m³ for worst case weather conditions (Appendix III). The worst case value, 0.86 ug/m³, is 4*E-6 (0.4 percent) of the OSHA standard for lead (0.2 mg/m³). These data indicate no impact from routine operation of the Indoor Firing Range will occur at the Child Care/Partnership School site.

It is recognized that OSHA standards are not intended for application to the general population, including children. However, when coupled with a safety factor of 10 to 100, these values serve as guidelines in evaluating potential exposures.

In summary: Low levels of volatile organic materials are released from the Pinellas Plant. These emissions are subject to significant mixing and dispersion by prevailing winds at the site. Two sets of independent air sampling data indicate that VOC emissions will have no apparent effect on school activities. Very low levels of lead are released during operation of the indoor firing range. Air sampling data shows this exposure to be negligible at the school site.

7.2 DESCRIPTION OF OPERATIONAL ACCIDENTS

Seven operational accidents were considered for this analysis. These are: fire in the Chemical Storage Building, failure of the chemical vapor deposition (CVD) system, fire in the lithium ambient battery (LAMB) area, fire in the thermal battery dry room, and fire in the bulk hydrogen storage and distribution system.

Scenario I - Uncontrolled fire in Building 600; Virgin Chemical Storage Building:

The chemical storage facility (Building 600) is a 7,200 square foot single story, reinforced masonry structure. Building 600 is divided into six segregated rooms for storage of production and general stockroom chemicals. Chemicals in the following classes are stored in separate rooms: flammables, toxics, alkalies, acids, oxidizers and heat powders.

Building 600 is located near the northwest corner of Building 100 and is more than 400 meters from the Partnership School. The building is protected by a wet pipe (water) fire sprinkler system. Concrete floors in each storage room are sloped and graded to contain all spilled material. Separate drain systems for each storage room lead to overflow sumps with 400 gallon capacity to contain chemical spills. Blow-out panels (skylights) are in place in all rooms. The heat powder storage room is equipped with in-rack fire sprinklers and explosion blow-out panels. The heat powder room is also air conditioned. Telephones and all electrical fixtures in Building 600 are explosion proof.

A number of safeguards are in place to reduce the probability of an uncontrolled fire in Building 600. Safeguards include:

- a) Incompatible materials are kept in separate and segregated storage areas.
- b) Automatic sprinkler systems are in place in both buildings. These are high capacity systems designed for high hazard occupancies. The existing fire protection system meets the requirements of National Fire Codes for chemical storage facilities.
- c) All electrical service is explosion proof.
- d) Large capacity, portable fire extinguishers are located in the area and on portable carts for rapid response.
- e) Smoking and sources of spark or open flame are strictly prohibited in the area of the chemical storage rooms.
- f) Bonding and Grounding equipment is in use for all storage and dispensing operations.
- g) Both manual pull station alarms and automatic sprinkler water flow alarms are in place.
- h) A lightning protection system is in place on Building 600.

Building 600 is separated from the Partnership School site by the entire main plant complex.

The Pinellas Plant maintains a full fire brigade with trained and equipped personnel. The Pinellas Plant Fire Brigade is made up of 89 trained members and provides fire protection on all three work shifts. A fire engine pumper truck is maintained on site. This vehicle provides a source of firefighting water that can be transported to all areas of the site. The plant fire station and pumper truck are located within quick response distance of the chemical storage buildings. A fire drill held in February, 1989 by a Factory Mutual Inspection team used a fire in Building 600 as the incident scenario. Response times for this unannounced drill were as follows:

Three fire brigade members arrived at the fire scene 30 seconds after the alarm. At 1 min 30 seconds the Fire Brigade Leader arrived and simulated a call for off-site help to the Seminole fire Department. Security personnel, additional fire brigade members and an in-plant fire vehicle arrived with bunker gear, also at 1 min 30 seconds. One hose was laid and ready to protect exposures 2 min after the alarm. A 2-1/2 inch hose was laid with four Fire Brigade members in position 6 min after the alarm. The "fire scene" was secured 8 min after the alarm.

Fire in the chemical storage facility (Building 600) is a credible accident scenario. The size and spread of such a fire is mitigated by a number of engineering and administrative safeguards. Segregation of incompatible chemicals and prohibition of spark sources minimize the start of a fire. Automatic, high capacity fire sprinklers and separate fire-resistant storage rooms minimize the spread of a fire in the building. Many of the chemicals stored in the facility are not flammable and would be unable to support combustion.

Toxic smoke could be expected to evolve from a fire in the chemical storage facility. Wind direction is critical in determining whether smoke would reach the school site or be blown away from the school. Wind velocity and dispersion patterns, coupled with the amount of smoke generated, would affect the actual concentration of toxic smoke to arrive at the school site (400 meters distant).

In summary, fire in the chemical storage buildings could be life threatening to nearby workers. Impact on the school could range from slight to major, depending on a number of variables. These variables include wind direction, time of day, and day of week. A relative risk assessment of this scenario, considering the number of safeguards in place, reflects a manageable risk within the limits of acceptability.

Scenario II: Release of Tungsten Hexafluoride Gas - Chemical Vapor Deposition (CVD)

Process, Building 353:

The scenario assumes a rapid release of the entire inventory of tungsten hexafluoride gas used in the CVD process in Area 353. The exit door to Building 300 is directly adjacent to the room enclosing the CVD unit. All of the material escapes into the outside environment, approximately 70 meters from the Partnership School. All of the tungsten hexafluoride rapidly reacts to form hydrogen fluoride (a maximum of 274 grams of hydrogen fluoride if the reaction is total). Hydrogen fluoride is a decomposition product of tungsten hexafluoride.

The total inventory of tungsten hexafluoride in Building 353 consists of a one-pound cylinder connected to the CVD system for production processing and a spare one-pound cylinder stored in the CVD vented and exhausted equipment cabinet. CVD is a low pressure system and tungsten hexafluoride is a material of low volatility. The cylinders are received at a pressure of 17.1 psia. This is just slightly above normal atmospheric pressure of 14.7 psia and makes sudden release of pressure incidents unlikely. According to the manufacturer, tungsten hexafluoride cylinders are rated to handle an operating pressure of 3000 psig, with a rupture pressure of 5000 psig. The potential for catastrophic bottle failure is low.

Assuming that 27 grams of HF (10% of that available) were released over a 10 minute period, building downwash and turbulence would result in an effective atmospheric concentration of the order of 10×10^{-4} sec/cubic meter at a distance of less than 100 meters from the building. The resultant concentration of hydrogen fluoride at the school (about 70 meters away) as calculated by an independent consultant would be about 0.1 mg/cubic meter. Although this is less than 4 percent of the Threshold Limit Value (TLV) for an adult worker (2.5 mg/cubic meter), the age of the target population makes the exposure one of potential concern.

There are no known studies with regard to child/infant exposures to these chemicals. While recognizing infant/child exposures as a potential concern, the predicted exposure levels are only 1/25th of the TLV. This safety factor provides a measure of protection.

Hydrogen fluoride is classified as a corrosive and irritant. Respiratory distress and burning of the eyes and skin would be expected from high exposure levels. Irritation and chronic or irreversible tissue injury will not occur at exposure levels below the occupational exposure limit (TLV) of 2.5 milligrams per cubic meter.

There is a second CVD system on the plant site in Building 400 containing 40 pounds of tungsten hexafluoride. However, this system is over 400 meters removed from the school site and would not pose a significant concern to the school site. In addition to a cylinder failure, other CVD system failures involving smaller releases of hydrogen fluoride are possible. The effects of these small releases are mitigated by the following engineering safeguards in Building 400:

- a) Detection and alarm systems are in place to sense the presence of hydrogen fluoride, hydrogen gas and low exhaust flow and low argon pressure conditions.
- b) The process machinery is enclosed in a vented and exhausted cabinet with redundant exhaust fans.
- c) Process effluent gases are scrubbed and neutralized before release to the atmosphere.

In summary, a massive failure of the CVD system in Area 353 is unlikely, however, the consequences could be life threatening to nearby workers but not to members of the school. Such an event would be self-limiting, involving skin and respiratory irritation. This risk is mitigated by in-place safety systems and is acceptable.

Scenario III: An uncontrolled fire in the Lithium Ambient Battery (LAMB) Assembly and Test Area:

A significant quantity of D-sized LAMB cells are under test conditions at any one time in Area 316. An uncontrolled fire in the LAMB area could result in significant releases of sulfur dioxide (SO₂).

Engineering safeguards are also in place and include the following:

- a) Redundant safety controls on test equipment.
- b) An automatic fire sprinkler system is in place.
- c) A sulfur dioxide detection and alarm system is in place.
- d) The LAMB area is served by a separate and dedicated exhaust ventilation system.

In summary: A fire in the LAMB cell area is an unlikely event. Full containment of a fire within Building 100 is expected. This event will have little impact on the school site and represents a manageable level of risk.

Scenario IV: An uncontrolled fire in the Thermal Battery Dry Room and Automated Assembly Station (Area 307):

The process requires three 10-gallon LiSi tanks, heat powder and pellets and iron disulfide. A maximum limit of 500 pounds (100 pounds per cabinet) of heat powder is allowed in the dry room.

Thermal Battery operations involve the use of water reactive metals, potentially explosive powders and limited amounts of calcium chromate. Should a reactive metals incident occur, a hydrogen explosion could follow. Other releases of hazardous materials could occur as a result of an explosion in the area. Materials in the Thermal Battery area could be expected to decompose releasing significant amounts of chlorine and sulfur dioxide.

An initial heat powder explosion can be expected to lead to damaging secondary fires.

The Thermal Battery dry room is a totally enclosed aluminum structure placed inside Building 100. Breach of this containment could result in spread of fire and hazardous materials through the main plant (Building 100). However, it is unlikely that fire or hazardous material release could occur outside Building 100. The Partnership School is located 70 meters from the eastern edge of Building 100. Fire and explosion inside the Thermal Battery area, even if spread to parts of Building 100, would not directly impact the school site.

Multiple engineering and administrative controls are in place to reduce and limit potential hazards from a fire or reactive metals incident. These safeguards include:

- a) A dry-pipe fire sprinkling system is installed in the area. This system will serve to prevent the spread of a fire in the dry room. Valves serving this system are turned secured in the "off" position to prevent accidental release of water. Plant employees are instructed not to activate the valves in case of fire but wait for response by the fire brigade.
- b) The in-plant fire brigade is trained and drilled in special fire fighting techniques for fires in the Thermal Battery and heat powder areas.
- c) Dry rooms are engineered to keep water and humidity out. Special humidity detectors are in place in the dry rooms. Water piping systems above dry room areas is not permitted unless no other alternative exists and then all pipes must be double walled along their entire length.
- d) Smoke and flame detection systems are in place to provide early warning of fire in the Thermal Battery area.

This comprehensive system of safeguards reduce the possibility of fire in the Thermal Battery area. Control systems are in place to extinguish such a fire. Damage would be confined to Building 100. The potential for impact at the school site is low. This is an acceptable level of risk.

Scenario V: Uncontrolled fire in the bulk hydrogen storage tank or along in-plant hydrogen piping systems:

Hydrogen gas is supplied to the plant from an 18,000 gallon liquid storage tank located outside a locked fenced area northeast of the plant. Also located in this area is a standby storage consisting of 20 horizontal cylinders pressured to 2000 psig and containing approximately 40,000 cubic feet of the gas. The hydrogen storage area is located north of Building 100 and is more than 400 yards northwest of the school site.

The tank is controlled to an operating pressure of 55 psig and is delivered to the plant piping system at 45 psig. The gas is piped under the parking lot, through a maxon valve and into the plant.

Hydrogen presents both explosion and fire hazards when released from containment. Because of its low ignition energy, gaseous hydrogen when released under high pressure, can ignite spontaneously, even from low heat ignition sources such as friction or static spark generation. According to NFPA records, high pressure releases result in fires rather than combustion explosions.

However, when hydrogen is released at low pressure, self-ignition is unlikely and combustion explosions may occur. Open air explosions have occurred from large releases of gaseous hydrogen.

Because of its very low boiling point, contact between liquid hydrogen and air can result in condensation of oxygen and nitrogen from the air. A mixture of hydrogen and liquid oxygen is potentially explosive, even in small quantities. This accident could occur when small containers of liquid hydrogen are handled in the open atmosphere.

At room temperatures, hydrogen is very light, weighing only 1/15 as much as air. The accordingly high diffusion rate makes it difficult for hydrogen to accumulate inside conventional structures unless the release rate is very high. This property tends to reduce its combustion explosion hazard.

The tank storage system is provided with grounding protection and pressure relief valves which meet or exceed the requirements of NFPA 50A and 50B.

Should the gas pressure drop to 25 psig as in a leak condition, audible and visible alarms are activated in the Utility Building (Building 500). A warning light outside of Area 139 also is activated.

The maxon valve can also be activated manually in Building 500 to shut off flow of hydrogen to the main plant. Once activated the valve must be manually reset. To do this the system must be intact since the pressure sensing device which operates the valve is downstream from the valve. A bypass line around the valve must be manually opened and the system pressurized to greater than 20 psig in order to reset the valve.

