SEC-00256 Pinellas Plant Evaluation Report

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About Pinellas Plant

- Clearwater, FL
  - 99.9-acre site midway between Largo and Pinellas Park, FL
- Produced high-technology nuclear weapons-related components
- Timeline
  - Operations: 1957 – September 1994
  - D & D: October 1994 – 1997
  - Remediation: 1999, 2008 – 2009

Photo from Gueretta 2015

Pinellas Plant

- Employed about 2000 people at its peak
- Manufactured neutron generators for first 10 years
- Expanded mission to include other specialized electronic and support components
  - Specialty capacitors, LAMB batteries, vacuum switch tubes, RTGs

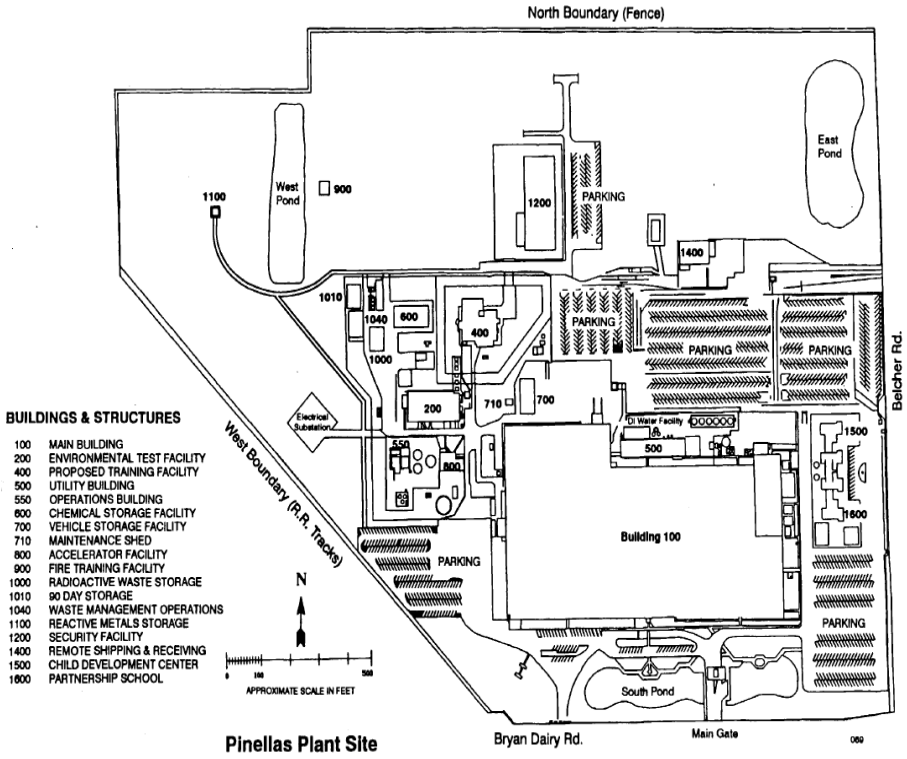

Figure from Martin Marietta 1993a

SEC-00256 Petition for Pinellas Plant

- 83.13 Petition received December 16, 2019
  - Revised on May 20, 2020 and August 17, 2020
- Temporary Plant in St. Petersburg (prior to 1957) not covered
- Final Petitioner-Requested Class:
  - *All employees who worked in any area of the Pinellas Plant in Largo, FL from January 1957 through December 1997.*
- Extensive supporting documentation

SEC-00256 Petition Qualification

- Petition qualified for evaluation October 20, 2020
  - (F.4) Basis: *Tiger Team Assessment of the Pinellas Plant* [DOE 1990a] discussed bioassay compliance (i.e., samples not being submitted)

- Class defined by NIOSH for further evaluation:
  - *All employees of the Department of Energy, its predecessor agencies, and their contractors and subcontractors who worked at the Pinellas Plant in Clearwater, Florida for the period from January 1, 1957 through December 31, 1990.*

Number of Pinellas Plant Claims

(as of May 3, 2021)

Description	Totals
Total number of claims submitted for dose reconstruction	503
Total number of claims submitted for energy employees who worked during the period under evaluation (January 1, 1957 through December 31, 1990)	496
Number of dose reconstructions completed for energy employees who worked during the period under evaluation	456
Number of claims for which NIOSH obtained internal dosimetry records for the time period in the evaluated class definition	279
Number of claims for which NIOSH obtained external dosimetry records for the time period in the evaluated class definition	277

Internal Radiological Exposure Sources

- Tritium
  - Tritiated water (HTO), Tritium gas, Organically bound tritium (OBT), Metal tritides (MT)

- **Not internal dose concerns**
  - Kr-85 (noble gas)
  - Plutonium (encapsulated RTG source)
  - Uranium (contained in tritium storage and borosilicate glass)
  - C-14 (negligible quantity used in labeling)
  - Ni-63 (contained in vacuum tubes)
  - Cs-137 and other sealed sources

