



**NATO/CCMS Pilot Study Meeting
Ottawa, Canada
June 13-15, 2005**

**ENVIRONMENTAL REMEDIATION PROJECT
ARGENTIA, NL**

**Presented By: Colin W. Janes, PWGSC
Glenn Worthman, Environment Canada**



Public Works and
Government Services
Canada

Travaux publics et
Services gouvernementaux
Canada

Canada



FEDERAL REAL PROPERTY IN CANADA 2005

LES BIENS IMMOBILIERS FÉDÉRAUX AU CANADA 2005

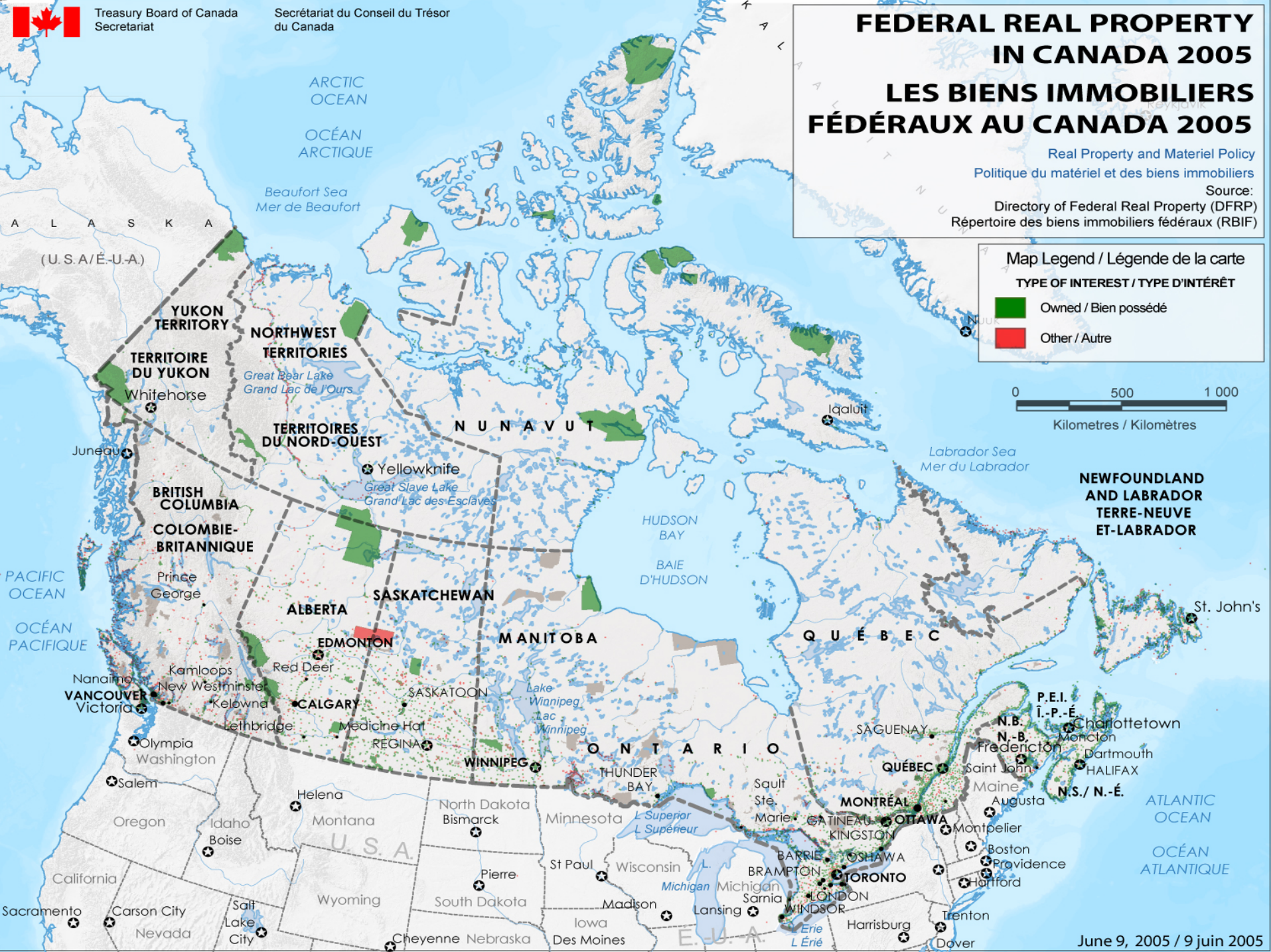
Real Property and Materiel Policy
Politique du matériel et des biens immobiliers

Source:
Directory of Federal Real Property (DFRP)
Répertoire des biens immobiliers fédéraux (RBIF)

