Special Exposure Petition
Pinellas Plant

Revised Edition
August 17, 2020

Replaces Document Submitted on January 21, 2020 and May 20, 2020

PART A: NAME OF PETITIONER REPRESENTATIVE

A.3 Name of Petition Representative: [redacted]

A.4 Address of Petition Representative: [redacted]

A.5 Telephone Number of Petition Representative: [redacted]

A.6 Email of Petition Representative: [redacted]

A.7 I have attached to this form written authorization to petition by the energy employee(s) indicated in Part C of this form.

PART B: SURVIVOR INFORMATION NON-APPLICABLE

PART C: ENERGY EMPLOYEE INFORMATION

PETITIONER 1

C.1 Name of Energy Employee: [redacted][1]

C.3 Address of energy employee: [redacted]

C.4 Telephone Number of Energy Employee: [redacted]

C.5 Email of Energy Employee: [redacted]

C.6 Employment Information Related to Petition:

C.6a Energy Employee Number: [redacted]

C.6b Dates of Employment: [redacted]

C.6c Employer Name: The Pinellas Plant has been known by several names;

- Temporary Plant (intersection of 24th Street North and 26th Avenue North in St. Petersburg, Florida)[2]
- 908 Plant
- GE Aerospace Neutron Generators (previously not included)[3]
- Pinellas Peninsula Plant
- GE X-ray Division-Florida (GEXF)

---

[1] [redacted] files were not available from the Department of Labor. Therefore, a Privacy Act Request was made to the Department of Energy by [redacted]. DOE provided Industrial Hygiene Records, Medical Records, Personnel Records and Radiological Records via DOE Request No. [redacted]. Those records were provided to DOL by [redacted].

[2] Oak Ridge Associated University (2011) *Pinellas Plant – Site Description*. Document No. *ORAUT-TKBS-0029-2, Revision No. 02*. p. 12

[3] US Department of Energy Pinellas Area Office, Neutron Devices, (November 1990) *Pinellas Plant Facts.* The Pinellas Plant was operated for the U. S. Department of Energy by GE Neutron Devices under Contract No. DE-AC04-76DP00656.

- GE Neutron Devices Department (GENDD)
- GE Neutron Devices (GEND)
- GE Pinellas Plant (GEPP)
- Pinellas Plant

C.6d Work Site Location: 7887 Bryan Dairy Road
Largo, Florida 34294

The Pinellas County Site is located in Largo, Florida, about 10 miles north-northwest of St. Petersburg and across Tampa Bay from the city of Tampa. The Pinellas Plant's facilities occupied approximately 70,195 square meters (755,584 square feet) under roof on 40.4 hectares (99.9 acres) midway between Clearwater and St. Petersburg, Florida.[4]

C.6e Supervisor's Name:

- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]

PETITIONER 2

C.1 Name of Energy Employee: [redacted][5]

C.3 Address of energy employee: [redacted]

C.4 Telephone Number of Energy Employee: [redacted]

C.5 Email of Energy Employee: [redacted]

C.6 Employment Information Related to Petition:

---

[4] GlobalSecurity.org (Accessed December 4, 2019) *Weapons of Mass Destruction: Pinellas Plant*. https://www.globalsecurity.org/wmd/facility/pinellas.htm

[5] [redacted]

C.6a Energy Employee Number: [redacted]

C.6b Dates of Employment: [redacted]

C.6c Employer Name: The Pinellas Plant has been known by several names;

- Temporary Plant (intersection of 24th Street North and 26th Avenue North in St. Petersburg, Florida)[6]
- 908 Plant
- GE Aerospace Neutron Generators (previously not included)[7]
- Pinellas Peninsula Plant
- GE X-ray Division-Florida (GEXF)
- GE Neutron Devices Department (GENDD)
- GE Neutron Devices (GEND)
- GE Pinellas Plant (GEPP)
- Pinellas Plant

C.6d Work Site Location:
7887 Bryan Dairy Road
Largo, Florida 34294

The Pinellas County Site is located in Largo, Florida, about 10 miles north-northwest of St. Petersburg and across Tampa Bay from the city of Tampa. The Pinellas Plant's facilities occupied approximately 70,195 square meters (755,584 square feet) under roof on 40.4 hectares (99.9 acres) midway between Clearwater and St. Petersburg, Florida.[8]

C.6e Supervisor's Name:

- [redacted]
-
-
-
-

PART D: LABOR ORGANIZATION INFORMATION NON-APPLICABLE – Authorized Petitioner, [redacted] does not represent a labor organization.

PART E: PROPOSED DEFINITION OF ENERGY EMPLOYEE CLASS COVERED BY PETITION

Definition of Class: Employees of the Department of Energy (DOE), DOE contractors and/or subcontractors who were employed by General Electric Neutron Devices including all names of this company listed in Part C, Martin Marietta Specialty Components, and/or Lockheed-Martin Specialty Components, Inc. (a.k.a. the *Pinellas Plant*) during the period from **January 1957 through December 1997**, and, who were employed for a number of works days accumulating at least 250 workdays either solely under this employment or by aggregating the total number of days of that worker that

---

[6] Oak Ridge Associated University (2011) *op. cit.* p. 12

[7] Us Department of Energy Pinellas Area Office, Neutron Devices, (November 1990) *op. cit.*

[8] GlobalSecurity.org (Accessed December 4, 2019) *Weapons of Mass Destruction: Pinellas Plant*. https://www.globalsecurity.org/wmd/facility/pinellas.htm

was employed in a class at multiple covered SEC facilities. The total number of days of employment in a class at each facility can be combined together to meet the 25 work day requirement. The designation of the Pinellas Plant in this class definition must be inclusive of all workers involved in AEC/DOE operations at the Pinellas Plant and neither limited to nor excluding workers, activities or site locations involved in these operations.

E.1 Name of DOE or AWE Facility: The Pinellas Plant has been known as:

- 908 Plant
- GE Aerospace Neutron Generators (previously not included)[9]
- Pinellas Peninsula Plant
- GE X-ray Division-Florida (GEXF)
- GE Neutron Devices Department (GENDD)
- GE Neutron Devices (GEND)
- GE Pinellas Plant (GEPP)
- Pinellas Plant
- General Electric Temporary Plant

E. 2 Locations at the Facility Relevant to this Petition

All locations and areas of the facility including but not limited to:

- Building:100 - Main Building
- Building: 100/Area 101
- Building: 100/Area 103 - Tool Equipment Construction, Equipment Fabrication and Test; Equipment Laboratory
- Building: 100/Area 104 - Machine Shop
- Building: 100/Area 105 - Ceramics
- Building: 100/Area 105- -Incoming Inspection
- Building: 100/Area 105 - Receiving/Traffic
- Building: 100/Area 106 - Tool Room, Tool & Fixture Machine Shop
- Building: 100/Area 107 - Tube Assembly
- Building: 100/Area 108 - Tube Exhaust, Neutron Tubes; Tube Exhaust and Test
- Building: 100/Area 109 – Magnetics
- Building: 100/Area 110
- Building: 100/Area 110 - Magnetics Development
- Building: 100/Area 110 - Opto-Electronic Production
- Building: 100/Area 110 - Storage
- Building: 100/Area 110F - Waste Storage Tank (Calcium Chromate)
- Building: 100/Area 111 - Magnetics Production
- Building: 100/Area 112 - Generator Assembly**:** Coils TTA and Final Assembly; Neutron Generators
- Building: 100/Area 112 Stock Room

---

[9] US Department of Energy Pinellas Area Office, Neutron Devices, (November 1990) *op. cit*.

- Building: 100/Area 113 --Environmental Chemistry: Environmental Health Lab; Health Physics Laboratory; Solder Training Facility
- Building: 100/Area 114 - Final Certification and X-Ray
- Building: 100/Area 114E **-** Silver Recovery
- Building: 100/Area 114I **-** Product Storage.
- Building: 100/Area 114J **-** Shelf Life and Stockpile Evaluation
- Building: 100/Area 115 - Graphic Services
- Building: 100/Area 116 - Capacitor Assembly
- Building: 100/Area 117 0 Metallize and Plate: Furnaces & Ceramic Metallize
- Building: 100/Area 118 - Stock Pile Bulk Storage: Laundry; Stock Room; Storeroom Bulk Storage
- Building: 100/Area 119 – Cafeteria
- Building: 100/Area 119O - Silver recovery
- Building: 100/Area 121 - Medical Center
- Building: 100/Area 122 - Air Purity Analysis Laboratory: Contamination Control; Security Patrol
- Building: 100/Area 123 - Calibration and Maintenance Shop
- Building: 100/Area 124 - Facilities Maintenance
- Building: 100/Area 125 - Protection Services: Chemistry Laboratory; Health Physics Laboratory
- Building: 100/Area 126 - Tube Processing
- Building: 100/Area 127 - Space Planning**:** Mail room; Mail room/Reprographics; Polymer Laboratory; Standards Laboratory
- Building: 100/Area 128 - Tube Test: Final Test and Assembly; Neutron Tube/Generator Test
- Building: 100/Area 129 – Accounting
- Building: 100/Area 130 – Resonators: Instrumentation Lab; Test Support Area; Tester Cal/Maintenance Lab; Tube/Standards Laboratory
- Building: 100/Area 131 - Final Test: Final Test and Assembly; Neutron Generator Test
- Building: 100/Area 132, 132O
- Building: 100/Area 132 - TRS Equipment Room
- Building: 100/Area 132I - Waste storage
- Building: 100/Area 132M - Central Exhaust Fan Room
- Building: 100/Area 132N - East Stack Fan Room
- Building: 100/Area 133 - Finance Offices
- Building: 100/Area 134 - Manufacturing IGS
- Building: 100/Area 135 - Operations Offices
- Building: 100/Area 136 - Manufacturing Offices
- Building: 100/Area 137 - Electrical Switch Gear Room
- Building: 100/Area 138 - Defect Analysis
- Building: 100/Area 13 - Final Preparation: Final Mechanical Shop
- Building: 100/Area 138D - Classified Part Assembly

- Building: 100/Area 138F - Nitrogen Fill
- Building: 100/Area 139 - Resin Casting
- Building: 100/Area 139M - Tritium Recovery System
- Building: 100/Area 140 - Furnace Room
- Building: 100/Area 141 – Inspection: Braze NSP; QC Inspection
- Building: 100/Area 142 – Spot weld Assembly
- Building: 100/Area 143 - Chemical Processing Facility
- Building: 100/Area - 144 Inspection
- Building: 100/Area 145 - Ceramic Manufacturing and Machining
- Building: 100/Area 146 - Ceramic Manufacturing and Fabrication
- Building: 100/Area 147 - Manufacturing Offices and Inspection
- Building: 100/Area 148 - Manufacturing Offices and General facilities
- Building: 100/Area 149 - DOE Offices
- Building: 100/Area 150 - Equipment Engineering
- Building: 100/Area 151 - Production Stock
- Building: 100/Area 151 - Production Stock
- Building: 100/Area 152 - General Stock
- Building: 100/Area 153 - Emergency Communication
- Building: 100/Area 154 - Metallurgy and Ceramics Chemistry: Engineering Detector Lab; RTG Model Shop
- Building: 100/Area 155 - Chemistry Laboratory
- Building: 100/Area 156 - Chemical Analysis Laboratory
- Building: 100/Area 157 - Gas Analysis Laboratory, Engineering Gas Analysis Lab
- Building: 100/Area 158 - Gas Analysis Laboratory
- Building: 100/Area 159 - Chemistry Laboratory: Advanced Analyses Laboratory; Engineering Instrumentation Lab
- Building: 100/Area 160 - Chemistry Laboratory: Engineering Instrumentation Lab
- Building: 100/Area 161 - Surface Science Laboratory
- Building: 100/Area 162 - Metallurgy Laboratory: Engineering Instrumentation Lab
- Building: 100/Area 162E - Product Test Engineering Laboratory
- Building: 100/Area 164 - Engineering Process Technology Lab
- Building: 100/Area 168 - Oscillator Shop
- Building: 100/Area 169 - Library and Records: Computer Systems
- Building: 100/Area 170 - Credit Union
- Building: 100/Area 171 - Information Systems Operator
- Building: 100/Area 173 - Engineering Documents
- Building: 100/Area 174 - Human Resources
- Building: 100/Area 175 - Engineering Quartz Devices Lab and Frequency Devices
- Building: 100/Area 176 - Environmental Chemistry Laboratory: Radioanalytical Laboratory
- Building: 100/Area 176 - LAC, Glass, RTG Laboratory
- Building: 100/Area 176B - Quartz Processing Laboratory

- Building: 100/Area 176D - Neutron Detector Laboratory: Electrical Test Laboratory; Electrical Test Room.
- Building: 100/Area 176G - Technical Information Center
- Building: 100/Area 180 - Engineering Capacitor Development Lab and Materials Engineering
- Building: 100/Area 181 - Tube Development Engineering
- Building: 100/Area 182 - Tube Development, Exhaust, and Assembly Area
- Building: 100/Area 183 - Systems Development: Engineering Field Test Neutron Generator Lab; Generator Development
- Building: 100/Area 184 - Tube Test: Engineering Field Test Neutron Generator Lab; Systems Development Laboratory
- Building: 100/Area 185 - Polymer Technology Laboratory: Engineering Polymer Lab; Materials Engineering Laboratory; Systems Development
- Building: 100/Area 185C - Pump Shed
- Building: 100/Area 186 - Polymer Laboratory and materials engineering
- Building: 100/Area 186A - Decontamination Area
- Building: 100/Area 188
- Building: 100/Area 189 - Engineering Offices
- Building: 100/Area 190 - Engineering Offices
- Building: 100/Area 191 - Magnetics Engineering Defects Analysis: Ceramic Product Engineering (CPE); Engineering Magnetics Lab; Tube Development Laboratory
- Building: 100/Area 192 - Ceramics and Deposition Technology Laboratory: Ceramic Product Engineering (CPE); Ceramics Laboratory; Engineering Ceramics Lab; Engineering Laboratory Ceramics
- Building: 100/Area 193 - Magnetics Engineering Defects Analysis: Engineering Environmental Test.
- Building: 100/Area 193 - Magnetics Engineering Laboratory
- Building: 100/Area 194 - Engineering Environmental Test**:** Engineering Environmental Conditioning & Test Lab.
- Building: 100/Area 194 - Ferroelectric Laboratory
- Building: 100/Area 194 - Non-destructive Testing
- Building: 100/Area 195A - Instrument/Computer Maintenance Shop Building: 100/Area 300
- Building: 100/Area 195B - Lithium Battery Dry room
- Building: 100/Area 195C - Furnace Room
- Building: 100/Area 195D - Storage room
- Building: 100/Area 195E - UPS Battery Room
- Building: 100/Area 195F - UPS Battery Room
- Building: 100/Area 195G - Storage room
- Building: 100/Area 195MA - Storage
- Building: 100/Area 195MB - Air Handler Room
- Building: 100/Area 195MC - Storage

- Building: 100/Area 196A, Neutron Generator Testing
- Building: 100/Area 196B - Clock/Resonator Testing
- Building: 100/Area 196D - Incoming Inspection Laboratory
- Building: 100/Area 300
- Building: 100/Area 306
- Building: 100/Area 307 - Engineering Dry Room
- Building: 100/Area 309
- Building: 100/Area 313 - Chemical Cleaning
- Building: 100/Area 314
- Building: 100/Area 315 - Ceramic Processing
- Building: 100/Area 316 - Power Sources Development
- Building: 100/Area 325 - Maintenance Shop
- Building: 100/Area 327 - Heather Glassing Shop
- Building: 100/Area 330 - Heather Glassing Shop
- Building: 100/Area 331 - Heather Electron Beam Welding Shop
- Building: 100/Area 336 - Heather Testing Shop
- Building: 100/Area 347 - Packing and shipping WR parts; Electrical Switchgear Room; Utilities Room; Packing and shipping WR parts.
- Building: 100/Area 348 - Opto-Electronics Shop; Product Acceptance Inspection; Optoelectronics Development Laboratory; Temporary Off-Loading Area.
- Building: 100/Area 349 - Manufacturing Dry Room Ambient battery
- Building: 100/Area 350 - Instrumentation Standards Laboratory. LAMB
- Building: 100/Area 350 - LAMB Battery Production and Testing
- Building: 100/Area 350 - Equipment Calibration and Instrumentation Laboratory
- Building: 100/Area 350 - Standards Lab
- Building: 100/Area 351 - Tube calibration and maintenance Building: Maintenance Calibration & Maintenance
- Building: 100/Area 351 - Resonator/Clock Manufacturing and Testing: Calibration/Maintenance and Tube/Resonator
- Building: 100/Area - 352
- Building: 100/Area 353 - Iron Disulfide Processing**:** Acid storage shed
- Building: 100/Area 357
- Building: 1000 - Waste Storage and Management**:** Compressed Gas Cylinder Storage; Container Storage Facility; Liquid Waste Storage; Radioactive Waste Storage
- Building: 1010 - New Container Storage
- Building: 1040 - Waste Storage and Management: Radioactive Waste Storage
- Building: 1100 - Reactive Metals Facility: Special Storage
- Building: 1200 - Security Facility
- Building: 1400 - Remote Shipping and Receiving Facility
- Building: 1600
- Building: 200 - Environmental Test Facility
- Building: 307

- Building: 4.5 - Acre Site
- Building: 400 - Thermoelectric Facility: RTG Assembly and Testing; Thermoelectric Test Facility
- Building: 40-Foot Trailers
- Building: 500 - Utility Building: Deionized Water Facility; Emergency Power; Plant Heating/Cooling; Plant Services; Utilities, Deionized Water Plant
- Building: 550 - Sewage Treatment Facility: Industrial Wastewater Neutralization Facility; IWNF; Wastewater Neutralization
- Building: 600 - Chemical Storage Facility
- Building: 6000
- Building: 700 - Vehicle Storage Facility: Fire Station; Maintenance Building and Fire Department; Reactive Metals Facility; Tractor Wash Station
- Building: 710 - Maintenance Storage Shed
- Building: 720 - Facilities Maintenance Storage
- Building: 800 - Linear Accelerator Facility
- Building: 900 - Fire Training Facility
- Building: Bonded Stock Area
- Building: Bonded Stock East Building
- Building: Bulk Tank # 3 - Hazardous Waste Storage, Treatment and Disposal
- Building: Bulk Tank # 5 - Hazardous Waste Storage, Treatment and Disposal
- Building: Drum Storage Pad: Hazardous Waste Storage, Treatment and Disposal
- Building: Drum Storage Site: Environmental remediation activities and waste storage
- Building: Former Fire-Training Site
- Building: Liquid Incinerator
- Building: Manufacturing Engineering: Calcium Chromate synthesis research
- Building: Northeast Retention Pond
- Building: Northeast Site: Groundwater Sampling
- Building: Northeast Site Area B: environmental remediation activities
- Building: Old Pistol Range: Weapons cleaning and firing activities
- Building: Pistol Range
- Building: Sludge Storage Tank. Hazardous Waste Storage, Treatment and Disposal
- Building: South Pond
- Building: Tank Storage Facility: Fire/explosion response and spill/material release response
- Building: West Pond

E. 3 List of Job Titles and/or Duties of Energy Employees included in the class. This includes but is not limited to the following titles:

- Administrative Assistant: including Aide, Administrative; Aide, Design Control; Aide, Distributed Systems; Aide, Engineering Measuring Systems; Aide, Engineering Support Systems; Aide, Environmental Health Support; Aide, Facilities Design; Aide, Fire Protection Support; Aide, Laboratory Support; Aide, Waste Management Support; Clerk-Typist; Executive Secretary; Receptionist; Secretary