The hydrogen piping system is constructed of hard soldered type K copper tubing. A number of manually operated back-seated diaphragm type shutoff valves are located throughout the system. These valves may be used to manually isolate any part of the piping system.

The piping system is designed in a series of loops so that any portion can be isolated without disturbing the supply to the remainder of the plant. The sections of pipe between any two of the valves can be purged prior to performing any maintenance operations. This is accomplished by opening a valved connection to the plant nitrogen system near one valve and also opening a vent line near the other valve which directs the purge out through the plant roof. The system is pressure tested annually.

Hydrogen detectors have been installed in each draft curtailed section of Building 100. These are connected to audible and visual alarms located in the Security Patrol headquarters.

Hydrogen detectors have also been installed in areas of high hydrogen usage. When these local detectors sense hydrogen they activate alarms and start up high volume explosion-proof exhaust fans in the area.

7.3 DESCRIPTION OF ACCIDENTS DUE TO NATURAL PHENOMENA

There are four natural phenomenon of concern to the schools site; hurricanes, tornadoes, lightning and seismic events.

Scenario VI: Hurricane may strike the school site with damaging winds. Damage to the GENDD plant may cause hazardous materials to be released and transported to the school site.

The greatest hazards hurricanes pose to life and property are high winds and tidal flooding. Hurricanes with wind speeds exceeding 100 mph are predicted as recurring at less than 100 year intervals. The design basis hurricane predicted by the U.S. Army Corps of Engineers shows tide heights ranging from 10 feet near the southern end of Tampa Bay to more than 14 feet at the northern end of the Bay.

The Pinellas Plant (and the Partnership School) are located 6.3 miles from the Gulf of Mexico and about 4.4 miles from Tampa Bay. The plant site and school are at a minimum floor height of 18.5 feet above mean sea level. No damage to the plant or the school is expected from hurricane storm surge or tidal flooding.

Although all buildings comply with the Southern Building Code and the requirements of DOE Order 6430, there is relatively little protection from wind damage in the event of hurricane or tornado. Hazardous material releases would be expected in significant enough quantities to impact the Child Care/Partnership School. New Building designs will consider these events per UCRL-15910 in the future. Major renovations of existing buildings, such as roof replacement, will follow UCRL-15010. The school building meets all requirements for school structures as specified by the Pinellas County School System.

Advance warning of an approaching hurricane is typically broadcast 36 to 48 hours in advance. Hurricane warnings are broadcast through the local office of the National Weather Service and NAWWS, the National Warning System. Both channels are continuously monitored in Security patrol headquarters in Building 100. Actions described in the Pinellas Plant Emergency Action Plan provide for the systematic shutdown of the site and evacuation of personnel prior to the arrival of winds associated with hurricanes.

Hurricanes are not considered to be a threat to the safety of the Partnership School occupants since adequate warning is anticipated. All occupants will be evacuated well in advance of hurricane force winds.

Scenario VII: Tornado strikes the school site with damaging winds. Damage to the GENDD plant may cause hazardous materials to be released and transported to the school site.

Historical information on tornado incidence in Pinellas County for the 31 year period from 1950 through 1980 was obtained from the National Severe Storms Forecast Center. During this period, 50 events occurred; 37 were classed as tornadoes and 13 as waterspouts moving ashore. They caused 7 deaths and 214 injuries and occurred during every month of the year.

Classed by intensity, 16 were termed very weak, 22 weak, 6 strong, 2 severe and 1 devastating. Three were not ranked. One devastating tornado occurred on April 4, 1966.

Tornadoes occurring in the United States have an average path of destruction about 20 miles long and 300-500 yards wide. Of tornadoes striking Pinellas County, the average path was 1.7 miles long and 385 feet wide.

Based on historical data for Pinellas County, the probability of a tornado striking any particular location in the county during a year can be determined. The occurrence rate (50 tornadoes in 31 years) is 1.61 tornadoes per year. If this rate is multiplied by the average path area (determined

from the data to be 47.7 acres) and divided by the area of the county (179,310 acres), the resulting probability is 4.3×10^{-4} . This is equivalent to one chance in 2,335 of a tornado striking anywhere within Pinellas County.

The boundaries of probability can be further defined by considering that the Pinellas Plant site consists of only 96.85 acres. This is 0.06 percent of the total land area of the county. Of this acreage, buildings occupy only 35 percent of the available land area. Of the 700,000 square feet of building space on the site, the Partnership School occupies 12,786 square feet, or 1.8 percent of the site. The probability of a tornado striking the school building is extremely low.

The probability that radioactive sources are out of vault being transported or become lost due to tornado action is low. However, a direct hit by a tornado could cause hazardous materials, including chemicals stored in the Bonded Stock area to be released. These agents could have an impact on the Partnership School.

A communication system is in place between the Partnership School and the main GENDD plant. Tornado warnings are broadcast by the National Weather Service local office when conditions are favorable for tornado formation or upon first sighting of a tornado in the general area. Typically, warnings are broadcast 20-30 minutes in advance of a tornado's approach. School personnel will be immediately evacuated into the main plant (Building 100 is 70 meters away) in the event that tornado warnings are issued.

The risk of tornado occurrence at the Child Care/Partnership School is essentially the same as routinely accepted by the public at other schools in the area.

Scenario XIII: Severe thunderstorms strike the school site with damaging wind, rain, hail and lightning.

Summer thunderstorms are a dominant feature of weather at the school site. On the average, thunderstorms occur 90 days a year, usually during the late afternoons during June, July, August and September. This season accounts for about 30 inches of the average annual rainfall of 49 inches.

Thunderstorms are usually rapidly moving and of short duration. Thirty minutes to one hour is the average duration. Strong, gusty winds, heavy rainfall, hail and dangerous lightning may occur.

Due to the high average rainfall, Pinellas County has an extensive network of drainage systems designed to handle the peak 100 year rainfall. Stormwater runoff drains are located at the plant and school site and prevent rainwater flooding from occurring.

To minimize the threat of a direct lightning strike, all plant and school structures are equipped with a lightning protection system.

Although rare, wind gusts in a thunderstorm may occasionally reach 70 miles per hour. It is expected that school structures would withstand these very short duration gusts without sustaining significant damage. Very severe thunderstorms are usually preceded by special weather bulletins from the National Weather Service and are received in the Security Control Center. Tornado precautions will be implemented as needed in these circumstances and school personnel can be quickly evacuated to the main plant as necessary.

Scenario IX: An earthquake strikes the main plant and school site. The resulting structural damage may cause release of radioactive and chemical hazardous materials.

The Pinellas Plant and Partnership School are located in a quiet seismic zone. The low hazard assessment for the site is based upon the great distance from the site to sources of significant seismic activity and the apparent seismic stability of the region. The plant site is classified as Seismic Zone 0 in the Uniform Building Code. A recent assessment by an independent consultant concluded that a damaging earthquake is extremely unlikely at the Pinellas Plant and school site.

However, in the event of an earthquake the Pinellas Plant and school site would be vulnerable. An earthquake of any size would cause the stored drums and bottles to fall from their racks in Building 600 (Chemical Storage Building). The use of unreinforced masonry for structures would likely mean that collapse of walls would occur in many areas. An earthquake could lead to widespread failures at the Pinellas Plant and school site.

Analysis shows that radiation exposures that would result from a plant accident would be too small to cause immediate health effects. The release of small quantities of tritium is the major hazard.

During the time required for workers and the public to evacuate the site it is possible that exposures to toxic chemicals could result. A cloud of toxic chemicals could possibly drift to the school site. The most likely problem would be release of solvent vapors and acid mists. Release of acutely poisonous materials is expected to be minimal.

Seismic activity at the school site is an extremely unlikely event. The level of risk is tolerable and essentially the same as that routinely accepted by the public.

Emergency Preparedness:

GENDD maintains an Emergency Preparedness Program and an Emergency Operations Center to quickly control and mitigate the effect of catastrophic incidents. Emergency procedures for the Child Care/Partnership School have been drafted and will be integrated into the Plant's Emergency Plans. The plans are consistent with Pinellas County Emergency Disaster Plan requirements for public schools.

School staff members are licensed and accredited by the State of Florida. They will receive training in emergency plans and procedures. GENDD emergency response personnel have been trained in first aid and are available for assistance to the school. The GENDD plant physician is also within minutes of the Partnership School.

A dedicated emergency telephone line links the school director's office directly to the main plant Communications Center.

7.4 DESCRIPTION OF RADIOLOGICAL ACCIDENTS

Radioisotopes

Tritium

The most credible accident involving radioactive materials is the loss of one processing bed of tritium, which is equivalent to 1 gram or 10,000 curies. Such an incident is possible should processing equipment fail, an uncontrolled fire occur in the area, or a breach of a processing bed take place. Processing equipment failure would exhaust gases through the Tritium Recovery System (TRS) which is in excess of 99% efficient at converting and capturing tritium in the oxide form. Should breakthrough of the TRS occur the effluent out of the system is monitored and equipped with critical alarms. Additionally, east stack exhaust, which receives TRS effluent, is also monitored and critically alarmed to detect continuous releases of 1.0 curies or less.

Uncontrolled fire in the area is unlikely because of the presence of an automatic sprinkler system. Small fires, should they occur, are readily detected by the area tritium monitoring system which responds to ions formed during combustion. The system is alarmed at a level of 4 picoamperes. Breach of a processing bed is most likely to occur through impact at the valve stem. The cylinder and valve are constructed of stainless steel and the beds are only handled (other than valve use) when the beds must be moved to specific locations for transfer of tritium gas to the uranium beds; x-ray; or connection to processing equipment. Padded metal transfer cases are used whenever the beds must be removed from normal use areas to add additional protection during bed handling.

Should, however, one of the above accidents occur and engineering and administrative safeguards fail, a 10,000 curie loss through the east stack would result in a maximum off-site dose of 25 mrem at 1,000 - 1,500 meters from the plant. Doses at the Child Care/Partnership School site are predicted to be lower because the release point is 75 feet above the ground. No exposure in excess of DOE or EPA guidelines for routine exposures to the public would be expected to occur.

Pu-238 Oxide

Plutonium oxide is used in the Building 400 RTG assembly and test operation. The primary consideration when evaluating potential accident situations is the effect on the plutonium heat sources.

Plutonium dioxide is used as the heat source in the RTG units. Three layers of encapsulation contain the source material (Figure 7.1). The outer layer is a nickel alloy and the inner two layers are a tantalum alloy. The encapsulated sources are not manufactured at the Pinellas Plant but are fabricated at another site. The units are designed to withstand the following test criteria:

- (1) Exposure to a 1,000 degree Centigrade fire (1,800 degrees Fahrenheit) for a period of one hour.
- (2) Impact on an unyielding steel surface at a velocity of 150 meters/second (355 miles per hour) without loss of structural integrity.

The plutonium dioxide source material is in a shard form, thus minimizing the potential for respirable size particles.

With the exception of the unpacking procedure, the source cleaning operation and the actual assembly operation, the heat sources are kept in source storage containers. These are steel containers with minimum wall thickness of 0.2475 inch. The source storage containers are stored in a secure vault.

Following assembly, the heat sources are contained within the RTG outer casing. In one model, the case is machined from hardened stainless steel, with a minimum case thickness of 0.169 inc. In the other model, the case is formed using 0.032 inch stainless steel.

Postulated Fires

Fire loading in the RTG facility is low and the structure is constructed of fire resistant concrete. Three postulated fires were considered: (1) an electrical fire in a distribution panel, (2) an electrical fire in a piece of equipment and (3) a solvent fire.

Alcohol is used in small quantities for some cleaning operations. The maximum quantity in the facility is 15 to 20 gallons. For this fire it was postulated that a safety can lost its integrity and the contents ignited. Smoke detectors are in place and the area is protected by automatic fire sprinklers. Non-combustible walls, floors and ceilings in the area would contain the fire and limit its spread to other areas. Fire sprinklers are expected to extinguish a fire from an electrical or chemical source. Response by the specially trained plant fire brigade is expected in less than 5 minutes.

Criticality

While plutonium is a fissionable material, the potential for criticality in the RTG facility is considered impossible. The maximum anticipated inventory of heat sources is considerably below that amount necessary to comprise a critical mass. Even if that amount were present, storage conditions preclude achieving a critical geometry.

Source Leakage

The probability of source leakage, although possible, is extremely remote. This assumption is based on the design and construction of the heat source (triple encapsulation). Should leakage

occur, however, contamination would be contained by the operational contamination control systems and the structure and remote location of the RTG assembly building (Building 400).

Krypton

A leak involving the loss of the entire inventory of Kr-85 in a short period could occur through leak detection equipment failure or an uncontrolled area fire. Such an event would result in off-site doses less than those calculated for the tritium mentioned above.

Catastrophic loss is unlikely because of the following engineering safeguards that are in place.

- Detectors in the exhaust stack
- Equipment is monitored and alarmed and has a transfer pump allowing safe storage in a standby tank
- Automatic sprinkler system in the radiflo chambers

Overall risks from radiation releases are low. An extensive system of engineering and administrative controls are in place to prevent radiation release to the outside environment. The operation of the Pinellas Plant reflects a manageable risk within the limits of acceptability.

