

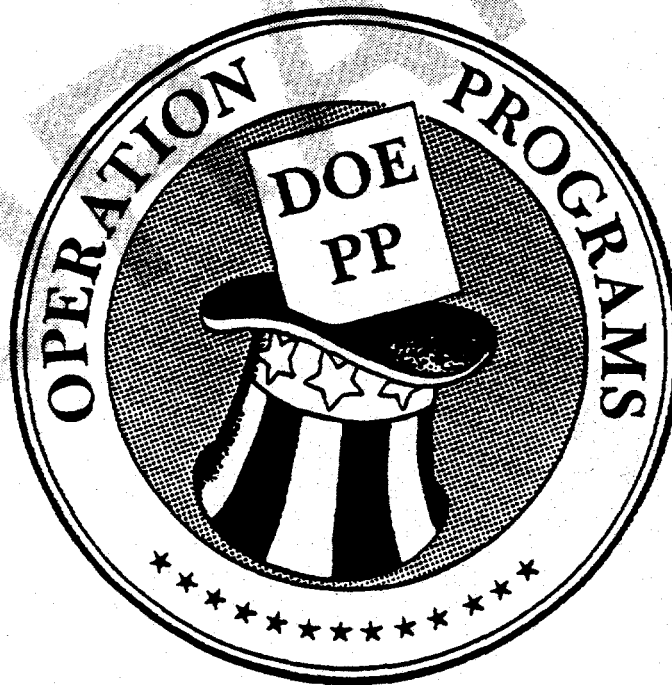
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**Pinellas
Plant**

U.S. Department of Energy

ANNUAL WASTE REDUCTION ACTIVITIES REPORT

ENVIRONMENTAL HEALTH AND SAFETY



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March 18, 1991

Issue 1

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7257

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DRAFT

INTRODUCTION

The Pinellas Plant is owned by the United States Government and is operated by GE Neutron Devices (GEND), a prime contractor to the Department of Energy (DOE). The contract is administered by the DOE Albuquerque Operation Office (AL) through the Pinellas Area Office (PAO). The plant is an essential part of the nation's nuclear weapon complex.

The plant site, approximately 99 acres, is located in central Pinellas County, Florida midway between the cities of Largo and Pinellas Park (see Figure 1). The plant employs approximately 1650 employees. The DOE/PAO consists of 28 employees. The plant facilities occupy approximately 700,000 square feet. A layout of the plant site is shown in Figure 2. The plant was built in 1956, and in 1957 commenced manufacturing neutron generators, a principal component in nuclear weapons. Several expansions have taken place in response to demands on the plant's unique capabilities in the neutronic/electronic fields.

As by-products of production, the plant generates a variety of waste materials that are carefully controlled by GEND and regulated not only by the federal government, but also by state and local agencies. This report summarizes the program GEND has implemented to reduce the waste generated at the Pinellas Plant.