- Administrator: including Administrator, Construction Subcontracts; Administrator, Contract; Administrator, Subcontracts; Administrator, Planning & Control
- Analyst: including Advanced Analyst-Design Definition; Analyst, Benefits Administration; Analyst, Budget; Analyst, Business Development; Analyst, Business Operations; Analyst, Classification; Analyst, Computer Operations; Analyst, Cost Accounting; Analyst, Data; Analyst, Data Base Administration; Analyst, Design Definition; Analyst, Financial; Analyst, Networking; Analyst, Programming; Analyst, Quality Systems; Analyst, Safety; Analyst, Systems; Analyst, Systems & Networks; Analyst, User Computing; Senior Analyst-Design Definition; Systems Analyst, Program Requirements
- Apprentice: including Apprentice, Quality; Apprentice, Quality Engineering Coordinator
- Assembler: including Assembler Chemical Cleaner; Assembler/Chemical Cleaner; Assembler/Operator; Chemical Cleaner
- Auditor
- Buyer
- Carpenter
- Chemist: including Advanced Chemist; Senior Developmental Chemist
- Clerk: including Calibration Scheduling and Monitoring Clerk; Clerk/Typist; Manufacturing Documentation Clerk/Instructor; Shop Clerk; Typist/Clerk
- Construction Worker
- Controller: including Controller, QC Reject Material; Controller, Special Materials
- Coordinator: including Chemical Waste Coordinator; Coordinator - Environmental Test; Coordinator - Equipment Calibration & Test; Coordinator - Life Test Program; Coordinator, Compensation and Human Resources Information Systems; Coordinator, Customer Service; Coordinator, Engineering Material Control; Coordinator, Equipment Calibration & Maintenance; Coordinator, Inventory Control; Coordinator, Maintenance Services; Coordinator, Material; Coordinator, Office Graphics Systems; Coordinator, Office Services; Coordinator, Personnel Security; Coordinator, PMT; Coordinator, Process; Coordinator, Product Evaluation; Coordinator, Production; Coordinator, Production Control; Coordinator, Production Materials; Coordinator, Production Planning; Coordinator, Public Affairs; Coordinator, Quality Assurance; Coordinator, Reconfiguration & Transition; Coordinator, Records and Document Control; Coordinator, Reproduction Support; Coordinator, Retraining; Coordinator, Security Escorts; Coordinator, Senior Process; Coordinator, Shelf Life/Stockpile; Coordinator, Shipping & Receiving; Coordinator, Special Projects; Coordinator, Systems; Coordinator, Transportation; Equipment Calibration & Maintenance Coordinator; Maintenance Service Coordinator
- Cost Estimator
- Designer: including Designer, Applications; Designer, Data Base; Designer, Engineering Computer Operations; Designer, Facilities; Designer, Systems Application
- Drafter: Draftsman

- Electrician
- Engineer, Applications
- Engineer, Ceramic
- Engineer, Component: including Component Engineer; Component Production Engineer
- Engineer, Computer Systems
- Engineer, Development: including Senior Development Engineer
- Engineer, Engineering Computer Operations: including Engineer, Facility Computer Systems
- Engineer, Engineering Systems Application
- Engineer, Equipment Software
- Engineer, Facilities: including Facilities Engineer; Facilities Project Engineer
- Engineer, Instrumentation: including Advanced Instrumentation Engineer
- Engineer, Laboratory Operations
- Engineer, Materials & Resources
- Engineer, Measurement & Standards: including Advanced Measurements and Standards Engineer; Measurement & Standards Engineer
- Engineer, Metallurgical: including Advanced Metallurgical Engineer; Senior Metallurgical Engineer
- Engineer, Nondestructive Evaluation: including Senior NDE Engineer
- Engineer, Operational Surety
- Engineer, Operations: Operations Engineer; Operations Specialist/Engineer; Senior Operations Specialist/Engineer
- Engineer, Packaging
- Engineer, Planning
- Engineer, Principal
- Engineer, Process
- Engineer, Process Technology: including Advanced Process Technology Engineer; Senior Process Technology Engineer
- Engineer, Producibility
- Engineer, Product
- Engineer, Production
- Engineer, Production Evaluation
- Engineer, Production Quality
- Engineer, Production Quality
- Engineer, Project
- Engineer, Quality
- Engineer, Quality Assurance: including Engineer, QA; Quality Assurance Engineer; Senior Quality Assurance Specialist/Engineering Group Leader
- Engineer, Reliability
- Engineer, Requirements:
- Engineer, Safety

- Engineer, System Design
- Engineer, Systems
- Engineer, Systems & Networks
- Engineer, Technical Operations
- Engineer, Test
- Engineer, Tool & Gage
- Engineer, Welding
- Engineering Aide, Magnetics
- Engineering Aide, Measuring System
- Engraver
- Equipment Developer
- Escort: including Security Escort
- Expediter: including Expediter, Indirect Mail; Expediter, Production Control; Expediter, Purchase Orders
- Final Product Certifier
- Fire Brigade Member
- Foreman: including Foreman, Facility Rearrangement; Foreman, Incoming Test & Inspection; Utilities Operator Foreman; Waste Management Foreman
- Gas Handler
- General Counsel
- Glass Worker
- Graphics Artist
- Groundskeeper
- Health Physicist: including Advanced Health Physicist; Health Physics Group Leader; Senior Health Physicist; Support Aide - Health Physics
- Industrial Hygienist: including Advanced Industrial Hygienist; Industrial Hygienist Technician
- Inspector/Tester: including Electronic Tester; Environmental Tester; Incoming Inspector/Tester; Inspector; Inspector, Mechanical Calibration; Inspector, Quality Assurance; Mechanical/Calibration Inspector; Mechanical/Cap Study Inspector; Quality Assurance Inspector Trainee; Tester; Tester, Electronic; Tester, QC Environmental
- Instructor: including Instructional Technologist; Mechanical/Capability Study/Final Product Inspector Instructor
- Intern: including Intern, Summer Education Program; Summer College Trainee
- Ironworker
- Key Operator
- Laborer: including General support/Entry Level Laborer; Janitor; Maintenance Labor/Support; Maintenance Laborer; Maintenance Laborer Support
- Laser Trimmer & Tester
- Liquid Nitrogen/Gas Handler
- Maintenance Cleaner

- Manager: including Budget Manager, Environmental Management; Director; Director, Business Development; Director, Business Management; Director, Environment, Safety & Health; Director, Environmental Management; Director, Facilities & Security; Director, Human Resources; Director, Operations; Director, Program Management; Director, Quality Assurance; Director, Technical & Operations Systems; Director, Technical Services; Facility Manager; Floor Manager; General Manager; Manager Product Tester Support Lab; Manager Tube Engineering Laboratory; Manager, Accounting, Benefits & Banking; Manager, Advanced Components Engineering; Manager, Applications Design; Manager, Applications Development; Manager, Audit & Ethics; Manager, Benefits Accounting; Manager, Business Development Programs; Manager, Classification; Manager, Communication Programs; Manager, Compensation/Human Resources Information Systems; Manager, Computer Security; Manager, Computer Services; Manager, Computer Systems Support; Manager, Computing & Telecommunication; Manager, Contracts; Manager, Cost Accounting; Manager, Cost Estimating; Manager, Cost Management; Manager, Data Processing Support; Manager, Database; Manager, Design Definition; Manager, EEO & Nonexempt Practices; Manager, EH&S Programs; Manager, Electrical Services & Support; Manager, Emergency Management; Manager, Energy Devices Engineering; Manager, Engineering; Manager, Engineering Support Services; Manager, Environmental Restoration & Permitting; Manager, Equipment Calibration & Electrical/Mechanical Maintenance; Manager, Equipment Calibration & Instrument Maintenance; Manager, Equipment Calibration & Maintenance; Manager, Equipment Calibration & Vacuum Maintenance; Manager, Equipment Engineering; Manager, Estimating & Cost Management; Manager, Facilities Engineering; Manager, Facilities Maintenance; Manager, Finance; Manager, Financial Operations; Manager, Fire Protection; Manager, Generator & Magnetics; Manager, Health Physics; Manager, Hourly/Nonexempt Relations; Manager, Industrial Hygiene; Manager, Instrument & Computing Maintenance; Manager, Manufacturing; Manager, Materials & Process Engineering; Manager, Materials & Process Laboratory; Manager, Materials & Process Technology; Manager, Medical/ESH Administration; Manager, Metrology Laboratory; Manager, Network-Internet-User Computer Services; Manager, Neutron Generator Engineering; Manager, Occupation Safety, Health & Fire; Manager, Operational Security; Manager, Operations Management Systems; Manager, Organization & Staffing; Manager, Performance Management; Manager, Plant Engineering; Manager, Plant Facilities; Manager, Plant Protection/Utility Operations; Manager, Plant Security; Manager, Process Monitoring; Manager, Procurement & Distribution; Manager, Product Assurance; Manager, Product Review & Certification; Manager, Production; Manager, Production Engineering; Manager, Production Operations; Manager, Production Planning & Scheduling; Manager, Production Programs; Manager, Production Tube and Subassembly; Manager, Program; Manager, Programs & Administration; Manager, Property Accounting and Accounts Payable; Manager, Public Affairs; Manager, Purchasing & Stockroom; Manager, Quality Assurance Incoming Material; Manager, Resources Planning; Manager, Risk Management &

Radiological Protection; Manager, Safety; Manager, Security Computer Systems; Manager, Special Materials; Manager, Surety Programs; Manager, Technical and Personnel Security; Manager, Technical Support; Manager, Technology Center; Manager, Technology Transfer; Manager, Thermal Battery; Manager, Training & Integration; Manager, Transportation; Manager, Tube and Generator Engineering; Manager, Waste Management; Manager, Waste Management and Waste Minimization; Manager, Weapon Program Requirements; Manager, Zetatron; President & General Manager; Program Leader, Capital Planning; Program Manager & Classification Officer; Unit Manager, Production

- Mason
- Mechanic, Maintenance: including General Maintenance; Maintenance - General/Utilities; Maintenance General; Maintenance Mechanic; Maintenance Utilities; Maintenance Worker, General/Utilities; Mechanic
- Medical Director
- Nurse
- Oiler/Machinist
- Operator, Computer: including Computer Operator; Data Processing Computer Operator
- Operator, Machine: including C-Flow Machine Tool Associate; C-Flow Production Associate; Machine Operator; Machine Operator - Special Materials; Machine Tool Operator; Machine Tool Operator/Toolroom Machinist; NC Programmer/Machinist; Operator, Machine Tool; Production Associate, C-Flow; Setup/Maintain/Repair; Support Machine Operator; Support Operator; Tool Cutter and Grinder
- Operator, Metallize
- Operator, Micrographics
- Operator, Process
- Operator, Process Control
- Operator, Resin Casting Machine
- Operator, Special Materials-Machine
- Operator, Support
- Operator, Switchboard
- Operator, Tritium Recovery System
- Operator, Utilities
- Operator, Vacuum: including Vacuum Operator; Vacuum Operator (Tube Exhaust/Evaporation); Vacuum Process Setup & Operate (Tube Exhaust/Evaporation); Vacuum Process Setup, Operate & Maintain (Tube Exhaust/Evaporation)
- Operator, Vehicle
- Operator, Vending Machine
- Operator, Waste
- Operator, Welding Machine
- Operator, Winding Machine
- Operator, X-Ray: including X-Ray Operator; X-Ray Operator/Inspector

- Painter
- Paralegal
- Patent Officer
- Physician
- Physicist: including Advanced Physicist; Physicist, Development; Senior Development Physicist
- Planner: Advanced Process Planner; Emergency Planner; Equipment Construction Planner; Machine Load Planner; Planner, Design Definition; Planner-Engineering; Process Planner
- Plumber/Pipefitter
- Program Manager: including Program Manager, Electronics & Computers; Program Manager, Neutron Generators; Program Manager, Occurrence Reporting; Program Manager, Reimbursables; Program Manager, Special Components; Program Manager, Technology Development; Program Manager, Training & Education; Program Manager, Transition; Program Manager, Weapons Systems
- Programmer
- Project Manager: including Manager, Project; Project Manager, Development; Project Manager, Engineering; Project Manager, Equipment; Project Manager, Inventory
- Purchasing Associate
- Quality Auditor: including Advanced Quality Auditor; Equipment Quality Technician; Manufacturing Product Auditor; Senior Quality Auditor
- Rejected Material Controller
- Remediation Worker
- Security Officer
- Sheet Metal Worker
- Solid Waste Attendant
- Specialist: including Advanced Specialist; Advanced Specialist, Facilities Computer Systems; Specialist, Archives & Records; Specialist, Audio-Visual Support; Specialist, CAD Operations; Specialist, Communication; Specialist, Component; Specialist, Computer Systems; Specialist, Configuration Management; Specialist, Cost Accounting; Specialist, Emergency Management; Specialist, Employee & Plant Safety; Specialist, Engineering Administration; Specialist, Environmental Oversight; Specialist, Environmental Protection; Specialist, Equipment Maintenance Programs; Specialist, Equipment Management; Specialist, Equipment Software; Specialist, Facility Computer Systems; Specialist, Facility Project Engineering; Specialist, Facility Schedule and Control; Specialist, Facility Utilities; Specialist, Fire Protection; Specialist, Fire Protection Group Leader; Specialist, General Accounting; Specialist, Human Resources; Specialist, Industrial Engineering; Specialist, Inspection & Test Planning; Specialist, Maintenance Planning; Specialist, Maintenance Programs; Specialist, Materials; Specialist, Neutron tube; Specialist, Operational Planning; Specialist, Operational Surety; Specialist, Operations; Specialist, Operations & Procedures; Specialist, Packaging; Specialist, Personnel Security; Specialist, Physical

Security; Specialist, Polymer Support; Specialist, Procedures & Forms; Specialist, Process Planning; Specialist, Process Technology; Specialist, Producible Engineering; Specialist, Product Acceptance; Specialist, Product Development; Specialist, Product Evaluation; Specialist, Production Planning; Specialist, Program Requirements; Specialist, Programs & Administration; Specialist, Property Accounting; Specialist, Property Management; Specialist, Public Affairs; Specialist, Publications; Specialist, Quality; Specialist, Quality Assurance; Specialist, Quality Control Field Engineering; Specialist, Quality Systems; Specialist, Requirements; Specialist, Security Awareness; Specialist, Software; Specialist, Software & Techniques; Specialist, Surety Programs; Specialist, Technical and Communications Security; Specialist, Technical Information; Specialist, Training; Specialist, Video Production; Specialist, Visual Support; Specialist, Waste Management

- Specialist, Chemical Analysis
- Specialist, Computer Systems
- Specialist, Fire Protection
- Specialist, Instrumentation
- Specialist, Maintenance Planning
- Specialist, Material Control
- Specialist, Polymer Chemistry
- Specialist, Process Monitoring
- Specialist, Product Development
- Specialist, Product Evaluation
- Specialist, Requirements
- Stock keeper/Packer/Shipper: including Material Handler; Picker-Shipper; Stock keeper; Stock keeper, Material Control; Stock keeper/Material Control; Stock keeper/Packer Shipper; Stock keeper/Packer-Shipper; Storekeeper
- Supervisor: including Area Supervisor; Group Leader; Group Leader, Banking & Travel; Group Leader, Engineering; Group Leader, Product Development; Group Leader, Tube Development; Project Leader, Engineering; Supervisor, Waste Management; Supervisor, Accounts Payable; Supervisor, Component Production Engineering; Supervisor, Computer Operations; Supervisor, Facilities; Supervisor, General Stockroom; Supervisor, Payroll & Cashiering; Supervisor, Production; Supervisor, Receiving & Traffic; Supervisor, Security Patrol; Supervisor, Security Patrol Relief; Unit Supervisor
- Technician
- Technician, Ceramics
- Technician, Chemistry
- Technician, Computer Hardware/Software Support
- Technician, Development
- Technician, Electrical Component Systems
- Technician, Electromechanical
- Technician, Electromechanical Data
- Technician, Electronic Data

- Technician, Electronics: including Electron Beam Instruments Technician; Electronics Technician; Laboratory Technician; Laboratory Technician - Group Leader; Senior Technician - Electronics; Senior Technician - Electronics (Data); Unit 860
- Technician, Environmental Health
- Technician, Health Physics
- Technician, Laboratory Mechanical Calibration
- Technician, Materials & Process Laboratory
- Technician, Mechanical Calibration
- Technician, Mechanical Equipment Measurement & Test
- Technician, Metallurgical
- Technician, Neutron Tube: including Neutron Tube Development and Manufacturing Laboratory Aide; Neutron Tube Development and Manufacturing Technician; Neutron Tube Technician
- Labor Category: Technician, Optoelectronics
- Technician, Physical Security
- Labor Category: Technician, Physics
- Technician, Polymer
- Technician, Polymer Chemistry Applications
- Technician, Security
- Technician, Tube
- Technician, Waste Management
- Technologist, Data Processing
- Technologist, Electromechanical
- Technologist, Electronics
- Technologist, Environmental Management
- Technologist, Firearms & Training Systems
- Technologist, Industrial Hygiene
- Technologist, Instructional
- Technologist, Mechanical Equipment
- Technologist, Operations Systems
- Technologist, Photography
- Technologist, Physics
- Technologist, Polymer Chemistry
- Technologist, Waste Management
- Telephone contractor
- Tool, Die & Gage Maker: including Tool Cutter & Grinder; Tool Maker
- Trainer, Security Patrol
- Vacuum Craftsman
- Welder
- Writer: including Copy Editor; Technical Writer

A mentioned previously, a list of associated work processes can be obtained at *EOICP Site Exposure Matrices Website -- Home Page - DOE FACILITIES AND RECA SITES DATA: Pinellas Plant* https://www.sem.dol.gov/expanded/index.cfm

E.4 Employment Dates relevant to this petition:

Start: January 1957 End: December 1997

E.5 Is this petition based on one or more unmonitored, unrecorded or inadequately monitored or recorded exposure incidents? NO

PART F: BASIS FOR PROPOSING THAT RECORDS AND INFORMATION ARE INADEQUATE FOR INDIVIDUAL DOSE RECONSTRUCTION

F.1 Historic Approach to Monitoring of Radiological Exposures at the Pinellas Plant.

Exhibit 1: Radioactive Material Inventory at the Pinellas Plant,[10] located at the end of this document, provides an extensive list of radiological materials included in this inventory. In regard to the possibility of radiological exposure to these radionuclides, an extensive discussion of Occupational Medical Dose; Occupational Environmental Dose; Occupational International Dose; and, Occupational External Dose have been provided by Oak Ridge Associated Universities (ORAU) in a multiplicity of ORAU authored documents. In these documents, ORAU identifies several radionuclides deemed pertinent to estimating the aforementioned doses of the former workers of the Pinellas Plant. These radionuclides are:

1. Tritium[11]
2. Plutonium[12]
3. Depleted Uranium: **Please note that according to ORAU: "The DU (mainly 238U) inside the Tritium storage beds presented no significant external radiation hazard, due to the low specific activity and the nonpenetrating radiation emitted."[13]**
4. Natural Uranium: **Please note that according to ORAU: "Because the uranium would have been encapsulated in the glass prior to its arrival at the Pinellas Plant, the glass was considered to be a sealed source and would have posed little to no internal dose hazard."[14]**
5. Nickel-63[15]
6. Carbon-14[16]

---

[10] Department of Health and Rehabilitative Services State of Florida and Department of Energy (1994) *op. cit.*

[11] IBID., pp. 8-10.

[12] Regarding plutonium, the document states: "… plutonium intakes were extremely unlikely at the facility." IBID., pp. 10-11.

[13] IBID., pp. 11-12.

[14] IBID., pp. 11-12.

[15] Regarding Nickel 63, the document states: it is unlikely that any workers at the Pinellas Plant received a significant internal dose from 63Ni, and potential 63Ni exposures do not need to be assessed for Pinellas Plant workers." IBID., p. 12.

[16] Regarding Carbon-14, the document states: it is unlikely that 14C was a significant internal dose concern at the Pinellas Plant. Therefore, internal doses due to 14C exposures do not need to be assessed for Pinellas Plant workers." IBID., p. 13.