MILLIWATT GENERATOR HEAT SOURCE

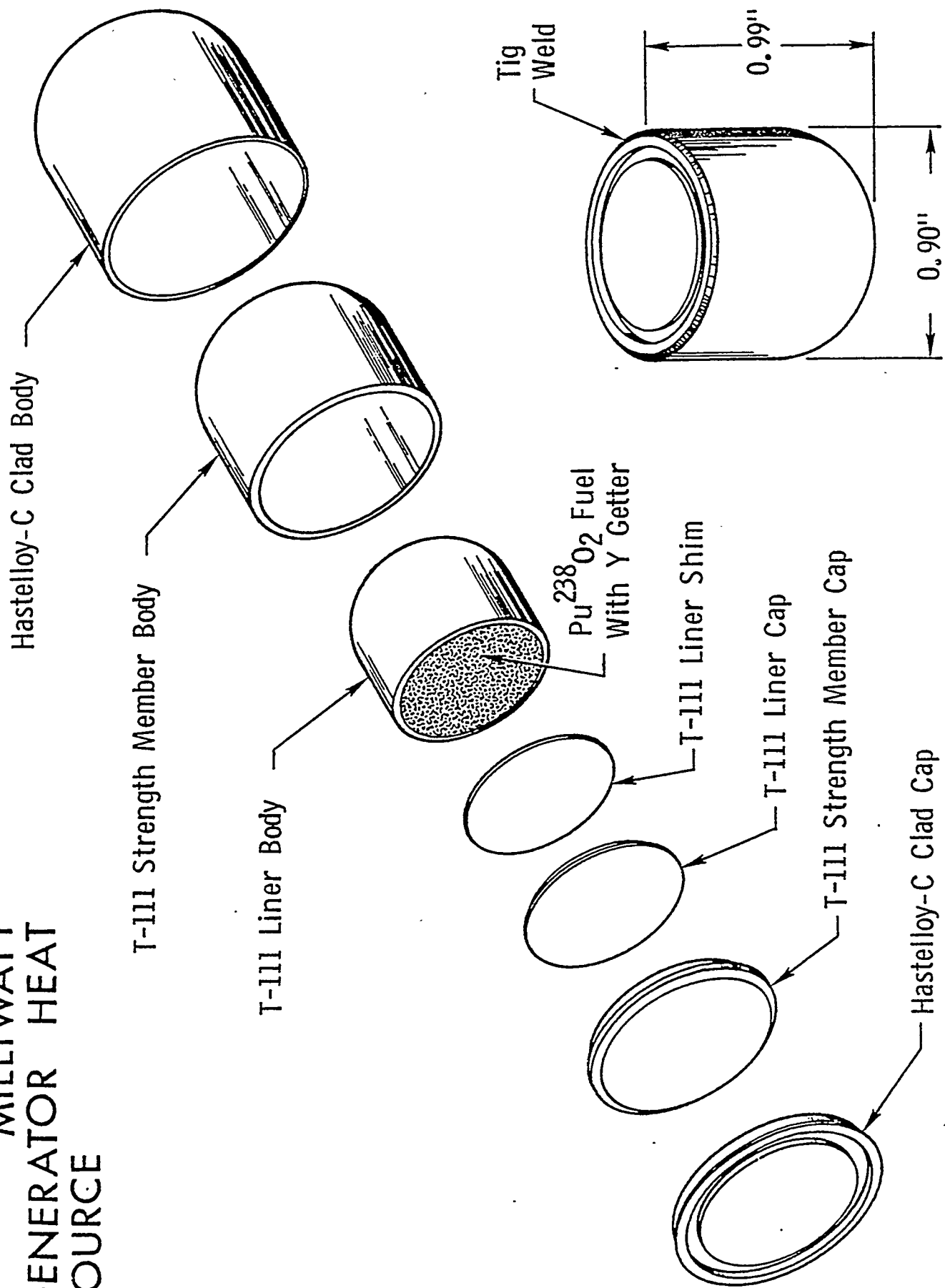


Figure 7.1

8.0 OPERATIONAL SAFETY REQUIREMENTS

This chapter conforms to the operational safety requirements guide for DOE/AL non-reactor nuclear facilities contained in DOE/AL Order 5481.1B.

8.1 INTRODUCTION

The Child Care/Partnership School is located in a former parking lot area on the East side of the Pinellas Plant site. The school is located approximately 70 meters from the eastern wall of the main plant building (Building 100).

8.2 ADMINISTRATIVE CONTROLS

The Child Care/Partnership School is not a production facility and no hazardous materials are used in its daily operation. Safety limits regarding maximum occupancy of the facility are established by the Pinellas County School Board and the local fire district. This capacity is established at approximately 270 children and 33 adults. These limits will be fully complied with.

Additions to the maximum allowable occupancy of the school must be approved by the appropriate GENDD and county and city authorities.

The Child Care/Partnership School is subject to safety audits by the GENDD safety and fire protection staff and DOE personnel. Additional inspections by the Pinellas County School Board, the Pinellas County Health Department and the Florida Division of Health and Rehabilitative Services are expected. Each habitable room of the Child Care Center will be tested for radon as required by Florida law.

8.3 EMERGENCY OPERATIONS PLAN

A valid Emergency Operations Plan is the major safety related limiting condition for operation of the Child Care/Partnership School. This plan (Appendix I) outlines the procedures for handling emergencies at the school site. The following contingencies have been addressed:

1. Medical Emergency
2. Emergency Evacuation of Students & Staff
3. Hurricane
4. Tornado
5. Guns or weapons on Site
6. Bomb Threat
7. Fire
8. Other Unusual Event

9.0 QUALITY ASSURANCE PROGRAM

GENDD has developed a program to ensure that quality assurance at the Pinellas Plant is consistent with DOE/AL Order 5700.6B, "Quality Assurance" (DOE, 1984). This program requires each operational unit of the plant to develop a quality program plan for each program managed by that unit.

These plans outline the functions and responsibilities of the individual programs within the larger operational units which manage them. The plans also present the applicable quality assurance elements related to the program, quality control policies for the program, and the appropriate DOE Orders that the program addresses. The quality elements identified for each program are based on the 18 basic requirements of a quality assurance program identified in the American National Standard Institute's "Quality Assurance Program Requirements for Nuclear Facilities," ANSI/ASME NQA-1 (ANSI, 1986). The Pinellas Plant has condensed these 18 requirements into 14 quality elements that are addressed in their quality program plans. These quality elements include design control, procurement, inspection, control of purchased items and services, identification and control of items, control of nonconforming items, supplier selection, control of development and production, control of facilities construction, control of measuring and test equipment, quality records, corrective actions, personnel training, and audits.

Individual quality program plans are reviewed by the manager of the program for which the plan was developed and the manager for quality programs. These managers sign and approve the plan prior to its being issued.

The quality program plans reference the various operating rules and procedures containing specific quality-related requirements for the individual programs. These plans act as a linking document between the specific procedures and the higher tier quality elements (e.g., ANSI NQA-1 and DOE Order 5700.6B). Implementation of these quality program plans at the Pinellas Plant ensures the quality operation of the Plant in conformance with DOE requirements.

10.0 ENVIRONMENTAL HEALTH AND SAFETY PROGRAMS MANAGEMENT

Environmental, Health and Safety Programs (EH & SP) is responsible for employee and plant safety, environmental protection, health physics, waste management, and education and training at the Pinellas Plant. EH & SP conducts a variety of programs that are common to all disciplines of environmental health and safety. All facility equipment and Plant rearrangement drawings require review by EH & SP to ensure the incorporation of proper safety and environmental considerations. All appropriation requests and approved suggestions are similarly reviewed.

All areas of the Plant are audited by personnel from each EH & SP discipline on a scheduled basis to ensure early detection and correction of potentially unsafe conditions. Reports are prepared and work orders or service requests are submitted for correction or deficiencies. Follow-up inspections are conducted to ensure the implementation and adequacy of corrective actions.

All accidents are investigated to determine their cause in order to minimize the possibility of similar accidents. Unusual occurrence reports are analyzed to detect accident trends so that appropriate control measures can be initiated.

10.1 SAFETY

A comprehensive industrial safety program is conducted at the Pinellas Plant emphasizing accident prevention through training, education and safety engineering. New modified or relocated equipment and processes are reviewed by EH & SP prior to their activation to ensure proper safety considerations have been incorporated.

Employee interest in the safety effort is generated and maintained through safety promotions in Company news outlets, a safety awards program, and by maximum employee participation in the safety program through the safety monitor program.

Industrial safety programs, such as traffic safety and eye protection programs, are also conducted to ensure maximum safety of employees, both on and off the job.

Employees are appointed as safety monitors for each operational group (Plant unit) at the Plant to assist EH & SP in identifying and eliminating unsafe acts and conditions. EH & SP and the monitors meet monthly to effect a continuous flow of environmental health and safety information between EH & SP and Plant personnel. Each Plant unit then conducts its own monthly safety meetings in which the supervisor and safety monitor provide safety information to operating personnel.

10.2 INDUSTRIAL HYGIENE

EH & SP programs applicable to industrial hygiene involve both routine monitoring and preoperational review of plant equipment and processes. The industrial hygiene program includes toxic material monitoring, laser safety, respiratory protection, hearing conservation, and exhaust hood flow measurements. The scope of these subprograms ranges from breathing zone sampling near controlled areas where chemicals are used to the evaluation of the physical hazards associated with noise sources and lasers. Also, all purchase orders are reviewed to ensure the early identification and proper control of all potentially hazardous materials.

10.3 FIRE PROTECTION

A complete fire protection program is provided, including fire prevention engineering, training, and fire-suppression capabilities. Buildings are engineered with proper fire partition, fire doors, alarms, sprinkler systems, and fire extinguishers. A well-trained and well-equipped fire brigade is maintained as a backup for automatic fire suppression systems. Fire brigade members receive formal training in the theory of fire suppression and actually extinguish controlled fires at Building 900, a fire training facility located in a remote area of the Plant property. Schedules are established to ensure

adequate coverage on all shifts, including weekends, by fire brigade personnel. Firefighting assistance will also be provided under contract by the Seminole Fire Department upon request.

10.4 HEALTH PHYSICS

EH & SP maintains a complete radiological safety program to minimize exposure of personnel to radioactive materials. A personnel monitoring program requires the submittal of bioassay samples by personnel working with radioactive materials and the wearing of film badges by personnel with the potential for exposure to external radiation. Radiation and contamination surveys are performed on a routine basis to ensure that controls are adequate.

10.5 ENVIRONMENTAL PROTECTION

EH & SP provides a well coordinated pollution control program directed toward the prevention, control, and abatement of air and water pollution from solid, liquid, and gaseous effluent sources. Effluent quality standards used by EH & SP as minimum operating criteria are those established by Federal and State pollution control agencies.

10.6 WASTE MANAGEMENT

The waste management program for the Pinellas Plant is described in Chapter 12.

10.7 EDUCATION AND TRAINING

The EH & SP maintains an extensive safety training program for new employees and conducts continuing safety training for current employees. All new employees are shown a slide and tape presentation covering a number of general safety aspects. Specific safety indoctrination for the particular work assignment is provided by area supervision and in some specialized cases, such as laser safety and radioactive contamination control, by EH & SP specialists.

EH & SP conducts hazard emphasis, off the job, and special education programs. For example, the GENDD strongly supports cardiopulmonary resuscitation (CPR) training. Movies and demonstrations of this lifesaving technique have been presented to the majority of Plant personnel. In addition, over 175 employees have been trained and certified in Basic Life Support Techniques.

Members of the Security Patrol receive safety and CPR training from EH & SP. All weapons use and safety instruction given at the Indoor Firing Range is conducted by Plant Security.

11.0 ENVIRONMENTAL SAFETY AND HEALTH (ES & H) SYSTEMS CRITICAL TO SAFETY

This chapter describes the ES & H systems required to reduce the potential hazards to workers, the general public, or the environment to an acceptably low level. For the Child Care Partnership School these systems include fire detection and suppression, ventilation, and communications.

11.1 FIRE DETECTION AND SUPPRESSION SYSTEM

All school buildings contain a system to detect smoke and heat generated from a fire. When smoke or fire is detected, an Underwriters Laboratory approved sprinkler system automatically releases water to suppress the fire. These systems cover all interior sections of the school.

The Child Care Partnership School is equipped with a standard HVAC system for the filtering, cooling, or heating and distribution of clean air to all rooms.

11.2 COMMUNICATION SYSTEM

The School Director's office is connected to the Building 100 telephone system. An intercom connects each schoolroom with the Director's office.

12.0 WASTE MANAGEMENT PROGRAM

Waste management operations at the Pinellas Plant are conducted in compliance with DOE/AL Order 5820.2, the Resource Conservation and Recovery Act, and appropriate Federal and State permits. This chapter summarizes the radioactive, hazardous, and sanitary waste management programs at the Plant and describes the air and water pollution control and monitoring systems for potential releases.