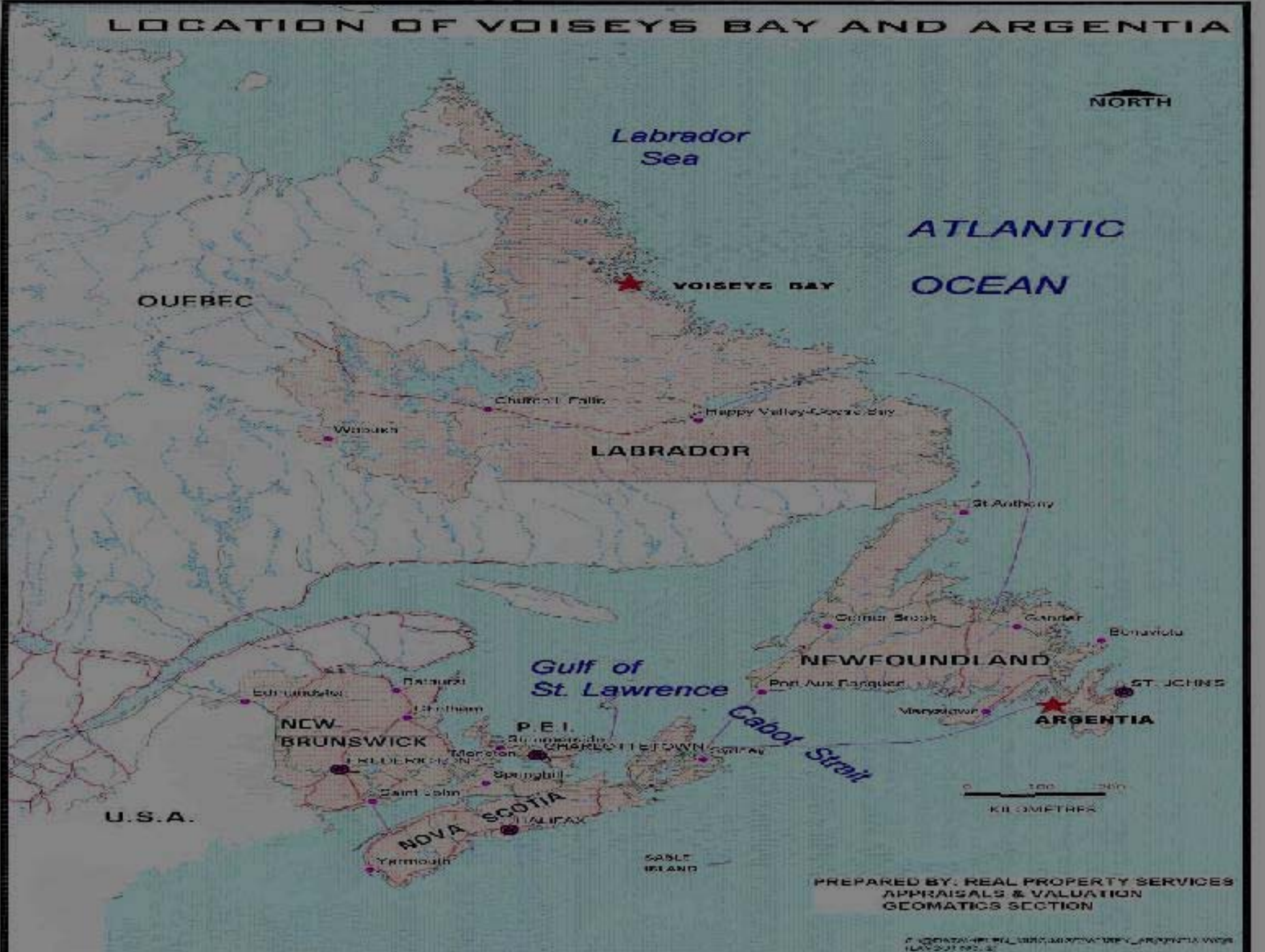
Map Legend / Légende de la carte

TYPE OF INTEREST / TYPE D'INTÉRÊT

- Owned / Bien possédé
- Other / Autre



LOCATION OF VOISEYS BAY AND ARGENTIA



PREPARED BY: REAL PROPERTY SERVICES
APPRAISALS & VALUATION
GEOMATICS SECTION

\\00DATA\REAL\DATA\APPRAISALS\APPRAISALS\ARGENTIA_VOISEYS
11/20/07 09:32

Newfoundland & Labrador Overview

Geography:

- 17,000 km of coastline
- 800 communities
- Area: 406,000 km²

Demographics:

- Population ~ 540,000
- St. John's (C) & environs ~ 250,000
- Mining, Pulp and Paper, Forestry, Fishery, Offshore Oil and Gas, Electrical Power Churchill Falls (Labrador)
- Limited rural growth (decline in fishery)