7. Krypton-85[17]

Beyond these seven radionuclides, ORAU states that intakes and internal doses for other miscellaneous radionuclides did not normally need to be evaluated for Pinellas Plant workers, and these radionuclides were not discussed further in ORAU TBD.[18]

This conservative approach to monitoring radionuclide exposure is further discussed in the *Pinellas Plant Feasibility Study: Final Report* (see Exhibit 1 below).[19] The main focus of attention according to this study are the following radionuclides: Tritium (since 1957), Krypton-85 (since 1963), Carbon-14 (1979 to 1984), and Plutonium 238 and Plutonium 239.[20]

This conservative approach appears to be corroborated by the former nuclear weapons workers files received from the Departments of Labor and Energy and reviewed by [redacted]. A small percentage of former nuclear weapons workers were monitored through bioassay or urinalysis for exposure to Tritium, neutrons and x-ray gamma **to the deficit of other radionuclides** contained in the *Radioactive Material Inventory for the Pinellas Plant*. Additionally, the majority of former nuclear weapons workers at the Pinellas Plant were **NEVER** monitored for any possible exposure to radioactive materials. As discussed below, the failure to monitor ALL workers for all radioactive materials at the Pinellas facility resulted in exposures that went undetected until former nuclear weapons workers from this facility partook in 24-Hour Heavy Metals Urine Tests in 2019 and 2020, as discussed below.

F. 2 Incomplete Radiological Characterization at the Pinellas Plant and Need for Special Exposure Cohort

Despite ORAU's characterization that most radionuclides at the Pinellas facility did not need to be monitored, research has identified several additional exposure pathways that **DO NOT** reflect Oak Ridge Associated Universities existing radiological characterization of the Pinellas Plant. **NOR** are these additional exposure pathways reflected in the dose reconstructions of former Pinellas nuclear weapons workers conducted by NIOSH.

<u>Exposures Not Monitored or Inadequately Monitored</u>

1. Although the Department of Energy (DOE) and National Institute of Occupational Safety and Health (NIOSH) have documented a series of radiological incidents that occurred at the Pinellas Facility, nowhere in this documentation is there any discussion of whether these exposures were actually used to determine the extent of exposure for **ANY** worker at the Pinellas Plant at the time of the incident. These documents include but are not limited to:
    a. US Department of Energy Environment, Safety and Health (1990) Tiger Team Assessment of the Pinellas Plant. (DOE/EH – 0126)
    b. John Holliday (1989) *Health Physics Report: Historical Report of Radiation Protection*. GEPP-97004407

---

[17] Regarding Krypton-85, the document states: "Because 85Kr is a noble gas, it is not a significant internal dose concern. Therefore, internal doses due to 85Kr exposures do not need to be assessed." IBID., p. 13.

[18] IBID., p. 13

[19] Florida Department of Health and Rehabilitative Services and U.S. Department of Energy (September 1994) *op. cit.*

[20] IBID., p. 26.

   c. Department of *Labor Site Exposure Matrices* (https://www.sem.dol.gov/)
2. Additionally, the files of former nuclear weapons workers at the Pinellas Plant, received from DOL and DOE, do not contain any exposure information related to these radiologic incidents.
3. In the *Health Physics Report: Historical Report of Radiation Protection (1989),* Health Physicist John Holliday notes that on July 1961 100 m ci Cobalt 60 source found leaking, this despite the assertion that Cobalt 60 was an encapsulated source. [21]
4. Health Physicist Holliday also reported that accurate monitoring was impacted by the fact that "Employees were found falsely identifying urine samples."[22]
5. Radiologic aspects of the Pinellas Plant exclusively focus on exposures and/or monitoring of the following radiologic materials: tritium, Krypton-85, Carbon-14, and in some cases, Plutonium 238/239. While the Department of Energy notes that plutonium present at the Pinellas Plant site was triply encapsulated in metal to contain potential releases, air monitoring and soil monitoring procedures were put in place to monitor for the release of plutonium 238/239. Despite encapsulation, levels of plutonium 238 and 239 were detected in both air and soil samples. While the Department of Energy noted that the levels of plutonium were at environmental background levels, it is important to note that the Tiger Team found sampling deficiencies where plutonium was concerned:

> A/CF-6 Plutonium Stack Sampling Deficiencies[23]
>
> PERFORMANCE OBJECTIVE: Environmental Monitoring Procedure EM-2.01 "Plutonium Stack Releases - Building 400" stipulates a procedure which applies to the collection of particulate plutonium 238 and 239 as well as specifying review frequencies.
>
> FINDING: The stack sampling equipment for Bldg. 400 which has been installed for the purpose of detecting potential releases of particulate Pu-238 and 239 is not of an isokinetic design, more than 15 feet from the sample extraction point and is downstream of numerous abrupt direction changes in the sample line. Additionally, stack gaskets and joints are leaking in both of the exhaust stacks. Furthermore, documentation does not exist verifying that the procedure has been reviewed since November 2, 1987. These deficiencies can lead to the sample mass not being proportional to the total mass of material (possibly including plutonium) exiting the stack. The filter for collecting this particulate is failure to properly sample particulate effluent streams can lead to inaccurate estimates of doses to the public. The site is aware of this situation and has an approved project budgeted for fiscal year 1990, No. 9082002 (I-R-16) to correct this situation.

The majority of workers WERE NEVER monitored for plutonium 238/239 exposures.

---

[21] John Holliday (1989) *Health Physics Report: Historical Report of Radiation Protection*. GEPP-97004407, p. 2.

[22] * This note was entered into the aforementioned report in September 1963. IBID.

[23] US Department of Energy: Environment, Safety and Health (May 1990) *Tiger Team Assessment. of the Pinellas Plant.* DOE/EH—0126. DE90 010294. pp. 3-14.

6. In the US Department of Energy (June 1997) *Environmental Baseline Report*, mention is made of the potential for unconfined radioactive materials or emissions, resulting from Radioactive Materials Management Area (RMMA) located in Building 100. [24]
7. Also not taken into consideration is the fact that the rooms within Building 100 were not self-contained. In other words, the rooms were wide open so any radioactive materials that were in the air, would be circulated throughout the entire plant.[25]
8. According to Bill Murray, part of the Oak Ridge Associated Universities Team that developed the Pinellas Plant Site Profile, "employer-required chest x-rays were required of employees at the facility."[26] **HOWEVER,** a review of employee files found that the majority of employees **WERE NOT** afforded these x-rays.
9. According to Independent Technical Review of Pinellas Plant (July 1994):
    d. Certain rooms in Building 100, several hoods in Buildings 200 and 800, and areas of Buildings 550 and 1000, have some radioactive contamination. No comprehensive radiological surveys have been completed for these buildings.[27]
    e. Building 100 laboratories and processes handle or have handled radioactive isotopes. There is radioactive contamination in some hoods and associated duct work. A precise, accurate survey of location, quantity and type of radiological contamination does not exist.[28]
10. According to the *Pinellas Plant Feasibility Study Final Report (1990)*: "Typical of many DOE facilities, meticulous environmental monitoring and records keeping did not take place until the early to mid 1970's. Prior to that, monitoring and records keeping was not very thorough."[29]
11. Therefore, there is inadequate or non-existent monitoring of exposures resulting from the presence of other radioactive materials in the confines of the Pinellas Plant.

Characterization of Former Nuclear Weapons Workers at Pinellas Plant

1. A review of files of former nuclear weapons workers at the Pinellas Plant reveal that workers rarely worked in only one area. They worked across all building locations associated with the Pinellas facility. Dose reconstructions performed by NIOSH reflect only one employment associated location rather than the full range of employment locations held by these workers. Each plant location has unique radiologic characteristics and the failure to include each and every employment location negatively impacts the former nuclear weapons worker dose reconstruction.

---

[24] US Department of Energy (June 1997) *Environmental Baseline Report,* p. 3-1

[25] NIOSH Dose Reconstruction Project Meeting on Pinellas Site Profile – Afternoon Session. (November 19, 2004) p. 2.

[26] Bill Murray (2004) *Development of the Pinellas Site Profile*, Oak Ridge
Associated Universities Team, slide 12.

[27] U.S. Department of Energy Office of Facility Transition and Management (1994) *Independent Technical Review of the Pinellas Plant*, p. A4.

[28] IBID., p. A9.

[29] Department of Health and Rehabilitative Services State of Florida (1990), *Pinellas Plant Feasibility Study Final Report*, p. 113

2. A review of files of former nuclear weapons workers at the Pinellas Plant reveal that workers were employed in a variety of labor categories associated with the Pinellas facility. Dose reconstructions performed by NIOSH reflect only one labor category rather than the full range of labor categories held by these workers. Each plant location has unique radiologic characteristics and the failure to include each and every labor category negatively impacts the former nuclear weapons worker dose reconstruction.
3. A review of files of former nuclear weapons workers at the Pinellas Plant reveal that workers participated in a multitude of work processes associated with the Pinellas facility. Dose reconstructions performed by NIOSH reflect only one work process rather than the full range of work processes held by these workers. Each work process has unique radiologic characteristics and the failure to include each and every work process negatively impacts the former nuclear weapons worker dose reconstruction.
4. A small number of workers *were monitored* for radiologic exposures, although inconsistently, and some *were never monitored* for such exposures. For those that were monitored, their dosimetry records **only included information until 1981**. Dosimetry records beyond 1981 were missing from all of their DOL and DOE files that were examined.
5. As mentioned in point 4, monitoring was often inconsistent and erratic – a script might prescribe an employee be monitored on a weekly basis, but documents pertaining to these monitored employees reveal that they were not. Questionable record keeping as mentioned in the Tiger Team report, is one of the problematic issues identified at the Pinellas Plant.[30]

24 Hour Heavy Metals Urine Tests

1. Failure to secure dosimetry and exposure data for the majority of former nuclear weapons employees at the Pinellas Plant led to 24-Hour Heavy Metals Urine Test testing with additional testing for radionuclides administered to a sample of former Pinellas employees. Members of this sample tested positive for exposure to radionuclides listed in the *Radioactive Material Inventory at the Pinellas Plant* and that were previously determined as not needing further evaluation by ORAU:
    - Strontium-90[31]
    - Cobalt-60[32]
    - Thallium-204[33]
    - Uranium[34]

---

[30] US Department of Energy: Environment, Safety and Health (May 1990) *Tiger Team Assessment. of the Pinellas Plant. Op. cit.*

[31] **Stronbtium-90 is mentioned here because a former employee who was monitored until 1981, tested positive for Strontium-90 exposure but was only monitored for Tritium, Neutrons and X-ray gamma.**

[32] Cobalt-60 is mentioned here because a former employee who was monitored until 1981, tested positive for Cobalt-60 exposure but was only monitored for Tritium, Neutrons and X-ray gamma.

[33] Thallium-204 is mentioned here because a former employee who was monitored until 1981, tested positive for Thallium-204 exposure but was only monitored for Tritium, Neutrons and X-ray gamma.

[34] Uranium is mentioned here because several unmonitored former workers tested positive for uranium exposure in their 24-Hour Urine Metals Test.

- Beryllium[35] - although the author understand that an SEC will not be qualified on the basis of beryllium, beryllium is added to this list not only because of the large number of individuals who tested positive for the material and whose exposures were ignored not only during the period of plant operation but in the years following plant closure.

2. Several conclusions can be drawn from these 24-Hour Urine Heavy Metals Test results with additional testing for radionuclides:
   a. For the sample of former nuclear weapons employees, these radiologic exposures could have **ONLY** resulted from employment at the Pinellas Plant.
   b. Since the focus of dosimetry and other forms of radiologic monitoring at the Pinellas Plant was on Tritium, neutrons and X-ray gamma and there appears to be no dosimetry or documentation available for the remainder of the radionuclides on the *Radioactive Material Inventory at the Pinellas Plant*, including those aforementioned radionuclides to which a sample of Pinellas Plant employees tested positive (Strontium-90, Cobalt-60, Thallium-204, Beryllium, and Uranium). the radiological characterization of the Pinellas Plant is incomplete and insufficient.
   c. There is an absence of dosimetry records beyond **1981** for those employees that were actually monitored at the Pinellas Plant.
   d. Former employees that were never monitored while employed at the Pinellas Plant would have been unaware of their exposures to the aforementioned radionuclides had this test not have been administered.
3. Even though ORAU admits that the radionuclides used at the Pinellas Plant contain "significant quantities of radioactivity (Author unknown undated b),"[36] ORAU has adopted the position that the majority of these radionuclides **"**were not considered to be potential sources for radionuclide intakes."[37] Two questions emerge and form the basis for this Special Exposure Cohort Petition:
   a. How does ORAU explain the former workers' positive 24-Hour Urine Heavy Metals Test results for exposures, when it has determined that these radionuclides were not considered as possible sources of radiation beyond what might be encountered in a limited number of incidents?
   b. Given the absence of complete dosimetry for former employees who were and were not monitored at the Pinellas Plant, as well as the unavailability of radiological records pertaining to Strontium-90, Cobalt-60, Thallium-204, Beryllium, and Uranium, reconstruction of radiologic exposures is not possible. It is clear the radionuclides on the *Radioactive Materials Inventory List for the Pinellas Plant* pose severe health risks for not only those who have tested positive for exposure but for all workers that may have unknowingly found themselves victims of exposures they were unaware and never monitored for. An overall lack of dose assessment concerning the radionuclides included on the

---

[35] Beryllium is mentioned here because several unmonitored former workers tested positive for Beryllium exposure in their 24-Hour Urine Metals Test.

[36] Oak Ridge Associated Universities (2011) *op. cit.*

[37] IBID., p. 13

Radioactive Material Inventory at the Pinellas Plant is confirmed by the findings by the Tiger Team that there was incomplete documentation of dose-assessments.[38]

F.3 Presence of Radioactive Materials at the Pinellas Plant

Strontium-90

1. The presence of Strontium-90 is affirmed in the *Radioactive Material Inventory at the Pinellas Plant*[39] and *Pinellas Plant Radioactive Source Historical Inventory Sta*tus (see exhibit 2 located at end of document).[40]
2. Some information about the presence of Strontium-90 at the Pinellas Plant can be gleaned from the Department of Labor's *Site Exposure Matrices*.
3. The Pinellas Plant was well known for groundwater contamination related to the nuclear weapons activity conducted for the Atomic Energy Commission and the Department of Energy.[41] The Tiger Team found that it was not unusual for the Pinellas Plant to add small quantities of radioactive waste to non-radioactive classified waste to solve classified waste disposal problems.[42] Additionally, radioactive Strontium-90 was found to be present in the groundwater in Pinellas County (see Exhibit 3 located at end of document).
4. In a study conducted in 1994, the contents of groundwater contamination were revealed in the *Pinellas County Water Sources Radioactive Measurements*.[43] (See Exhibit 3) Strontium-90 was detected until approximately 1984. There is a lack of data available that provides a reasonable explanation as to why measurements of Strontium-90 contamination were discontinued at this time.
5. General Electric was well known for its development and production of Radioisotope Thermoelectric Generators (RTGS) at the Pinellas Plant. In fact, it served as the primary location of such undertakings. General Electric, under the auspices of the U.S. Atomic Energy Commission (AEC), began developing these devices in 1956 at a temporary facility in order to create power supplies for space, terrestrial and marine applications. These devices were all described by the general title: Systems for Nuclear Auxiliary Power (SNAP).[44] General Electric was known to use both Strontium-90 and plutonium as power supplies for RTGS. According to the International Atomic Energy Agency: "Radioisotope thermoelectric generators (RTGS) use heat generated by decay of radioactive isotopes to produce electric power… They are used as a power supply where frequent maintenance or refueling is

---

[38] US Department of Energy: Environment, Safety and Health (May 1990) *op. cit*., p. ES-2

[39] Department of Health and Rehabilitative Services State of Florida and Department of Energy (1994) *op. cit.* p. 23

[40] IBID. p. 108.

[41] US Department of Energy: Environment, Safety and Health (May 1990) *op. cit*., pp. ES-2 through ES-3. Included in the Tiger Team assessment pertaining to groundwater contamination found lack of adequate characterization of inactive waste sites; deficiencies in the site-wide environmental monitoring program; on- and offsite groundwater contamination which was above State standards; and failure to apply for air pollution permits. A key National Environmental Policy Act (NEPA) finding concerned reliance by the site on an outdated site-wide Environmental Assessment which has no documented Finding of No Significant Impact (FONSI).

[42] US Department of Energy: Environment, Safety and Health (May 1990) *op. cit*., pp. ES-2 through ES-3

[43] IBID.

[44] D. L. Parks; J. P. Grimm; and J. Dominick (2009) "*End of an Era and Closing the Circle – Disposal of Strontium-90 Radioisotope Thermoelectric Generators – 9415,*" WM2009 Conference, March 1-5, 2009, Phoenix, AZ

expensive or impractical. Most terrestrial RTGS are fueled with Strontium-90.[45]Therefore, Strontium-90 was used extensively in terrestrial RTGS, such as in the "Sentinel."[46] Strontium-90 was also used in RTGS for communication satellites as shown in Exhibit4. Since a Strontium-90 based RTG deteriorated about three times as fast as one based on Pu-238,[47] when General Electric was tasked with extending the life of RTGS, it shifted the focus of its research and development to plutonium. Given the Pinellas Plant's central role in the development and production of RTGS, the use of Strontium-90 cannot be ruled out.

6. In the case of Strontium-90, the levels of Strontium-90 detected in the Pinellas Country water sources could not feasibly be related to only the Strontium-90 check sources. Some form of Strontium-90 in dispersible form had to be present and/or used at the facility to cause this level of contamination. Groundwater contamination is symptomatic of other forms of Strontium-90 exposures included those to the former employees of this facility.
7. Beyond the amount of Strontium-90 acknowledged for use as a check source, it is important to note that there is a lack of available documentation regarding the additional use and/or amount of Strontium-90 present at the Pinellas Plant. However, the positive test response to Strontium-90 revealed in the 24- Hour Urine Heavy Metals Test that included additional testing for radionuclides administered to a sample of former nuclear weapons workers is unsettling.[48] If the only acknowledged use of Strontium-90 at the Pinellas facility was as a check source, how might one explain positive test results for exposure? A positive response for exposure raises questions about the completeness of data sources, technical accuracy and overall adequacy of data regarding the use of radionuclides at the Pinellas facility. Furthermore, the lack of available data speaks to the inability to adequately assign a radiation dose for this radionuclide.

Cobalt-60

1. The presence of radioactive cobalt, specifically Cobtal-60, is confirmed in the *Radioactive Materials Inventory at the Pinellas Plant*. (See Exhibit 1).[49] Its presence is also confirmed in the Department of Labor's *Site Exposure Matrices*. While these two sources confirm that Cobalt-60 was used as check source at the Pinellas Plant, additional uses of this radionuclide are provided in the *Site Exposure Matrices*:
   - Use as a levelling device and thickness gauge.
   - Use in machining, sheet metal fabrication, and welding.[50]

---

[45] International Atomic Energy Agency; Technical Reports Series No. 436. *Disposal Options for Disused Radioactive Sources*. p 6, 13. Vienna, Austria, 200

[46] I. Yaar & E. M. A. Hussein (2013) *Passive Detection of Concealed Strontium-90 Radioisotope Thermoelectric Generators in Transport*, Scientific and Technical Papers; and *"Power Sources for Remote Arctic Applications".* Washington, DC: U.S. Congress, Office of Technology Assessment. June 1994. OTA-BP-ETI-129.

[47] Rod Adams (1996) *RTG Heat Sources: Two Proven Materials*. Atomic insights. https://atomicinsights.com/rtg-heat-sources-two-proven-materials/

[48]NOTE: A special request to the laboratory was made to test for several radionuclides including Strontium -90 for one particular claimant who remembers having a possible exposure to the radionuclide. See Appendix 1 for the relevant 24-HourUrine Heavy Metals Tests.