12.1 RADIOACTIVE WASTE MANAGEMENT

Radioactive wastes at the Pinellas Plant site contain tritium (Hydrogen-3) and Krypton-85. All radioactive waste generated at the Plant is classified as low-level waste. Tritium wastes are generated in gaseous, solid, and aqueous forms. Krypton-85 is released only in a gaseous form. The Child Care/Partnership School does not contain or utilize radioactive materials and does not generate radioactive wastes.

Radioactive Solid Waste

Wastes contaminated with tritium consist mainly of scrap products, molecular sieve material from the exhaust gas of the Tritium Recovery System, contaminated equipment and protective clothing, and solid debris from decontamination efforts. This waste is compacted directly into Department of Transportation (DOT) Specification 17C, 55-gallon steel drums. Sealed containers are stored in an enclosed facility with controlled access for shipment and disposal at the Savannah River Plant.

Radioactive Liquid Waste

Wastewater containing tritium is generated during the decontamination of equipment and areas. All Plant areas using tritium are provided with drains which discharge to

a holding tank system. After tritium analysis, wastewaters are discharged to the Pinellas County Sewer System. All discharges to the County system are analyzed for compliance with tritium release limits established in DOE Order 5480.1B.

Tritium contaminated oils are solidified by the addition of absorbent and stabilizers. This material is stored on-site until a facility is located that can accept this waste. Waste oil is not classified as a hazardous waste by US EPA or the State of Florida.

Radioactive Gaseous Waste

Discharges from equipment using tritium gas, in both the engineering and manufacturing areas of the Plant, are treated in the Tritium Recovery System. This system converts hydrogen and its isotopes to water vapor using copper oxide at an elevated temperature. The water vapor is removed in columns containing molecular sieves that are then managed as a low level radioactive solid waste.

The processed gas from which the tritium has been removed is discharged to the exhaust stack. The exhaust stacks from engineering laboratories and manufacturing areas have ionization chamber monitoring systems for immediate detection of tritium or Krypton-85, and silica gel sampling systems for determining the quantities of tritium discharged. Low levels of Krypton-85 are released in a gaseous form from operation of tracer flow leak detectors. In-stack radioactivity concentrations are maintained below the levels listed in DOE Order 5480.1, Chapter XI, for continuous exposure in uncontrolled areas.

12.2 HAZARDOUS WASTE MANAGEMENT

Wastes generated at the site which are classified as hazardous under the Resource Conservation and Recovery Act (RCRA) include:

- Halogenated and nonhalogenated solvents
- Spent plating bath solutions
- Corrosive materials
- Ignitable materials
- Reactive materials
- EP toxic metal wastes (lead, chromium, arsenic, cadmium)
- Off-specification laboratory materials
- Electroplating sludges

A detailed description of the chemical and physical properties of these hazardous wastes and the processes generating them is given in the Pinellas Plant Waste Management Site Plan, GEPP-SP-1077a. Detailed hazardous waste management procedures are given in GEPP-SP-818, "Waste Management Operating Procedures (WMOP)." "The Pinellas Plant Contingency Plan for Hazardous Waste Management Facility," GEPP-SP-1104, describes emergency response cleanup efforts for the release of hazardous substances. A separate document, "The Pinellas Plant Spill Prevention Control and Countermeasures Plan," GEPP-SP-1122, manages emergency response cleanup efforts for the release of oil and petroleum products.

As discussed in Section 5.2, solvents used for weapons maintenance are used completely. Hazardous wastes associated with weapons maintenance are handled according to the WMOP (DOE, 1987b).

Hazardous Waste Storage Facilities

On-site storage facilities include a container storage area and aboveground storage tanks. The capacity of the container storage area (Building 1040) is 79 55-gallon drums and 42 20-gallon drums. Wastes are packaged according to DOT requirements and incompatible wastes are segregated during storage before being sent off-site for further treatment or disposal.

All bulk liquids are stored in aboveground, concrete diked tanks. Three 5,000-gallon tanks are used to store flammable liquids, halogenated hydrocarbons, and metal cutting coolant. These wastes are sent to an off-site recycling facility. A 500-gallon tank is used to store petroleum-based oils. Used oils are sent off-site for use as fuel.

Hazardous Waste Treatment Facilities

Calcium and lithium metal are deactivated by submerging them in water for a period of time sufficient to react all the reactive material. A detailed description of the pickup and treatment procedures is given in the WMOP (DOE, 1987b). The reacted metal is disposed of as a solid waste at a sanitary landfill. The water is drained to the industrial wastewater system.

Explosive electronic detonators, heat paper, and heat powder are thermally treated by open burning. Residue from the burning of heat paper is managed as hazardous waste due to the barium content and is disposed of at an off-site hazardous waste landfill. The detonators and heat powder and pellets are nonhazardous and are disposed of at an off-site sanitary landfill.

12.3 OFF-SITE TREATMENT AND DISPOSAL FACILITIES

No disposal facilities are located at the Pinellas Plant site. Hazardous waste requiring further treatment or disposal is sent off-site.

Mixed Waste

Mixed waste is defined as a mixture of radioactive and hazardous waste. This type of waste is not routinely generated at the site. Any mixed waste that is generated is properly managed in accordance with DOE and EPA requirements.

Effluent Control System

Spent caustics or acid solutions are discharged into a chemical drain system where it is neutralized before discharge into the Pinellas County Sewer System. Hazardous waste is not discharged to the Plant effluent system. Limits for discharge of contaminants into the Pinellas Plant's effluent are established by the Pinellas County Sewer Use Ordinance (DOE, 1988b).

SECTION 13.0 RADIOACTIVE ENVIRONMENTAL MONITORING

Small amounts of tritium gas, tritium oxide, and krypton-85 gas are discharged from the Pinellas Plant exhaust stacks. Tritium gas and tritium oxide are discharged from the Building 100 laboratory and the Building 200 and 800 stacks, while tritium gas, tritium oxide, and krypton-85 gas are discharged from the Building 100 main exhaust stack. On-and off-site environmental sampling for plutonium is performed because the material is physically present on the plant site, even though it is completely encapsulated.

GASES AND AIRBORNE PARTICULATES

Tritium gas and tritium oxide discharges are monitored at the four exhaust stacks. Krypton-85 discharges are monitored at the Building 100 main exhaust stack. Six on-site and five off-site sampling stations monitor the atmospheric levels of tritium gas and tritium oxide resulting from these discharges. The ventilation effluent from the building where the sealed plutonium capsules are handled is monitored for plutonium. Four site perimeter and five off-site plutonium air monitoring stations are operated continuously during the year to monitor the atmosphere for plutonium. The locations of the on- and off-site tritium and plutonium air monitoring stations are shown in Figures 13.1 and 13.2 respectively. Soil samples collected from both on- and off-site are analyzed to provide a set of data for comparison with the pre-operational survey plutonium levels.

Monitoring Procedures

Tritium

Exhaust from the majority of processing and laboratory equipment which utilizes tritium in Building 100 is connected to the tritium recovery system. The system converts tritium gas in the

exhaust to tritium oxide (which represents both the tritium oxide and the tritium gas in the exhaust air) which is then measured as a solid radioactive waste prior to disposal off-site. The effluent from the tritium recovery system (from which 95% to 99%+ of tritium has been removed) is directed into the Building 100 main stack.

The six on-site air sampling stations (individually numbered 1 through 6) and the five off-site air monitoring stations, which monitor the atmosphere for both tritium gas and tritium oxide, are operated continuously during the year. Samples are analyzed at four-week intervals.

Krypton

The exhaust from all equipment which utilizes krypton-85 is connected to the Building 100 main exhaust stack. Krypton-85 discharges from the Building 100 main stack are determined from a continuous air sample which is drawn through a Kanne-type ionization chamber connected to a picoammeter and recorder. Releases are calculated regularly based on sampling results and analyses of the process gas.

Plutonium

Plutonium is not discharged to the environment: however, because of its presence on-site, a plutonium monitoring program is maintained. Sample filters through which a known amount of air has passed are collected from the exhaust ventilation system of the building in which the plutonium is housed and from the on- and off-site air monitoring stations.

The exhaust stack on the building where the heat sources are stored and used is continuously monitored during the year. The monitoring system samples the exhaust effluent at a rate of approximately 3700 L/hr (2.2 cu ft/min). Whatman Corporation's Brand 934-AH filter material is used for all environmental plutonium air samples. The filters from the building which houses the plutonium are changed monthly and composited for quarterly analysis.

Four on-site and five off-site plutonium air sampling stations are operated continuously during the year. Ambient air is sampled at a rate of approximately 5600 L/hr (3.3 cu ft/min). The filters are changed at two-week intervals and composited for quarterly analysis.

Two on-site and four off-site soil samples were analyzed in 1988 for plutonium. The four off-site soil samples were collected at locations surrounding the plant at distances from 2.5 to 3.7 miles.

Discharges

Tritium

Radioactive gaseous effluents are released from four exhaust stacks on the site. Tritium gas, tritium oxide, and krypton-85 gas are discharged from the 70-foot Building 100 main stack, tritium gas and tritium oxide are discharged from the 100-foot Building 100 laboratory stack, and from the 21-foot Building 800 stack and 30 ft. Building 200 stack.

Calculated maximum ground level concentrations resulting from these discharges were less than 0.05% of the DOE Interim DCG for tritium and krypton-85 and occurred at a distance of 550 yards from the plant site center.

On-site perimeter tritium samples are analyzed to determine the tritium level resulting from the stack discharges and to monitor conformance with the radionuclide discharge standards set forth in the DOE Interim DCG. The average concentrations detected at the on-site stations in 1988 were less than 0.04% of the DOE Interim DCG for tritium oxide in air. The highest average (tritium oxide) obtained from the on-site perimeter stations was 0.173%, or approximately 580 times less than the DOE Interim DCG for tritium oxide. The highest average was a value taken from on-site monitoring Station No. 2.

Off-site tritium air samples are also analyzed. The average tritium oxide concentrations detected at the off-site air sampling stations in 1988 were 0.005% of the DOE Interim DCG. The highest average (tritium oxide) obtained from the off-site perimeter stations was 0.013%, or approximately 7600 times less than the DOE Interim DCG.

Krypton

All exhaust effluents containing krypton-85 are directed to the Building 100 main exhaust stack. Analysis of an air stream from this stack is performed continuously. A total of 30 Ci of krypton-85 was discharged from the main stack in a total of 4.29×10^{11} liters of air in 1988.

Plutonium

Plutonium filter samples from the Building 400 exhaust ventilation system and the four on-site and five off-site monitoring stations are analyzed for plutonium-238 and plutonium-239 content throughout the year. All 1988 samples were reported as less than the minimum detection levels. No plutonium releases occurred during 1988. All on-site perimeter air samples were reported as less than the minimum detection levels. All off-site air samples were reported as less than the minimum detection levels.

Two on-site and four off-site soil samples were analyzed for plutonium during 1988. The four off-site soil samples were collected at locations surrounding the plant at distances from 2.5 to 3.7 miles. The results of the analysis of all five samples were less than the respective minimum detection levels.

Discussion

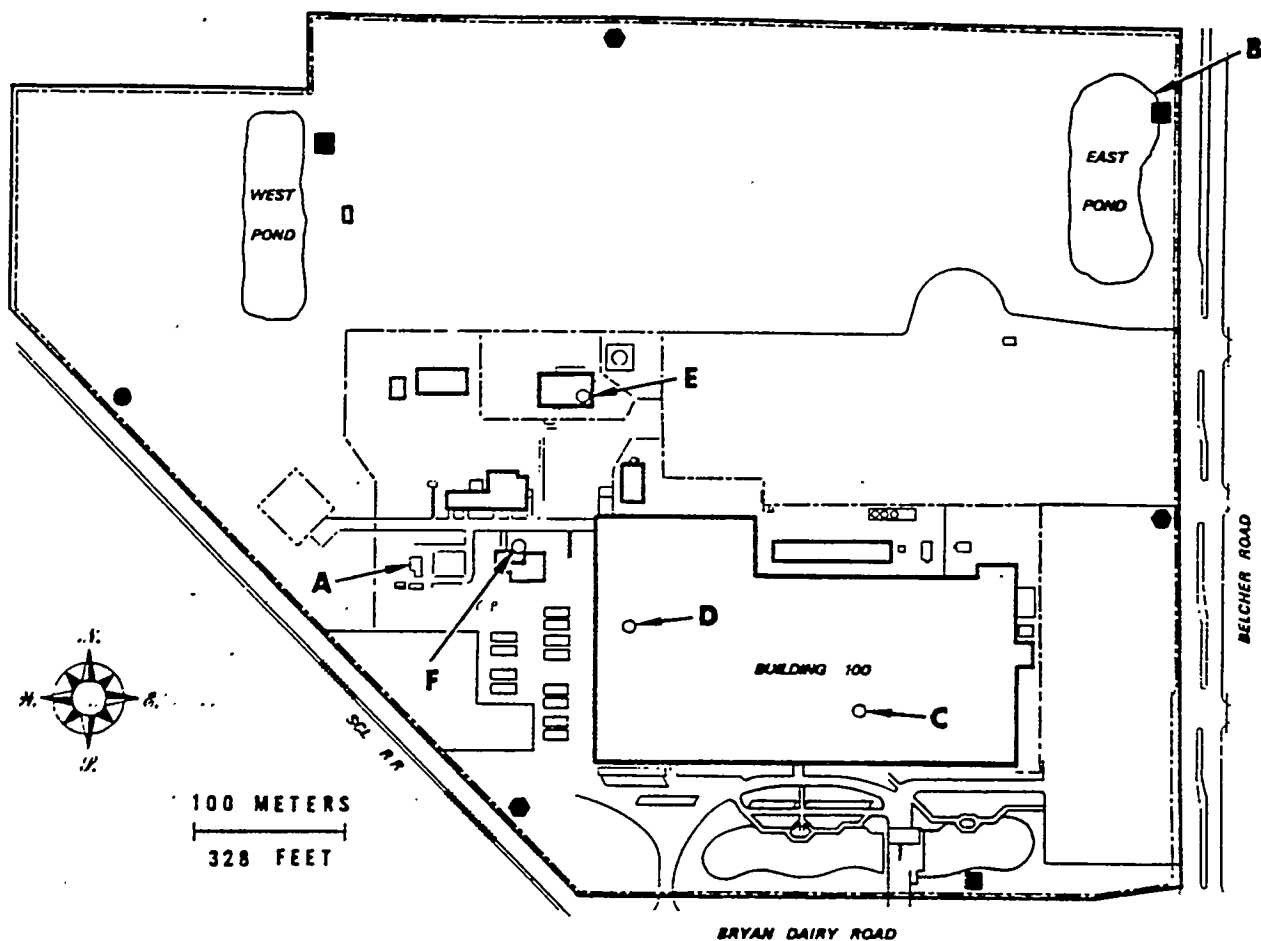
The EPA computer code (AIRDOS-EPA) was used to calculate the environmental concentrations of tritium and krypton-85 in airborne releases. The closest plant site boundary is approximately 110 yards from the center of the plant site in a southwest direction. The maximum air