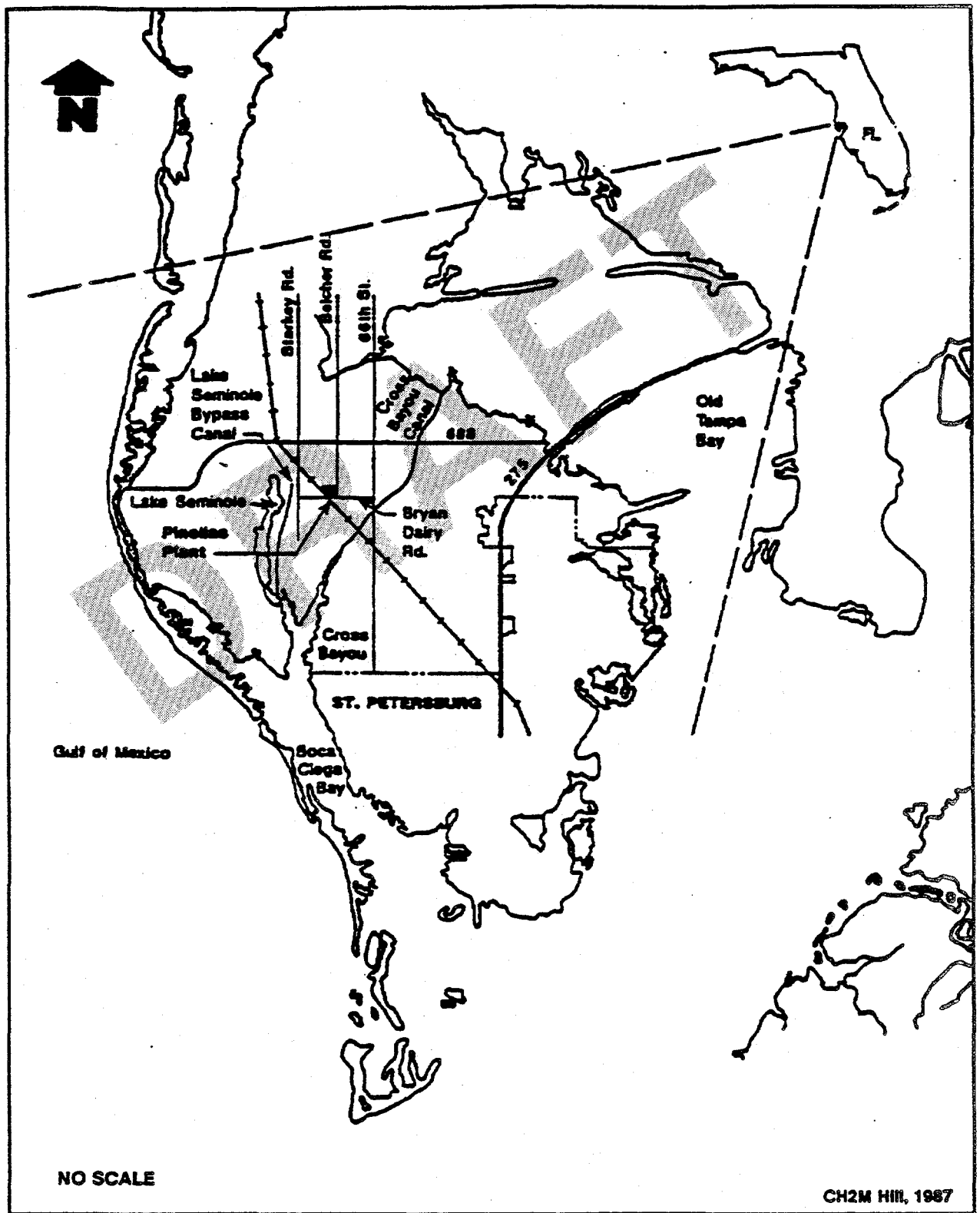


Figure 1. Location of the Pinellas Plant in Pinellas County

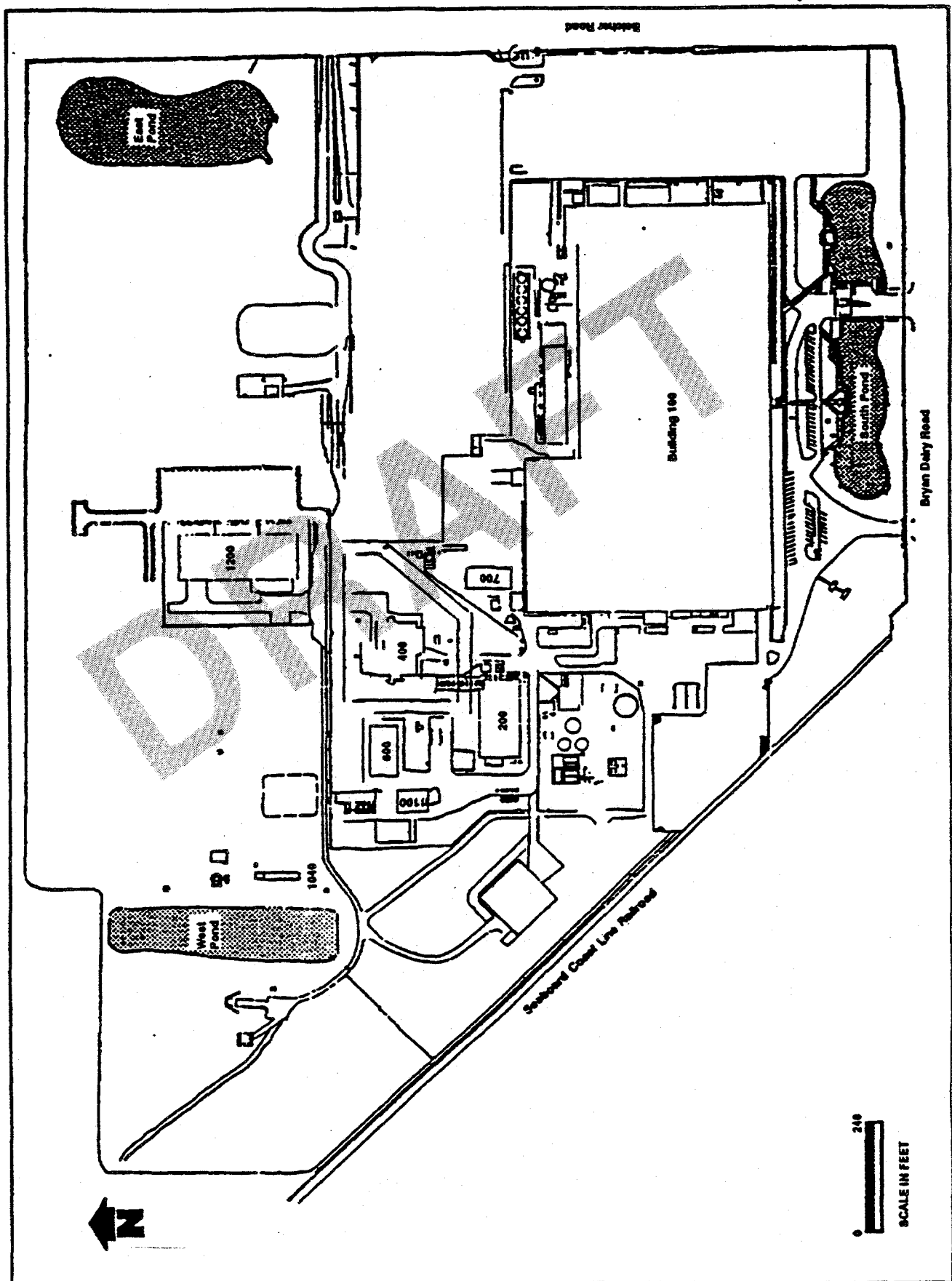


Figure 2. Pinellas Plant Site Layout