[49] Department of Health and Rehabilitative Services State of Florida and Department of Energy (1994) op. cit. p. 23

[50] Agency for Toxic Substances and Disease Registry Division of Toxicology; Public Health Statement: *Cobalt*. http://www.ntis.gov

- Used in radiography for purpose of detecting structural flaws in metal parts. [51]
- In the magnetics of a neutron tube that is part of a neutron generator.[52]
- Mixed with other metals to form alloys, which are harder or more resistant to wear and corrosion. These alloys are used in a number of military applications such as aircraft engines, magnets, and grinding and cutting tools.[53]

2. The aforementioned uses seem to challenge the assumption that Cobalt 60 was an encapsulated source. [54] In general, there is an overall lack of available documentation regarding the use and/or amount of Cobalt-60 used at the Pinellas Plant for other purposes.
3. Extensive research reveals that in addition to use as a check source, Cobalt-60 was commonly used as a power source for RTGS developed under the Systems for Nuclear Auxiliary Power (SNAP)[55] (see Exhibit 4 located at end of document). Given the Pinellas Plant's central role in the development and production of RTGS, the use of Cobalt-60 cannot be ruled out as a power source. Neither can its use in magnetics associated with neutron tubes be ruled out.
4. In the *Health Physics Report: Historical Report of Radiation Protection (1989),* Health Physicist John Holliday notes that on July 1961 100 m ci Cobalt 60 source found leaking, this despite the assertion that Cobalt 60 was an encapsulated source. [56] (Please see Appendix 2)

Thallium

1. The presence of Thallium-204 is affirmed in the *Radioactive Material Inventory at the Pinellas Plant*[57] (See Exhibit 1located at end of document) as well as the Department of Labor *Site Exposure Matrices.* Both confirm that Thallium-204 was used as a check source. However, there is a lack of available documentation regarding the use and/or amount of Thallium-204 beyond this use.
2. Extensive research reveals that Thallium-204 was used in several activities associated with the work conducted at the Pinellas Plant beyond that as a check source. These activities include:
    - Use in electrical switches in nuclear weapons.[58]
    - Use for isotopic power generation[59] for RTGS developed under the Systems for Nuclear Auxiliary Power (SNAP).[60] (See Exhibit 4 located at end of the document)

---

[51] Wikipedia (Accessed 12/12/2019) *Industrial Radiography*.
https://en.wikipedia.org › wiki › Industrial radiography

[52] See: EW Blackmore (1985) *Radiation effects of protons on samarium-cobalt permanent magnets.* IEEE Transactions on Nuclear Science, http://www.ieeexplore.ieee.org; AH Frentrop (1970) *Neutron generator including an ion source with a massive ferromagnetic probe electrode and a permanent magnet-electrode.* US Patent 3,546,512, 1970

[53] Dr. Marco Ferrante (2013) Health Effects of Metals and Related Substances in Drinking**.** Science

[54] John Holliday (1989) *Health Physics Report: Historical Report of Radiation Protection*. GEPP-97004407,see Attachment A. Page 2 of document.

[55] M. Ragheb (2011) *op. cit.*

[56] John Holliday (1989) *op. cit*.

[57] Department of Health and Rehabilitative Services State of Florida and Department of Energy (1994) *op. cit*. p. 23

[58] US DOE Office of Declassification (1996) *Restricted Data Declassification Decisions, 1946 to the Present*, p. 93.2

[59] M. Ragheb (2011) *op. cit.*

[60] IBID.

Uranium

1. According to ORAU, Uranium was the radionuclide encountered by the most workers.[61] The use of Uranium included but was not limited to:
   - Classified Component Testing and Inspection, including
     - Heather Glassing Shop
     - Heather Electron Beam Welding
     - Heather Testing Shop
   - Equipment calibration and maintenance
   - Glass and glass parts development and production including borosilicate glass that was doped with natural uranium
   - Neutron tube processing
   - Neutron tube and device assembly
   - Source and target processing
   - Tube loading including exhaust and assembly process, inspection and radiological monitoring
   - Use in the Tritium storage beds
2. Despite the vast number of activities involving Uranium, ORAU asserts that Uranium would have posed little to no internal dose hazard and therefore, workers were not monitored for this radionuclide.
3. There is an overwhelming lack of dosimetry or other exposure monitoring for this sample of former nuclear weapons employees of the Pinellas Plant regarding this radionuclide and there is even less documentation regarding the use and/ or amount of Uranium used at the Pinellas Plant in general.

Beryllium

1. Throughout the course of its operations, the potential for beryllium exposure existed at the Pinellas Plant due to beryllium use, residual contamination, and decontamination activities. At the Pinellas Plant, Beryllium was used to fabricate metal, weapons components and to facilitate a number of weapons-related experiments. Specifically, Beryllium was used for:
   - Equipment calibration and maintenance
   - Equipment fabrication and testing
   - Glass parts development and production
   - Reflector material (or 'pit liner') in most neutron generators.[62]
2. While workers can be tested for Beryllium exposure by the National Supplemental Screening Program, many former nuclear weapons workers have not been informed about this program or told that they were unlikely to have suffered from such an exposure. Therefore, the majority have not been screened nor informed that screening was available. Beryllium exposure should be of grave concern to all former employees in the nuclear weapons complex.

---

[61] Marquis P. Orr, Paul J. Demopoulos and Brian P. Glecker (2011) Pinellas Plant – Site Description, Oak Ridge Associated Universities, ORAUT-TKBS-0029-2

[62] Beryllium (accessed December 12, 2019) https://www.globalsecurity.org/wmd/intro/beryllium.htm

3. While Beryllium may or may not fit into the normal parameters of the Special Exposure Cohort, in the case of the Pinellas Plant, much more needs to be done to ensure that former employees receive access to adequate screening programs, diagnosis and medical care.

F. 8 Conclusion

The request for a Special Exposure Cohort for the Pinellas Plant is based upon the incomplete radiological characterizations by the Department of Labor, Department of Energy and the Oak Ridge Associated Universities. The probability of exposure to the radionuclides listed below is more likely than not despite the denial of the aforementioned government agencies. Both monitored and unmonitored former nuclear weapons workers tested positive to the radiological materials list below with the application of 24 Hour Heavy Metals Urine Tests:

- Strontium-90[63]
- Cobalt-60[64]
- Thallium-204[65]
- Beryllium[66]
- Uranium[67]

These radiologic exposures could have only resulted from employment at the Pinellas Plant. The focus of dosimetry and other forms of monitoring at the Pinellas Plant were on Tritium, neutrons and X-ray gamma, not the radionuclides listed on the *Radioactive Material Inventory at the Pinellas Plant*. There is an absence of dosimetry and exposure records beyond 1981 for former workers who were actually monitored at the Pinellas Plant. Former employees that were never monitored while employed at the Pinellas Plant would have been unaware of their exposures to the aforementioned radionuclides had this test not have been administered. The revelation of these positive exposures to Strontium-90, Cobalt-60, Thallium-204, Beryllium, and Uranium raise serious questions about the ability of NIOSH to adequately and accurately perform the dose reconstructions for former employees of the Pinellas Plant given the incompleteness of data sources, questionable technical accuracy and overall in adequacy of data regarding the overall use of radionuclides at the Pinellas facility.

The presence of these radiological materials has been acknowledged by the Department of Energy and DOL through the *Site Exposure Matrices.* There is no documentation that reveals how much Strontium-90, Cobalt-60, Thallium-204, Beryllium, and Uranium was present at the facility. There is no dosimetry or other exposure data available for these radioactive materials from the DOL or DOE. The absence of documents related to the quantity and weapons use of

---

[63] Stronbtium-90 is mentioned here because a former employee who was monitored until 1981, tested positive for Strontium-90 exposure but was only monitored for Tritium, Neutrons and X-ray gamma.

[64] Cobalt-60 is mentioned here because a former employee who was monitored until 1981, tested positive for Cobalt-60 exposure but was only monitored for Tritium, Neutrons and X-ray gamma.

[65] Thallium-204 is mentioned here because a former employee who was monitored until 1981, tested positive for Thallium-204 exposure but was only monitored for Tritium, Neutrons and X-ray gamma.

[66] Beryllium is mentioned here because several unmonitored former workers tested positive for Beryllium exposure in their 24-Hour Urine Metals Test.

[67] Uranium is mentioned here because several unmonitored former workers tested positive for uranium exposure in their 24-Hour Urine Metals Test.

the aforementioned radionuclides at the Pinellas Plant, in addition to the lack of dosimetry and exposure data for these radionuclides points to the inability of NIOSH and ORAU to adequately assign a radiation dose for this radionuclide for the former employees of the Pinellas Plant.

F. 4 Bibliographic of Scientific or Technical Reports

I/We have attached a bibliography of scientific or technical reports, issued by a government agency of the Executive Branch of Government or the General Accounting Office, the Nuclear Regulatory Commission, of the Defense Nuclear Facilities Safety Board, or published in a peer-reviewed journal that identifies dosimetry and related information that are unavailable (due to either a tack of monitoring or the destruction or loss of records) for estimating the radiation doses of energy employees covered by the Pinellas Plant petition.

1. **Elizabeth D. Ellis; John D. Boice, Jr.; Ashley P. Golden; et. al. (2018) "Dosimetry is Key to Good Epidemiology: Workers at Mallinckrodt Chemical Works had Seven Different Source Exposures."** ***Health Physics*****: Volume 114 - Issue 4 - p 386–397**: According to this study, accurate and quality dosimetry is essential to deriving the dose response from radiation exposure in an epidemiological study. When dosimetry is unavailable, inconsistent or varies widely the quality of the dosimetry is questionable. If one were to apply these standards to the availability of data and quality of dosimetry, it is reasonable to conclude that In the case of the Pinellas Plant, lack of dosimetry, inconsistent data reporting, discrepancies in employment categories, etc. bring into question the quality and reliability of dosimetry characterizing the Pinellas Plant.
2. **Institute of Medicine 2013.** ***Review of the Department of Labor's Site Exposure Matrix Database*****. Washington, DC: The National Academies Press** (https://doi.org/10.17226/18266):
    a. One of the failures of the Site Exposure Matrices (SEM) is its ability to accurately characterize the responsibilities of the employment categories for former employees of the Pinellas Plant. Distinct employment categories are lumped together under a generic category. For instance, employees who report holding a Janitor position involving cleaning duties did not perform the same tasks as a Janitor involved in labor duties. In fact, the two positions do not work in the same location of the plant. Yet, in the SEM the two positions do not appear to be distinct. Not only are the employment locations often generically presented rather than emphasizing exact locations, many of the radionuclide and chemical exposures are not accurately provided or provided at all for the umbrella category. It has been Denise DeGarmo's experience in representing Pinellas claimants that the ability of the SEM to accurately characterize the responsibilities of employment categories is limited. Additionally, the SEM does not provide accurate information regarding employee exposures to radionuclides as well as other toxic substances. Therefore, the SEM was built upon inaccurate information and flawed assumptions.

    b. A list of incidents that occurred at the Pinellas Plant between 1963 and 1995 are list below.[68]

        1. Tritium Leak, Tritium Stack, 1963

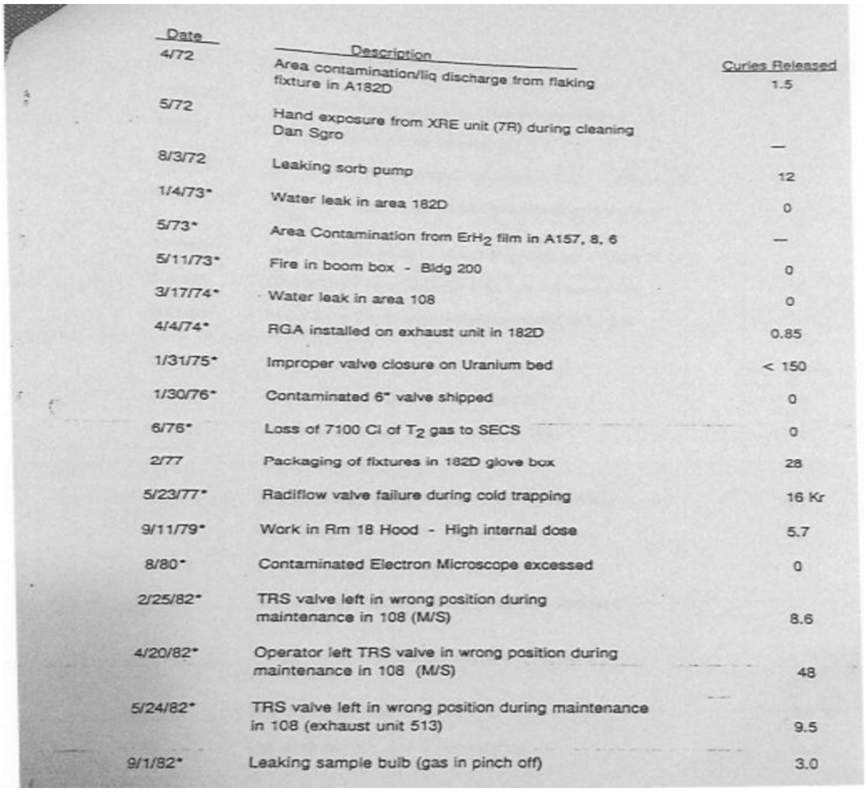
---

[68] Site Exposure Matrices. https://sem.dol.gov/expanded/Incident3.cfm

2. Tritium Contamination, Building 400, 1969
3. Tritium Contamination, Building 100, 1971
4. Tritium Release, Building 100, Area 182D, 1971
5. Fire in Tritium-Containing Boom Box, Building 200, 1973
6. Area Evacuation Due to Potential Explosive Mixture of Chromium Trioxide, Titanium Hydride, Manganese and Vanadium Pentoxide, Building 100, Area 132, 1978
7. Nitrogen Dioxide Release, Building 100/Area 143, 1978
8. Tritium Release, Building 100, 1979
9. Diesel Fuel Spill, North Building 500, 1981
10. Tear gas exposure, Building 900, March 3, 1982
11. Area 114 Rooms Evacuation Due to Hydrogen Sulfide Emissions, 1990
12. Cristobalite Exposure, Area 117, 1993
13. Lithium Silicon Battery Fire, Building 300/Area 307, 1983
14. Tritium Contamination, Building 400, 1995

However, information taken from microfilm records and the recollections of John Holliday, GEND Health Physicist 1967-1985, under contract # R-00162-X (See Appendix 2) provide a list of accidents/incidents not reported in the Site Exposure Matrices:

Table 2: Incidents at Pinellas Plant 1972-1982



Date	Description	Curies Released
4/72	Area contamination/liq discharge from flaking fixture in A182D	1.5
5/72	Hand exposure from XRE unit (7R) during cleaning Dan Sgro	—
8/3/72	Leaking sorb pump	12
1/4/73*	Water leak in area 182D	0
5/73*	Area Contamination from ErH_2 film in A157, 8, 6	—
5/11/73*	Fire in boom box - Bldg 200	0
3/17/74*	Water leak in area 108	0
4/4/74*	RGA installed on exhaust unit in 182D	0.85
1/31/75*	Improper valve closure on Uranium bed	< 150
1/30/76*	Contaminated 6" valve shipped	0
6/76*	Loss of 7100 Ci of T_2 gas to SECS	0
2/77	Packaging of fixtures in 182D glove box	28
5/23/77*	Radiflow valve failure during cold trapping	16 Kr
9/11/79*	Work in Rm 18 Hood - High internal dose	5.7
8/80*	Contaminated Electron Microscope excessed	0
2/25/82*	TRS valve left in wrong position during maintenance in 108 (M/S)	8.6
4/20/82*	Operator left TRS valve in wrong position during maintenance in 108 (M/S)	48
5/24/82*	TRS valve left in wrong position during maintenance in 108 (exhaust unit 513)	9.5
9/1/82*	Leaking sample bulb (gas in pinch off)	3.0

    The non-reporting of additional toxic chemical and radiological accidents and/or incidents result in inaccurate worker exposure data. Therefore, exposure estimates do not accurately reflect the depth, breadth, and pathways of chemical and radiological exposures. The sheer number of incidents to which employees would have been exposed would have increased significantly, thus increasing exponentially not only the levels of exposures but the types of radiological exposures. In regard to the use of the SEM to determine toxic and radiological materials a worker at the Pinellas Plant was exposed to, as discussed elsewhere, the matrices are flawed as a result of GEND practices discussed elsewhere in this document.

    c. The Site Exposure Matrices for the Pinellas Plant, based upon the aforementioned evidence, are flawed and do not fully represent the positions that workers held at the plant nor the array of toxic and radiological substances workers were exposed to.

3. **Department of Energy Environment, Safety and Health (May 1990) The Tiger Team Assessment of the Pinellas Plant. DOE/EH – 0126, DE90 010294**:
    a. The Tiger Team Assessment of the Pinellas Plant reported the employment position guides for many positions at the plant were out of date.[69]
    b. According to the Tiger Team Assessment of the Pinellas Plant in 1990, GEND historically and consistently failed to comply with DOE regulations. This finding calls into question the ability of the DOE and DEEOIC to accurately reconstruct important elements of the Pinellas Plant's operation including the depth, breadth, and pathways of exposures to both radiological materials and toxic chemicals.[70]
    c. According to the Tiger Team Assessment of the Pinellas Plant: A General Electric policy and program governing the use of procedure site-wide was not developed and implemented. Properly controlled technical documents and drawings and other related material were not readily available to the personnel that required such information. Safety goals and performance were not measurable nor auditable for the various health and safety functions. Most of the personnel training was accomplished in an informal manner. As a result, in some critical health and safety areas, the training program was non-existent and not at the level required at DOE facilities.
    d. There was no policy and procedure manual or GEND standard for training, which led to considerable variability in each training program. This deficiency was found in many of the disciplines appraised by the S & H Sub-team. These areas include technical support (packaging and transportation), emergency preparedness, industrial hygiene, occupational safety and fire protection. In conclusion, many of the concerns expressed by the S & H Sub-team might have been the result of a lack of comprehensive safe (hazard) assessment of the many functions and operations at the Pinellas Plant. Without such an analysis, a clear understanding of the hazards associated with the varied operations and the consequences of credible accidents is

---

[69] Department of Energy Environment, Safety and Health (May 1990) *op. cit.*

[70] IBID. p. 3-35.

not possible. "[71] In other words, these failures call into question the ability of DOE and DEEOIC to accurately detail the hazards and exposures associated with the Pinellas Plant across the time period 1957-1990.[72]

e. The Tiger Team assessment revealed several key findings that impacted the health and safety of workers at the Pinellas Plant:
    i. A site-wide safety assessment did not exist to identify hazards of a type and magnitude not normally encountered and accepted by the public.
    ii. The Occupational Safety Program did not implement an effective program for identifying, evaluating, and resolving potential safety and health concerns. The_Pinellas Plant has potential serious hazards and code violations as related to DOE and OSHA requirements.
    iii. The emergency preparedness program has not: 1) incorporated credible hazards or consequence assessments into the emergency plans; 2) developed emergency plans for specific buildings; 3) implemented procedures for emergency actions; or 4) provided adequate levels of training for spills of hazardous materials.[73]
    iv. The Tiger Team Assessment also revealed:
        1. A disciplined safety and health culture was not fully accepted by the Pinellas Plant.[74]
        2. A management program to develop, control, and document site-wide operations and functions was not established for health and safety purposes.[75]
        3. General Electric Neutron Devices was not required to provide: 1) safety assessment of site activities to establish ranking of hazards as well as relative risks of operations; and, 2) safety oversight function required by DOE for the site-wide operations, health and safety performance, follow-ops to safety concerns.[76]
        4. Workers were exposed to hazardous air born particulates because "The ventilation systems were not checked, tested and maintained in a manner consistent with generally accepted industrial practices."[77]
        5. "There was a widespread mindset that the Pinellas Plant poses no unusual or unique risks."[78]
        6. There were instances of non-compliance with radiological regulations.[79]

---

[71] IBID. p. 4-3
[72] IBID. p. 2-4
[73] IBID. p. 2-3
[74] IBID. p. 2-4
[75] IBID.
[76] IBID. p. ES-3
[77] IBID. p. 4-56
[78] IBID.
[79] IBID. 4-90

7. “The radiological safety controls associated with the accelerator and X-ray machines were lacking in formality and were not in compliance with generally accepted standards.[80]
8. “Compliance with procedural requirements for work on contaminated systems and compliance with ‘hold points’ in safety work permits was less than acceptable.”[81]
9. Accreditation of the dosimetry system was not completed along with the formalization of employee exposure investigations.[82]
10. Radiation workers were observed not wearing their personnel dosimeter consistently or failed to ensure they were properly located on their body.[83]
11. The facility and site did not ensure effective implementation and control of radiological protection activities on the facility and site.[84]
12. The internal audit program for both routine operations and unusual radiological occurrences did not provide adequate performance assessments: The Health Physics internal appraisal program was not in accordance with the DOE 482,1B, Section 9.d., and DOE 5480.11.[85]
13. The radiological procedures at the Pinellas Plant did not provide for the control and use of radioactive materials and radiation generating devices in regard to safe operations.[86]
14. Radiological postings were not being accomplished in accordance with DOE 5480.11 and GEND procedures.[87]
15. “Radiological work procedures were not being followed.”[88]
16. GEND dosimetry was not accredited by 1990 as required by DOE Regulation 5480.11. The plant lacked formal documentation of investigations into personnel exposure anomalies and supervisors were not required to acknowledge the facts surrounding the assignment of radiation exposure to their personnel.[89]
17. The personnel dosimetry program at GEND did not ensure personnel radiation exposures were accurately determined and recorded.”[90]
18. The contamination control program did not ensure that workers were protected from unnecessary radiation exposure.[91]

---

[80] IBID.