concentration at this boundary was calculated to be 1.2×10^{-11} uCi/mL for tritium and 7.3×10^{-13} uCi/mL for krypton-85. By applying Sutton's atmospheric diffusion equations to the stack discharges, maximum ground level air concentrations may be determined for comparison with the nonoccupational exposure concentration standards listed in the DOE Interim DCG for tritium and krypton-85. The calculations were made to determine the distance and direction at which the maximum ground level air concentration would occur. In the case of both tritium and krypton, the maximum concentration in any direction would occur at a distance 550 yards from the center of the plant site. The maximum concentrations of tritium and krypton obtained were found 550 yards west of the plant site and were 0.044% and 0.0002% of the respective DOE Interim DCG values. The Child Care/Partnership School site is approximately 50-70 yards east of the main plant (Bldg. 100) site.

All of the monitoring results obtained at both the on- and off-site air monitoring stations in 1988 were extremely small when compared to the DOE Interim DCG of 1×10^{-7} uCi/mL for tritium oxide in air. On-site tritium oxide levels were 0.04% of the standard. Off-site tritium oxide levels were 0.013% of the same standard. These results support the conclusion that the contribution of the tritium discharges from the Pinellas Plant to the local environment is insignificant.

Sealed, encapsulated plutonium oxide sources are used on-site. The effluent from the industrial exhaust ventilation system from the building in which the sealed capsules are handled and stored is monitored for plutonium. The effluent passes through high efficiency particulate air (HEPA) filters prior to being released to the environment. These filters, along with those from on-site perimeter and off-site air monitoring stations, are analyzed for plutonium. All of the results obtained in 1988 were below the analytical method minimum detection level. This result supports the fact that no plutonium was released to the environment.

A total of six soil samples (two on-site and four off-site) were analyzed for plutonium during 1988. The results were less than the analytical method minimum detection level in all cases and are comparable to those found during the survey conducted prior to the introduction of plutonium sources at this site. These results also support the conclusion that no plutonium has been released from the site.



WASTEWATER EFFLUENT TO POTW
 EAST POND EFFLUENT
 BUILDING 100 MAIN STACK
 BUILDING 100 LABORATORY STACK
 BUILDING 400 EXHAUST STACK

KEY		
A	BUILDING 800 EXHAUST STACK	F
B	PROPERTY LINE	
C	TRITIUM AIR SAMPLING STATION	■
D	PLUTONIUM AIR SAMPLING STATION	●
E	TRITIUM/PLUTONIUM AIR SAMPLING STATION	●

FIGURE 13-1. PINELLAS PLANT SITE

From: 1987 Pinellas Plant Environmental Monitoring Report (1988)

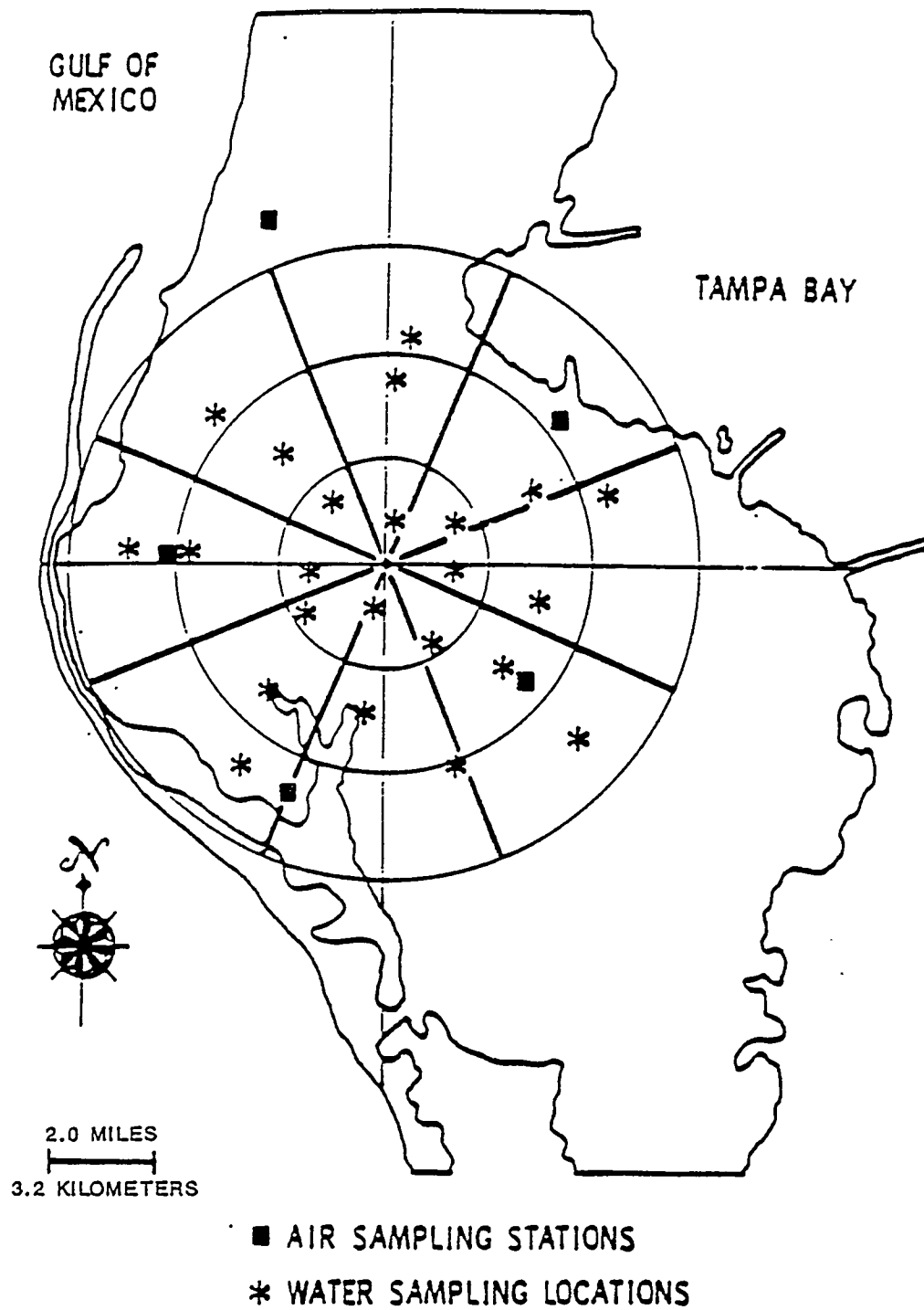


FIGURE 3-2

OFF-SITE TRITIUM AND PLUTONIUM AIR MONITORING STATIONS AND
TRITIUM SURFACE WATER SAMPLING LOCATIONS

From: 1987 Pinellas Plant Environmental Monitoring Report (1988)

14.0 SUMMARY OF EMERGENCY RESPONSE PLAN

The Pinellas Plant utilizes a series of emergency-specific Control Plans. These include:

- Fire Control Plan
- Hurricane Plan
- Tornado Plan
- Severe Weather Message Plan
- Explosion Plan
- Medical Plan

In addition, the location and capabilities of each piece of emergency response equipment is outlined in a separate control plan, along with a description of personnel protective devices, monitoring equipment, first aid and medical supplies, emergency decontamination equipment and emergency communication and alarm systems which are available on the site. Each plan is briefly summarized below.

Fire Control Plan

The plan describes appropriate procedures to be followed in response to a fire alarm, and outlines the lines of authority within the fire brigade. Fires in a radiation area require the use of complete turnout gear and self-contained breathing apparatus. Table 15-1 lists fire alarm and response equipment on site and provides the inspection parameters and schedule for each emergency system. The plan also includes the procedure to be followed for inspecting each system or piece of equipment, i.e., "Weekly Test of Smoke Detection Systems," and "Weekly Check of Two West Diesel Fire Pumps."

Hurricane Response Plan

This plan includes specific information on the steps which must be taken to prepare the Plant for hurricane-force winds and shut-down. Hurricane duty personnel are listed by job title, along with emergency equipment requirements and recovery actions. The plan also defines the color codes used to describe current and projected weather conditions when hurricanes threaten the site, as well as information sources for weather conditions.

Tornado Plan

The plan discusses posting of tornado watches and the actions that are taken to secure loose equipment on site and reduce the chance of damage or injury during a tornado. Plant shut-down activities are outlined. Also, information sources for weather condition are listed in this plan, along with the individuals (by job title), responsible for disseminating that information site-wide.

Severe Weather Message Plan

This document outlines the procedures for handling messages in the Emergency Operations Center (EOC) under severe weather conditions. Persons to whom the information must be directed are listed by job title for messages received during working and non-working hours.

Explosion Plan

The explosion plan includes guidelines for responding to the most likely damage caused by an explosion, i.e., fire. The appropriate response includes assessment of damage to the automatic sprinkler systems and the use of interior hose reels.

Medical Plan

This plan provides guidance for emergency response to a range of potential medical emergencies from those involving the single individual to a multiple injury disaster. Information on the location of emergency medical trays and available medical manpower resources are included in the plan. Specific physicians are identified for notification in case of a radiation incident.

In addition to the above plans, a series of accident scenarios have been developed specifically for emergency response training in the IFR. Emergency personnel are trained semi-annually to deal with these scenarios, which include single and multiple individual(s) suffering from gunshot wounds.

Emergency Equipment Plan

This plan identifies emergency equipment, its location, and its capabilities. This plan includes fire control, personnel protection, medical, communications, alarms and miscellaneous equipment.

TABLE 14.1

INSPECTION AND TESTS OF FIRE PROTECTION EQUIPMENT

ITEMS	INSPECTION	FREQUENCY
<u>SPRINKLER SYSTEMS</u>		
CONTROL VALVES	"SPRING" CHECK FOR OPEN	MONTHLY (VALVES ARE LOCKED)
	OPERATE AND LUBRICATE	ANNUALLY
ALARMS	INSPECTORS TEST CONNECTION	WEEKLY
DRAINS	2-INCH DRAIN TEST	QUARTERLY
<u>WATER SUPPLIES</u>		
TANKS	CHECK WATER LEVEL	WEEKLY
PUMPS	OPERATE	WEEKLY
HYDRANTS	FLUSH AND LUBRICATE	ANNUALLY
YARD MAINS AND WATER SUPPLIES	MEASURED FULL FLOW TESTS	ANNUALLY
<u>EXTINGUISHERS</u>	LOCATION & APPEARANCE	MONTHLY
	EXAMINE, CHECK SEAL & GAUGES	QUARTERLY
	WEIGH CO₂ & CO₂ CARTRIDGES	SEMI-ANNUALLY

TABLE 14.1**INSPECTION AND TESTS OF FIRE PROTECTION EQUIPMENT
(Continued)**

ITEMS	INSPECTION	FREQUENCY
	HYDROSTATIC TEST:	
	WATER	EVERY 5 YEARS
	DRY CHEMICAL	EVERY 5 YEARS
	CO₂	EVERY 5 YEARS
	HALON	EVERY 12 YEARS
<u>ALARM SYSTEM</u>		
DETECTION DEVICES & CIRCUIT		WEEKLY
<u>FIRE BRIGADE EQUIPMENT</u>		
HOSES IN RACKS OR HOSE HOUSES	RUN WATER THROUGH	ANNUALLY
	RE-FOLD	ANNUALLY
	HYDROSTATIC TEST:	
	OUTSIDE HOSE	ANNUALLY
	HYDROSTATIC TEST:	
	INSIDE HOSE	BIANNUALLY
	FIRE DOORS	MONTHLY
	PIV'S/OS & Y	WEEKLY
	HYDROGEN GAS DETECTOR	WEEKLY
	SULFUR DIOXIDE GAS DET.	WEEKLY
	SCBA	MONTHLY

FROM: PINELLAS PLANT FIRE CONTROL PLAN

New Directions In Learning

Child Development Center

and

Partnership School

01

February, 1991

NEW DIRECTIONS IN LEARNING

CHILD DEVELOPMENT CENTER AND PARTNERSHIP SCHOOL

New Directions In Learning (NDL) is a child development center and partnership school located on-site at the Pinellas Plant. It provides a child development program for children from eight weeks through four years old and an elementary program for kindergarten through second grade for children and grandchildren of Pinellas Plant employees.