Placentia Bay

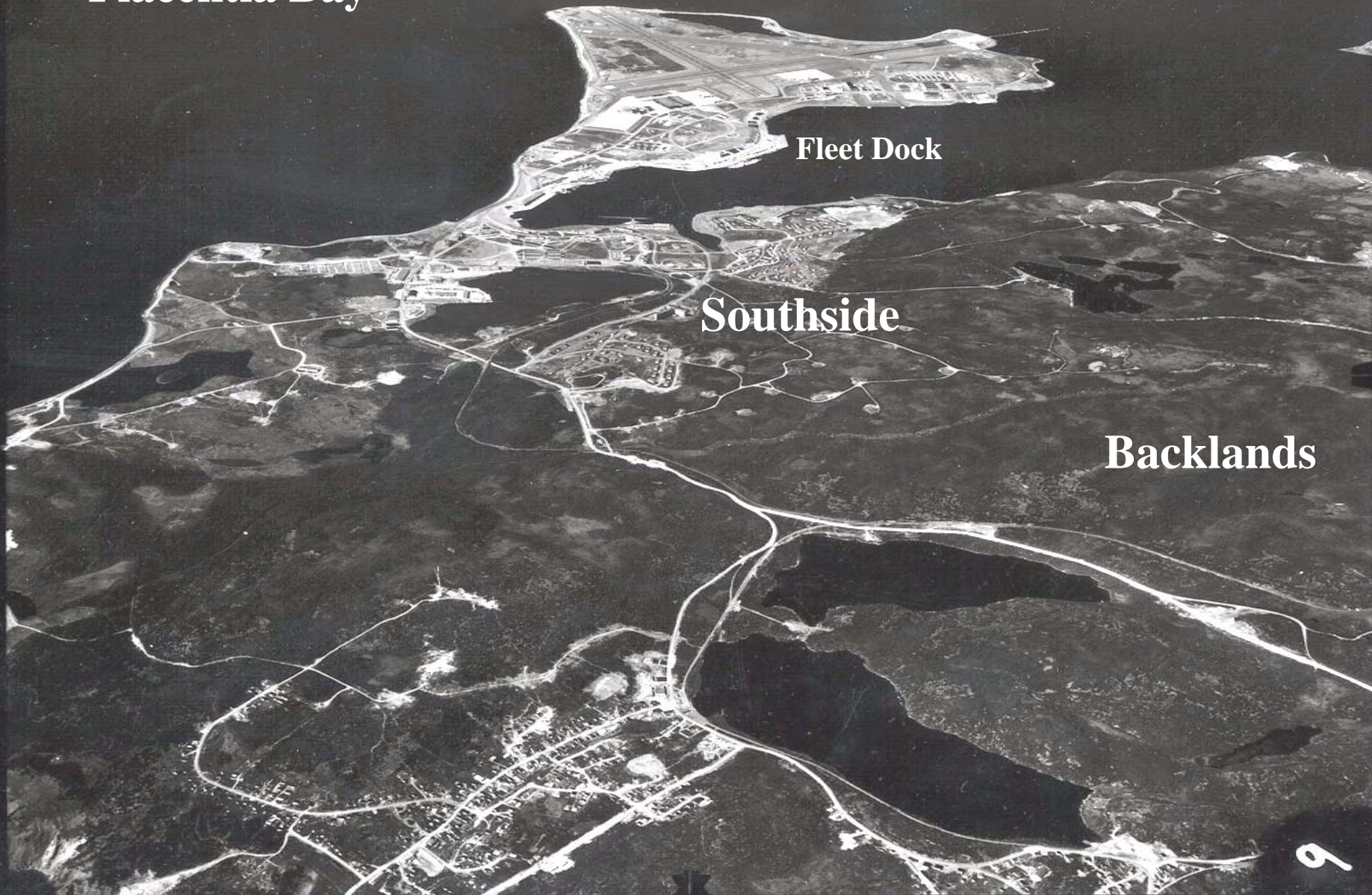
Northside

Fleet Dock

Southside

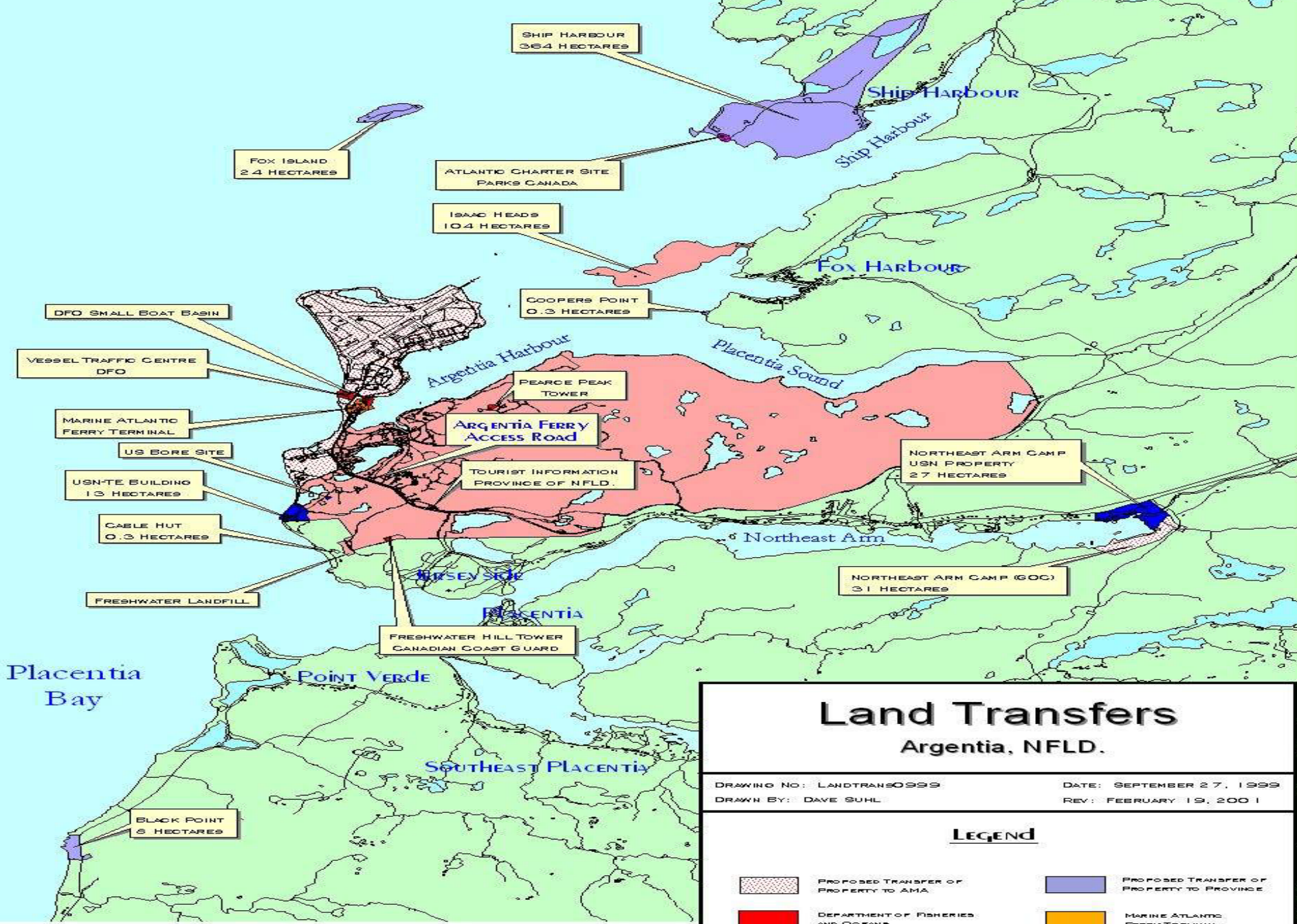
Backlands

XAA-1106-2-66



Argentia ~ 1994





Scale: 1:150000

Land Transfers Argentia, NFLD.