[81] IBID.

[82] IBID.

[83] IBID.

[84] IBID. p. -92.

[85] IBID. p. 4-93

[86] IBID. p. 3-94

[87] IBID. p. 4-94

[88] IBID. p. 4-95

[89] IBID. p. 4-96

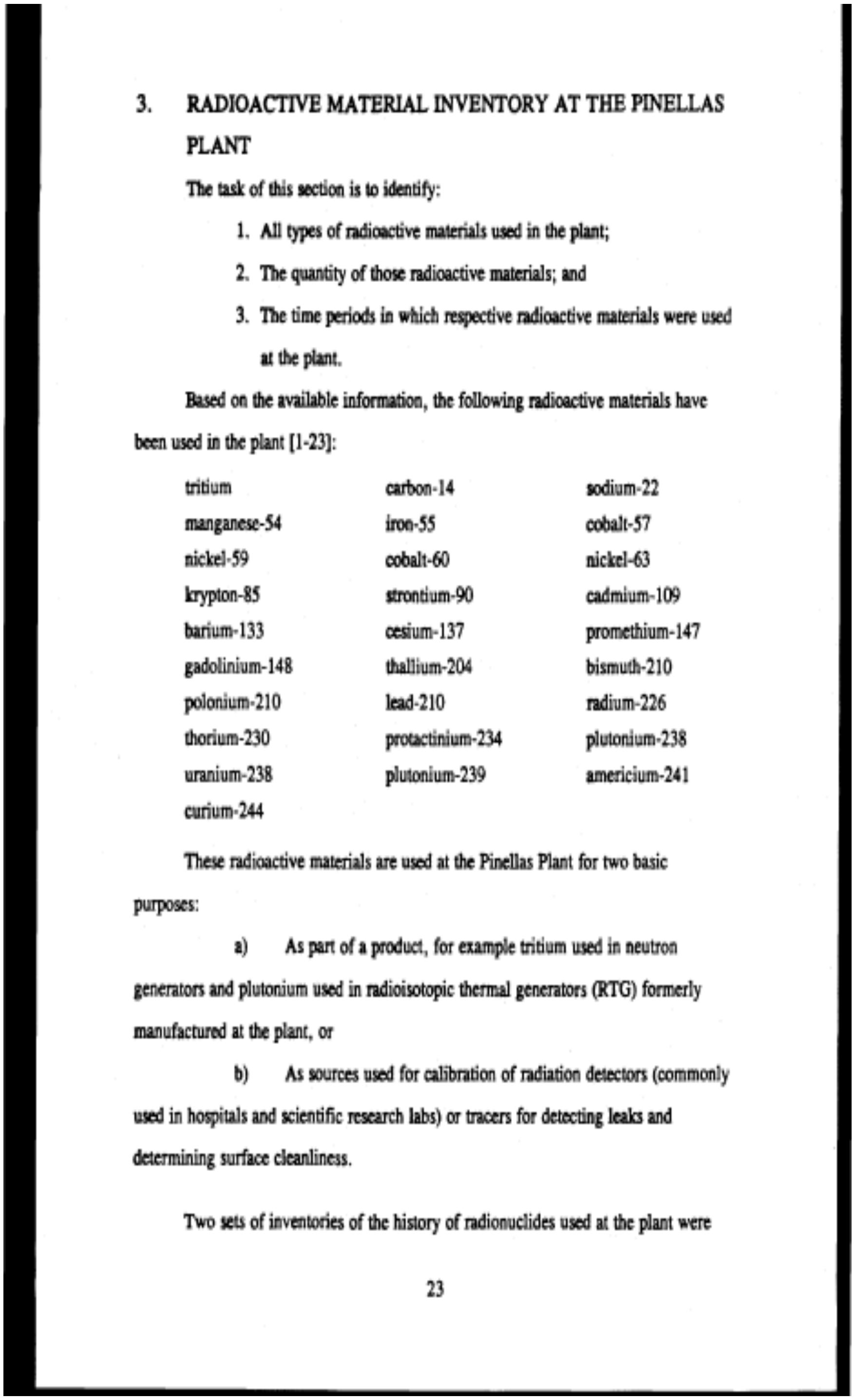
[90] IBID. p. 4-98

[91] IBID. p. 4-102

   f. In sum, the assessment of the Pinellas Plant by the Tiger Team identified numerous deficiencies in GEND operations generally and safety and health procedures governing the exposure of workers to toxic chemicals and radiological hazards. Insufficient data collection calls into question the reliability of not only the actual doses workers received from radiological materials. Exposure pathways remain underdeveloped and under reported. Incidents/accidents at the Pinellas Plant are not fully reported thus adversely impacting the ability to accurately reconstruct exposures to toxic chemical and radiological materials.

4. **Matthew P. Moeller, Ronald D. Townsend, and David A. Dooley (2008) "The NIOSH Radiation Dose Reconstruction Program: Managing Technical Difficulties. 95(1):14-9**: The initial challenges of this program included garnering sufficient and capable scientific staff, developing an effective infrastructure, establishing necessary methods and procedures, and integrating activities to ensure consistent, quality products. And while the Dose Reconstruction Program has been a helpful tool to analyze data related to worker exposure, challenges remain. These "challenges include maintaining the project focus on recommending a compensation determination (rather than generating an accurate dose reconstruction), managing the associated very large data and information management challenges, and ensuring quality control and assurance in the presence of an evolving infrastructure. The lessons learned concern project credibility, claimant favorability, project priorities, quality and consistency, and critical path project activities."
5. **Richard E. Toohey (2005) "Scientific Issues in Radiation Dose Reconstruction." Health Physics 95(1):26-35**: This article points to several issues that continue to plague the dose reconstruction process. Most of these issues involve the scientific basis of radiation dose reconstruction for compensation. These issues include data issues, dosimetry issues, and compensation issues. Data issues include demographic data of the worker, changes in site operations over time (both production and exposure control), characterization of episodic vs. chronic exposures, and the use of coworker data. Dosimetry issues include methods for assessment of ambient exposures, missed dose, unmonitored dose, and medical x-ray dose incurred as a condition of employment. Specific issues related to external dose include the sensitivity, angular and energy dependence of personal monitors, exposure geometries, and the accompanying uncertainties. Those related to internal dose include sensitivity of bioassay methods, uncertainties in biokinetic models, appropriate dose coefficients, and modeling uncertainties. Compensation issues include uncertainties in the risk models and use of the 99th percentile of the distribution of probability of causation for awarding compensation. In order for the system of compensation to reach greater accuracy in the reflection of exposures to former nuclear weapons workers, these issues need further study and correction.

Exhibit 1: Radioactive Material Inventory at the Pinellas Plant[92]



3. RADIOACTIVE MATERIAL INVENTORY AT THE PINELLAS PLANT

The task of this section is to identify:

1. All types of radioactive materials used in the plant;
2. The quantity of those radioactive materials; and
3. The time periods in which respective radioactive materials were used at the plant.

Based on the available information, the following radioactive materials have been used in the plant [1-23]:

tritium
carbon-14
sodium-22
manganese-54
iron-55
cobalt-57
nickel-59
cobalt-60
nickel-63
krypton-85
strontium-90
cadmium-109
barium-133
cesium-137
promethium-147
gadolinium-148
thallium-204
bismuth-210
polonium-210
lead-210
radium-226
thorium-230
protactinium-234
plutonium-238
uranium-238
plutonium-239
americium-241
curium-244

These radioactive materials are used at the Pinellas Plant for two basic purposes:

a) As part of a product, for example tritium used in neutron generators and plutonium used in radioisotopic thermal generators (RTG) formerly manufactured at the plant, or

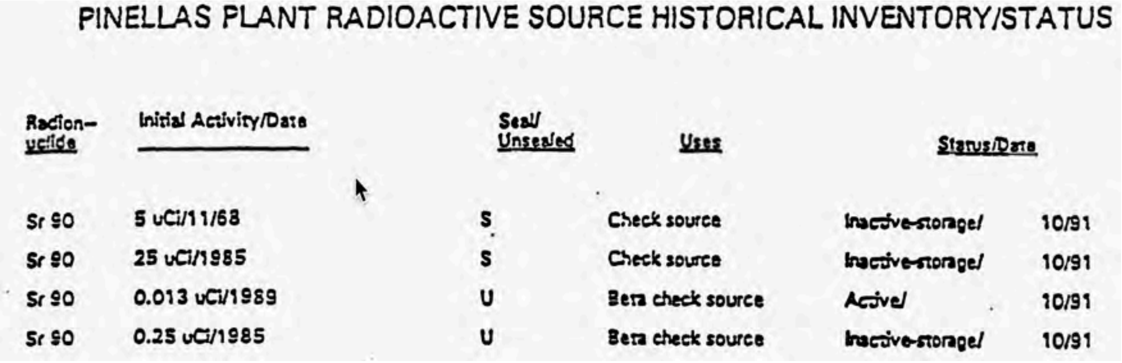
b) As sources used for calibration of radiation detectors (commonly used in hospitals and scientific research labs) or tracers for detecting leaks and determining surface cleanliness.

Two sets of inventories of the history of radionuclides used at the plant were

---

[92] IBID. p. 23

Exhibit 2: Pinellas Plant Radioactive Source Historical Inventory Status[93]



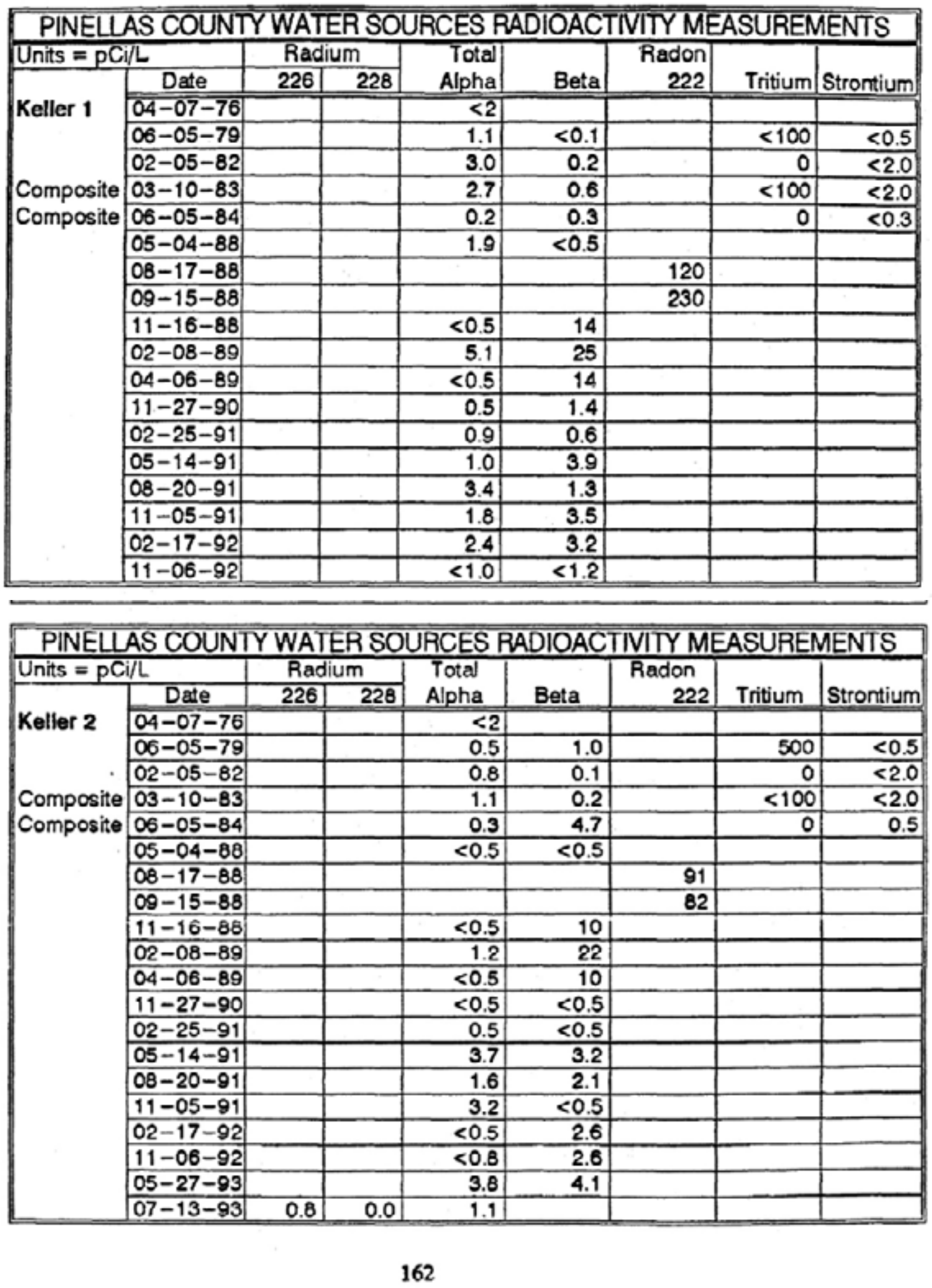
PINELLAS PLANT RADIOACTIVE SOURCE HISTORICAL INVENTORY/STATUS

Radionuclide	Initial Activity/Date	Seal/ Unsealed	Uses	Status/Date	
Sr 90	5 uCi/11/68	S	Check source	Inactive-storage/	10/91
Sr 90	25 uCi/1985	S	Check source	Inactive-storage/	10/91
Sr 90	0.013 uCi/1989	U	Beta check source	Active/	10/91
Sr 90	0.25 uCi/1985	U	Beta check source	Inactive-storage/	10/91

---

[93] IBID.

Exhibit 3: ***Radioactive Measurements of Pinellas County***[94]



PINELLAS COUNTY WATER SOURCES RADIOACTIVITY MEASUREMENTS

Units = pCi/L		Radium		Total		Radon		
	Date	226	228	Alpha	Beta	222	Tritium	Strontium
Keller 1	04-07-76			<2				
	06-05-79			1.1	<0.1		<100	<0.5
	02-05-82			3.0	0.2		0	<2.0
Composite	03-10-83			2.7	0.6		<100	<2.0
Composite	06-05-84			0.2	0.3		0	<0.3
	05-04-88			1.9	<0.5			
	08-17-88					120		
	09-15-88					230		
	11-16-88			<0.5	14			
	02-08-89			5.1	25			
	04-06-89			<0.5	14			
	11-27-90			0.5	1.4			
	02-25-91			0.9	0.6			
	05-14-91			1.0	3.9			
	08-20-91			3.4	1.3			
	11-05-91			1.8	3.5			
	02-17-92			2.4	3.2			
	11-06-92			<1.0	<1.2			

PINELLAS COUNTY WATER SOURCES RADIOACTIVITY MEASUREMENTS

Units = pCi/L		Radium		Total		Radon		
	Date	226	228	Alpha	Beta	222	Tritium	Strontium
Keller 2	04-07-76			<2				
	06-05-79			0.5	1.0		500	<0.5
	02-05-82			0.8	0.1		0	<2.0
Composite	03-10-83			1.1	0.2		<100	<2.0
Composite	06-05-84			0.3	4.7		0	0.5
	05-04-88			<0.5	<0.5			
	08-17-88					91		
	09-15-88					82		
	11-16-88			<0.5	10			
	02-08-89			1.2	22			
	04-06-89			<0.5	10			
	11-27-90			<0.5	<0.5			
	02-25-91			0.5	<0.5			
	05-14-91			3.7	3.2			
	08-20-91			1.6	2.1			
	11-05-91			3.2	<0.5			
	02-17-92			<0.5	2.6			
	11-06-92			<0.8	2.6			
	05-27-93			3.8	4.1			
	07-13-93	0.8	0.0	1.1				

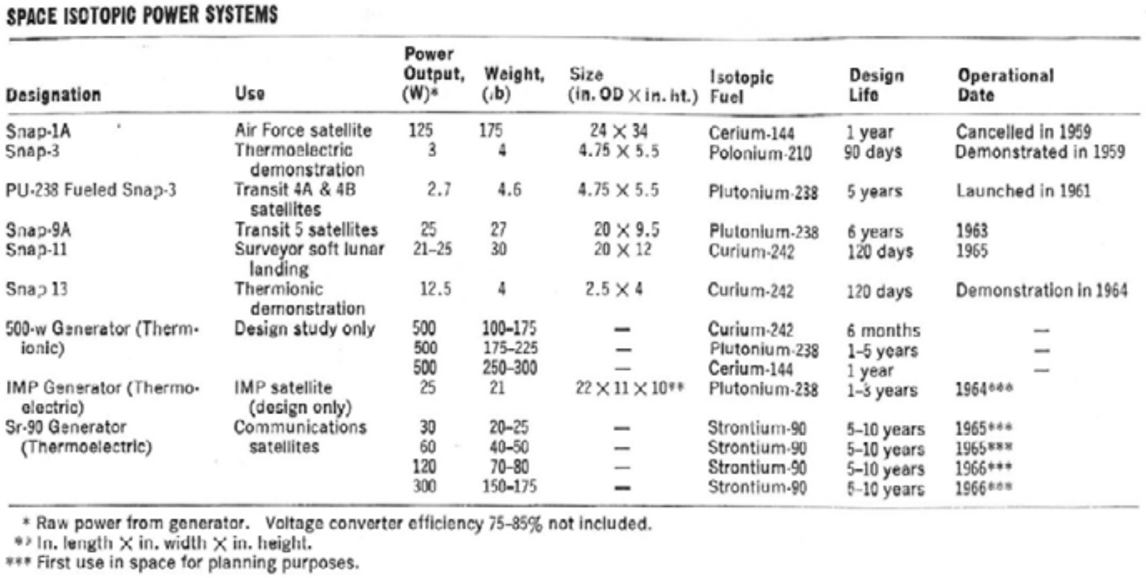
162

---

[94] IBID.

