SWMU 9 Statement of Basis
and
IR 1 and IR 8 Proposed Plans

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Acronyms Used in this Presentation

- AOC - Area of Concern
- ARAR - Applicable or Relevant and Appropriate Requirements
- CERCLA - Comprehensive Environmental Response, Compensation and Liability Act
- CA - Corrective Action
- CAD - Corrective Action Design
- CMS - Corrective Measures Study
- COC - Chemical of Concern
- DD - Decision Document

More Acronyms

- DPT - Direct Push Technology
- FS - Feasibility Study
- IR - Installation Restoration
- IRA - Interim Remedial Action
- HRC - Hydrogen Releasing Compound
- LUC - Land Use Control
- ORC - Oxygen-Releasing Compound
- PA - Preliminary Assessment
- PCB - Polychlorinated Biphenyl

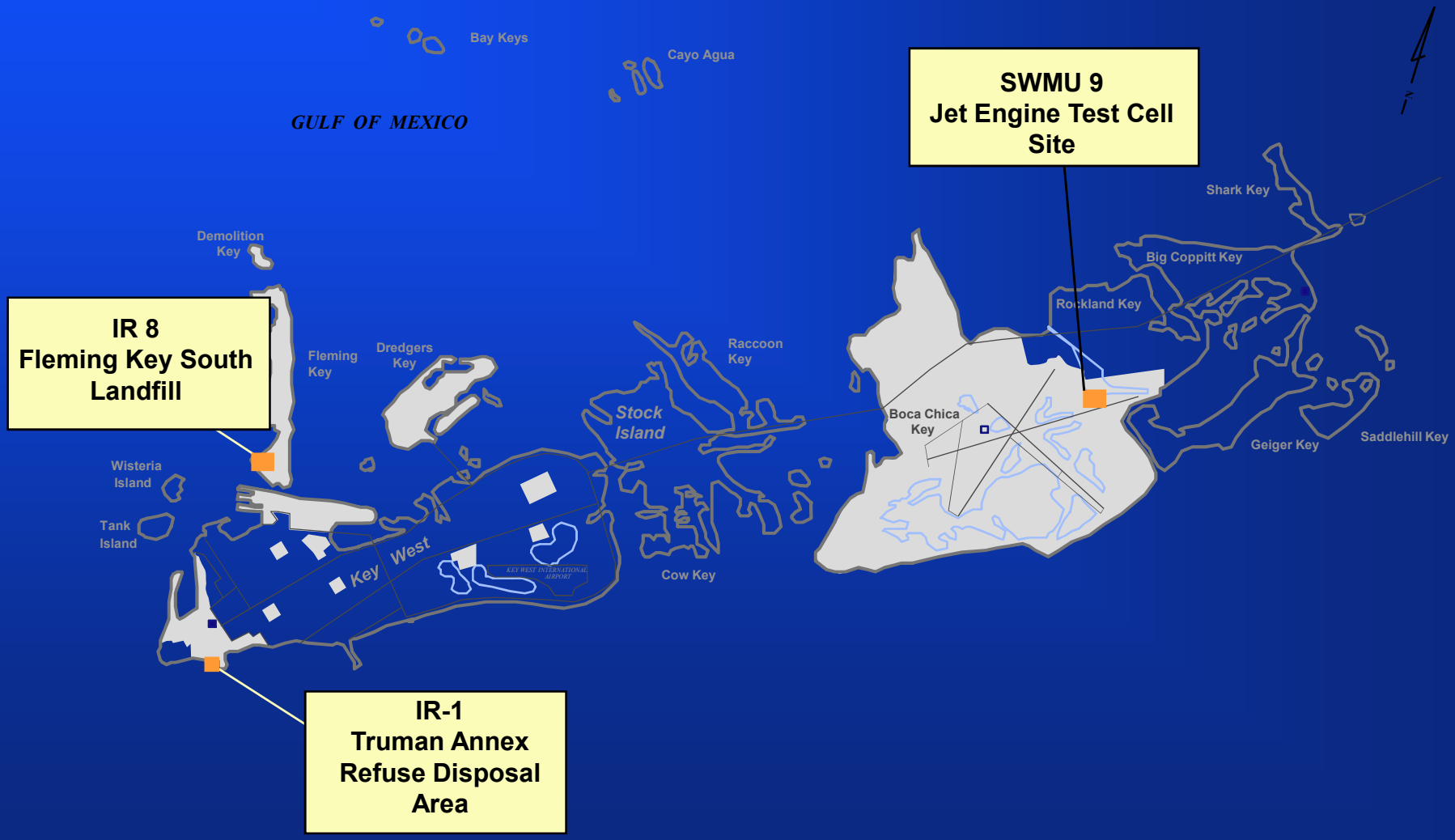
More Acronyms

- PM - Permit Modification
- PP - Proposed Plan
- ppm - parts per million
- PR - Preliminary Review
- RA - Remedial Action
- RCRA - Resource Conservation and Recovery Act
- RD - Remedial Design
- RFA - RCRA Facility Assessment
- RFI - RCRA Facility Investigation