DRAWING NO: LANDTRANS0999
DRAWN BY: DAVE SUHL

DATE: SEPTEMBER 27, 1999
REV: FEBRUARY 19, 2001

LEGEND

	PROPOSED TRANSFER OF PROPERTY TO AMA		PROPOSED TRANSFER OF PROPERTY TO PROVINCE
	DEPARTMENT OF FISHERIES AND OCEANS		MARINE ATLANTIC FERRY TERMINAL
	PARKS CANADA		ARGENTIA MANAGEMENT AUTHORITY (AMA) 321.2 HECTARES
			



1940

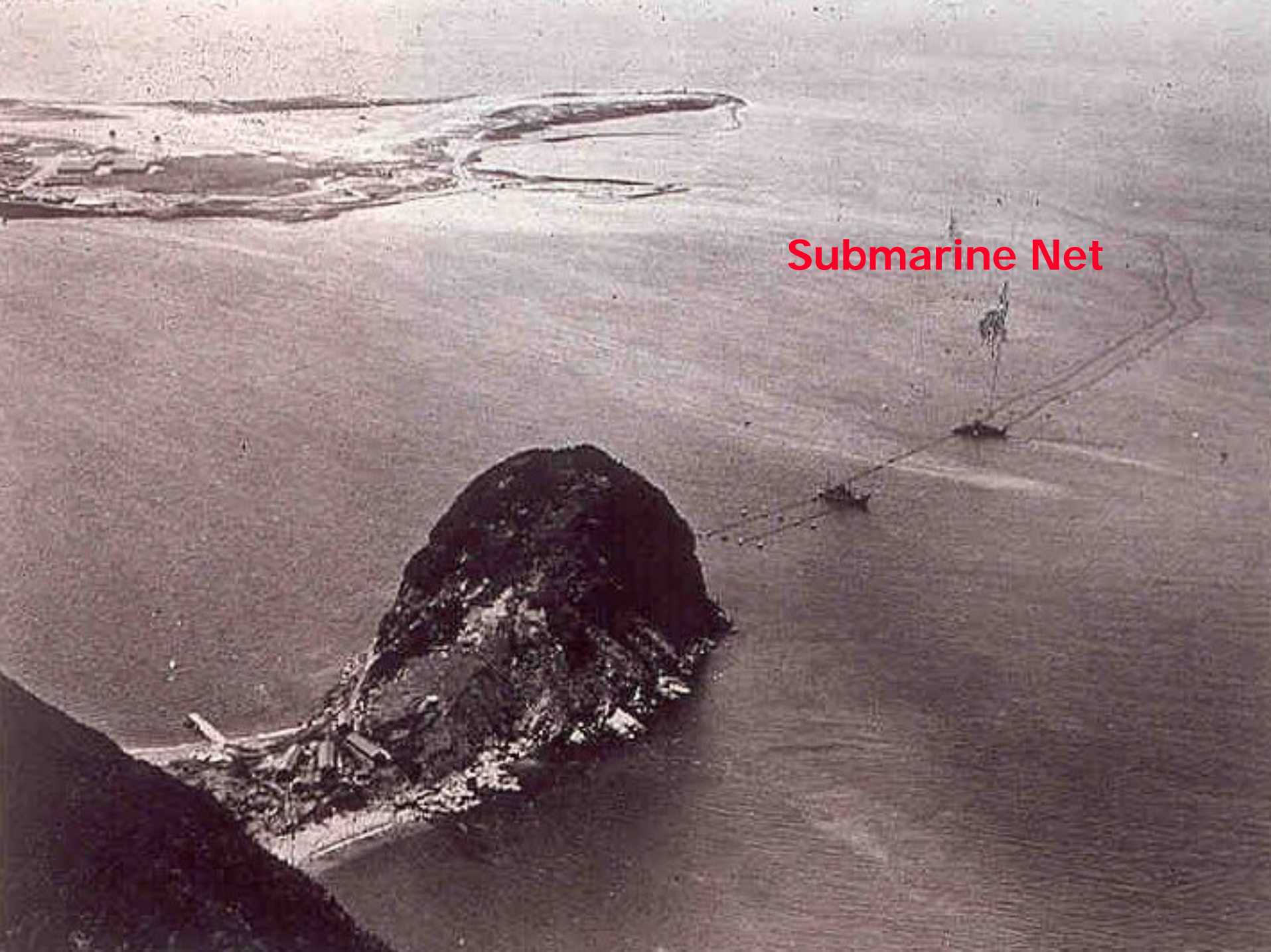


AN AERIAL VIEW OF THE COASTAL AREA OF THE STATE OF CALIFORNIA, SHOWING THE GRID-LIKE PATTERN OF THE FIELDS AND THE ADJACENT BAY.