PINELLAS COUNTY WATER SOURCES RADIOACTIVITY MEASUREMENTS								
Units = pCi/L		Radium		Total		Radon		
	Date	226	228	Alpha	Beta	222	Tritium	Strontium
Cypress	02-05-82			0.8	4.4		0	<2.0
Composite	03-10-83			1.1	2.6		<100	<2.0
Composite	06-05-84			0.6	1.6		0	<0.3
	05-04-88			0.7	<0.5			
	09-15-88					140		
	11-16-88			<0.5	<0.5			
	02-08-89			<0.5	3.1			
	04-06-89			<0.5	<0.5			
	11-27-90			1.5	3.0			
	03-12-91			1.6	1.4			
	05-14-91			1.0	<0.5			
	08-20-91			1.7	1.1			
	11-05-91			2.8	2.6			
	02-17-92			1.9	1.6			
	11-06-92			2.8	2.8			
	05-27-93			0.6	1.9			
	07-13-93	0.9	0.0	0.5				
Consec.	07-13-93	1.1	0.0	1.1				
East Lake	04-07-76			<2				
	05-04-88			1.2	<0.5			
	11-16-88			<0.5	7.9			
	02-08-89			2.8	6.3			
	04-06-89			<0.5	7.9			
	03-21-91			0.9	2.2			
EWPW								
Composite	02-12-79	0.5	<0.5	1.6	<0.1	<100	<1.0	
Composite	06-27-80			0.8	3.6	<200	<0.5	

Exhibit 4: Space Isotopic Power Systems[95]



SPACE ISOTOPIC POWER SYSTEMS

Designation	Use	Power Output, (W)*	Weight, (lb)	Size (in. OD × in. ht.)	Isotopic Fuel	Design Life	Operational Date
Snap-1A	Air Force satellite	125	175	24 × 34	Cerium-144	1 year	Cancelled in 1959
Snap-3	Thermoelectric demonstration	3	4	4.75 × 5.5	Polonium-210	90 days	Demonstrated in 1959
PU-238 Fueled Snap-3	Transit 4A & 4B satellites	2.7	4.6	4.75 × 5.5	Plutonium-238	5 years	Launched in 1961
Snap-9A	Transit 5 satellites	25	27	20 × 9.5	Plutonium-238	6 years	1963
Snap-11	Surveyor soft lunar landing	21–25	30	20 × 12	Curium-242	120 days	1965
Snap 13	Thermionic demonstration	12.5	4	2.5 × 4	Curium-242	120 days	Demonstration in 1964
500-w Generator (Thermionic)	Design study only	500	100–175	—	Curium-242	6 months	—
		500	175–225	—	Plutonium-238	1-5 years	—
		500	250–300	—	Cerium-144	1 year	—
IMP Generator (Thermoelectric)	IMP satellite (design only)	25	21	22 × 11 × 10**	Plutonium-238	1–3 years	1964***
Sr-90 Generator (Thermoelectric)	Communications satellites	30	20–25	—	Strontium-90	5–10 years	1965***
		60	40–50	—	Strontium-90	5–10 years	1965***
		120	70–80	—	Strontium-90	5–10 years	1966***
		300	150–175	—	Strontium-90	5–10 years	1966***

* Raw power from generator. Voltage converter efficiency 75–85% not included.

** In. length × in. width × in. height.

*** First use in space for planning purposes.

---

[95] Capt. RT Carpenter, USAF. *Space isotopic power systems*. Atomic Energy Commission. https://fas.org › nuke › space › carp

Exhibit 5: Properties of Isotopes Useful for Isotopic Power Generation[96]

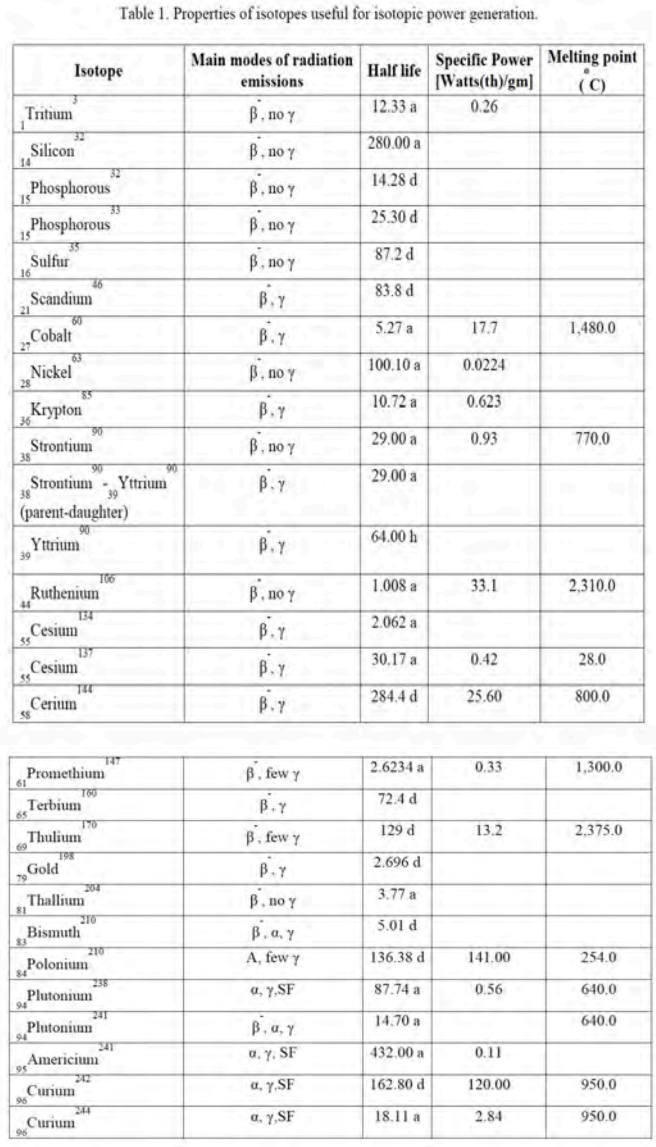


Table 1. Properties of isotopes useful for isotopic power generation.

Isotope	Main modes of radiation emissions	Half life	Specific Power [Watts(th)/gm]	Melting point $^{\circ}$(C)
${}_{1}^{3}$Tritium	β^-, no γ	12.33 a	0.26	
${}_{14}^{32}$Silicon	β^-, no γ	280.00 a		
${}_{15}^{32}$Phosphorous	β^-, no γ	14.28 d		
${}_{15}^{33}$Phosphorous	β^-, no γ	25.30 d		
${}_{16}^{35}$Sulfur	β^-, no γ	87.2 d		
${}_{21}^{46}$Scandium	β^-, γ	83.8 d		
${}_{27}^{60}$Cobalt	β^-, γ	5.27 a	17.7	1,480.0
${}_{28}^{63}$Nickel	β^-, no γ	100.10 a	0.0224	
${}_{36}^{85}$Krypton	β^-, γ	10.72 a	0.623	
${}_{38}^{90}$Strontium	β^-, no γ	29.00 a	0.93	770.0
${}_{38}^{90}$Strontium - ${}_{39}^{90}$Yttrium (parent-daughter)	β^-, γ	29.00 a		
${}_{39}^{90}$Yttrium	β^-, γ	64.00 h		
${}_{44}^{106}$Ruthenium	β^-, no γ	1.008 a	33.1	2,310.0
${}_{55}^{134}$Cesium	β^-, γ	2.062 a		
${}_{55}^{137}$Cesium	β^-, γ	30.17 a	0.42	28.0
${}_{58}^{144}$Cerium	β^-, γ	284.4 d	25.60	800.0
${}_{61}^{147}$Promethium	β^-, few γ	2.6234 a	0.33	1,300.0
${}_{65}^{160}$Terbium	β^-, γ	72.4 d		
${}_{69}^{170}$Thulium	β^-, few γ	129 d	13.2	2,375.0
${}_{79}^{198}$Gold	β^-, γ	2.696 d		
${}_{81}^{204}$Thallium	β^-, no γ	3.77 a		
${}_{83}^{210}$Bismuth	β^-, α, γ	5.01 d		
${}_{84}^{210}$Polonium	A, few γ	136.38 d	141.00	254.0
${}_{94}^{238}$Plutonium	α, γ,SF	87.74 a	0.56	640.0
${}_{94}^{241}$Plutonium	β^-, α, γ	14.70 a		640.0
${}_{95}^{241}$Americium	α, γ, SF	432.00 a	0.11	
${}_{96}^{242}$Curium	α, γ,SF	162.80 d	120.00	950.0
${}_{96}^{244}$Curium	α, γ,SF	18.11 a	2.84	950.0

---

[96] IBID.

Appendix 1: 24-Hour Urine Heavy Metals Tests

Background to requesting the tests:

1) Several DEEOIC claimants represented by [redacted] volunteered to have 24-hour Heavy Metals Urine Tests Conducted.
2) [redacted] provided these claimants with a list of radionuclides for which to be tested: **Beryllium;[97] Cobalt; Thallium; and, Uranium.**
3) In one particular case, a specific claimant was advised to be tested for **Strontium-90** because of possible exposure due to specific employment categories.
4) Claimants used three specific labs to have these tests conducted: LabCorp; Quest; and Genova Diagnostics. Although information was requested by [redacted] regarding the process by which these tests were conducted, the labs stated that they were unable to provide that information at this time due to the demands for testing related to the current COVID-19 pandemic.
5) A chart was created by [redacted], that summarizes the information obtained from claimants' employment files and results of the 24-hour Urine Heavy Metals Test. Due to Privacy Act concerns, each claimant who participated was assigned a unique ID number. For each claimant, a list of their employment categories is provided. The reason this information has been included is to illustrate regardless of employment location, former workers had the potential for radiological exposures ignored by the existing tests within this facility. While some claimants included in this sample were tested by the Pinellas facility for radiologic exposure to tritium,[98] neutrons and gamma; most claimants included were never afforded testing throughout the duration of their employment. It is also important to note that while one might argue that these exposures were insignificant, the shear fact that people were exposed to radionuclides without their knowledge is unacceptable. These exposures have more likely than not contributed to these individuals long term health concerns.
6) Finally, redacted copies of the test results are also included in this appendix.
7) Final note, in the case of one specific claimant, a complete file entailing medical, personnel and radiological information was not available through the DOL nor DOE. In fact, it was delivered to claimant via special delivery from University of Florida. We have been unable to ascertain as to why the file was never turned over to the DOE.

---

[97] As discussed elsewhere in this document, although Beryllium is not considered a radionuclide, it is included here to illustrate the extensive exposure of workers to this toxin.

[98] In available dosimetry contained in several of these former employee's files, no tritium exposure records exist prior to 1970 which impact the reliability of all dosimetry related to this material.

RESULTS HEAVY METALS TESTS FOR FORMER WORKERS AT PINELLAS PLANT*

ID	Yrs Employed		Beryllium	Cobalt	Strontium90	Thallium	Uranium
1	1965-1997		X				X
	[redacted]						
	[redacted]						
2	1963-1997		X				X
	[redacted]						
	[redacted]						
3	1964-`970		X				X
	[redacted]						
	[redacted]						
4	1963-1997		X				X
	[redacted]						
	[redacted]						
	[redacted]						
5	[redacted]		X				X
	[redacted]						
	1982-1992 Pinellas						
	[redacted]						
6	1967-1995			X	X	X	
	[redacted]						
	[redacted]						
	[redacted]						
7	1958-1992						
	[redacted]						
	[redacted]						
8	1968-1972			X			X
	[redacted]						

[redacted]

CUMULATIVE REPORT

Arsenic Exposure Profile, Ur

COLLECTION DATE	06/21/2019
Order Date	06/21/2019
Result Date	06/25/2019
Ordering Physician	[redacted]
Arsenic (Total),U	None Detected (0-50 ug/L)
Creatinine(Crt),U	0.57 (0.30-3.00 g/L)
Arsenic(Inorganic),U	None Detected (0-19 ug/L)

Lead, Urine

COLLECTION DATE	06/21/2019
Order Date	06/21/2019
Result Date	06/25/2019
Ordering Physician	[redacted]
Lead, Urine	None Detected (0-49 ug/L)

Mercury, Urine

COLLECTION DATE	06-21-2019
Order Date	06/21/2019
Result Date	06/25/2019
Ordering Physician	[redacted]
Mercury, Urine	None Detected (0-19 ug/L)

Cadmium, Urine

COLLECTION DATE	06/21/2019
Order Date	06/21/2019
Result Date	06/25/2019
Ordering Physician	[redacted]
Cadmium, Urine	None Detected (None detected ug/L)

Beryllium, Urine

COLLECTION DATE	06/21/2019
Order Date	06/21/2019
Result Date	06/25/2019
Ordering Physician	[redacted]
Beryllium, Urine	<0.5 (<2.0 ng/ml)

Uranium, Urine

COLLECTION DATE	06/21/2019
Order Date	06/21/2019
Result Date	06/25/2019
Ordering Physician	[redacted]
Uranium, Urine	<1.0 (ng/ml)

*Rheumatoid Factor Quantitative

[redacted]

[redacted]

CUMULATIVE REPORT

Arsenic Exposure Profile, Ur

COLLECTION DATE	06/21/2019
Order Date	06/21/2019
Result Date	06/25/2019
Ordering Physician	[redacted]
Arsenic (Total),U	None Detected (0-50 ug/L)
Creatinine(mg/	0.36 (0.30-3.00 g/L)
Arsenic(Inorganic),U	None Detected (0-19 ug/L)

Lead, Urine

COLLECTION DATE	06/21/2019
Order Date	06/21/2019
Result Date	06/25/2019
Ordering Physician	[redacted]
Lead, Urine	None Detected (0-49 ug/L)

Mercury, Urine

COLLECTION DATE	06/21/2019
Order Date	06/21/2019
Result Date	06/25/2019
Ordering Physician	[redacted]
Mercury, Urine	None Detected (0-19 ug/L)

Cadmium, Urine

COLLECTION DATE	06/21/2019
Order Date	06/21/2019
Result Date	06/25/2019
Ordering Physician	[redacted]
Cadmium, Urine	None Detected (None detected ug/L)

Beryllium, Urine

COLLECTION DATE	06/21/2019
Order Date	06/21/2019
Result Date	06/25/2019
Ordering Physician	[redacted]
Beryllium, Urine	<0.5 (<2.0 ng/ml)

Uranium, Urine

COLLECTION DATE	06/21/2019
Order Date	06/21/2019
Result Date	06/25/2019
Ordering Physician	[redacted]
Uranium, Urine	<1.0 (ng/ml)

*PC CBG

[redacted]

[redacted]

LabCorp Patient Report

[redacted]

Patient Details
[redacted]

Specimen Details
Date collected: 07/24/2019 1200 Local
Date received: 07/25/2019
Date entered: 07/25/2019
Date reported: 07/30/2019 0306 ET

Physician Details
Ordering: [redacted]
Referring:
ID:
NPI: [redacted]

General Comments & Additional Information
Total Urine Volume: 1525ml **Fasting:** U

Ordered Items
Arsenic Exposure Profile, Ur; Lead, Urine; Mercury, Urine; Cadmium, Urine; Beryllium, Urine; Uranium, Urine; Handwritten Order; Request Problem

TESTS	RESULT	FLAG	UNITS	REFERENCE INTERVAL	LAB
Arsenic Exposure Profile, Ur					
Arsenic (Total),U ^A^	19		ug/L	0 - 50 Detection Limit = 10	01
Arsenic,Urine 24 Hr	29		ug/24 hr	0 - 50	
Arsenic(Inorganic),U ^A^	None Detected		ug/L	0 - 19 Environmental Exposure: 0-19 Occupational Exposure: 35 Detection Limit = 10	01
Creatinine(Crt),U	0.50		g/L	0.30 - 3.00 Detection Limit = 0.10	01
Lead, Urine ^A^	None Detected		ug/L	0 - 49 Detection Limit = 1	01
Mercury, Urine ^A^	None Detected		ug/L	0 - 19 Detection Limit = 1	01
Cadmium, Urine ^A^	None Detected		ug/L	None detected Detection Limit = 1.0	01
Beryllium, Urine	<0.5		ng/ml	<2.0	02

Reference range:
nonsmokers: less than 0.5 ng/ml
smokers: less than 2.0 ng/ml

Beryllium analysis performed by inductively coupled plasma / mass spectrometry (ICP/MS).

This test was developed and its performance characteristics determined by LabCorp. It has not been cleared or approved by the Food and Drug Administration.

TESTS	RESULT	FLAG	UNITS	REFERENCE INTERVAL	LAB
Uranium, Urine	<1.0		ng/ml		02

Normal (unexposed population):

[redacted]

TESTS RESULT FLAG UNITS REFERENCE INTERVAL LAB

less than 1.0 ug/24 hours

Exposed: levels of 100 ng/ml are indicative of recent exposure to at least 50 ug/m3 uranium.

Analysis performed by inductively coupled plasma/ mass spectrometry (ICP/MS).

This test was developed and its performance characteristics determined by LabCorp. It has not been cleared or approved by the Food and Drug Administration.

Request Problem

Quantity was not sufficient for analysis. 03

Comments:

* This test was developed and its performance characteristics determined by LabCorp. It has not been cleared or approved by the Food and Drug Administration.

01	BN	LabCorp Burlington 1447 York Court, Burlington, NC 27215-3361	Dir: Sanjai Nagendra, MD
02	MX	MedTox Laboratories Inc 402 W County Road D, St Paul, MN 55112-3522	Dir: Karla Walker, PhrmD
03	TA	LabCorp Tampa 5610 W LaSalle Street, Tampa, FL 33607-1770	Dir: Sean Farrier, MD

For inquiries, the physician may contact **Branch: 800-877-5227 Lab: 800-762-4344**

Specimen ID: [redacted]
Control ID: [redacted]

Acct #: [redacted] [redacted] Rte: CC

[redacted]

[redacted]

Patient Details
[redacted]

Specimen Details
Date collected: 08/30/2019 0847 Local
Date received: 08/30/2019
Date entered: 08/30/2019
Date reported: 09/05/2019 0809 ET

[redacted]

General Comments & Additional Information
Total Urine Volume: 2100ml

Fasting: No

Ordered Items
Arsenic Exposure Profile, Ur; Lead, Urine; Mercury, Urine; Cadmium, Urine; Beryllium, Urine; Uranium, Urine

TESTS	RESULT	FLAG	UNITS	REFERENCE INTERVAL	LAB
Arsenic Exposure Profile, Ur					
Arsenic (Total),U [A]	None Detected		ug/L	0 - 50 Detection Limit = 10	01
Arsenic(Inorganic),U [A]	None Detected		ug/L	0 - 19 Environmental Exposure: 0-19 Occupational Exposure: 35 Detection Limit = 10	01
Creatinine(Crt),U	0.57		g/L	0.30 - 3.00 Detection Limit = 0.10	01
Lead, Urine [A]	None Detected		ug/L	0 - 49 Detection Limit = 1	01
Mercury, Urine [A]	None Detected		ug/L	0 - 19 Detection Limit = 1	01
Cadmium, Urine [A]	None Detected		ug/L	None detected Detection Limit = 1.0	01
Beryllium, Urine	<0.5		ng/ml	<2.0	02

Reference range:
nonsmokers: less than 0.5 ng/ml
smokers: less than 2.0 ng/ml

Beryllium analysis performed by inductively coupled plasma / mass spectrometry (ICP/MS).

This test was developed and its performance characteristics determined by LabCorp. It has not been cleared or approved by the Food and Drug Administration.

TESTS	RESULT	FLAG	UNITS	REFERENCE INTERVAL	LAB
Uranium, Urine	<1.0		ng/ml		02

Normal (unexposed population):
less than 1.0 ug/24 hours

[redacted]

Control ID: [redacted]

[redacted]
Date collected: 08/30/2019 0847 Local

TESTS RESULT FLAG UNITS REFERENCE INTERVAL LAB

Exposed: levels of 100 ng/ml are indicative of recent exposure to at least 50 ug/m3 uranium.

Analysis performed by inductively coupled plasma/ mass spectrometry (ICP/MS).

This test was developed and its performance characteristics determined by LabCorp. It has not been cleared or approved by the Food and Drug Administration.

Comments:

[A] This test was developed and its performance characteristics determined by LabCorp. It has not been cleared or approved by the Food and Drug Administration.

01	BN	LabCorp Burlington 1447 York Court, Burlington, NC 27215-3361	Dir: Sanjai Nagendra, MD
02	MX	MedTox Laboratories Inc 402 W County Road D, St Paul, MN 55112-3522	Dir: Karla Walker, PhrmD

For inquiries, the physician may contact **Branch: 800-877-5227 Lab: 800-762-4344**

[redacted]

TESTS RESULT FLAG UNITS REFERENCE INTERVAL LAB

Beryllium, Urine <0.5 ng/ml <2.0 02

Reference range:
nonsmokers: less than 0.5 ng/ml
smokers: less than 2.0 ng/ml

Beryllium analysis performed by inductively coupled plasma / mass spectrometry (ICP/MS).