Monitoring Data- Internal Exposure

- **Tritium urine bioassay** with routine schedule frequencies (i.e., daily or on each performance, weekly, monthly) based on exposure potential
  - Detailed internal dose data for all years under evaluation
- **Plutonium urine bioassay** annually for the RTG project workers
- **Area air monitoring** in areas with potential for tritium release and for plutonium in RTG area
- **Routine smear survey monitoring** for tritium in areas with potential for tritium release and for plutonium in RTG area

Summary of Pinellas Plant Internal Monitoring 1986-1995

Year	Number Monitored	Total Dose (person-mrem)	Average Dose (mrem)	Highest Individual Dose (mrem)
1986	194	699	3.60	86
1987	139	358	2.58	105
1988	129	565	4.38	130
1989	201	557	2.77	97
1990	177	184	1.04	31
1991	202	390	1.93	101
1992	164	150	0.91	35
1993	134	103	0.77	21
1994	217	17	0.08	6.3
1995	215	224	1.04	93

External Radiological Exposure Sources

- **Photon**- testing neutron tubes and neutron generators, RTG work, ion accelerator, Kr-85 component leak testing
- **Beta**- Kr-85 component leak testing incidents, x-ray diffraction and e-beam device incidents
  - Tritium not an external dose hazard due to low energy beta
  - C-14 quantities considered negligible
- **Neutron**- neutron generator testing, RTG, ion accelerator

Monitoring Data- External Exposure

- Monitored workers with potential for radiological exposure and routinely entered radiation areas
  - Individual monitoring is available for the entire evaluation period
- Typical personnel external monitoring exchange frequency was monthly until January 1990 when it switched to quarterly
- Area monitoring consisted of direct radiation surveys, area film monitoring, and work support surveys

Summary of Pinellas Plant External Monitoring 1985-1995

Year	Number Monitored	Total Dose (person-mrem)	Average Dose (mrem)	Highest Individual Dose (mrem)
1985	Not Reported	5,525	Not Reported	411
1986	Not Reported	2,837	Not Reported	550
1987	Not Reported	2,102	Not Reported	321
1988	171	1,712	6.7	170
1989	187	1,847	4.9	180
1990	185	2,104	8.3	280
1991	107	830	3.9	40
1992	117	350	1.7	30
1993	88	270	2.3	50
1994	80	60	0.5	20
1995	72	243	0.28	10

Qualifying Petition Basis

From the *Tiger Team Assessment of the Pinellas Plant*:

- "GEND estimated that 20 percent of the personnel that terminated in 1988 did not provide a termination bioassay." [DOE 1990a, PDF p. 224]
- "Seventy percent of the required monthly samples and 35% of the required weekly samples were not submitted." [DOE 1990a, PDF p. 224]

Evaluation of Qualifying Petition Basis- Termination Bioassays

"GEND estimated that 20 percent of the personnel that terminated in 1988 did not provide a termination bioassay." [DOE 1990a, PDF p. 224]

- Termination bioassay data are available to NIOSH
- Due to the short biological half-life of tritium, termination samples only provide an indication of exposure just preceding the sample collection
- NIOSH finds dose reconstruction feasible

Evaluation of Qualifying Petition Basis- Routine Samples (1 of 2)

"Seventy percent of the required monthly samples and 35% of the required weekly samples were not submitted." [DOE 1990a, PDF p. 224]

- Interviews with 16 former workers and DOE oversight staff
  - Pinellas Plant employees generally compliant
  - Did not know of workers not submitting samples as requested
  - Ideas as to why monitoring compliance was not at the desired level:
    - Employees with non-routine entries to tritium areas added to routine monitoring
    - Leave/vacation
- Review of NOCTS claims for consistency in monitoring

Evaluation of Qualifying Petition Basis- Routine Samples (2 of 2)

"Seventy percent of the required monthly samples and 35% of the required weekly samples were not submitted." [DOE 1990a, PDF p. 224]

- No increase in site-wide or individual average internal dose after increase in compliance
  - No significant internal dose went unmonitored
- Most highly exposed workers (i.e., those on weekly monitoring) more compliant
  - Dataset available from monitored workers is likely biased high
- Doses for monitored workers are low
  - Can bound tritium dose

Conclusion: Evaluation of Qualifying Petition Basis-Routine Samples

"Seventy percent of the required monthly samples and 35% of the required weekly samples were not submitted." [DOE 1990a, PDF p. 224]

- Unmonitored Dose
  - Current External TBD assigns 100mrem dose
  - Based on whole body dose data from monitored workers
    - external WB + tritium internal
  - Update to Internal TBD
- Approaches to assign dose to workers with gaps in monitoring
- **NIOSH finds dose reconstruction is feasible**

Feasibility Findings for Pinellas Plant

SEC-00256

Internal Source of Exposure	Dose Reconstruction Feasible?
Tritium	Yes
Plutonium, uranium, carbon-14, nickel-63, krypton-85	Not Applicable

External Source of Exposure	Dose Reconstruction Feasible?
Beta, gamma, neutron	Yes
Occupational Medical	Yes

Questions?