Submarine Net





Churchill/Roosevelt Sign Atlantic Charter- Aug. 1941



**Churchill - Roosevelt
Atlantic Charter
Signed: August , 1941**



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Photo # NH 67194-A HMS Prince of Wales at Argentia, Newfoundland, August 1941



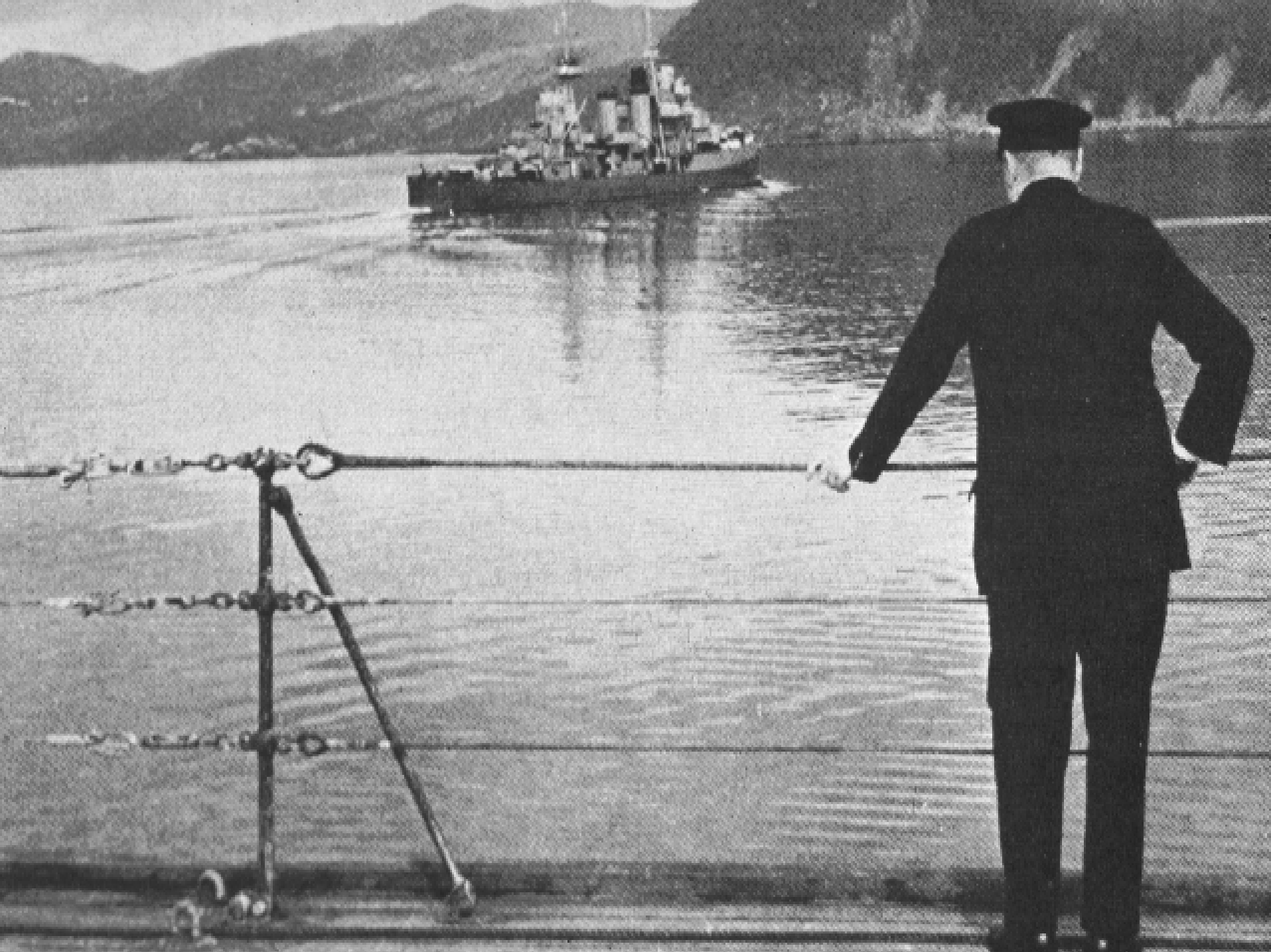


Photo # 80-G-466398 USS Augusta off Oahu, 31 January 1933



Background

1941:

- 99 Year Lend-Lease b/t Great Britain and United States
- Establishment of U.S. Naval Facility Argentia, NL
- 3700 Hectares, 15,000 to 20,000 Personnel
- 1949 - Newfoundland Becomes Province of Canada
- 1974 - U.S. Northside Airfield Closed
- 1993/94 - PWGSC Completes ESA - \$7.4M
 - > 700 Monitoring Wells;
 - > 500 Test Pits (TP's), Analytical Data !!





Background

- 1994 - U.S. Naval Facility “Closed” - PWGSC Custodian
- 1995 – Argentia Management Authority (AMA) Formed
- 1996 - TB \$81M - 10-Year Remediation Project Commences
- 2001- GOC Property and “Port” Transferred to AMA
- 2002- INCO/Province of NL Sign Voiseys Bay Agreement
- 2003- INCO/VBNC Hydromet Demo. Plant Construction
- 2004 – Revised TB Project Approval : \$106M – 85% Complete
- 2006/07- Project Completion





MANDATE

- **Remediate to CCME Guidelines: Risk Based Approach for Commercial/Industrial Reuse**
- **Transfer All GOC Property ~ 3700Ha (9100Acres)**
- **Implement Stringent Health & Safety - #1 Priority**
- **Sustainable Development: Recycling/Reuse C/D Waste**
- **Communications - Stakeholder Management**





Canadian Council of Ministers of the Environment (CCME)

“National Guidelines for Decommissioning Industrial Sites”