This test was developed and its performance characteristics determined by LabCorp. It has not been cleared or approved by the Food and Drug Administration.

Uranium, Urine <1.0 ng/ml 02

Normal (unexposed population):
less than 1.0 ug/24 hours

Exposed: levels of 100 ng/ml are indicative of recent exposure to at least 50 ug/m3 uranium.

Analysis performed by inductively coupled plasma/ mass spectrometry (ICP/MS).

This test was developed and its performance characteristics determined by LabCorp. It has not been cleared or approved by the Food and Drug Administration.

Barium, Urine

Barium 1.9 ng/ml 02

Normal (unexposed population): <20.0 ug/ml

Barium analysis performed by inductively coupled plasma / mass spectrometry (ICP/MS).

This test was developed and its performance characteristics determined by LabCorp. It has not been cleared or approved by the Food and Drug Administration.

Antimony, Urine ^A None Detected ug/L 0 - 9 01
Detection Limit = 1

Bismuth, Urine ^A None Detected ug/L 0.3 - 4.6 01
Detection Limit = 1.0

Comments:

^A This test was developed and its performance characteristics determined by LabCorp. It has not been cleared or approved by the Food and Drug Administration.

[redacted]

LabCorp Patient Report

Specimen ID: [redacted]
Control ID: [redacted]

Acct #: [redacted]

Phone: (770) 345-2300 **Rte: 19**

[redacted]

[redacted]

Patient Details
[redacted]

Specimen Details
Date collected: 06/07/2019 1201 Local
Date received: 06/07/2019
Date entered: 06/07/2019
Date reported: 06/12/2019 1207 ET

Physician Details
Ordering: [redacted]
Referring:
ID:
NPI: [redacted]

General Comments & Additional Information
Total Urine Volume: 1000ml

Fasting: No

Ordered items
Heavy Metals Profile, Urine; Aluminum, Urine; Nickel, Urine. Cadmium, Urine; Thallium, Urine; Beryllium, Urine; Uranium, Urine; Barium, Urine; Antimony, Urine; Bismuth, Urine

TESTS	RESULT	FLAG	UNITS	REFERENCE INTERVAL	LAB
Heavy Metals Profile, Urine					
Creatinine(Crt),U	1.62		g/L	0.30 - 3.00 Detection Limit = 0.10	01
Arsenic (Total),U ^	None Detected		ug/L	0 - 50 Detection Limit = 10	01
Arsenic(Inorganic),U ^	None Detected		ug/L	0 - 19 Environmental Exposure: 0-19 Occupational Exposure: 35 Detection Limit = 10	01
Lead, Urine ^	None Detected		ug/L	0 - 49 Detection Limit = 1	01
Mercury, Urine ^	None Detected		ug/L	0 - 19 Detection Limit = 1	01
Aluminum, Urine					
Aluminum, Urine ^	9		ug/L	5 - [illegible] Detection Limit = 3	01
Aluminum/Crt Ratio	6		ug/g creat	0 - 49 Environmental Exposure: [illegible]	
Aluminum,Urine 24 Hr	9		ug/24 hr	0 - 32	
Nickel, Urine					
Nickel, Urine ^	None Detected		ug/L	Not Estab. Detection Limit = 1.0	01
Nickel, Urine (24hr) Unable to calculate result since non-numeric result obtained for component test.					
Cadmium, Urine ^	None Detected		ug/L	None detected Detection Limit = 1.0	01
Thallium, Urine ^	None Detected		ug/L	0.0 - 1.5 Detection Limit = 1.0	01

Date issued: 06/12/19 1211 ET

FINAL REPORT

[redacted]

[redacted]

FINAL RESULT

Accession ID: [redacted]
Lab Ref ID: [redacted]

Order Date: 05/31/2019
Result Recd: 06/06/2019 19:30:06

Coll Date: 05/31/2019 13:46:00
Report: 06/06/2019 19:19:00

[redacted]

HEAVY METALS COMPREHENSIVE PANEL, RANDOM URINE

NAME	VALUE	REFERENCE RANGE	LAB
F THALLIUM, URINE	0.6 H	< 0.5 (mcg/g creat)	SLI
-			
- Nonexposed Adults:			
- < or = 0.4 mcg/g creatinine			
-			
F CREATININE, RANDOM URINE	32	20-320 (mg/dL)	SLI
F COBALT, RANDOM URINE	<0.2	< 2.9 (mcg/L)	SLI
-			
- Nonexposed Adult:			
- < or = 2.8 mcg/L			
-			
- Biological Exposure Index (end of shift/work week):			
- < or = 15.0 mcg/L			
-			
F ARSENIC, URINE	See Below	(mcg/g creat)	SLI
- See below			
- Results are below reportable range for this analyte, which is			
- 10.0 mcg/L.			
-			
- Nonexposed Adult:			
- < or = 35 mcg/g creatinine			
-			
- Biological Exposure Index (end of shift/work week):			
- < or = 50 mcg/g creatinine			
-			
F LEAD, URINE	See Below	< 10 (mcg/g creat)	SLI
- See below			
- Results are below reportable range for this analyte, which is			
- 10.0 mcg/L.			
-			
- Nonexposed Adult:			
- < 10 mcg/g creatinine			
-			
F MERCURY, RANDOM URINE	See Below	(mcg/g creat)	SLI

[redacted]

NAME	VALUE	REFERENCE RANGE	LAB

- See below
- Results are below reportable range for this analyte, which is 4.0
- mcg/L.
-
- Nonexposed Adult:
- < or = 4 mcg/g creatinine
-
- Biological Exposure Index (preshift):
- < or = 35 mcg/g creatinine
-

F CADMIUM, RANDOM URINE	See Below	(mcg/g creat)	SLI

- See below
- Results are below reportable range for this analyte, which is 0.5
- mcg/L.
-
- Nonexposed Adult:
- < or = 1.2 mcg/g creatinine
-
- OSHA Reference Range for Industrial Exposure:
- < or = 3.0 mcg/g creatinine
-
- This test was developed and its analytical performance
- characteristics have been determined by Quest Diagnostics Nichols
- Institute Valencia. It has not been cleared or approved by the US
- Food and Drug Administration. This assay has been validated
- pursuant to the CLIA regulations and is used for clinical
- purposes.

FASTING:NO

FASTING: NO

PERFORMING LAB: SLI, Quest Diagnostics-Nichols Valencia, 27027 Tourney Rd, Valencia, CA, 91355-5386 Jon M Nakamoto M.D., Ph.D

[redacted]

[redacted]

Quest Diagnostics

Report Status: Fina

[redacted]

Patient Information	**Specimen Information**	**Client Information**
[redacted]	[redacted] Collected: 10/02/2019 / 09:09 EDT Received: 10/04/2019 / 09:48 EDT Reported: 10/15/2019 / 07:06 EDT (* A Copy From)	[redacted]

COMMENTS: FASTING:NO

Test Name	In Range	Out Of Range	Reference Range	Lab
BERYLLIUM (U)				T7A
CREATININE Reporting Limit: 100 mg/L	956.3		mg/L	
U.S. Population (10th - 90th percentiles, median) All participants: 335 2370 mg/L, median 1180 (n=22,245) Males: 495 - 2540 mg/L, median 1370 (n=10,610) Females: 273 - 2170 mg/L, median 994 (n=11,635) Analysis by Colorimetry (C)				
BERYLLIUM Reporting Limit: 0.50 mcg/L	None Detected		mcg/L	
Reference Range: Less than 0.5 mcg/L. May be elevated in smokers. Analysis by Inductively Coupled Plasma/Mass Spectrometry (ICP/MS)				
BERYLLIUM (CREATININE CORRECTED) Reporting Limit: 0.52 mcg/g Creat	None Detected		mcg/g Creat	
Analysis by Inductively Coupled Plasma/Mass Spectrometry (ICP/MS) Disclaimer: Specimens for elemental testing should be collected in certified metal-free containers. Elevated results for elemental testing may be caused by environmental contamination at the time of specimen collection and should be interpreted accordingly. It is recommended that unexpected elevated results be verified by testing another specimen.				
THORIUM, SERUM/PLASMA Reporting Limit: 0.50 mcg/L	None Detected		mcg/L	T7A
Normally: Less than 0.5 mcg/L. Analysis by Inductively Coupled Plasma/Mass Spectrometry (ICP/MS) Disclaimer: Specimens for elemental testing should be collected in certified metal-free containers. Elevated results for elemental testing may be caused by environmental contamination at the time of specimen collection and should be interpreted accordingly. It is recommended that unexpected elevated results be verified by testing another specimen.				
STRONTIUM 90(U) Reporting Limit: 10 mcg/L	130		mcg/L	T7A
Normally: less than 500 mcg/L Analysis by Inductively Coupled Plasma/Mass Spectrometry (ICP/MS) Disclaimer: Specimens for elemental testing should be collected in certified metal-free containers. Elevated results for elemental testing may be caused by				

[redacted]

Patient Information	**Specimen Information**	**Client Information**
[redacted]	[redacted] Received: 10/04/2019 / 09:48 EDT Reported: 10/15/2019 / 07:06 EDT [illegible]	Client #: Not Given

Test Name	**In Range**	**Out Of Range**	**Reference Range**	**Lab**
environmental contamination at the time of specimen collection and should be interpreted accordingly. It is recommended that unexpected elevated results be verified by testing another specimen.				
URANIUM, URINE Reporting Limit: 0.10 mcg/L	None Detected		mcg/L	T7A
Normally: Less than 0.1 mcg/L. Analysis by Inductively Coupled Plasma/Mass Spectrometry (ICP/MS) Disclaimer: Specimens for elemental testing should be collected in certified metal-free containers. Elevated results for elemental testing may be caused by environmental contamination at the time of specimen collection and should be interpreted accordingly. It is recommended that unexpected elevated results be verified by testing another specimen.				

[redacted]

[redacted]

Toxic Element Clearance Profile
Ratio to Creatinine

Genova Diagnostics®
Innovative Testing for Optimal Health

63 Zillicoa Street
Asheville, NC 28801
© Genova Diagnostics

[redacted]

Order Number: [redacted]
Completed: May 03, 2010
Received: April 29, 2010
Collected: April 28, 2010

[redacted]

Toxic Elements

Results in µg/g creatinine

Element	Reference Range	TMPL	Reference Range**
Lead	11.2		<= 1.4
Mercury	1.94		<= 2.19
Aluminum	41.3		<= 22.3
Antimony	0.062		<= 0.149
Arsenic		>247	<= 50
ium	1.7		<= 6.7
Bismuth	<dl		<= 2.28
Cadmium	1.90		<= 0.84
Cesium	3.7		<= 10.5
Gadolinium	<dl		<= 0.019
Gallium	0.012		<= 0.028
Nickel	<dl		<= 3.88
Niobium	0.074		<= 0.084
Platinum	<dl		<= 0.033
Rubidium	1,394		<= 2,263
Thallium	0.161		<= 0.298
Thorium	<dl		<= 4.189
Tin	1.28		<= 2.04
Tungsten	0.074		<= 0.211
Uranium	<dl		<= 0.026

eference ranges are representative of a healthy population under non-challenged or non-provoked conditions.

Sulfur

Results in mg/g creatinine

Element	Reference Range	Reference Range**
Sulfur*	735	367-1,328

* Elevated sulfur may indicate the presence of a chelating agent.

Creatinine Concentration

Urine Creatinine ◆	40.47	23.00-205.00 mg/dL

Collection Information

Urine Total Volume (in milliliters): not given

Length of Collection: (in hours) 6.0

Provocation Comment:

Information regarding pre- or post-provocation was not provided.

TMPL

Tentative Maximum Permissible Limit (TMPL) - **Element** excretion is significantly elevated, consistent with increased body burden. Increased element concentrations can have a negative impact on overall health and well-being. These values are derived from Casaret and Doull's **Toxicology: The Basic Science of Poisons**, 5th Ed. 1996 McGraw Hill NY, NY p 997-998. Units have been standardized.

The performance characteristics of all assays have been verified by Genova Diagnostics, Inc. Unless otherwise noted with ◆ as cleared by the U.S. Food and Drug Administration, assays are For Research Use Only.

MERCURY, RANDOM URINE **See Below**

mcg/g creat

See Below
Results are below reportable range for this analyte,
which is 4.0
mcg/L.

Nonexposed Adult:
< or = 4 mcg/g creatinine

Biological Exposure Index (preshift):
< or = 35 mcg/g creatinine

CADMIUM, RANDOM URINE **See Below**

mcg/g creat

See below
Results are below reportable range for this analyte,
which is 0.5
mcg/L.

Nonexposed Adult:
< or = 1.0 mcg/g creatinine

OSHA Reference Range for Industrial Exposure:
< or = 3.0 mcg/g creatinine

This test was developed and its analytical performance
characteristics have been determined by Quest Diagnostics
Nichols
Institute Valencia. It has not been cleared or approved
by the US
Food and Drug Administration. This assay has been
validated
pursuant to the CLIA regulations and is used for clinical
purposes.

[redacted]

Key

⛔ Priority Out of Range ▲ Out of Range

Report Insights

[redacted]

Quest
Diagnostics

[redacted]

0

HEAVY METALS COMPREHENSIVE PANEL, URINE

THALLIUM, URINE

Reference Range <0.5 mcg/g creat

See Below

See below
Results are below reportable range for this analyte,
which is 0.2
mcg/L

Nonexposed Adults:
< or = 0.4 mcg/g creatinine

CREATININE, RANDOM URINE

Reference Range
20-320 mg/dL

Reference range varies across results

COBALT, RANDOM URINE

Reference Range
<2.9 mcg/L

Nonexposed Adult:
< or = 2.8 mcg/L

Biological Exposure Index (end of shift/work week):
< or = 15.0 mcg/L

ARSENIC, URINE

mcg/g creat

See Below

See below
Results are below reportable range for this analyte,
which is
10.0 mcg/L.

Nonexposed Adult:
< or = 35 mcg/g creatinine

Biological Exposure Index (end of shift/work week):
< or = 50 mcg/g creatinine

LEAD, URINE

Reference Range: <10 mcg/g creat

See Below

See below
Results are below reportable range for this analyte,
which is
10.0 mcg/L

Nonexposed Adult:
< 23 mcg/g creatinine

APPENDIX 2

65-273

GEPP--9

236

HEALTH PHYSICS REPORT

RECEIVED
OCT 01 1996
OSTI

Historical Report of Radiation Protection at GEND

Introduction:

The information presented in this report was collected in response to a request by the GEND Plant Manager in November 1989. Included are a basic description of early operations, significant HP activities, unusual events, and a summary of environmental releases of radioactivity since plant start up in 1957. The bulk of this information was taken from microfilm records and personal recollection by John Holliday, GEND Health Physicist 1957 - 1985, under contract # R-00162-X.

Discussion:

The core business of the Pinellas Plant was the same in 1957 as it is today, that is, production of neutron generator tubes for use in nuclear weapons. This process involves the loading of various metal films with deuterium and tritium under vacuum conditions, to form metal hydrides. Over the 30 year period since plant start up significant improvements have been made both in the product itself, and in the production methods. The original loading systems were made largely of glass and were much more delicate than the metal systems in use today.

During the first decade of operations, monthly reports to GE Management and the AEC indicate frequent personnel exposures, loss of contamination control, and releases of tritium to the environment. From the first Health Physics report, dated April 1957, it is apparent that GEND Health and Safety personnel had much to learn about methods to monitor and control tritium exposures and releases. At that time, very little published material was available concerning tritium safety. The overall attitude of the scientific (and regulatory) community was that tritium presented little hazard due to the very low energy associated with its decay. However, should these same events occur in today's regulatory environment, detailed investigations and reports would be required in many instances.

DISTRIBUTION RESTRICTED TO U.S. ONLY

MASTER

To better understand the early problems faced by radiation protection specialists at the Pinellas Plant, a brief description of the glass loading systems and their operation is needed. As shown in figure 1, the system consisted primarily of 2 vacuum pumps and a glass manifold to which quartz "beds" and glass "tubes" were attached. The system was roughed down using the Welch pump and taken to fine vacuums by the mercury diffusion pump. System pressure was originally measured with a U-tube mercury manometer mounted on a meter stick. Tritium and deuterium were introduced to the system by applying heat to the beds which contained either titanium deuteride or titanium tritide. Following the required exposure time, gas take back was accomplished by removing heat from the bed. When the system pressure reached zero, as indicated by the mercury manometer, the operator would age (functionally test) the tubes right on the system, using pulse tanks. Then, following bake out and pump down, the operator would seal off the tubes. Attaching and removing system components (such as beds and tubes) was accomplished using a torch. Variations in the quantity of tritium released to the environment following tube loading were attributed to: (1) Operators of various heights trying to determine that two legs of a U-tube manometer located inside a dimly lit hood were of equal height and, (2) Intentional opening of the #1 stopcock when the time for gas take-back was too lengthy.

Glass breakage was a frequent occurrence. Systems occasionally exploded or imploded causing gas release, loss of contamination control, and personnel exposure. To limit this breakage the glass systems were periodically "flamed" by "lead" glass men who would apply heat to the system using a torch to relieve stress in the glass. During this procedure the #1 stopcock would be open, maintaining the system at a rough vacuum with the pump exhaust vented to the stack.

The major causes of area contamination were the change and maintenance of the Welch vacuum pumps, and the cleaning of glass systems and component parts. Each of the hood rooms contained four glass loading systems resulting in a total of approximately 80 (contaminated) Welch vacuum pumps. Tritium gas and oxide, as well as vapors from the mercury diffusion pumps would build up in the pump oil until either saturated or flushed with air. Periodically, the pumps were removed from the systems and taken to a hood room where their oil was changed and any other necessary maintenance was performed. System cleaning involved cleaning all system stopcocks using a solvent material for removing greases. On occasion, breakage of a titanium hydride bed would cause high levels of floor contamination due to the high specific activity of the tritide that existed as extremely fine powder (similar to talc or activated charcoal.) Increased experience of manufacturing personnel in loading operations and education of area personnel in radiological safety, resulted in fewer losses of contamination control over time.