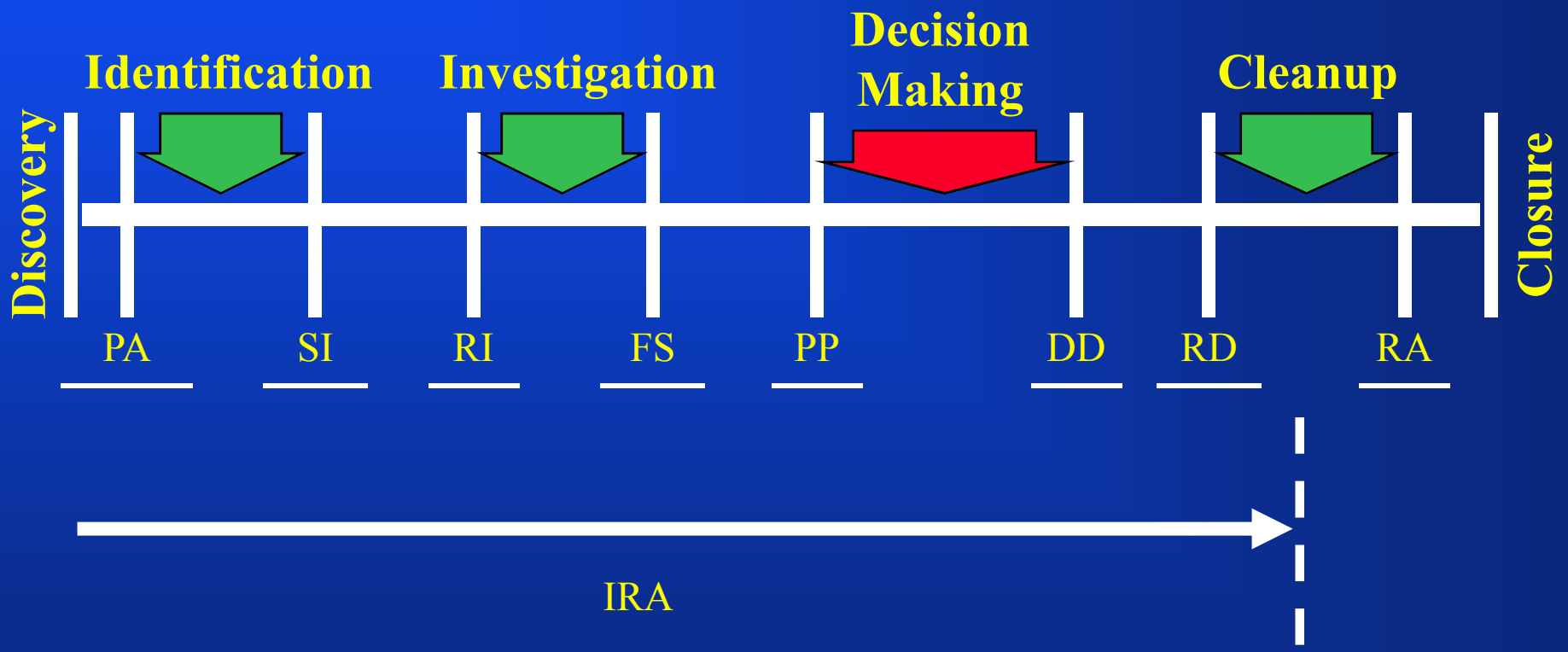
More Acronyms

- RGO - Remedial Goal Option
- RI - Remedial Investigation
- SI - Site Inspection
- SOB - Statement of Basis
- SWMU - Solid Waste Management Unit
- VSI - Visual Site Inspection

Site Map


SWMU 9
Jet Engine Test Cell Site
IR 8
Fleming Key South Landfill
IR-1
Truman Annex Refuse Disposal Area
Bay Keys
Cayo Agua
GULF OF MEXICO
Demolition Key
Fleming Key
Dredgers Key
Raccoon Key
Stock Island
Boca Chica Key
Shark Key
Big Coppitt Key
Rockland Key
Geiger Key
Saddlehill Key
Wisteria Island
Tank Island
Key West
Cow Key

The Typical Life of a Hazardous Waste Site



Note: The CERCLA hazardous waste site life-cycle process is described in the Code of Federal Regulations, Chapter 40, Part 300.

Purpose of the Statement of Basis and Proposed Plans

- Identify proposed remedy
- Explain the rationale for its selection
  - Describe all the remedies evaluated
  - Summarize findings of the investigation
- Provide information to the public on involvement in the remedy selection process
- Solicit public review and comment

Selection of the Proposed Remedy

- Protection of human health and the environment
- Compliance with ARARs (media cleanup and waste management standards)
- Long-term reliability, effectiveness and permanence (source control)
- Reduction of toxicity, mobility, or volume through treatment
- Short-term effectiveness
- Implementability
- Cost
- State acceptance
- Community acceptance

SWMU 9 - Jet Engine Test Cell Site

- Located in the northeastern portion of the Boca Chica Key airfield
- Jet engine testing activities were performed on an approximately 60 feet wide semicircular concrete pad in the central part of the site
- Building A-969 is 50 feet southeast of the testing area
- Adjacent to the southwestern edge of the concrete pad are a switch house, air tanks, voltage box, and the AST used to store JP-5
  - The AST was used to fuel jet-engines from 1987 through 1995

SWMU 9 - Jet Engine Test Cell Site (continued)

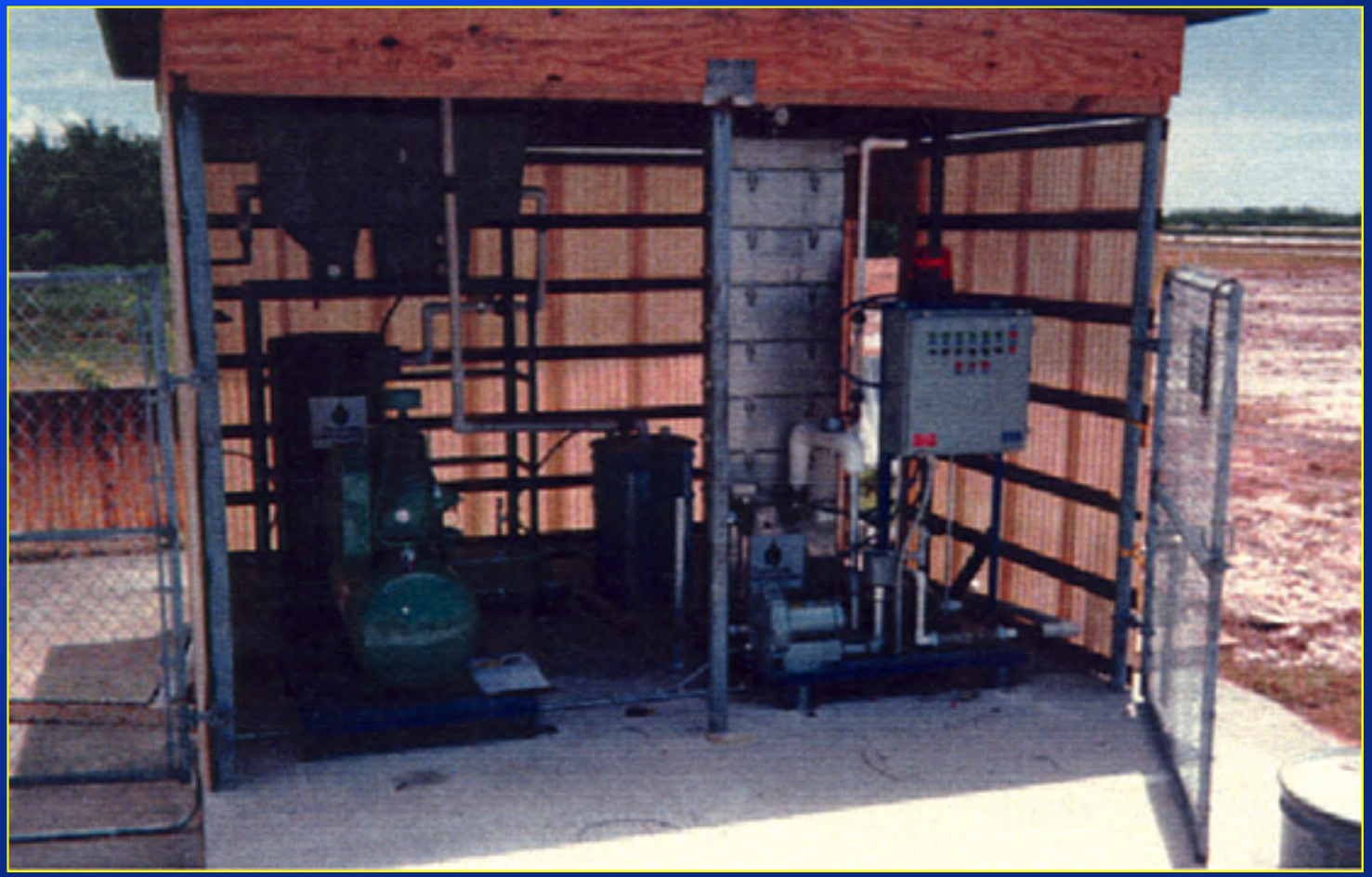
- A small shed located at the eastern end of the pad was used for storage :
  - Various equipment, oils, and jet fuel
  - Gas path cleaners were also stored
- Potential sources of contamination are fuels, oils, and solvents (primarily trichloroethene or TCE) stored at the Jet Engine Test Cell
- VOC and SVOC fuel and solvent constituents have been detected in groundwater

SWMU 9 - Interim Remedial Action

- A Fuel system leak resulted in the release of approximately 700 gallons of JP-5 fuel on the west side of the AST in January 1989
- Sampling was performed in 1993, 1995, 1996, and 1998 during a series of remedial investigations
- IRA was initiated in 1996
  - A groundwater pump and treat system was installed to stabilize the plume
  - After receiving results of the performance of the treatment in 1997, the Partnering Team agreed that operation should cease because the objectives had been met