- Phase I - Site Information Assessment
- Phase II - Reconnaissance Testing
- Phase III - Detailed Testing
- Phase IV - Preparation Remedial Action Plans (RAPs)
- Phase V - ** Remediation **
- Phase VI - ** Confirmatory Sampling/Reporting **



Regulatory/Technical Working Committee

- Group of Federal/Provincial Regulatory Agencies with Expertise in Environmental and Health
- Fisheries, Wildlife, Water/Soil Quality, and Occupational Health and Safety (OHS)
- Expanded as Required for Specialized Issues
- Integrated Approach for Advice to Project Management Team

Environment Canada - Role

- **Regulatory advice:**
 - *Canadian Environmental Protection Act (CEPA)*
 - *Fisheries Act (FA)*
 - *Migratory Birds Convention Act (MBCA)*
 - *Canadian Environmental Assessment Act (CEAA)*
- **Encourage Use/Application of CWS and CCME Frameworks, Guidelines, Polices, and Criteria**
- **Science and Monitoring Expertise**
- **Assessment and Delineation Advice**
- **Compliance Promotion and Verification**
- **Conduct Site Visits**
- **Review Project Proposals, Remedial Options, Risk Assessments and Risk Management**

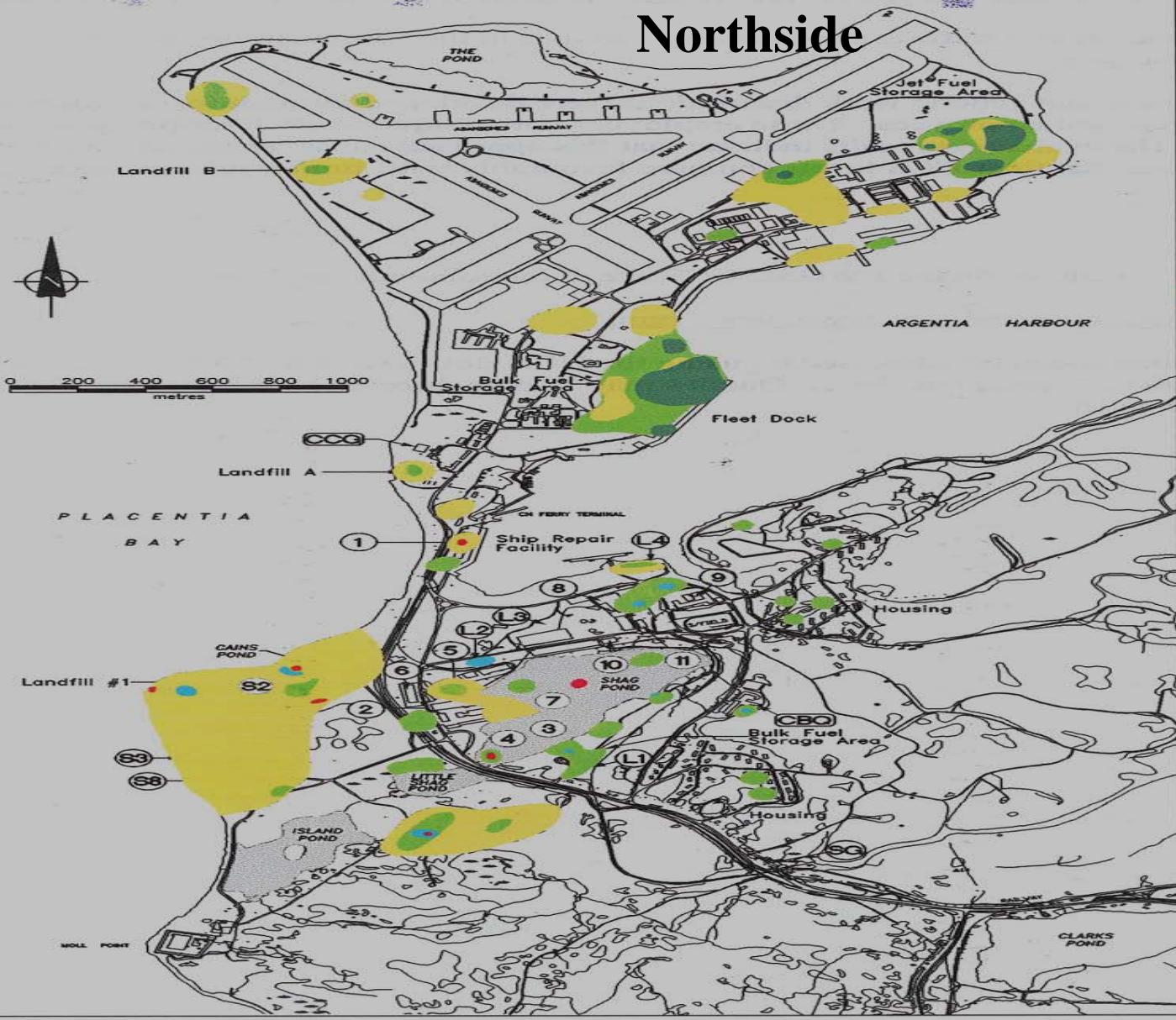
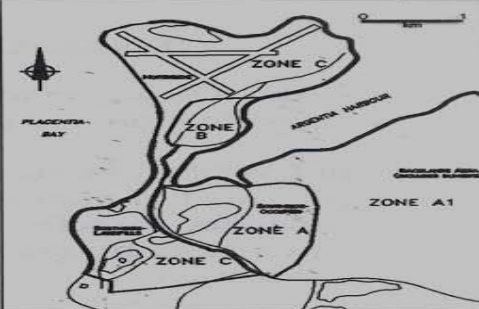
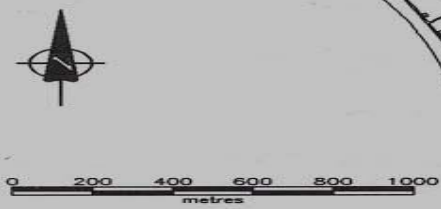
Environment Canada