1.0 PROGRAM ADMINISTRATION

1.1 Waste Reduction Program Structure

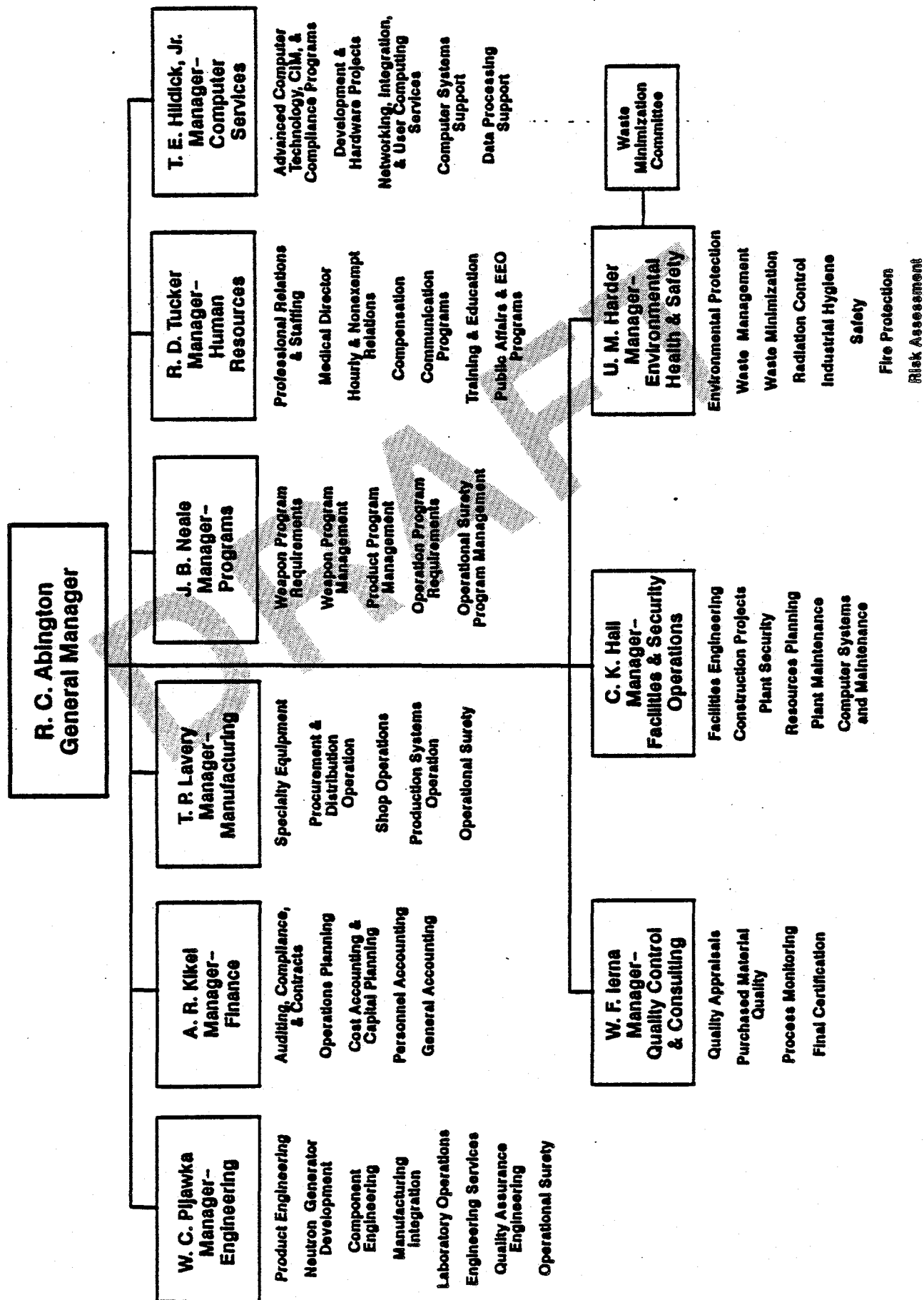
The strategy for implementation of the Waste Minimization Program includes the following elements:

- Demonstrate top management support through inclusion of waste minimization concepts in corporate policy and procedures.
- Designate a Waste Minimization Coordinator and Waste Minimization Committee that includes personnel from all appropriate segments of plant operations.
- Establish challenging goals for waste reduction.
- Enlist employee involvement in identifying and implementing waste minimization actions.
- Provide training for management and employees in the benefits and techniques of waste minimization.
- Provide incentives for management and staff to suggest waste minimization options and recognize successful suggestions.

1.2 Organization and Responsibilities

GEND has assigned the responsibility for management of the Waste Reduction/Minimization Program to the Waste Minimization Coordinator, one of the Waste Management Specialists within EH&SP. This specialist reports directly to the Manager, EH&SP, who reports to the General Manager as shown in Figure 3. Furthermore, GEND has established a Waste Minimization Committee which is chaired by the GEND Waste Minimization Coordinator. The committee is comprised of members from pertinent organizations within the plant including Purchasing, Materials and Inventory Control, Laboratory Operations, Product Planning, EH&SP, Facility Engineering, and Manufacturing. This committee meets annually, at a minimum, and usually more frequently, based on specific ongoing waste minimization activities. A representative of DOE/PAO has oversight responsibility for GEND activities and ensures that the program meets the requirements of the applicable principles, State and Federal laws and regulations, and DOE Orders.

GEND FUNCTIONAL ORGANIZATION CHART



March 1991
Interleaf

Figure 3.

1.3 Program Documentation

EH&SP maintains a Waste Tracking Data Base to monitor waste generation and disposal activities. The data collected for each waste stream include:

- Specific waste characterization and categorization.
- Areas and operations generating specific waste streams.
- Quantity of waste generated.
- Frequency of generation.

Based on this data, the Waste Management Organization produces a waste generation report. Waste Management uses this report to identify and resolve potential problems, such as the generation of waste of unknown composition that requires subsequent sampling and analysis. Generators of "unknowns" are identified, and waste segregation and labeling procedures are developed to eliminate unnecessary waste handling costs associated with characterizing unknown waste.

GEND has in place a requirement for EH&SP review of all materials purchase orders to ensure that only essential hazardous materials are procured. Once a purchase order is approved, it is entered into the Automated Integrated Materials System (AIMS). When the material arrives at the site, the AIMS updates inventory records and, for material used in production, enters information in the Manufacturing Resources Planning (MRP) system. The Chemical Labeling System stores codes for all chemicals and tracks virgin chemicals from arrival point to use areas. Hazardous materials are placed in the chemical storage facility and issued to users upon receipt of work orders.

Waste materials are collected in designated areas in the production facilities and are periodically delivered to Waste Management. Records of the amounts and types of waste are entered into the Waste Tracking Data Base by Waste Management. Hazardous waste is transported to the waste management facility for packaging and storage prior to disposal. A Drum Log is maintained with information on the type, quantity, and source of waste loaded in each drum. The Chemical Shipment Tracking System tracks all off-site shipments of hazardous waste from departure to disposal and records associated costs.

1.3 Continued...

GEND is developing a Hazardous Material Tracking system that will integrate the data bases and paper systems currently used to record information about hazardous materials at the site. This four-phase development effort includes tracking of hazardous weapon-component shipments, hazardous non-weapon shipments, hazardous material receipts, and distribution of hazardous materials within the plant. The system will produce data for use in emergency response planning and reports required to satisfy government regulations. The first two phases of development are complete, and the entire development effort is scheduled for completion by the end of 1991.

1.4 Program Administration

The Waste Minimization Program is administered by the Waste Minimization Coordinator, a Waste Management Specialist in EH&SP who serves as the point of contact for all waste reduction activities at the site. The Waste Minimization Coordinator maintains contact with waste generators to encourage identification and evaluation of waste reduction opportunities. The Waste Minimization Coordinator serves as Chairperson of the Waste Minimization Committee, which includes representatives from the organizations that generate waste and the pertinent administrative groups. The committee meets periodically to review the status of waste reduction activities and to assess progress toward goals.