SWMU 9 - Lagoon Adjacent to Site

SWMU 9 - Pump & Treat Equipment



SWMU 9 - Natural Attenuation

- **A natural attenuation evaluation was conducted in 1998**
  - **Degradation of fuel and TCE in groundwater is occurring at a relatively fast rate**
  - **TCE degradation occurs in several steps**
    - ➔ The degradation rate for the second step (dichloroethene) is very slow
    - ➔ This degradation rate of dichloroethene should increase significantly if more oxygen exists in the groundwater

SWMU 9 - Lab Equipment

SWMU 9 - Summary of Evaluated Remedies

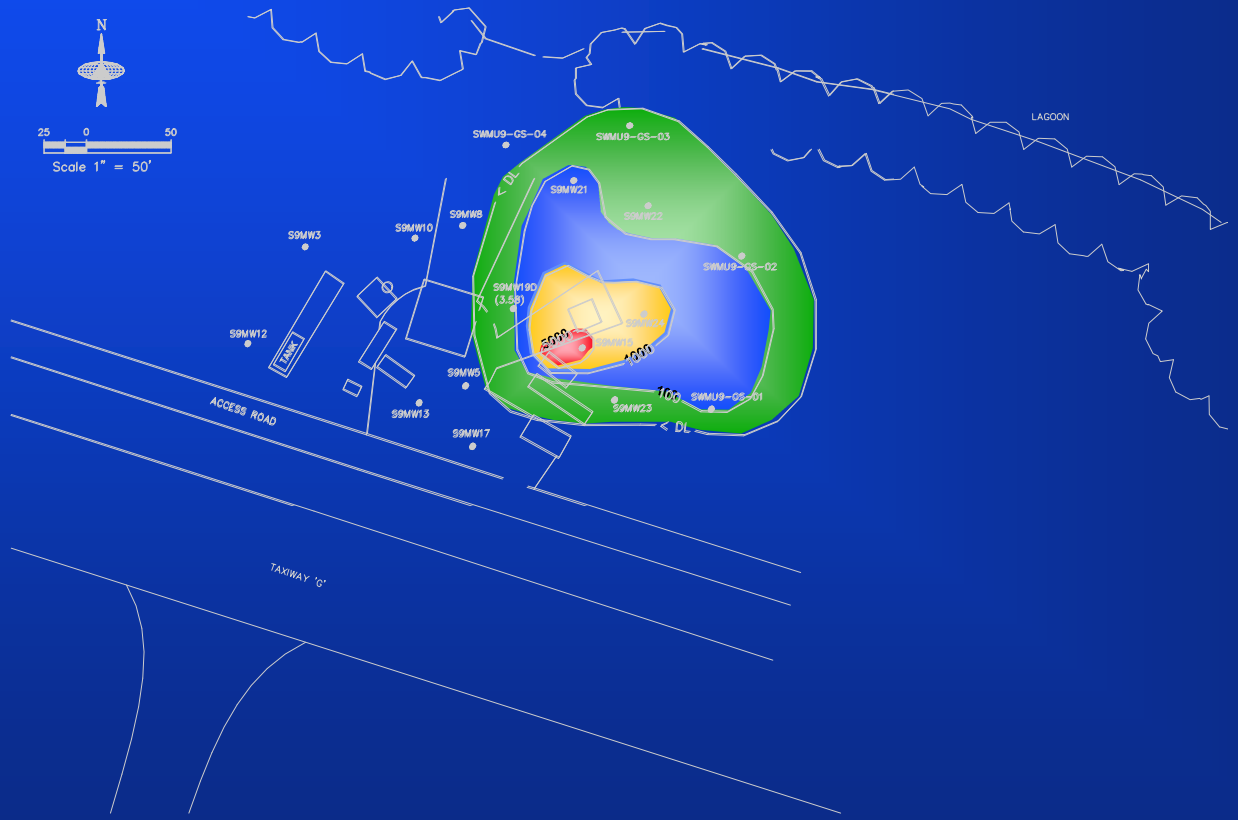
- No Action: This alternative would not address the remaining groundwater contamination at SWMU 9. This alternative would involve no cost
- Natural Attenuation with Groundwater Monitoring:
  - Based on the assumption that SWMU 9 would remain a secured Federal facility with access restrictions
  - Groundwater monitoring would be conducted for 20 years
  - Site review to be conducted every 5 years
  - Total cost is about $240,000

SWMU 9 - Summary of Evaluated Remedies (continued)

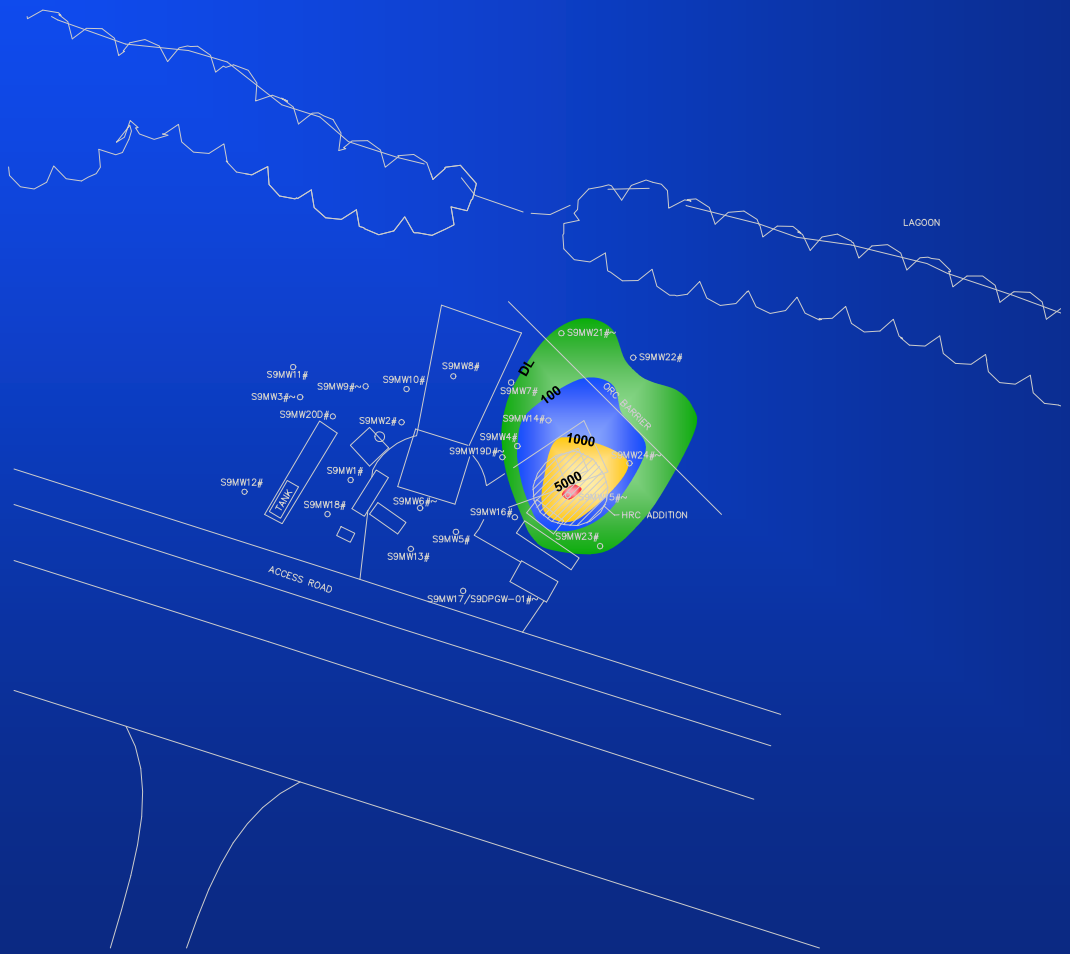
- **Enhanced Biodegradation with Performance Monitoring:**
  - **Add approximately 1,000 pounds of an Oxygen Releasing Compound (ORC) into the contaminated groundwater plume, creating a barrier to treat the contaminant plume**
  - **Add approximately 500 pounds of a Hydrogen Releasing Compound (HRC) to the center of the contaminant plume to directly treat fuel contaminants and TCE**
  - **Monitor groundwater for 5 years following treatment**
  - **Cost is about $180,000**