Regulatory/Technical Working Committee

Lessons Learned

- **Non-litigious Approach**
- **Written Terms of Reference valuable, includes commitment for regular information exchange**
- **Good documentation needed as long-term projects will have staff turn-over**
- **Timely access to project team and regulators/technical experts essential**
- **Conflict potential for regulatory body**
- **Limited capacity to follow-up on value of advice**
- **Facilitates exit/project conclusion**

Northside



LEGEND

PONDS

- METAL CONCENTRATIONS IN WATER OR SEDIMENTS EXCEEDING ASSESSMENT GUIDELINES
- PETROLEUM HYDROCARBONS (TPH) AT ELEVATED LEVELS
- PCBs AT ELEVATED LEVELS

LAND AREAS

- MEASURABLE THICKNESS IN MONITOR WELLS
- CONCENTRATIONS IN SOIL OR WATER EXCEEDING ASSESSMENT GUIDELINES

HEAVY METALS ZINC LEAD COPPER IRON MERCURY MANGANESE CHROMIUM

- METAL CONCENTRATIONS EXCEEDING ASSESSMENT GUIDELINES

ORGANIC COMPOUNDS I.e. SEMI-VOLATILE AND VOLATILE ORGANIC COMPOUNDS

- CONCENTRATIONS EXCEEDING ASSESSMENT GUIDELINES

PCBs

- AT ELEVATED LEVELS

APPROXIMATE LIMIT OF CONTAMINATED AREAS

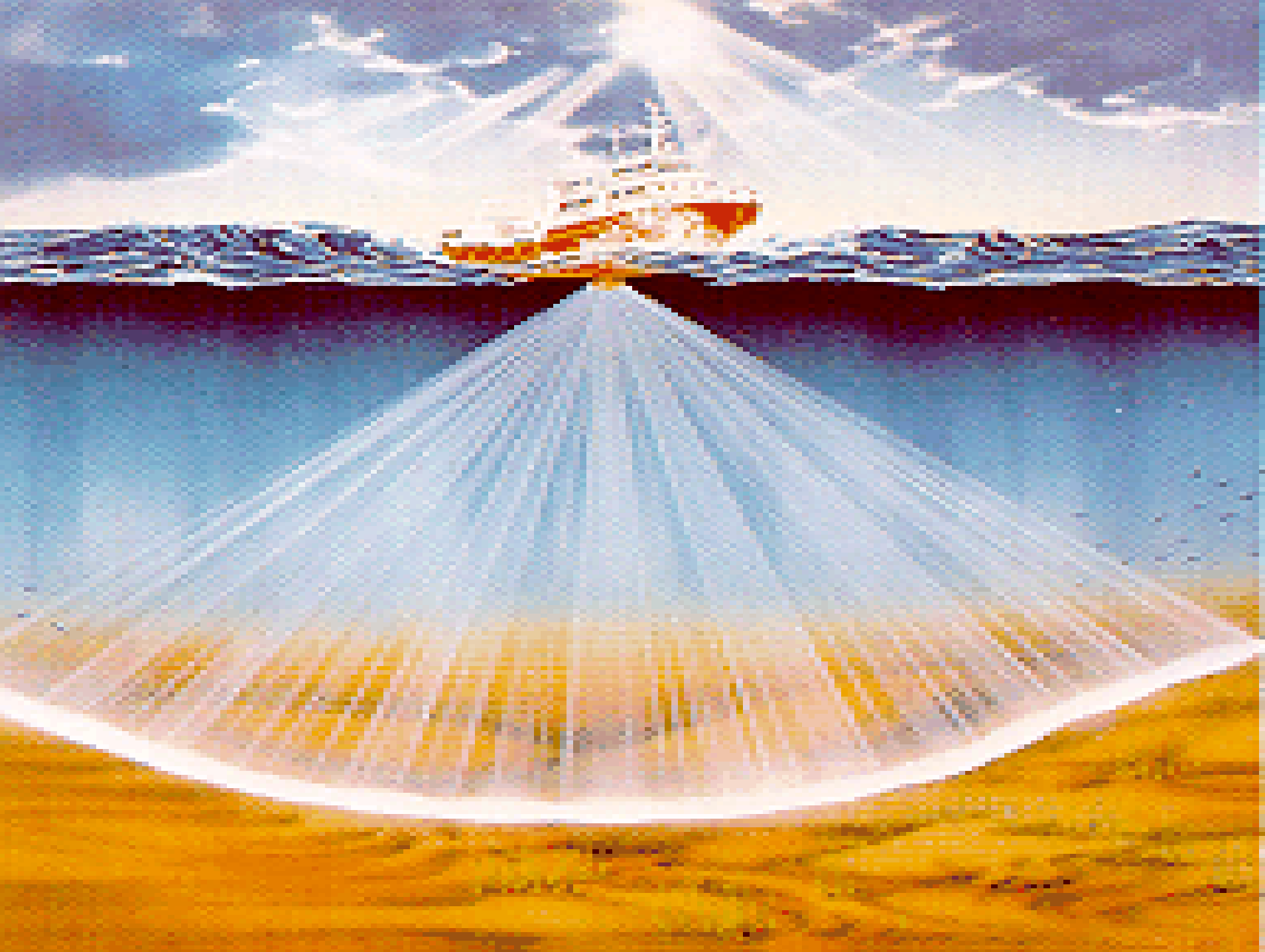
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2	500M	Vehicle Maintenance Garage