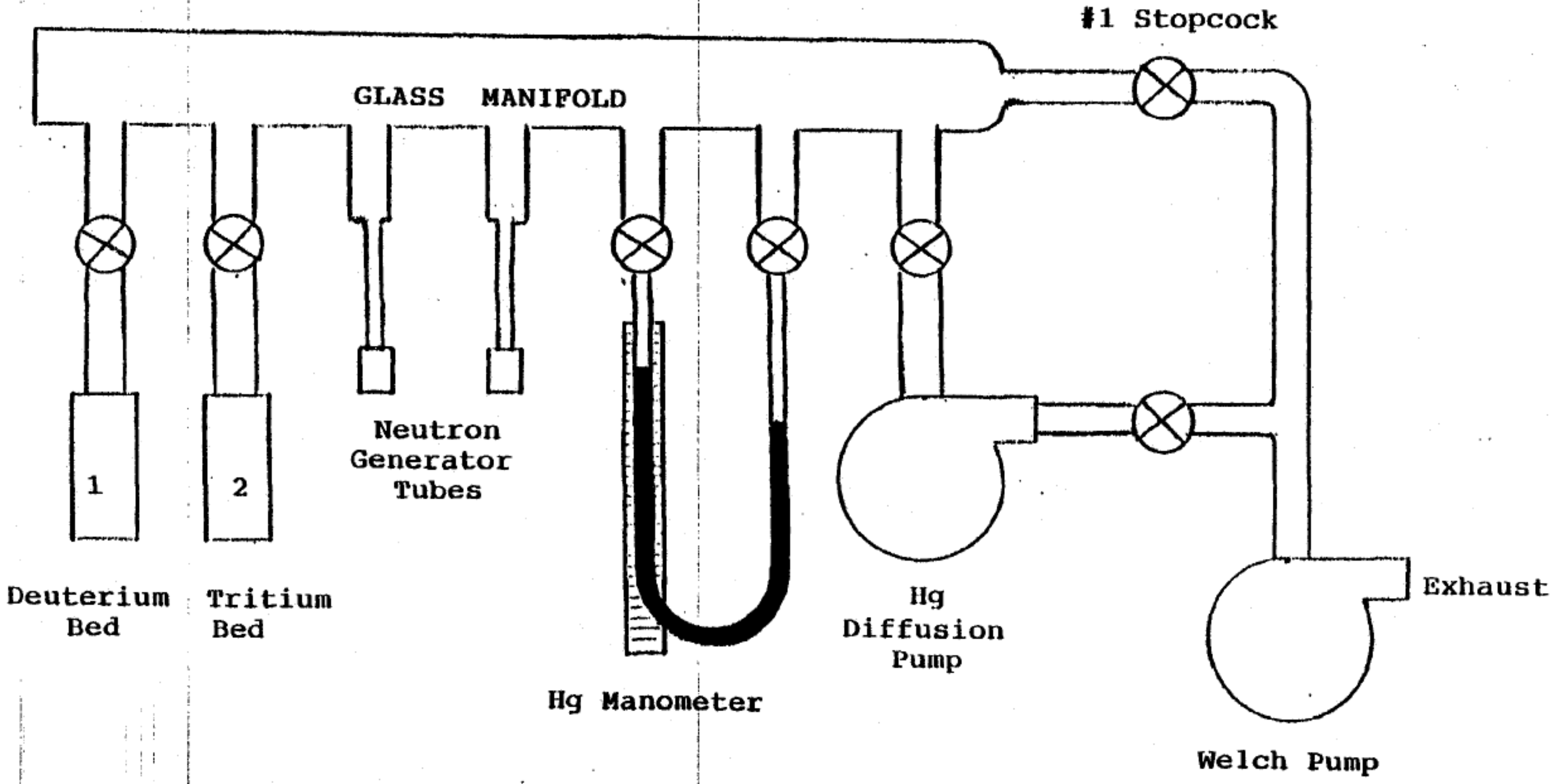


FIGURE 1: Glass Loading System

Three specific actions were responsible for major reductions in the quantities of tritium released to the environment. First, manufacturing management approved a 15 minute wait prior to opening the #1 stopcock after a tritium load*. This significantly reduced the quantity of tritium remaining in the system, and resulted in a reduction in total environmental discharges from 42,600 Ci in 1959 to 6,700 Ci in 1960.

Second, Health Physics personnel developed a method to convert gaseous tritium to water vapor and then remove the water molecules from an air stream using a desiccant. This concept was presented to the General Engineering Laboratory in Schnectady who then designed and installed the first Stack Effluent Control System (SECS) ever to be used anywhere. This system became operational in October 1960. The effect of the installation of the SEC System on releases is easily observable on Figure 2.

Third, the main tube exhaust area (108) was rearranged by removing most of the hood rooms and replacing the glass loading systems with metal systems similar to those in use today. With the switch to metal systems the gas storage unit was switched from titanium hydride in a glass cylinder to uranium hydride in a stainless steel cylinder. This provided better protection against breakage and allowed lower temperatures to be used when driving off the gas for each use.

Tritium releases to the environment rose with the startup of the metal loading systems because these systems were not initially connected to the SEC System. However, once all tritium loading systems were connected to the SECS in 1972, routine releases were reduced to a level approximately 100 times lower than those experienced in the 1950's.

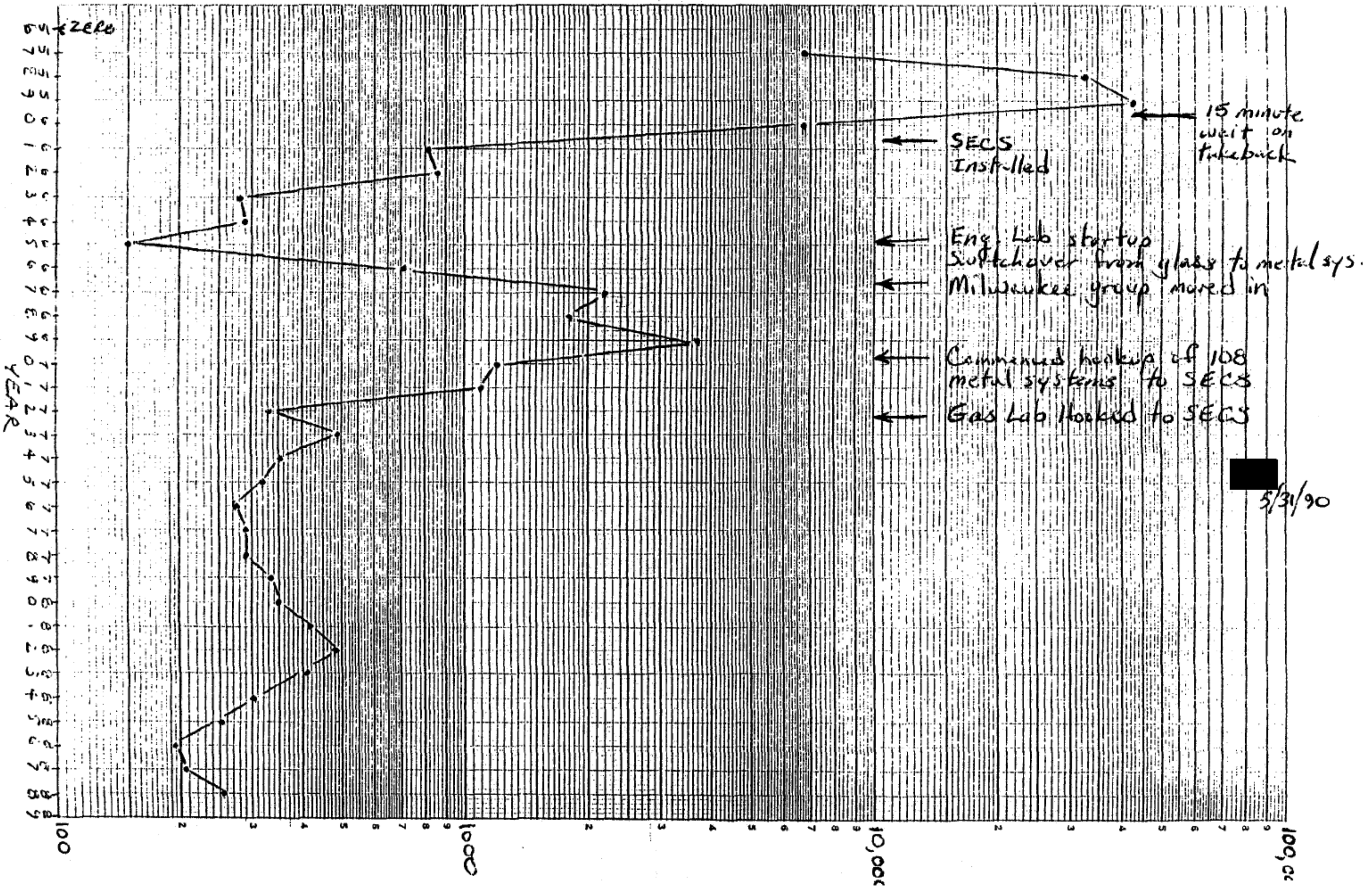
Over the last 15 years environmental releases have roughly paralleled tube production volumes. The major contributors to current routine releases are believed to be permeation of small amounts of T_2 gas through the metal walls of the uranium storage beds during heating, and minor HTO releases during normal system maintenance.

Much of the history of the Health Physics Program at GEND is documented on microfilm. Interested individuals may view the films at the record retention office. An index to this information is included as attachment C. For convenience a tabulation of events of historical significance involving radiation protection (attachment A) and a list of unusual events involving environmental releases or personnel or area contamination (attachment B), are included here.

*Note: The "wait period" was replaced by a specific vacuum limit once vacuum gages were installed on the systems around 1960.

FN-265-A (8-50) GENERAL ELECTRIC COMPANY, SCHENECTADY, N. Y., U.S.A. 3 cyc. x 170 1mm Divisions

FIGURE 2: TRITIUM CURIES RELEASED PER YEAR



[redacted]

5/31/90

Attachment A:

Date	Activity
4/57	Glass wool filters installed on Kanne inlets
	Need for calibration of Kanne chambers recognized
	New employee orientation in rad safety offered
9/57	Request for prior-employment exposure records initiated
	Pu-Be source received
	Written instructions provided for response to tube damage
	Washing machine purchased
10/57	Measured n dose rates at all test positions
	Reduced LLD for HTO in water by X2
	Pre and post employment bio program instituted
11/57	Measured n-output of n.g's (10 mrem/pulse @ 1 inch)
	Stack oxide levels first monitored
	SWP program initiated
12/57	Raytheon Tubes found to contain 10 nci Co-60
	GOP E.10.06 "Review of Operations" was issued
	Sandia asked to provide film badges
	Foot monitor installed in Area 108.
	Telephone booth whole body T monitor installed in Area 108.
1/58	Received 5, 50-micro ci Cs-137 sources
2/58	Monitored shipments of Co-60 needles
1/60	HP representative assigned to area 108 full time
3/60	Monitored workers urine for Hg exposure (max 0.052 mg/l)
	Installed stopcock interlocks on all systems in 108
6/60	Began milk sampling
	HP procedures prepared for GEXF Recovery System
8/60	Shoe covers reinstituted in 108. Area shoes still used
	Requested funds to purchase EM & RAT truck
	Visited by Florida State Board of Health on Environmental Monitoring

Date	Activity
9/10/60	Secured area 108 in preparation for Hurricane Donna. Provided continuous HP coverage during storm. Requirement for full anti-c's in 108 reduced to lab coats for normal production operations.
11/14/60	Visited by FSBH to review EM data. Began using NBS Handbook 69 for MPC's Pu Alpha sources shipped to Sandia for calibration
2/61	Evaluated and rejected use of Kr-85 for leak testing - doses too high.
3/61	Full-time HP Support provided to 3rd shift.
7/61	100 m ci Co-60 Source found leaking was corrected.
8/61	Semi-annual AEC Health & Safety Inspection.
11/61	The Cottingham School was advised on protection from fallout. We calibrated survey instruments for the Pinellas County Health & Fire Departments.
2/62	Fallout monitoring station set up
3/62	An HP representative spoke to the 8th grade at Maderia Jr. High on "Radiation" FSBH and ALO reviewed our HP programs.
9/62	HP personnel participated in Operation Spade Fork.
10/62	A modified personnel monitor was installed in Area 108.
3/63	HP darkroom installed
9/63	HP representative attended radiflo training course 9/24/63 Kr-85 first put in radiflo unit - lost 2 curies due to leaks Employees found falsely identifying urine samples
11/63	Dichromate coating found to hold Kr-85 in radiflo fixtures - removed X-rays found penetrating E-beam evaporator ports. Began use of wrist badges

Date	Activity
2/64	E-beam evaporator found reading 250 mr/hr at start up - shielded to 4 mr/hr Semi-annual AEC inspection.
6/64	0.2 Ci HTO in waste was burned as a test
10/64	ALO approved on-site incineration of rad waste Inspected by AEC (Semi-annual)
11/64	PAO approved reduction in env. Sampling frequency
12/7/64	Eng lab's first exhaust unit approved for use
11/65	HP representative visited Milwaukee We participated in a presentation on "the peaceful uses of atomic energy" at Azalea Jr. High. RAT team exercise
12/65	X-ray diffraction unit found leaking was shielded Gas powered air sampler obtained for RAT
4/66	In place testing of freshly loaded tubes in 108 discontinued.
9/66	Move from Milwaukee in progress
12/66	Glovebox line installed in A182C
4/67	HP got 1.6 Rads surveying a new x-ray machine. The unit was then shielded
7/69	X-ray survey found wiring problem resulting in 2X higher energy output at start up
9/69	Semi-annual survey found leaking Ba-bolt 10 ug Ra-226 source found at warehouse X-ray emission unit in area 155 found leaking to 1.6 R/hr Shallow wells near holding tanks found to have measurable HTO indicating leakage.

Date	Activity
* 10/69	10.74 Ci of HTO measured in acid dip tank Commenced connection of metal systems to SECS
11/69	Building 400 Cell #3 contaminated with TiH_2 from used flask storage - all flasks removed to burning pad West of building 400. Eng working on new bed processing system to eliminate need for storage.
2/72	4 HP personnel served on RAT teams for an incident involving a leaking Delta Airlines shipment.
2/72	Gas lab hooked to SECS completing the SECS extension project. Preloaders identified as a major point of stack emissions of HTO, along with the bed processing system.
8/72	Identified need to bake out sorb pumps to SECS immediately after use or keep chilled until so baked.
11/72	Sniffer pumps installed on 182 Mezzanine
11/72	Audited by ALO
11/72	Gel column env monitoring system being evaluated
2/73	Order placed for 120 Ci Cs-137 irradiator
5/73	PSAR Submitted to ALO for RTG project
8/73	Made arrangements to ship getter discs to Mound for T_2 recovery Ion pump cleaning put 41 curies HTO in acid soln. AR for waste drum storage bldg submitted Env monitoring stations being installed RTG PSAR returned - disapproved - modified Shepherd calibrator installed.
9/73 - 1/86	Activity logs not available.
1/86 - Present	See Health Physics files

ATTACHMENT B

Unusual Events involving radiogical protection at GEND

Date	Description	Curies Released
12/10/57	Operator error in manometer use Rm 18	458
2/11/58	Error in estimating the amount of T_2 Rm 18 remaining in the system	1253
7/8/58	Glass system breakage Rm 22	280
3/7/58	Glass system breakage Rm 18	567
8/16/58	Operator error in loader valve position Rm 21	780
8/18/58	Glass Breakage (bed) Rm 21	1180
2/10/59	Operator error in stopcock use Rm 8	286
2/20/59	Hand Contamination - Operator not wearing gloves (Ed Perrino)	—
2/21/59	Area Contamination - Operator broke glass system Rm 18	—
3/12/59	Operator contaminated during system cleaning by another worker Rm 14	—
6/4/59	GEL personnel error working on SECS test Rm 21	753
6/5/59	Area Contamination - Diffusion pump exploded in hood 14	—
6/18/59	Near miss explosion on glass system - operator error	—
6/18/59	Air in loading system (explanation questioned) Rm 20	423
9/11/59	Tritium in holding tank H_2O possibly from drum washing	6.5
10/5/59	Stopcock blew out of glass system Rm 15	

Date	Description	Curies Released
1/60	Operator left stopcock open	40
2/5/60	Glass bed broke from strain	72
2/11/60	Operator left stopcock open	308
3/25/60	Operator error caused 3 workers exposure Rm 13	—
5/14/60	Broken flask caused area contamination Rm 10	—
6/21/60	Ion Gage Exploded Rm 18	—
7/8/60	Sample bulb dropped Rm 23	6.8
7/13/60	Manifold shattered exposing worker Rm 23	—
8/12/60	Contamination spread (TiH_2) in 108 from broken flask	—
4/61	Area contamination from system breakage	—
12/62	Breathing Air supply line connected to A108 exhaust duct	
2/4/65*	Explosion during cold trapping	38 Kr
3/10/65	Worker exposed when x-ray interlock failed [redacted] XRE shutter	
3/30/65	Broken flask Rm 9	—
5/20/65	Flask explosion Rm 12	—
5/66	SECS Col Water removal problem	252
1/27/67	Glove box pump oil degassed A182C	32
10/12/67	Personnel Contamination - O-ring mishandled Rm 18 [redacted]	—
1/17/68*	Faulty relay in auto mode of Radiflow #1 - Unit vented when placed in manual.	129 Kr

Date	Description	Curies Released
6/18/68*	Acid cleaning explosion - Area 181	0
2/69	Leaking Flange @ sorb pump 108	8
2/69	Area Contamination when pump exh lines cut during hood removal Rm 2	0
2/3/69	Equipment failure - valve did not seat properly -	20 Kr
8/11/69	Holding Tank Overflow after pump failure	—
11/5/69*	Area contamination Bldg 400 assoc with D-bed	?
1/70	Area contamination/personnel exposure from flaking tube part in Gas lab	—
2/70	Area Contamination from pressurized sorb pump (air expansion) Rm 2	—
11/20/70	Area Contaminated when operator used vacuum cleaner on ScH_2 dust - A182D	0
12/28/70*	SECS Col saturated from an air leak in A108	117
3/12/71*	Copper gasket uncovered in Rm 18 hood - High internal dose	7.3
6/14/71*	Area 108 [redacted] Gage repair, high internal	
10/9/71*	Radiflo #1 Storage tank leak	6.1
10/21/71	Tritium release from improperly baked evaporator system A182D	129
11/10/71*	Area contamination from T-loaded disc - A154 Auger spectrometer sample	0
12/1/71*	High internal exposure - Room 18 hood work	1

Date	Description	Curies Released
4/72	Area contamination/liq discharge from flaking fixture in A182D	1.5
5/72	Hand exposure from XRE unit (7R) during cleaning [redacted]	—
8/3/72	Leaking sorb pump	12
1/4/73*	Water leak in area 182D	0
5/73*	Area Contamination from ErH_2 film in A157, 8, 6	—
5/11/73*	Fire in boom box - Bldg 200	0
3/17/74*	Water leak in area 108	0
4/4/74*	RGA installed on exhaust unit in 182D	0.85
1/31/75*	Improper valve closure on Uranium bed	< 150
1/30/76*	Contaminated 6" valve shipped	0
6/76*	Loss of 7100 Ci of T_2 gas to SECS	0
2/77	Packaging of fixtures in 182D glove box	28
5/23/77*	Radiflow valve failure during cold trapping	16 Kr
9/11/79*	Work in Rm 18 Hood - High internal dose	5.7
8/80*	Contaminated Electron Microscope excessed	0
2/25/82*	TRS valve left in wrong position during maintenance in 108 (M/S)	8.6
4/20/82*	Operator left TRS valve in wrong position during maintenance in 108 (M/S)	48
5/24/82*	TRS valve left in wrong position during maintenance in 108 (exhaust unit 513)	9.5
9/1/82*	Leaking sample bulb (gas in pinch off)	3.0

Date	Description	Curies Released
1/5/83*	Bed Oxidation System room 21, design problem	130
1/19/83*	Work on Sorb pump in 208, overpressure relief	9
4/5/83*	Bed heater control failure area 108	0
7/25/84*	Sorb pumb Sieve dumped into drum in 108 - UOR 84-07	67
4/3/84*	SECS blockage when Trichlor was introducted in Area 182D	0
12/9/85*	Sorb pump overheat - Area contamination - UOR 86-01	0
6/5/86*	Waste Drum removed from Area 108 without survey	0
6/24/86*	Mass Spec Oil Change workers exposed to T_2 gas UOR 86-04	1.5
11/24/86	Tracerflow maintenance	3.6 Kr
2/5/87	270 Ci pumped from Rm 18 to SECS	0
6/16/87	SECS pressurization by Ar purge in 108	0
8/87	Cold Trapping	26 Kr
9/8/87	ELDS #6 Sorb pump leakage (bad weld at neck)	0.7
11/4/87	Test of O_2 regeneration need by SEC system	12
2/11/88	Leaking sample bulb from 182 in 108	8
3/7/88*	E-beam welder shield failure - workers exposed UOR 88-03	0
5/5/88	Purge left on over 3rd Shift in 108 - SECS overpressure	2.7
5/27/88	Leakage from Radiflo system #2	0.4 Kr
9/88	Lab area release over 2 week period	16.2

Date	Description	Curies Released
1/6/89*	Water in SECS line area 182D - UOR 89-02	1
9/7/89*	Loss of control of Radioactive Material - UOR 89-08	0
12/15/89*	Work performed in area 108 without permit - UOR 89-12	0