Assumed Current Contamination

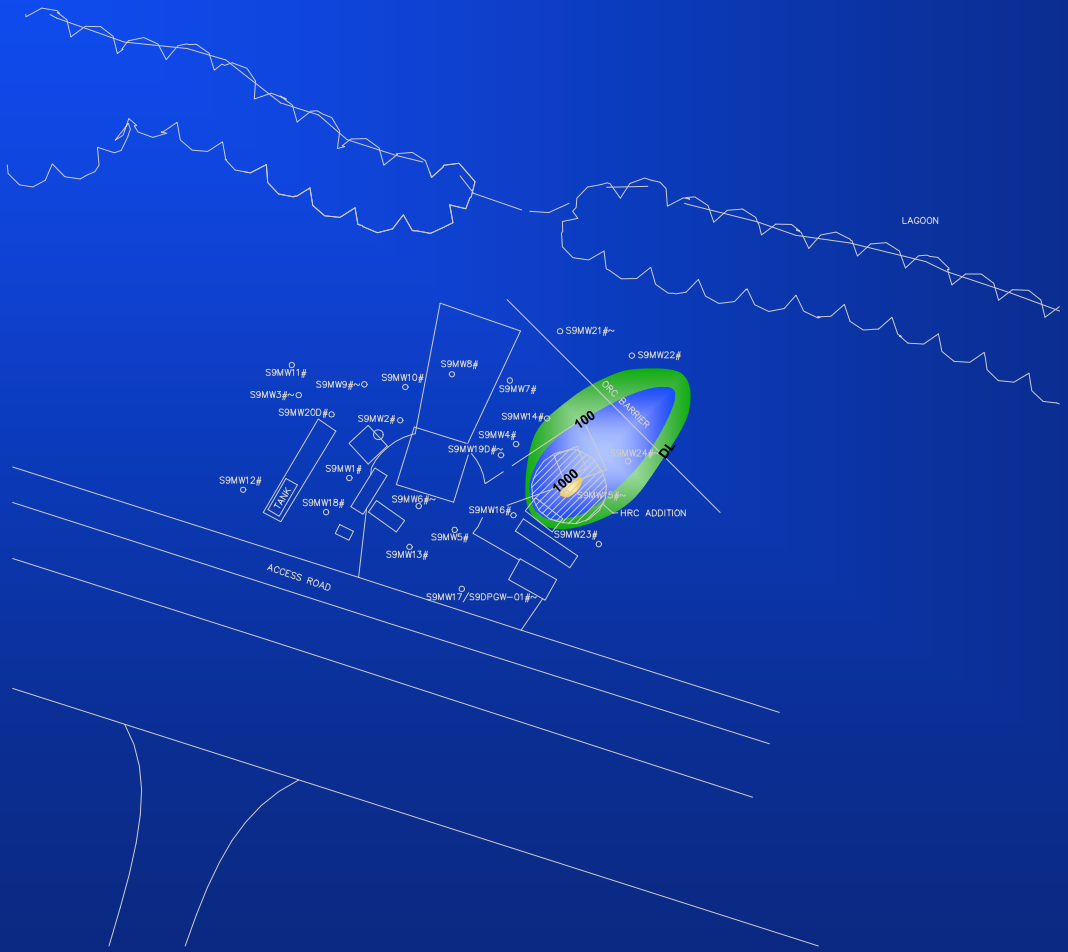
(May 1998 plume)



Alternative 3 - Enhanced Biodegradation with Performance Monitoring (Preferred) *(November 2000)*



Alternative 3 - Enhanced Biodegradation with Performance Monitoring (Preferred) *(May 2001)*