Organization and Program

The Partnership School is a program offered by the Pinellas County School System to businesses with 1,000 or more employees. NDL was the first Partnership School in Pinellas County and serves as a role model for the community. The program is taught by Pinellas County School Teachers using the county curriculum, materials, supplies and furniture. It is simply a small county school on the business site. This program alleviates some of the overcrowding problems facing the school system and provides an educational environment during a child's formative years that encourages parental participation.

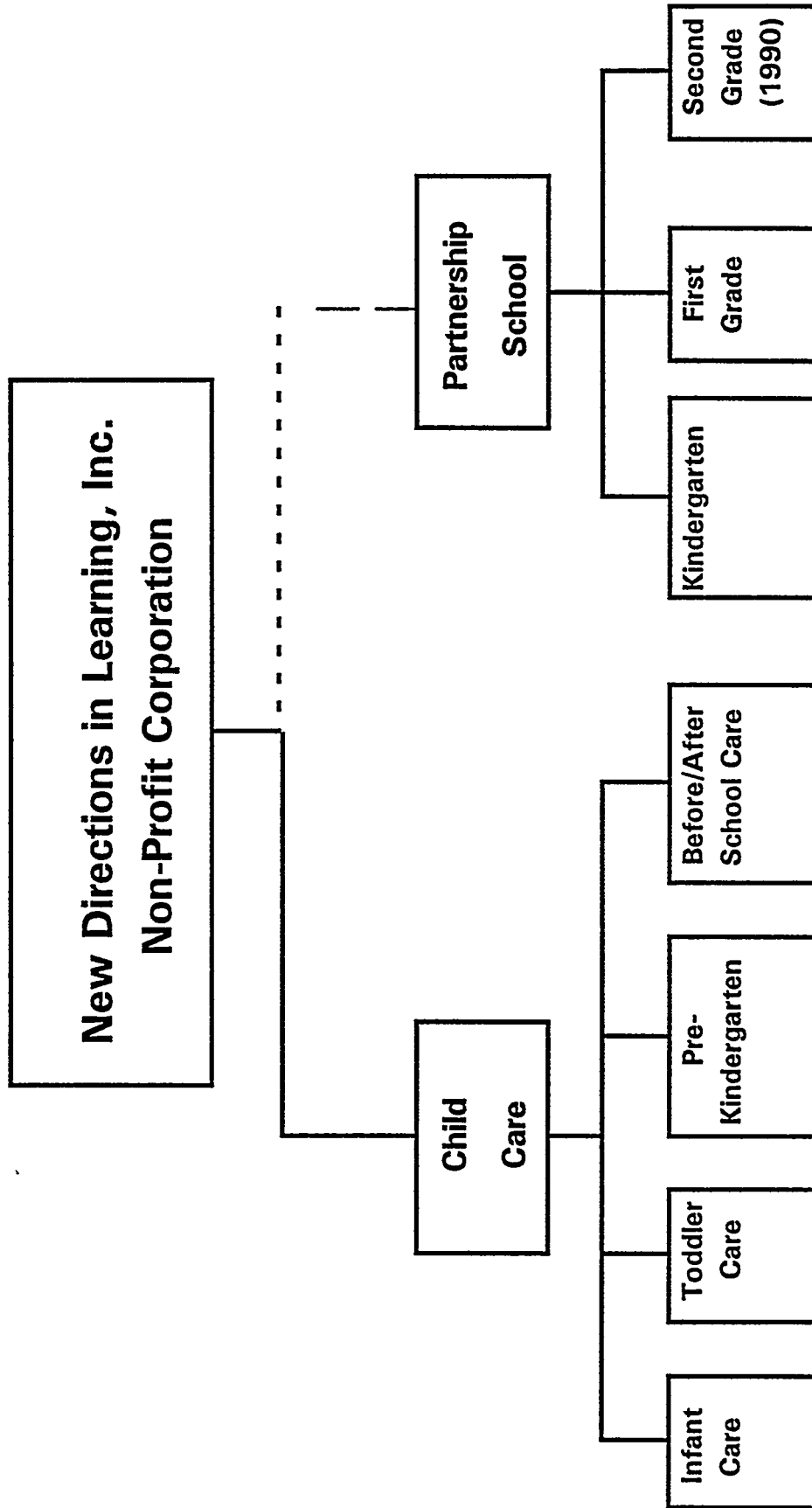
The Child Development Center is operated by a non-profit corporation run by employees of the Pinellas Plant. This program is actually a small business operated by an elected Board of Directors. They are responsible for everything from staffing to setting fees to balancing the budget. The business (GE or DOE) plays no role in the operation of the center. This non-profit corporation holds primary liability responsibility through a \$5 million insurance policy that holds both the DOE and the primary contractor harmless.

Facility

The buildings are located in the east parking lot of the Pinellas Plant site. The combined square footage is approximately 12,800 feet and the site is approximately 2 acres. It is a modular construction designed specifically for this purpose. The northern building houses the programs for children from eight weeks through three years and the southern building houses pre-kindergarten through second grade. The center is open from 6:30 AM through 5:30 PM. The facilities have capacity for approximately 200 children. Current enrollment is 90 children.

Funding

There are two types of costs associated with NDL -- start-up and ongoing. The majority of the start-up costs... building, land, furniture, etc...were provided by the DOE. The ongoing costs...liability insurance, salaries, benefits, food, etc...are the responsibility of the non-profit corporation. NDL raises funds through fees charged for the program, donations and fund raising.



ORGANIZATION/COST STRUCTURE

PARTNERSHIP SCHOOL

GEND PROVIDES

- Building
- Maintenance
- Utilities

SCHOOL SYSTEM PROVIDES

- Teachers
- Materials
- Equipment

CHILD DEVELOPMENT CENTER

GEND PROVIDES

- Building
- Utilities
- Maintenance
- Furniture & Equipment

*NDL PROVIDES

- Teachers
- Liability Insurance
- Materials & Supplies
- All Other

*NDL FINANCING COMES FROM PARENT FEES AND FUND RAISING

CHILD CARE/PARTNERSHIP SCHOOL

FINANCIAL SUMMARY

(\$ in Thousands)

<u>COST</u>	<u>FY 1989</u>	<u>FY 1990</u>	<u>FY 1991 & BEYOND</u>
CAPITAL	\$1100		
OPERATING	<u>225</u>	<u>\$100</u>	<u>\$100</u>
Subtotal	\$1325	100	100
<u>SAVINGS</u>			
ABSENTEEISM/TARDINESS		112	161
TURNOVER		19	35
OVERALL PRODUCTIVITY		<u>60</u>	<u>60</u>
Subtotal		191	256
NET SAVINGS	\$(1325)	\$ 91	\$156

Internal Rate of Return (IROR) from
Payback period

5% to 8%
8 to 10 years

NDL UNIQUE ATTRIBUTES

CHILD DEVELOPMENT CENTER

- Programmed Development
(not just babysitting)
- Parental Involvement - "The Bond"
- Outstanding, Trained Staff
- Managed by Employees
- Most Advanced Recreational Equipment
- Nutritional Program

PARTNERSHIP SCHOOL

- Superior Curriculum
- Business Participation in Teacher Selection
- Year-Round Curriculum
- Individual Attention
- Parental Involvement

COMMENTS FROM FACILITIES DESIGN & RISK MANAGEMENT BRANCH

SUBJECT: Child Care/Partnership School
AREA OFFICE: PAO

DATE: December 11, 1989
PAGE: 1 OF 13

DESIGN CRITERIA	TITLE I	TITLE II
<input checked="" type="checkbox"/> OTHER (Safety Assessment)		

General Comments

1. Report does not follow the instructions provided in AL Order 5481.1B, Chapters 6 and 7, for text and structure preparation. The application of generalities and unstructured format in the heart of the document (Chapter 7) does not provide review confidence.
2. It would be appropriate to discuss overall security and operation/monitoring of the playground in Chapter 5.
3. Considerable reliance is placed upon data developed by two "independent" consultant organizations. However, the SA contains no indications as to the qualifications of either organization, either as analytical chemists or meteorological experts. Information should be included as to specifically what type of a cross-checking system they have to assure both accuracy and precision in their sample analyses, what work they are certified for and by whom, etc.
4. A fundamental assumption used in previous safety documents generated by GEND is that the plant's nearest site boundary (NSB) is fixed and personnel located within the NSB are occupational workers. Placement of a child care center within the confines of the plant NSB violates this assumption since the school children are not workers, but should be treated as the general public. This school is in effect the plant NSB.
5. Needs acronym identification appendix and reference section for citations.
6. Figure 4.2, Site Plan - Has drop-off and pick-up of school children, etc., been well planned relative to peak traffic flow/congestion? Is drop-off on Belcher Road prohibited?

Specific Comments

1. Page 2-1, 2nd Paragraph - The last sentence is not entirely true. The school is located within the plant, 70m away from one of the main process buildings (100). The plant is generally surrounded by open fields for several hundred yards. Therefore, the general public is further away from the plant than what the statement infers.
2. Page 2-1, 3rd Paragraph - The statements made in this paragraph are not backed by the safety analysis in this document. There is not enough information provided which allows the reviewers to make the conclusion that plant operations will have an acceptably low level of risk in terms of impacts on the child care center.

Verify Assumptions

3. Page 2-1, 4th Paragraph - Any future expansion, unless enveloped by this SA, will require an update of the SA with the requisite approval by DOE/AL.
4. Page 2-1, 4th Paragraph - Statements relative to "The level of risk has been reduced to a point similar to that routinely accepted by the public" has not been substantiated by the SA. Accident probability and consequence to the school should be compared to everyday processes in the general public (i.e., risk of driving a car, etc.) in order to validate this statement.
5. Page 3-1, Section 3.1, Paragraph 1 - A detailed figure depicting the Pinellas Plant site and its surroundings should be referenced here. The figure should include all buildings, building numbers, building functions, child care center and school (hereafter referred to as school), site property lines, streets and roads (both off and onsite), distances of buildings to school, and proximity of school to plant entrance(s).
6. Page 3-3, 1st Paragraph - A wind rose will greatly help to back up these statements.
7. Page 3-3, Paragraph 2 - Additional data concerning these 30 tornadoes should be included such as wind velocities (both rotational and horizontal). Furthermore, the LLNL (Fujita) tornado study for Pinellas should be summarized including tornado return periods, etc.
8. Page 3-4, Paragraph 3.3 - Are there any sinkholes in close proximity to the plant and the school facility (i.e. <1 mile)? Describe any previous or potential damage caused by these sinkholes on property and facilities.
9. Figure 3-1 - Show population rose within the proximity of the plant site (<1 mile) and outlying areas.
10. Figure 3-2 does not clearly show the location of residential areas, location and types of businesses, location of undeveloped areas, or the distances of the above from the plant controlled area. (See Specific Comment 1.)
11. Figure 3-2 - Legend provided contains more symbols than what's depicted on figure. Needs to be edited to assure consistency.
12. Figure 3-3 - Major sinkhole formations (within one mile of plant) should be depicted on this geology diagram.
13. Section 3.1.3 - This section really has nothing to do with locating a school on the plant site.
14. Page 3-4, Section 3.4.1 - The first three lines are unclear. Please clarify.