The Waste Minimization Coordinator maintains contact with appropriate personnel in PAO who are responsible for oversight of waste management operations. The Coordinator regularly attends DOE workshops on waste minimization and maintains familiarity with DOE directives and research activities. Furthermore, the Coordinator is active in state and local organizations that promote responsible waste management. GEND participates in the Waste Minimization Clearinghouse operated by the State of Florida and the Industrial Group on Environmental Issues, a group of local industry representative who meet regularly to exchange ideas, training aids, and information, and to arrange chemical exchanges or transfers. GEND maintains contact with other DOE facilities to coordinate use of excess virgin chemicals, progress on common waste reduction problems, and technical exchanges. The Waste Minimization coordinator is the GEND focal point for the interactions with other facilities and agencies.

2.0 PROGRAM DESCRIPTION

2.1 Waste Minimization Assessments

Individual production processes and facilities are reviewed annually to identify opportunities to minimize or eliminate waste generation. Selected elements of the Waste Minimization Program are audited annually in accordance with the requirements of the Waste Minimization Program Quality Assurance Plan. The results of these reviews and audits will be reported back to the waste generator. This process is not a one-time endeavor but a continuing effort. Many of the GEND high priority waste minimization options have been implemented, and the lower priority options are now being examined for opportunities to further reduce waste generation. The waste minimization assessments will examine progress in the following areas:

- The Pinellas Plant's Annual Hazardous Waste Report to the FDER lists waste descriptions and amounts of hazardous waste, sent to approved disposal facilities. The waste includes solvents, chemicals, paint-related materials, solutions, batteries, oils, poisonous compounds and, in essence, any material classified as hazardous by EPA. The Pinellas Plant generates minor amounts of low-level radioactive waste which are sent to DOE-controlled waste disposal sites.
- Production and maintenance operations are the major waste stream generators; however, continuing waste minimization efforts have drastically reduced the total hazardous waste noted in the annual reports (Table 1). Efforts will continue to monitor waste generation and to identify those areas where additional improvements are practicable.
- Procurement policies will continue to be a principle element in waste minimization efforts. Oversight is provided by EH&SP review of purchase orders to limit, to the extent practicable, the procurement of hazardous materials.
- Review and oversight of production operations will help identify, correct, substitute, or prevent waste generation in plant operations.

2.1 Continued...

- The FDER performed a Waste Minimization Audit of GEND operations in early 1990. FDER was satisfied with the progress made in waste minimization at the Pinellas Plant, and stressed a continuation and enhancement of current waste minimization practices. GEND will encourage periodic audits of this type and will use the results to gauge progress in waste minimization programs.

2.2 Waste Reduction Techniques and Benefits

This section describes the techniques used and actual cost benefits gained from waste reduction activities at the Pinellas Plant. The Plant utilizes off-site recycling, source reduction and treatment to reduce the volume and toxicity of hazardous, non-hazardous, and low level waste.

2.2.1 Waste Recycling

Mixed Halogenated Solvents (F001, F002)

Mixed halogenated solvents consisting of 1,1,1 Trichloroethane and 1,1,1 trichloroethylene used in degreasing and cleaning operations are shipped off-site for reclamation. Although the refined product does not meet the high purity standards required at the Pinellas Plant, a commercially pure product is sold to those industries which do not demand ultra high purity degreasers.

The costs of recycling are less than half the costs of solidification, stabilization, or incineration. The cost structure and annual savings are illustrated below.

Recycling costs	\$155.00 per drum
Incineration cost	500.00 per drum
Quantity Generated in 1990	9 - 55 gallon drums
Recycling costs	$\$155.00 \times 9 = \1395.00
Incineration costs	$\$500.00 \times 9 = \4500.00
Total savings	\$3105.00

Methylene Chloride (F001)

Methylene chloride is used at the Pinellas Plant principally for mold cleaning operations. The methylene chloride, like the mixed halogenated solvents, are shipped off-site for reclamation. The refined product is then sold to industry as a commercial grade cleaner or degreaser.

2.2.1 Continued...

There are no disposal costs involved in the recycling of methylene chloride except for a minimal per drum transportation fee. The cost structure and annual savings are illustrated below.

Recycling costs	\$50.00 per drum
Incineration costs	\$500.00 per drum
Quantity Generated in 1990	8 - 55 gallon drums
Recycling costs	$\$50.00 \times 8 = \400.00
Incineration costs	$\$500.00 \times 8 = \4000.00
Total savings	\$3600.00

NOTE: A new solvent recycler in Brandon, Florida has agreed to accept used methylene chloride from the Pinellas Plant. The new pricing structure provides for a refund of \$.07 per pound.

Trichlorofluoromethane (Freon) (F001, F002)

Freon is used at the Pinellas Plant as a degreaser and cleaning agent. Printed circuit boards as well as processes which require a high density cleaning agent are the principal generator of this waste. The waste freon is also shipped off-site to a commercial recycler where it is cleaned and sold as a commercial grade solvent.

There are no disposal costs associated with freon except for a minimal per drum transportation fee. The cost structure and annual savings are illustrated below.