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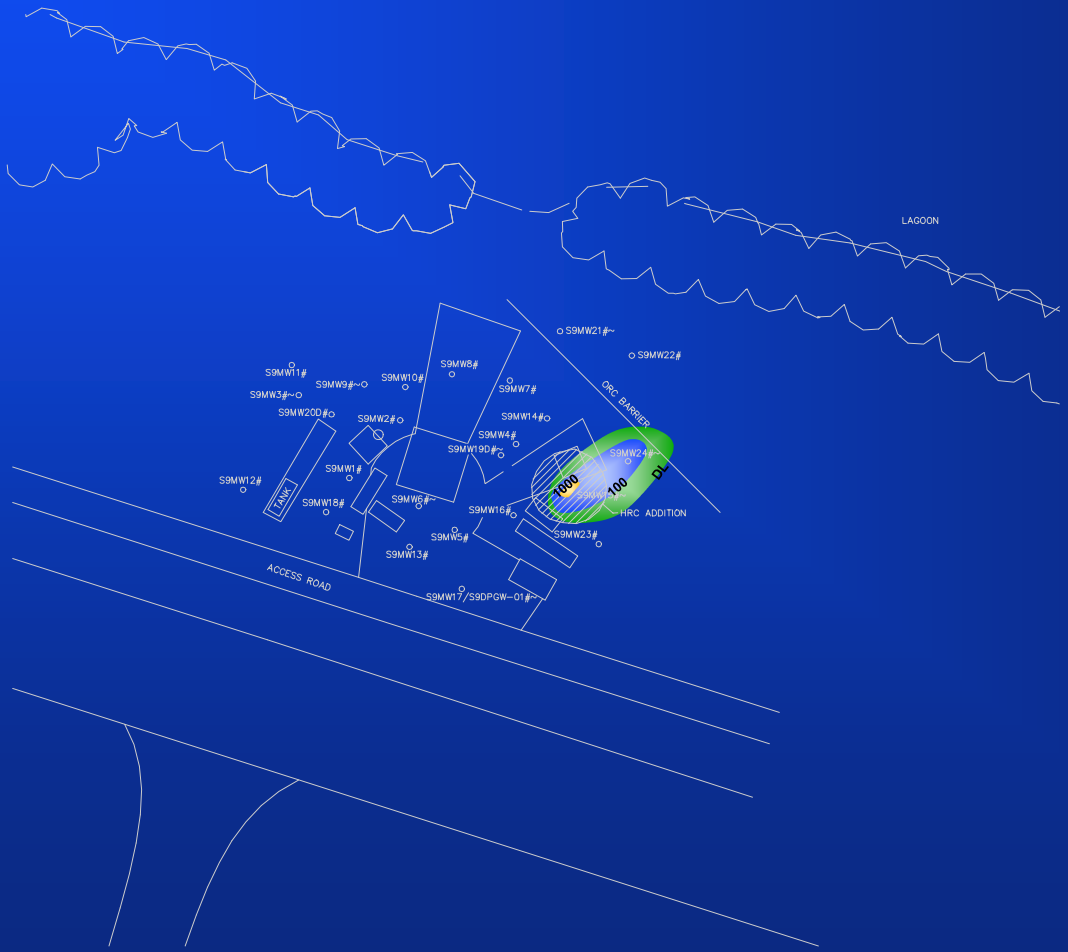
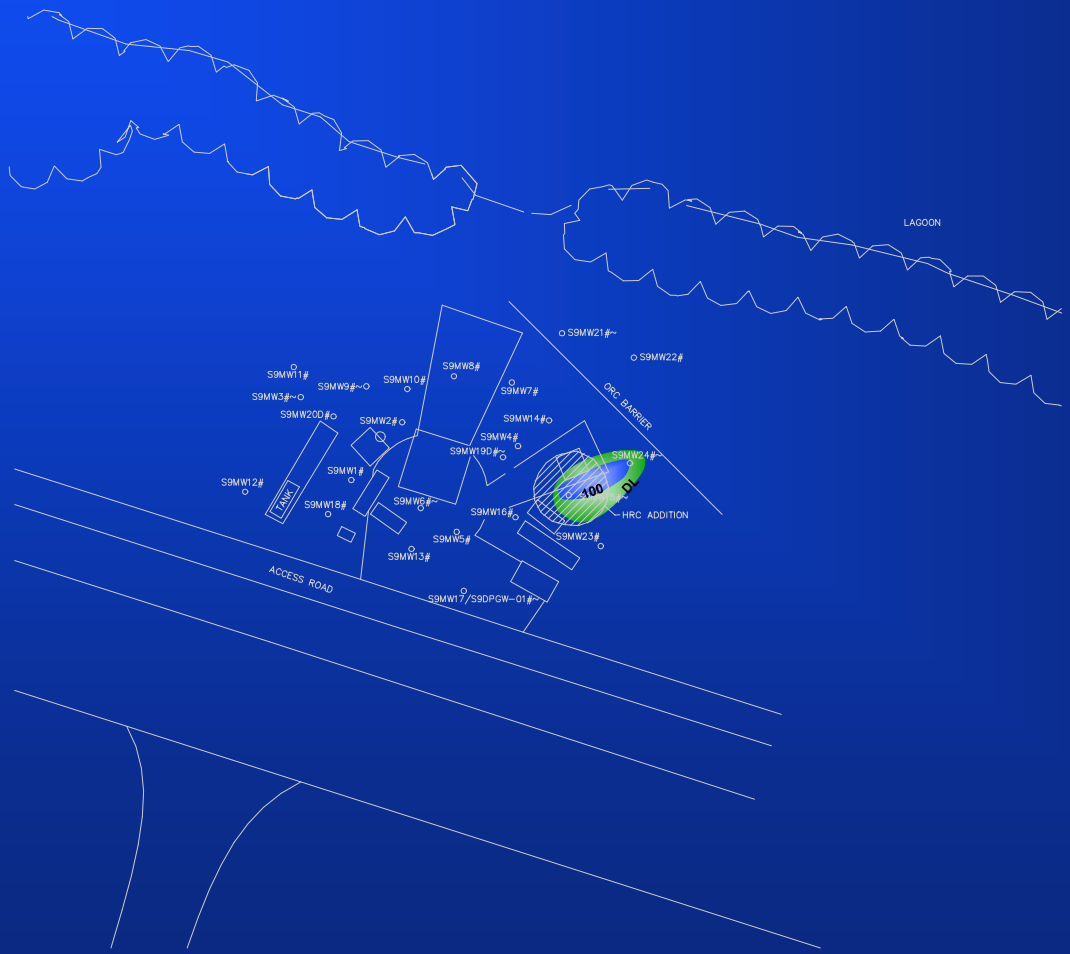
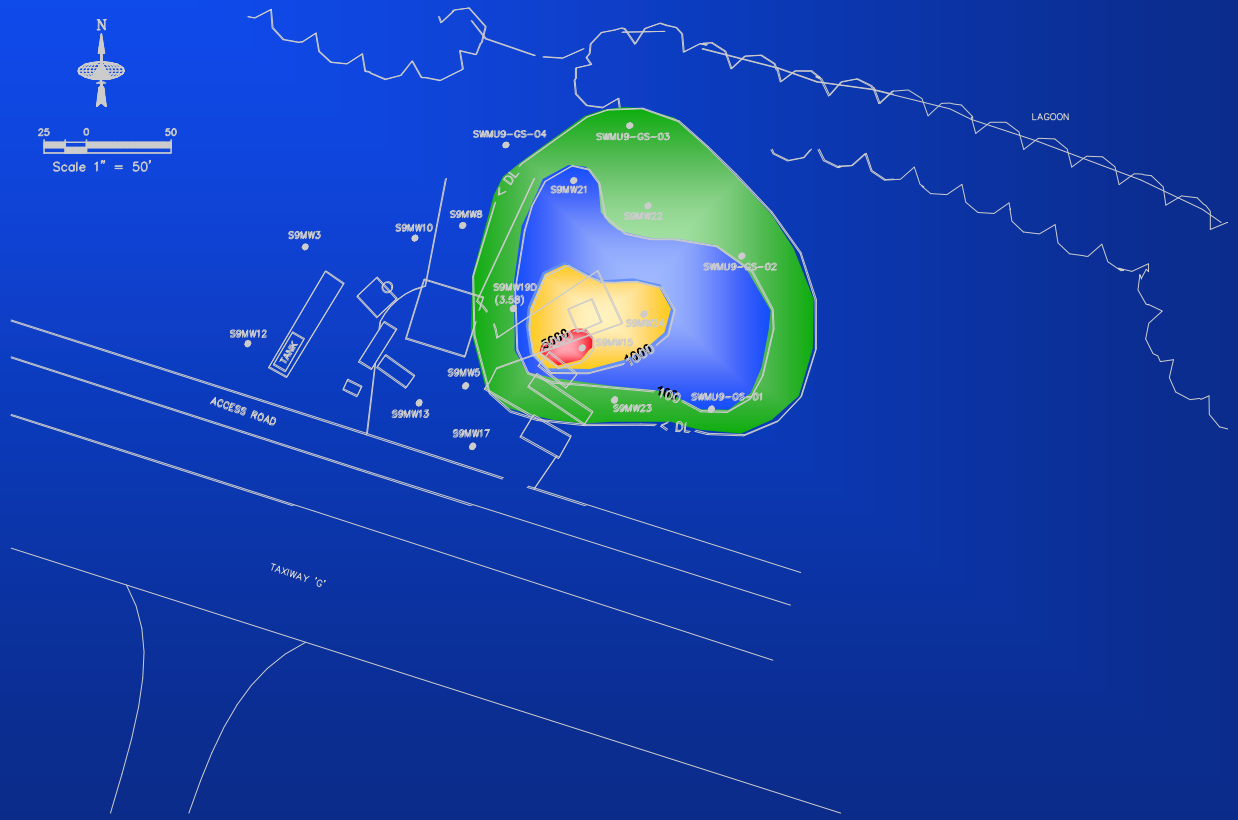


Alternative 3 - Enhanced Biodegradation with Performance Monitoring (Preferred) *(May 2002)*