15. Page 4-1, Paragraph 4.0 - Given that the school exhibits nonexistent hazards, it would be more relevant to provide a discussion on the number of hazardous operations and facilities that are sited in close proximity. This should be backed up by inventory, characteristics confining systems and safety systems to prevent release of radiation hazards or energetic materials. This would provide for a more logical discussion of the accident scenarios in Chapter 7.
16. Page 4-1, Paragraph 4.1 - Some discussion should be provided on how many parking slots were eliminated by this action to site the school within the plant and the adequacy of existing parking area and traffic flow to support plant personnel and ensure traffic safety.
17. Page 4-2, 1st Paragraph
 - a. "Standard" should be "Uniform" Building Code.
 - b. The maximum head-on wind load capacity of the building should be stated.
 - c. Should discuss what type of seismic Design Basis Accident (DBA) the building is constructed to withstand.
 - d. Describe compliance with all local and state requirements placed on the Child Care Center in addition to 6430.1A code requirements.
18. Page 4-2, 3rd Paragraph
 - a. Define "DX" acronym.
 - b. Why isn't HEPA filtration provided in a bypass to assure that when HVAC dampers are closed, the amount of radiation hazard or toxic particulates diffusing through the dampers are filtered out?
19. Page 4-2, Paragraph 4.2, 2nd Paragraph, 7th Line - "lightning protection is in accordance with NFPA #13." This should be NFPA #78.
20. Page 4-2, Paragraph 4.2, 5th Paragraph - Does this imply that smoke and heat detectors are also placed throughout?
21. Page 4-2, Paragraph 4.2, 6th Paragraph - Add to last line, "complying with NFPA #101."
22. Page 4-3, Paragraph 4.2, Next to Last Paragraph - Expand on description of wall construction. Wood studs?
23. Page 4-3, Paragraph 4.3, 1st Sentence - "fully protected" - Does this include the area below the floors?
24. Page 4-3, Paragraph 4.3, 3rd Sentence - Was a flow test made to determine the adequacy of existing available water to satisfy both hydrant and sprinkler needs?

-
25. Page 4-3, Paragraph 4.4, 4th Sentence - Does this mean battery operated?
 26. Page 4-3, Paragraph 4.5, 3rd Sentence - Could the dampers be arranged to close upon heat, smoke or sprinkler operation?
 27. Page 4-3, Paragraph 4.5
 - a. How do you assure that the dampers will be actuated in the event of an accident? These dampers are manually actuated when energized and are strictly dependent on personnel action of the school director (provided he is there).
 - b. Does damper closure shutdown the HVAC system? If not, you will still have leakage of contamination from outside the school.
 28. Page 4-3, Paragraph 4.5 - Discuss how HVAC cooling is accomplished--any refrigerant materials?
 29. Page 4-3, Figure 7 - No procedure is stated for ensuring that gates are opened for evacuation. How is this accomplished since selected gates would be secured for daytime operation of the school.
 30. Page 4-4, Paragraph 4.6 - In the second paragraph, the maintenance schedule for emergency lights should be indicated.
 31. Figure 4.1 - Buildings 100 and 500 should be added to the legend.
 32. Page 4-4, Paragraph 4.6 - Describe how the emergency egress paths and people assembly areas are clearly marked throughout the school and playgrounds. Needs a table for 6430.1A criteria comparison per DOE Order 5481.1B for all facility and systems design.
 33. Figure 4.1
 - a. Figure scale is poorly copied and doesn't include scale units.
 - b. Where are Buildings 353, 307, 316 and others identified in the text of the SA shown on this figure?
 - c. Is this all of the hazardous facilities on-site or are there additional facilities that are not included on this figure?
 34. Figure 4.2
 - a. No scale provided.
 - b. Provide legend for all structures depicted on this figure.
 - c. Describe and depict main traffic flows, access and egress on this figure. Explain how this may impact traffic safety.

35. Page 4-2, 5th Paragraph - Why aren't communications wired backed to the site plant manager, so that in the event of an emergency the school director can get firsthand information to decide on the response action.
36. Page 4-2, 5th Paragraph - Discuss compliance with NFPA 101.
37. Figure 4-3 - Based on this and other figures, it appears that evacuation from the east side of the facility to the nearest entrance on Belcher Road away from Buildings 300 and 100 would make more sense. None of the figures makes clear to the reader the location of the exit from the site onto Belcher Road. It would appear that the best assembly point would be as near to that exit as possible so that children could be removed from the site as quickly and efficiently as possible.
38. Figure 4.4 - What purpose does this figure serve?
39. Page 5-1, Paragraph 5.0, 5th Paragraph, 7th Line - "heat" also?
40. Page 5-1, Paragraph 5.0 - In the same context, since the school is located within the plant site, what type of security ID and radiation monitoring equipment will be required for school personnel and children?
41. Page 5-1, 4th Paragraph - What are the hours for first shift operations? Is there any staggering of the shift at this plant? If so, how will operations of the school be affected?
42. Page 5-1, 5th Paragraph - Last part of the paragraph discusses design information provided in Section 4. This is not relevant to the discussion of facility operations.
43. Page 5-1, Paragraph 4 - This number (270) does not agree with the projection (200) in Chapter 1, Page 5, Paragraph 4.
44. Page 5-2, Paragraph 5.1 - Should recheck the tally in the partnership school: 90 children instead of 120.
45. Page 5-3, Section 5.2 - The quality of analytical work of the two independent consulting organizations cannot be evaluated because there is no description of air, soil or water sampling programs (how they are set up statistically to assure that they are random and truly representative). Furthermore, there is nothing in this document to indicate whether their analytical chemistry groups are properly certified or whether they have acceptable cross-checking programs to assure results are both precise and accurate.
46. Page 6-1, Paragraph 6.0 - This section doesn't address the requirements of AL Order 5481.1B. It should be a FMEA of safety protection systems of the school. It is not a FMEA deriving the accident analysis in section 7. Rewrite this section to provide the information.

FMEA format doesn't conform to that stated in AL 5481.1B. Need to add:
--detection category
--failure mechanism category
--organized subsystem and function column

47. Page 6-1, Paragraph 6.0, 2nd Paragraph, 4th Line - balancing "should be multiplying"?
48. Chapter 6/FEMA - If compensating factor "School is air conditioned", does this mean that there is no supply or makeup air to the building? (Area 353)
49. Page 4, Chapter 6 - It should be indicated whether the hazard severity column applies to the school site or Building 600. This comment applies to the following pages also.
50. Page 4, Chapter 6 - The spelling of "lightning" should be corrected here, twice, and once on page 12.
51. Chapter 6/FEMA - Lane B Battery Room compensating factor. "Fire would be contained within Building 100". What happens to the product of combustion gases generated? (See Engineering Safeguards, page 7-11, d.)
52. Chapter 6/FEMA - Thermal Battery area, Building 100, compensating factor "Fire walls, Building 100 limit and control". What happens to the products of combustion gases generated?
53. Chapter 6, FEMA - Tornado, compensating factor "Total evacuation of students to GEND main building prior to strike". Has it been determined that the main building is tornado proof?
54. Tables 6.1 and 6.2 - These tables belong in Chapter 7.
55. Chapter 7.0, General - The accident analysis is inadequate because for the most part it lacks specific and quantitative information and relies largely on broad generalities. For example, on Page 7-8, Paragraph 4, there is nothing of substance to back up the final statement.
56. Page 7-1, Paragraph 7.0 - SA should provide a list of facilities within the plant that house, or process, or can potentially generate radiation, hazardous, toxic, or explosive materials. Quantities and release mechanism should be consistently stated. Recommend using the attached format for all accident scenario analysis to assure that all accidents are adequately analyzed and potential risks quantified.
57. Page 7-1, 2nd Paragraph - Discussion is not germane since analysis was performed for nominal operations not abnormal/accident conditions. Routine operations discussion should be in section 5 of the SA. Chapter 7 should deal strictly with "Accident" analysis.
58. Page 7-2, 1st Paragraph - Unclear how the second sentence backs up the claim made in first sentence.

59. Page 7-2, 2nd Paragraph

- a. How was this conclusion independently assessed and verified?
- b. Define the term "truly catastrophic in dimension".
- c. Poorly referenced.
- d. Statement is generally not supported by technical data in the SA.

60. Page 7-2, Paragraph A

- a. How does the plant EPA AIR DOSE model compare with environmental sampling data at the plant and surrounding area?
- b. 100 mr/yr (DOE) citation is not correct. 40 CFR 61 states that DOE operations cannot result in a dose to the general public exceeding 25 mr/yr (whole body).

61. Page 7-2, Paragraph A - Where are these source materials (Pu-238 and Kr-85) located and how much of the stated values were calculated by EPA AIR DOSE and verified by sampling.

62. Page 7-3, 4th Paragraph - Table 3.1 indicates calm wind conditions 3% of the time instead of 5%.

63. Page 7-5, 4th Paragraph - The use of OSHA or TLV standards are not appropriate for children. Their smaller weight and different metabolic rates are not similar to adults and are likely to be more sensitive to exposures of chemicals. Therefore, conservative technically justifiable guidance should be developed in this case rather than using TLV and safety factors of such without detailed technical justification. Suggest looking at AIHA or NRC's Committee on Toxicology Standards for guidance.

64. Page 7-6, Paragraph 7.2.1 - Is the 400 gallon capacity large enough to accept the maximum credible fire water overflow?

65. Page 7-7, Paragraph b) - What's the deluge rate in gpm per ft²?

66. Page 7-8, 1st Paragraph - State the response time of the fire department and delete the rest of the details.

67. Page 7-8, 2nd Paragraph

- a. Credibility statement needs to be quantified (i.e., likely, unlikely, etc.).
- b. Fire resistant storage rooms should have been stated in page 7-7 with the appropriate fire rating.

- c. Describe what chemicals are not flammable, but will be likely to volatilize (i.e., how hazardous is this material and how much will be released from the building).

68. Page 7-8, 3rd Paragraph - The maximum amount of toxic smoke needs to be determined. Discuss the maximum credible amount of toxic materials that can reach the school and provide a pathways analysis to the children. Also requires impact analysis on children with a discussion on the type of emergency response required to minimize injuries or fatalities.

69. Page 7-8, 4th Paragraph - Conclusion is not adequate and backup statements insufficient to allow reviewer to reach the same conclusions that risks from this accident scenario are acceptable.

70. Page 7-9, 1st Paragraph

- a. Discuss potential mixing of HF in water to form hydrofluoric acid.
b. Does 1# WF_6 equal 274 gm of HF?
c. Is airborne HF heavier or lighter than air?

71. Page 7-9, 2nd Paragraph

- a. In actuality, there is really 2 lbs. of WF_6 , not 1 lb., which then can form into 548 gms of HF within Building 353. Explain why 1 lb. of WF_6 is considered to be the design basis accident.
b. Please use probability terms defined in Table 6.1. Does low probability translate to "unlikely"?

72. Page 7-9, 3rd Paragraph

- a. Provide the technical justification to explain why a 10% release over a 10 minute interval constitutes a maximum credible release.
b. Should discuss at what levels of HF do you start seeing serious injuries or fatalities (i.e., 50 ppm) and translate this result into the children population either by using weight ratio and LD50 data provided by Handbook of Dangerous Materials (Sax) or other acceptable standards.

73. Page 7-10, 2nd Paragraph - Quantify "high exposure levels".

74. Page 7-10, 3rd Paragraph - Unsubstantiated WF_6 conclusion made on the potential health impacts of 40 lbs. of WF_6 located at 400m away from the facility. Provide analysis that justify these statements.

75. Page 7-10, 5th Paragraph - Summary statements are not technically justified and would require detailed risk analysis and comparison of the nominal public risk to provide the validity of these conclusions.

76. Page 7-11, 1st Paragraph

- a. Describe what is SO_2 and its potential health effects.
- b. Describe the maximum quantity of LAMB cells in Building 316.
- c. Maximum amount of SO_2 released in a DBA fire.
- d. Transport and pathway analysis, etc.
- e. See attached recommended format for presentation.

77. Page 7-11, 2nd Paragraph - Provide approximate distance between schools; 316.

78. Page 7-11, 4th Paragraph - Is the dry room in Area 307?

79. Page 7-11, 5th Paragraph

- a. Quantify hydrogen explosion, i.e., TNT equivalents.
- b. Reactive metal is Lithium?
- c. Quantify "release of hazardous materials".
- d. Define "significant amounts of Cl and SO_2 ".

80. Page 7-12, 1st Sentence - Does the heat power explosion have the capability of destroying the facility building?

81. Page 7-12, 2nd Paragraph

- a. Aluminium material will burn and provides a poor fire containment structure.
- b. Justify why it is unlikely that a material release could occur outside of Building 100.
- c. Depict where the thermal battery area is within Building 100.

82. Page 7-12, 2nd Paragraph - If water reactive materials are stored, why isn't a Halon or inerting system in place for fire suppression? Discussion on this page needs to be in the recommended format with the required data.

83. Page 7-12, Scenario IV, 4th Paragraph - Will exhausting gases from the building be expected?

84. Page 7-13, 1st Paragraph - 40,000 ft^3 of H_2 gas at standard temperature and pressure (STP) or is this at 2000 psia?