Recycling costs	\$50.00 per drum
Incineration costs	\$500.00 per drum
Quantity generated in 1990	4 - 55 gallon drums
Recycling costs	$\$50.00 \times 4 = \200.00
Incineration costs	$\$500.00 \times 4 = \2000.00
Total annual savings	\$1800.00

NOTE: A new solvent recycler in Brandon, Florida has agreed to accept used methylene chloride from the Pinellas Plant. The new pricing structure provides for a refund of \$.07 per pound.

2.2.1 Continued...

Scrap Metal and Cardboard

All scrap metal and salvageable cardboard is accumulated and sold as recyclable material. Scrap metal is sold on a sealed bid basis and cardboard is sold to a local paper recycler. Aluminum cans are collected and sold as scrap metal. This program resulted in an income of \$38,000 for 1990.

Non-hazardous Solid Waste

Non-hazardous solid wastes such as trash and construction debris are recycled through an innovative commercial trash firm. Compacted wastes are sent to the county refuse-to-energy plant where it is used to fuel an incinerator which in turn generates electrical power.

Construction debris, glass, wood, and plastics are collected in a 30 yard roll-off. The roll-off is removed from the property and it's contents are separated and sold to recyclers.

The Pinellas Plant has cut in half the costs normally incurred when the trash is land filled.

2.2.2 Source Reduction

Methylene Chloride (F001, F002)

Methylene chloride has successfully been replaced (in some cases) by methylpyrrolodine. This chemical has been shown to be less toxic than methylene chloride and is used as a mold cleaning agent.

The spent methylpyrrolidone is accumulated along with hazardous waste (F003, F005, D001) in a 5000 gallon tank which when disposed of is used as a beneficial fuel in the production of cement.

Mixed Halogenated Solvents (F001, F002)

Halogenated solvents such as 1,1,1 trichloroethylene and 1,1,1 trichloroethane have (in some instances) been replaced with a aqueous degreaser. The new degreaser is made of citrus products and after use can be discharged to the Plant industrial wastewater system and then to the Publicly Owned Treatment Works (POTW).

2.2.3 Waste Treatment

Spent Machining Coolant

Spent machining coolant is treated on-site as part of the industrial wastewater treatment system. Spent coolant which can contain tramp oils and heavy metals is treated in batches of 200 gallons. The pH is raised slightly and polymers are added which provide a suspension media that raises all solids to the surface. The resulting liquid is drained through a filter into a tank and then discharged to the industrial wastewater system. Both the effluent and solid waste have undergone extensive testing and neither exhibit hazardous waste characteristics.

The following information illustrates the cost benefits of this treatment.

On-site Treatment costs (inc. labor and material)	\$2.50/ gallon
Off-site treatment and Disposal costs	\$6.55/ gallon
Quantity Generated in 1990	2585 gallons
On-site Treatment costs	$\$2.50 \times 2585 = \6462.00
Off-site treatment and disposal	$\$6.55 \times 2585 = \16931.00
Total savings	\$10,469.00

Reactive Wastes (D001) (D003)

Reactive waste such as calcium metal and alloys, heat powder and pellets, heat paper, small charge class "C" explosives, and lithium silicon residues are treated on-site. On-site treatment reduces the hazards associated with the storage and off-site transportation of wastes which exhibit the characteristics of ignitability and reactivity.

Calcium metals and lithium silicon residues are chemically treated with water thereby rendering them non-hazardous. The resulting wastewater, which has an approximate pH of 10.5, is then used as a buffer in the industrial wastewater system.

Heat powder, heat paper, and electric squibs are thermally treated on-site which results in reduced volume, and in most cases, a non-hazardous waste.

2.2.3 Continued...

The following information illustrates the cost benefits of on-site treatment of reactive wastes.

Heat Powder/pellets off-site disposal costs	\$30.00/pound
Calcium metal and alloys off-site disposal costs	\$35.00/pound
Lithium silicon contaminated waste	\$25.00/pound

NOTE: There is no approved facility for off-site disposal of explosive squibs and heat paper.

Quantity Generated in 1990

Heat powder/pellets	35 pounds
Calcium metal/bimetal	35 pounds
Lithium silicon	63 pounds

Disposal costs:

Heat Powder/pellets	$\$30.00 \times 35 = \1050.00
Calcium metal/bimetal	$\$35.00 \times 35 = \1225.00
Lithium silicon contaminated waste	$\$25.00 \times 63 = \1575.00

Total offsite disposal costs	\$3850.00
On-site treatment costs (labor and material)	\$800.00

Total savings	\$3050.00
---------------	-----------

Low Level Waste

The Pinellas Plant generates relatively small amounts of low level wastes (LLW). These wastes are generated from the production of neutron generators and plant rearrangement projects. Tritium is the major radionuclide, however, small amounts of krypton 85 are also generated.