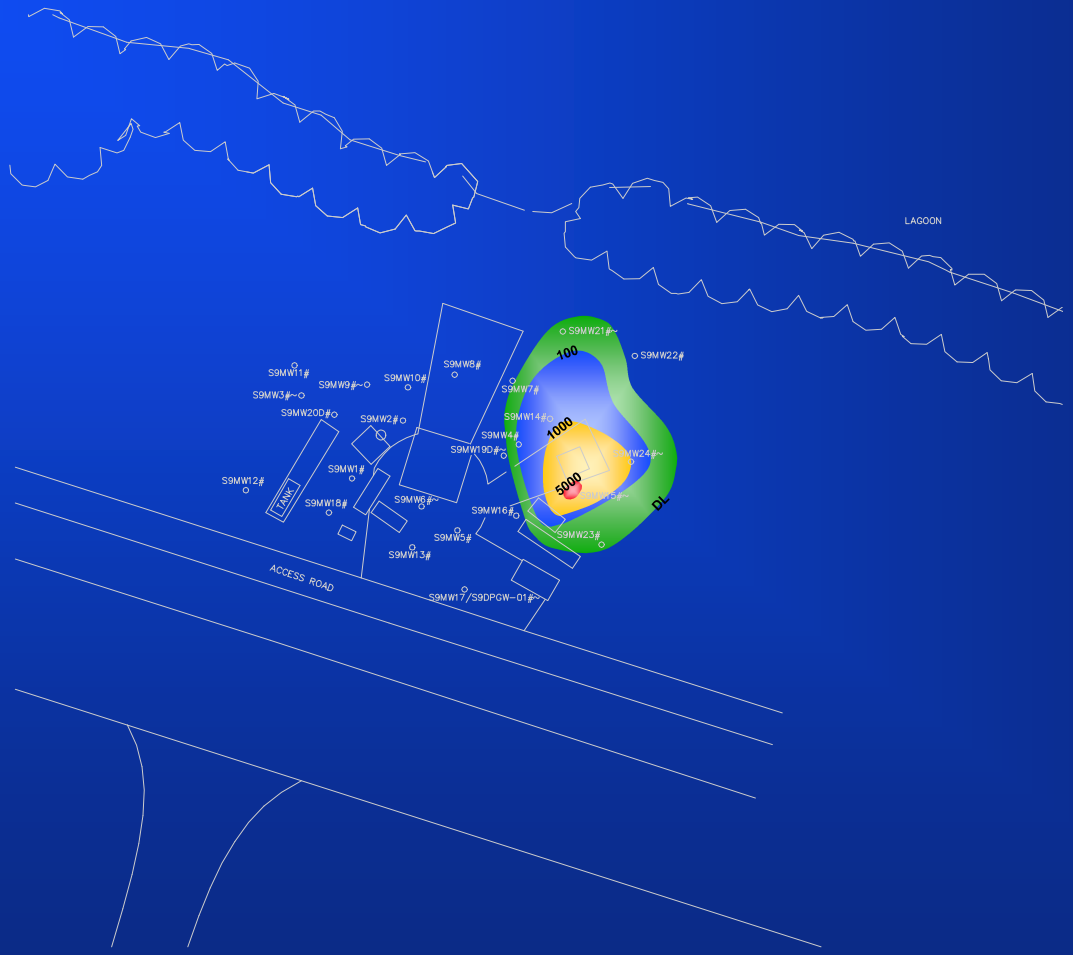


Assumed Current Contamination

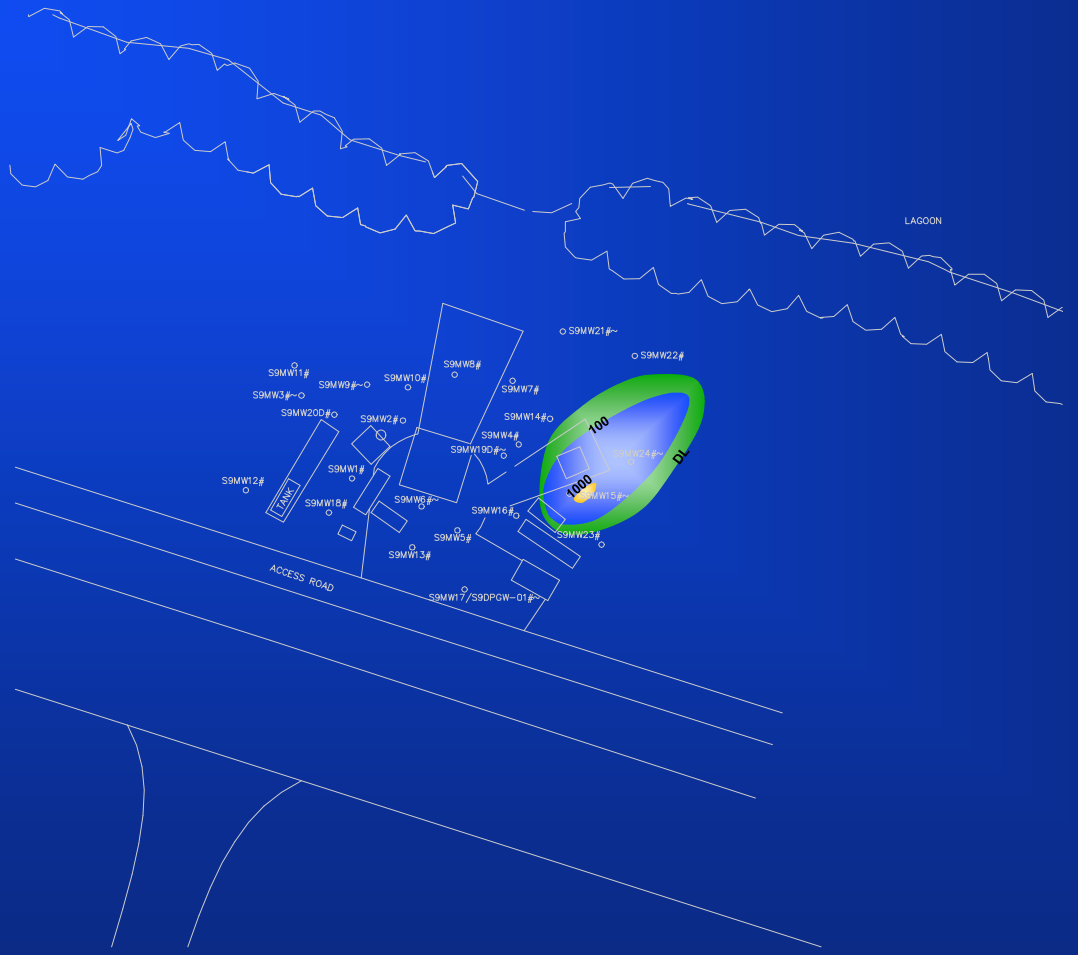
(May 1998 plume)