-
85. Page 7-13, 2nd Paragraph - What's a MAXON valve?
86. Page 7-13, 3rd Paragraph - The discussion is highly dependent on the H_2 being confined by buildings or dirt overburden. Such a confinement will allow a deflagration to transition into a detonation. Please provide analysis on H_2 detonation potential for the plant.
87. Page 7-12, 5th Paragraph - Discuss the potential for subcooled vapor phase (GH_2) explosions and their consequences.
88. Page 7-12, 6th Paragraph - Statements are not correct. If hydrogen is released inside of a room or structure, GH_2 buildup will occur and static or nongrounded electrical sources will initiate a detonation.
89. Page 7-14, 3rd Paragraph
- a. Describe accident scenarios of a pipe break upstream of the MAXON valves.
 - b. Need schematic diagram of the H_2 piping system to understand discussion.
90. Page 7-14, General - Need to address TNT equivalence of potential vapor phase explosions from H_2 tank leak with resulting overpressure to the school. Describe consequence to school and people within probability analysis.
91. Page 7-14, Scenario V, 9th Paragraph - The first and third sentences appear to be contradictory.
92. Page 7-15, Paragraph 7.3 - As an accident scenario, this doesn't appear to be credible to incur any injuries due to the very long lead time that the plant has to evacuate personnel from the school and plant. It is unlikely that anyone would authorize school and regular plant personnel to be present at the plant during a hurricane. However, the description does need to address the cost of potential total damage to the school with replacement cost.
93. Page 7-16, 3rd Paragraph - Clarify if all deaths and injuries occurred in Pinellas County and how close were these to the plant.
94. Page 7-16, Scenario VII - Elsewhere, it is stated that students could be evacuated to the main building. Is this appropriate if there is "relatively little protection from wind damage" as stated on page 7-15?
95. Page 7-17, Paragraph 4 - states a 20-30 minute advance warning for tornados. Elsewhere (FEMA tables, etc.), a 15-60 minute range and 15-30 minute range is stated. Verify consistency.
96. Page 7-17, 1st Paragraph - Discussion should cite the Fujita report on probabilities of tornados at the plant site which would quantify the spectrum and probability of damaging winds occurring.

97. Page 7-17, 2nd Paragraph - Probabilities should be based on damaging winds striking the school and not on direct tornado strike of the school building. Winds that would exceed the design basis of the building will be just as catastrophic as a direct strike on the building.
98. Page 7-17, 3rd Paragraph - Probabilities of chemical release and impact on the school needs to be better addressed and quantified. Discussion provided is not adequate to provide reviewer with a good impression that the risk imposed is acceptable or not.
99. Page 7-17, 4th Paragraph - Describe what mitigative safety systems are within building 100 which allows evacuation from the school to the building to be a logical choice. A discussion of damaging winds and missile impacting the 100 building would also be helpful along with the probability of occurrence and consequence of such events.
100. Page 7-18, 5th Paragraph - Explain consequence of a DBA earthquake and the probability that this will be exceeded by a real quake event.
101. Page 7-19, 3rd Paragraph - If the building (school) collapsed on top of the children and staff, it is doubtful you will have enough survivors within the building that will care about toxic and radiological exposures.
102. Page 7-21, 1st Paragraph - The offsite dose 1,000 meters away doesn't have any meaning to the school since the school is onsite and in much closer proximity. Describe what the dose will be under worst case meteorological conditions and what the recovery action plan would be.
103. Page 7-21, 2nd Paragraph - Section on radiological accidents is not adequate relative to Pu and Kr-85 accident scenarios. This analysis needs to be strengthened. We recommend you use the attached format for discussion. This section is considerably weaker than the tritium discussion.
104. Page 7-22, Paragraph 2 - The estimated BTU loading expected fire duration and fire temperature should be stated here and should be related to available fire water supply.
105. Page 7-22, 3rd Paragraph - Needs probability of postulated fires occurring and its potential effects (see recommended format).
106. Page 7-22, 4th Paragraph - Reference reports that back these conclusions.
107. Page 7-22, Paragraph 4, Lines 1 and 2 - Is this true under accident conditions and all conditions of neutron moderation? Need statement that criticality event has been analyzed for worst case accident conditions.

108. Page 7-22, Paragraph 5 - Plant experience with source leakage should be briefly discussed and a brief discussion of Health Physics Program to assure maintenance and control of sealed sources from a leakage standpoint (contamination control).
109. Page 7-23 - What is total Kr inventory? How much can be lost in worst case accident; specifically what are projected doses at the school? Here again, this section gives nothing in terms of detailed information.
110. Page 7-23 - No summary risk table from postulated accident scenario was provided?
111. Chapter 7 needs a table summarizing the accident analysis in which the accidents are briefly described including the consequences, probabilities and risks.
112. Page 10-1 - All boilerplates from previous SARS should have been tailored to this case (i.e., how does this ES&H program management plan apply to the school and what organization linkage will it have to the school director).
113. Page 11-1, Paragraph 11.1
 - a. Describe "special" dampers on the HVAC system that will mitigate ingress of toxic or land radiological material during a postulated accident.
 - b. Describe sealing capability of doors and windows that will mitigate ingress of toxic and radioactive materials.
114. Page 13-1 - Describe any sampling performed in the school interior for radioactive, hazardous and toxic materials in air, water (in school) and adjacent grounds.
115. Page 14-1, Paragraph 14.0 - Of all these plans cited will they be revised to include the school and students on-site?

Emergency Plan (Appendix 1)

1. General - Provide phone number of plant manager.
2. General, Paragraph 1 - The plan needs to be specific on what conditions will the plant evacuate the school and the conditions that you will seal off the school and stay in place. This should be directly tied to the accident analysis.
3. Page 2, 2nd Paragraph - Are there any buses or means to evacuate the children under a general plant emergency?

4. Page 2, 3rd Paragraph - Under a site emergency requiring outside medical help, which nearby hospitals are coordinated with the plant to receive accident victims?
5. Page 5, 5th Paragraph - No trained personnel or Scott air packs available for last minute sweeps of the area under a fire emergency?
6. Page 6 - Describe what actions are taken in the event of this accident being coupled with an adjacent fire or explosion. Discuss what happens if windows are blown out by the explosion.
7. Page 6, Emergency Plan - Who specifically notifies the School Director to switch air conditioning to recirculate or to off? Why should there be a choice?
8. Appendix II, Table 4, Column 4, Page 14, - The data in this column (Worst/PEL) appear to be in error. See also the table, Page 2, and Sections 2.1 and 2.2, Appendix III for partial list of OSHA PELs. The PELs for all the compounds listed in Table 4 should be included in the table on Page 2.
9. Appendix III, General - Analysis provided is only applicable for normal plant operations and doesn't cover any accident events. This should be expanded to cover all accident scenarios provided in section 7.0.

INARA II
*

FORMAT FOR ACCIDENT ANALYSIS SECTION (7)

Building or area containing materials:

Approximate distance between building and Area At Risk (AAR):

Building process function description:

Building rad, haz materials and/or energetic source inventory:

Safety mitigation systems description:

Accident scenario description:

Credibility of accident and technical justification:

Maximum credible release and source term assumptions:

Explosion TNT equivalence/Fire Heat source inventory (if applicable):

Transport assumptions and computational methodology:

Validation of computational methodology:

Overpressure or Fire Heat loading at AAR with comparison to AAR design criteria (if applicable):

Concentration and duration of rad, haz or toxic material at AAR:

Safety mitigation systems within AAR under normal and faulted conditions:

Pathways analysis to people within the AAR:

Comparison of exposure to regulatory criteria:

Number of people exposed within AAR and consequence analysis for short and long-term effects:

Summary accident effect on AAR physical facility:

Summary accident effect on surrounding facilities, plant personnel, general population and environment in proximity to the plant:

Summary probability and hazard severity index for this accident scenario:



Neutron Devices
General Electric Company
PO Box 2908
Largo, FL 32649-2908

Subject: Safety Analysis & Review System
PAO; DSI; QAS 0 1680

cc: RC Abington
CK Hall
RL Peterson
RJ Zimmerman

Date: December 12, 1989

To: HF Gregory, Chief
QA and Safety Branch, PAO

*Develop/prepare Site-wide Risk Assessment
then identify need(s) for SAR(s), keeping
in mind Site-wide SAR will be
required.*

The Pinellas Plant is not in full compliance with DOE and AL Orders 5481.1B. With the exception of the Building 1200 firing range SAR and the soon to be completed safety analysis of the new TRS system, the Plant's safety analysis documents are out of date; not consistent with the current SA/SAR requirements; and, do not cover most Plant operations and facilities. These needed areas of improvement have been identified by SAI 2.3, **Risk Management**. GEND's planned corrective actions will be included in the ES&H Long Range Improvement Plan. Since this is an area of existing non-compliance, it will receive the highest priority.

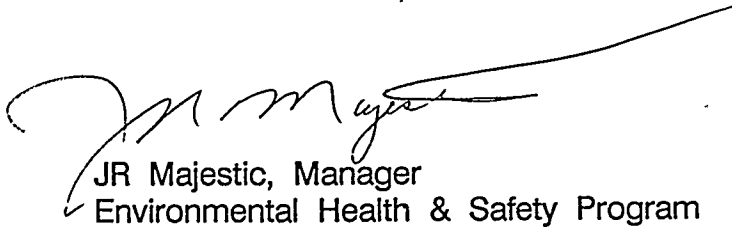
RA
As you are aware, the guidance provided by the Orders on when an SAR is required is not specific and open to interpretation. Based on the Plant's classification as a non-nuclear, moderate hazard facility, GEND intends to conduct a site-wide SA to identify operations/facilities that present levels of risk not normally accepted by the public. For those parts of the Plant's operations, individual SAR's will be completed. We are prepared to draft and release a scope of work and request for quote to perform a site-wide SA as soon as concurrence with this approach is received from PAO and AL SPD per the guidance in AL 5481.1B.

In addition, the need for development and maintenance of a Plant Safety Analysis and Review Program is recognized. A Safety Analysis position has been approved and posted internally. External recruitment for qualified candidates will follow immediately. Once the successful candidate has been selected, he/she will be tasked with developing and implementing site-safety analysis and systems engineering programs; completion of the SA and any subsequent SAR's; and, the maintenance and update of those documents to assure that all Plant operations are appropriately conducted within a defined safety envelope.

With this letter, your concurrence with the outlined SA/SAR approach is requested. Upon the receipt of your approval and that of AL SPD, realistic time frames for completion are as follows:

- a. Prepare and issue SA scopes of work and requests for quotes - 2 weeks
Bid reception, review and contract award - 2 months
Final SA reception - 9 months
- b. Add Safety Analysis position to staff - 3-6 months
Develop Safety Analysis and Systems Engineering Programs - 6-9 months

The activities in (a) and (b) above will run concurrently. However, the estimates given for expected completion of items under each area of activity run in series.



JR Majestic, Manager
Environmental Health & Safety Program

Attachment

JRM:lgw

CHAPTER 5

SAFETY ANALYSIS

Programmatic Expectations

The safety analysis (SA) program must be in full compliance with DOE Order 5481.1B and DOE Notice 5481.1C as applicable. Operations must be systematically and quantitatively evaluated to determine the levels of risk involved during normal operation, and under emergency conditions postulated by maximum credible accidents. Operational safety envelopes shall be documented in formal Safety Assessments and Safety Analysis Reports (SAR) and shall be defined by limiting conditions of operation and operational safety requirements where appropriate. New and modified operations shall be engineered to assure system safety and to determine if their inherent risks are bounded by the existing safety envelop.

Existing Conditions

SAI 2.3, Risk Management exclusively assessed this ES&H program area. Although the risk to the Plant population and the public from ongoing operations is qualitatively considered acceptable, the Plant has no formalized SA program and is out of compliance with Order requirements. With the exception of an approved SAR for the Building 1200 indoor firing range, and an analysis of the new Tritium Recovery System (in the current SAR format but not approved), the Plant has no acceptable SA documentation. Other existing SA documents, including the Building 400 SAR, are outdated and not acceptable in scope or completeness by current Order requirements.

The degree of analysis required for the non-nuclear nature of the Plant's mission assignments is not clear in either DOE Order 5481.1B or the companion AL Order. Notice 5481.1C, although directed specifically towards nuclear facilities, may be relevant to the Plant's tritium and plutonium oxide operations. In an effort to determine the Plant's SA needs, an independent evaluation of potential risks has been conducted. Based upon the conclusions of the Safety Systems Management Assay completed by TENERA, the Plant has proposed the preparation of a site wide Safety Assessment. It would be supplemented, if necessary, by specific SAR's for those operations found to be outside of the levels of risk routinely accepted by the public. The proposal has been submitted to the Pinellas Area Office and the AL Safety Programs Division for review and concurrence.

In addition to the lack of an established SA program, the Plant's systems engineering program is not formalized nor consistently and effectively applied. Although the requirement

for systematic safety reviews is included in GOR G.1.06, it is not comprehensive in its current form and is frequently circumvented.

Improvement Plans

A SA program management position has been approved and is presently being recruited. Immediately upon selection, the successful candidate will be tasked with developing and implementing comprehensive SA and systems engineering programs. In the interim, and upon reception of concurrence with the Plant's proposal for a site wide Safety Assessment, a request for quote will be released for preparation of the document. It is expected to take six to nine months and up to \$250,000 to complete. The SA program manager would direct the preparation of any SAR's that may be required on a priority basis. Funding for a significant level of SAR development (potentially up to \$2,000,000) is not presently available.

The ineffectiveness of the existing systems safety engineering program is, in part, due to the availability of resources in the Facilities Engineering operation. A more detailed discussion of the level of support required is included in Chapter 8, Facilities and Maintenance.

Action Items