The Plant does not generate high level (HL), or transuranic (TRU) wastes therefore storage or disposal is not required. The Pinellas Plant does not generate or store mixed waste. Mixed waste generation is controlled through engineering and manufacturing processes which carefully monitor the use of materials which are listed wastes, or substances which exhibit the characteristics of a hazardous waste (i.e, TCLP).

2.2.3 Continued...

The reduction of LLW is achieved through a programmatic approach which includes the following:

- Decontamination of tools, equipment and work surfaces where feasible.
- Limiting the quantity of materials which enter an area where tritium or krypton is used.
- Laundering lab coats, shoe covers and gloves for reuse.
- Compaction of disposable materials such as finger cots, shoe covers, and paper wipes.

Approximately 90% of the LLW generated at the Pinellas Plant is Classified Confidential Restricted Data. Shipments of LLW are transported on super secure transports (SST) to a DOE approved radioactive waste disposal site. Unclassified waste such as construction debris and compacted wastes are shipped using commercial transporters.

2.3 Waste Minimization Awareness Programs

2.3.1 Employee Training Program

Waste minimization training is provided to all employees annually through the Safety Monitor meeting system in which one month is dedicated to waste minimization. The Training Specialist from EH&SP and Waste Management Operations personnel provide waste reduction training to the plant supervisors, who subsequently train their personnel. Training includes required housekeeping techniques to minimize waste generation. Specific speakers on waste minimization are scheduled periodically for unit meetings. GEND has compiled and used a Pinellas Plant specific waste minimization videotape and has purchased a commercially prepared tape to supplement its training materials. New employees are trained through the annual waste minimization training session.

GEND has created a centralized training organization that has assumed responsibility for waste minimization training. Training materials and procedures are reviewed and updated annually to ensure that the training is relevant to existing waste minimization programs and technologies.

2.3.2 Employee Incentives/Awards Program

The award system at GEND has two major parts, the Management Award Program for exempt employees and the Suggestion Program for nonexempt and hourly employees. Exempt employees can be recommended for the Management Award Program based on their work in waste minimization as well as other areas. The Suggestion Program for the nonexempt and hourly employees follows a formal process whereby an individual or a group submits a suggestion which is beyond the scope of their job description and responsibility. The suggestion then goes through an intense evaluation and is signed off by the responsible manager and a peer. Each approved suggestion provides the suggestor(s) with an award of 15% of the annual savings. Examples of suggestions related to waste reduction were associated with efficient removal of sludge from a cooling tower basin and improvement in the inventory log system for waste management storage and shipping. A total of about 400 suggestions per year are received, with 75% of these resulting in a savings for the Pinellas Plant. The average total savings per year is over \$100,000. The Incentive Program results in 1050 nonexempt and hourly and 600 exempt employees being eligible for the Suggestion and Management Award Programs, respectively. GEND has identified waste minimization as a high priority for employee suggestions in its periodic publication of awards program information.

3.0 PROGRAM PERFORMANCE EVALUATION

3.1 Trend Analysis

Waste Minimization trend analysis is measured annually in the Pinellas Plant Waste Management Site Plan, and the Generator's annual report submitted to the Florida Department of Environmental Regulation (FDER). During fiscal year 1991 a cradle to grave computerized tracking system will be developed to identify waste reduction opportunities. The system will identify program resource requirements and report cost benefits realized from implementation of waste reduction activities.

Factors influencing the implementation of waste reduction activities include cost benefits and actual waste reduction impacts. Process waste assessment programs are scheduled to begin the third quarter of FY91. The machine shop, tritium recovery system and the ceramics processing area were selected since they provide a multitude of waste reduction opportunities.

4.0 WASTE GENERATION INFORMATION

- 4.1 Table 1.0 provides information relative to the quantity of hazardous waste generated and associated transportation and disposal costs. A reduction of greater than 5% is projected for wastes generated in FY91.
- 4.2 Table 2.0 provides information on the quantity of LLW waste generated at the Pinellas Plant. A slight increase in the amount of LLW was experienced in FY90 due to rearrangement and area enhancements. Indications are strong that the generation of LLW will be reduced as a result of waste minimization activities.
- 4.3 Table 3.0 provides information on radioactive waste management costs.
- 4.4 Table 4.0 provides information on hazardous waste management costs.