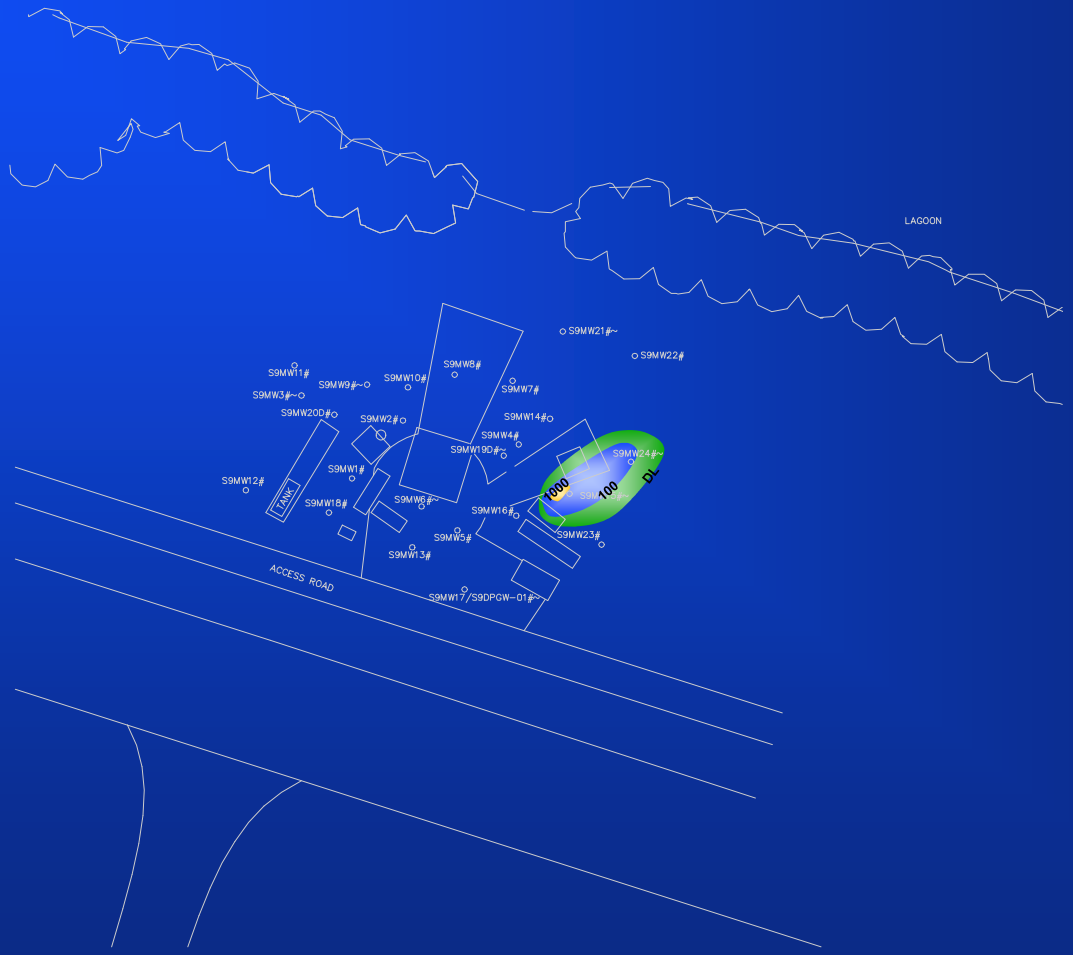
Natural Attenuation with Performance Monitoring *(May 2007)*



Natural Attenuation with Performance Monitoring *(May 2014)*



Natural Attenuation with Performance Monitoring *(May 2021)*



Natural Attenuation with Performance Monitoring *(May 2028)*

SWMU 9 - Proposed Remedy

- **Enhanced Biodegradation with Performance Monitoring**
  - **Protective of human health and environment by treatment of contaminants and monitoring of groundwater**
  - **No significant risks anticipated in the short-term**
  - **Perform a pilot-scale study to confirm an increase in the degradation rate**
  - **If the proposed remedy is not found to be protective of the environment, then other alternatives would be considered**

IR 1 - Truman Annex Refuse Disposal Area

- The U.S. Navy owns 5,660 acres in Monroe County, Florida as part of NAS Key West
- IR 1 is located adjacent to the open ocean along the southern shore of Truman Annex on Key West
- IR 1 encompasses approximately 7 acres and consists primarily of a Navy antenna facility
  - A chain-link fence surrounds the site, and access to IR 1 is strictly controlled

IR 1 - Truman Annex Refuse Disposal Area (continued)

- From 1952 until the mid-1960s, the Truman Annex Refuse Disposal Area was used for general refuse disposal and open burning
  - No restrictions were placed on the types of wastes disposed at the site
  - General refuse, waste paint thinners, and solvents may have been disposed of at the site

IR 1 - Historical Investigations

- 1986 and 1990 - Initial investigations were performed, additional investigations recommended
- 1993 - Remedial Investigation (RI) performed and recommended:
  - Additional sampling
  - A focused feasibility study
  - Performing an Interim Remedial Action (IRA)
  - Conducting a baseline human health risk assessment

IR 1 - Interim Remedial Action

- 1995 - An IRA was performed:
  - Removed 4,878 cubic yards of lead-contaminated soil
  - Reduced the highest lead concentration in soil from 35,200 milligrams per kilogram (mg/kg) to 680 mg/kg
  - Confirmation sampling was performed to ensure removal of highly contaminated soil

IR - 1 Supplemental Investigation

- 1996 - Supplemental RI found that:
  - Copper, lead, and zinc were detected in sediment above ecological threshold values
  - Human health risks are within or below EPA target levels for most scenarios, but above stricter FDEP target level due to antimony, arsenic, copper, iron, lead, and Aroclor-1254
  - Toxicity testing of sediment recommended
- Potential human health risks can be mitigated through land use controls
- 1999 - Toxicity tests indicated that adverse impacts exist in only one area of sediment

IR 1 - Before IRA

IR 1 - Excavation of Contaminated Soils

IR 1 - Removal of Civil War Era Cannonball

IR 1 - Southeastern View Before Georges

IR 1 - Eastern View Before Georges

IR 1 - Shoreline Erosion East of Site

IR 1 - Broken Fence South of Site

IR 1 - Erosion at Western Fence

IR 1 - Sample Locations

IR 1 - COC Location Map

Chemical of Concern (COC)

- **Inorganics**
  - Arsenic
  - Antimony
  - Copper
  - Iron
  - Mercury
- Organics
  - Aroclor

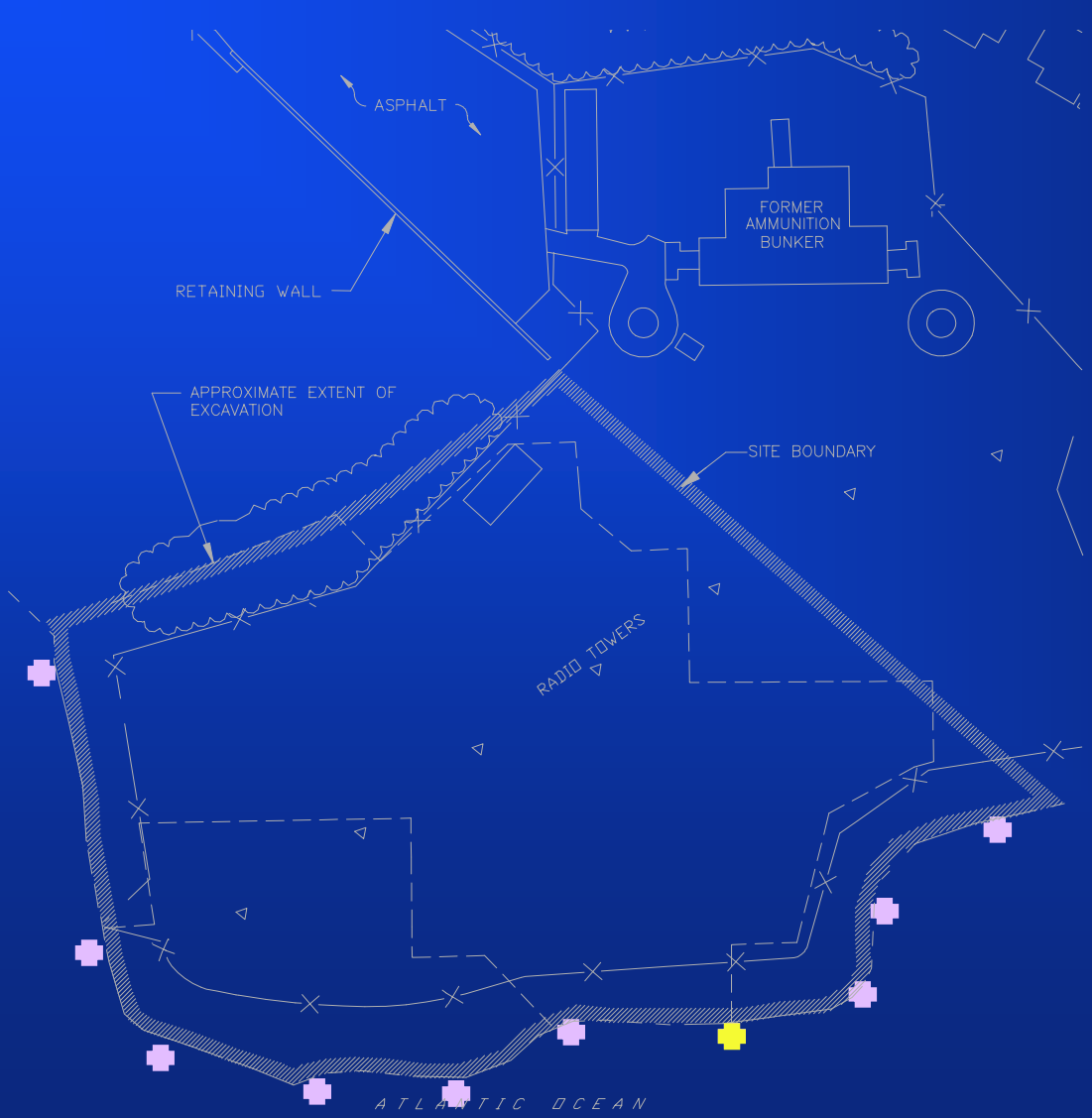
0 175 350

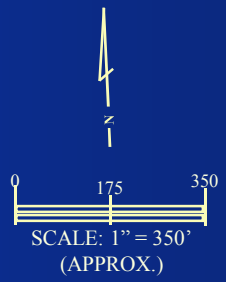
SCALE: 1" = 350' (APPROX.)

LEGEND

- Soil
- Sediment
- Biota

IR 1 - Sediment Toxicity Sample Locations





IR 1 - Proposed Remedy

- Land use controls with performance monitoring of groundwater
  - Previous soil removal has eliminated the need for additional remedial action
  - Prevent future residential use
  - Elevated levels of chemicals detected during monitoring will trigger the NAS Key West Partnering Team to discuss any future actions
  - Groundwater, sediment, and biota will be monitored annually
- Minimal costs are associated with implementing and administering land-use controls with performance monitoring

IR 8 - Fleming Key South Landfill

- The U.S. Navy owns 5,660 acres in Monroe County, Florida as part of NAS Key West
- IR 8 covers approximately 45 acres in the southwestern portion of Fleming Key
- The City of Key West Sewage Treatment Plant borders the southeastern portion of the site
- A munitions storage area is located along the eastern boundary of the site
- The Gulf of Mexico borders the remainder of the site

IR 8 - Fleming Key
South Landfill (continued)

- A closed canopy of Australian pines covers most of the site.
- The western portion of the site contained piles of metal debris
  - heavy equipment, desks, marine equipment, etc.
- As many as 8,000 tons of unknown waste reportedly was disposed at the landfill annually between 1962 and 1982
- Waste materials and fill from Sigsbee Key (Dredgers Key) were also disposed of at the site between 1948 and 1951

IR 8 - Fleming Key
South Landfill (continued)

- The open trench disposal method was practiced at this site
  - Trenches were typically 25 feet wide, 10 feet deep, and 500 to 1,000 feet long
  - Due to seepage from groundwater, the trenches were partially full of sea water when waste disposal occurred
- Combustible wastes were taken to the western portion of the site and burned
- Ash and unburned wastes were then deposited in the western portion of the landfill

IR 8 - Historical Investigations

- 1986 and 1990 - Initial investigations were performed, additional investigations recommended
- 1993 - The RI was performed and recommended:
  - Additional sampling
  - A focused feasibility study
  - Performing an Interim Remedial Action (IRA)
  - Conducting a baseline human health risk assessment

IR 8 - Supplemental Investigation

- 1996 - Supplemental RI found that:
  - Copper, lead, and zinc were detected in sediment above ecological threshold values
  - Human health risks were within or below EPA target levels for most scenarios, but above stricter FDEP target level due to antimony, arsenic, iron, and thallium
  - Toxicity testing of sediment recommended
- Potential human health risks can be mitigated through land use controls
- 1999 - Toxicity tests indicated negligible ecological risks from metals found in sediments

IR 8 - Interim Remedial Action

- 1997 - An IRA was performed:
  - Removed debris from shoreline
  - Installed shoreline protection system
  - Planted Sea Purslane on seaward slope
- Shoreline protection system earned the 1998 Excellence in Technology Award from the International Erosion Control Association

IR 8 - Before IRA

IR 8 - Before IRA

IR 8 - Preparation of Base Material

IR 8 - Articulated Concrete Block Used on the Slope

IR 8 - Revetment In Place

IR 8 - Mat Was Designed to Promote Flora Growth

IR 8 - Sea Purslane Growing Down the Slope

IR 8 - Sample Locations

N

0 175 350

SCALE: 1" = 350' (APPROX.)

LEGEND

- Soil
- Sediment
- Surface Water
- Groundwater
- Biota

IR 8 - COC Location Map

Chemical of Concern (COC)
- Antimony
- Arsenic
- Iron
- Thallium

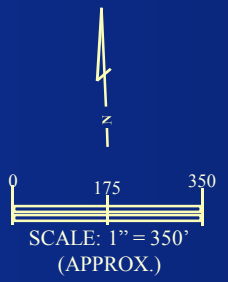
N

0 175 350

SCALE: 1" = 350'
(APPROX.)

LEGEND
- Sediment
- Surface Water
- Biota

IR 8 - Sediment Toxicity Sampling Locations



IR 8 - Proposed Remedy

- Land use controls with monitoring of groundwater quality
  - Shoreline protection system survived Hurricane Georges without any erosion
  - Prevent future residential use
  - Elevated levels of chemicals detected during monitoring will trigger the NAS Key West Partnering Team to discuss any future actions
  - Land-use controls with monitoring will be protective of human health and the environment
- Minimal costs are associated with implementing and administering land-use controls with performance monitoring

Summary

- SWMU 9
  - HSWA Permit Modification
  - Enhanced Biodegradation (ORC/HRC Injection)
  - Groundwater Monitoring
  - Land-Use Controls (Prevent groundwater use) during Remedial Action implementation

Summary (continued)

- IR 1
  - Land-Use Controls (Restricted Site Access)
  - Groundwater, Sediment, and Biota Monitoring
- IR 8
  - Land-Use Controls (Restricted Site Access)
  - Groundwater Monitoring