Table 1
Hazardous Waste Generation

EPA ID No.		Immediate Past Years			Future Projections		
		FY1989		FY1990	FY1991		FY1992
		Qty (m)	Cost (\$)	Total Cost (\$)	Qty (m)	Cost (\$)	Qty (m)
D007, U032	Calcium Chromate (Solid)	0.83	800	590	0.83	800	0.62
D003	Iron Disulfide and Residue*	0.82	765	0	0.00	0	0.00
D003	Calcium Chromate Batteries	0.50	3,500	0	1.40	7,500	0.62
D003	Lithium Silicon Batteries	0.71	4,200	0	0.83	6,000	1.24
D003	Lithium Silicon	0.47	3,000	0	0.41	2,000	0.41
D003	Titanium Metal Powder**	0.21	1,686	0	0.00	0	0.00
F003, F005, D001	Flammable Liquids***	18.76	2,500	3,000	18.90	4,500	18.90
F001, F002	Halogenated Hydrocarbons*	7.50	7,000	2,720	2.08	3,400	2.08
D001	Waste Epoxy Resin	1.00	1,800	0	0.62	600	0.83
F001, F002	Methylene Chloride Resin	1.00	1,800	200	1.04	1,250	0.83
---	Trim Cutting Coolants	10.00	1,200	36,200	18.90	5,000	7.57
---	Laboratory Wastes	20.00	60,000	163,000	37.40	180,000	36.40
---	New Waste Streams						
---	(contingency)	12.60	14,775	9,140	4.16	10,000	3.12
D002, D003, F007	Waste Cyanide**	0.63	3,000	0	0.00	0	0.00
---	Waste Asbestos**	5.00	3,000	0	0.00	0	0.00
TOTAL COSTS			\$109,026	\$214,850		\$211,050	\$212,350

* Off-specification Iron Disulfide is being returned to vendor for reprocessing

** Waste is being shipped in small quantities as laboratory waste.

*** Consists of acetone, alcohol, amyl acetate toluene, and mineral spirits.

+ Consists of methylene chloride, 1,1,1 trichloroethane, trichloroethylene, and Freon (manufactured by E. I. du Pont de Nemours and Co., Inc.).

Table 2
Low Level Waste Generation

Fiscal Year	Category	Main Constituents	Volume (cu ft)	Mass (Kg)
1989	LLW	Tritium	3005	70,660
1990	LLW	Tritium	4930	29,430
<u>Projected</u>				
1991	LLW	Tritium	2800	30,000
1992	LLW	Tritium	2210	27,000
1993	LLW	Tritium	1960	25,000
1994	LLW	Tritium	1960	22,000
1995	LLW	Tritium	2070	28,000

Table 3
Radioactive Waste Management Costs

Waste Operation	Expenditures		Future Projections			
	FY1990	FY1991	FY1992	FY1993	FY1994	FY1995
SOLIDS						
Decontamination, Packaging Shipments & Surveys	\$35,000	\$34,000	\$25,000	\$24,000	\$24,000	\$25,000
						\$26,000
WASTEWATER						
Process Control and Release	3,200	3,500	3,700	4,000	4,500	4,500
						5,000
GASEOUS						
Tritium Recovery System	25,000	18,000	18,000	20,000	20,000	20,000
						21,000
ANALYTICAL SERVICES						
	18,000	19,000	17,000	17,500	18,000	19,000
						19,000
REPORTS						
	1,200	1,300	1,400	1,500	1,500	1,500
						2,000
TOTAL	\$82,400	\$75,800	\$65,100	\$67,000	\$68,000	\$70,000
						\$73,000
SPECIAL PROJECTS:						
Remove old Stack Effluent Control System (SECS)*						

*Project started in FY1991; scheduled for completion in FY1991.

Table 4
Hazardous Waste Management Costs

	FY1990	FY1991	FY1992	FY1993	FY1994	FY1995
SERVICES						
Assays	\$ 27,000	\$ 29,000	\$ 29,000	\$ 28,500	\$ 28,500	28,500
Training	7,000	7,000	8,000	8,000	8,000	8,000
Identification	2,000	2,000	1,000	2,000	2,000	2,000
Transportation and Disposal	<u>255,000</u>	<u>260,000</u>	<u>250,000</u>	<u>240,000</u>	<u>230,000</u>	<u>220,000</u>
SUBTOTAL	\$291,000	\$298,000	\$288,000	\$278,500	\$268,500	\$258,500
MATERIALS						
Packaging Supplies	\$ 18,000	18,500	18,000	17,000	16,000	15,000
Labeling Supplies	<u>1,100</u>	<u>1,200</u>	<u>1,100</u>	<u>1,200</u>	<u>1,200</u>	<u>1,200</u>
SUBTOTAL	\$ 19,100	\$ 19,700	\$ 19,100	\$ 18,200	\$ 17,200	\$ 16,200
MISCELLANEOUS EQUIPMENT						
Storage Trailers	4,000	4,000	00000	00000	00000	00000
General Tools and Equipment	<u>25,200</u>	<u>50,000</u>	<u>6,000</u>	<u>7,000</u>	<u>6,000</u>	<u>20,000</u>
SUBTOTAL	\$ 29,200	\$ 54,000	\$ 6,000	\$ 7,000	\$ 6,000	20,000
TOTAL	\$339,300	\$371,700	\$313,100	\$303,700	\$291,700	\$294,700

5.0

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