3	502M	Warehouse and Fire Station
4	504M	Equipment Storage and Vehicle Maintenance
5	507M	Warehouse and Electrical Substation
6	771M	Public Works Administration
7	772M	Shops and Storage
8	646M	Recreation/Club Facility
9	550M	A.L. Bristol School
10	724M	Bowling Alley
11	587M	Gymnasium
CBO	545M	Combined Bachelor's Quarters
L1		Loading Area 1
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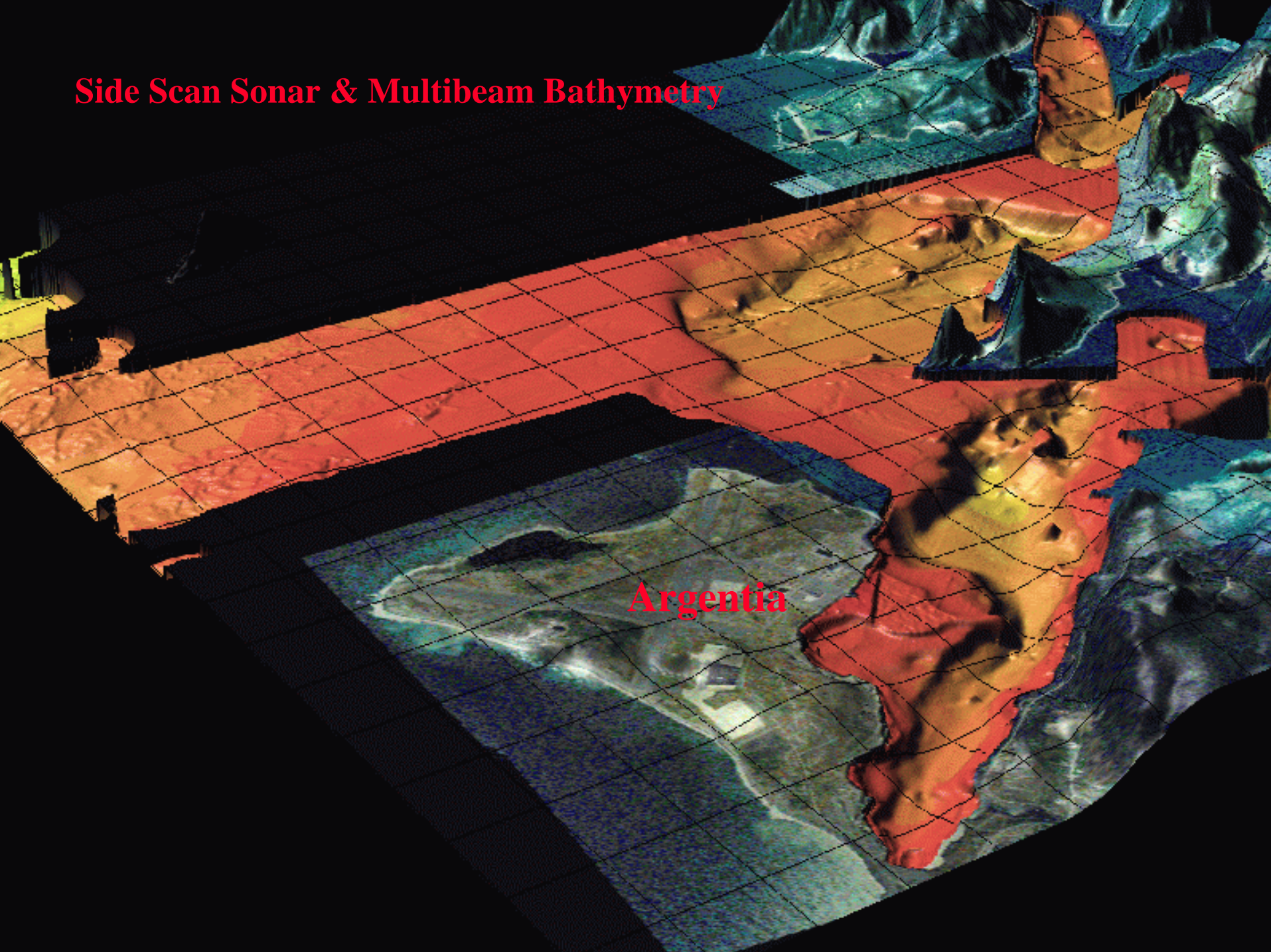
VERSION DATE: APRIL 12, 1994

DFO Research Vessel "Frederick Creed"





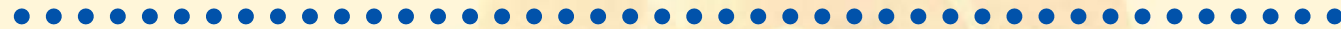
Side Scan Sonar & Multibeam Bathymetry



Argentina



Side Scan Sonar/Multibeam Bathymetry



Service and Solutions

Geological Survey of Canada

Web site:

www.gsca.nrcan.gc.ca/oceanmapping/argentina/



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Services gouvernementaux
Canada

Canada



LAND TRANSFER PRINCIPLES

- **“Brownfield” Site**
- **Environmental - Full Disclosure**
- **Argentia Management Authority (AMA)- Legal Owners**
- **All GOC Property Including Port**
- **GOC Liable for U.S. Contamination Only**
- **PWGSC Access for Remediation**
- **Limited Land Use Areas - Commercial/Industrial**



Argentia Port Facilities



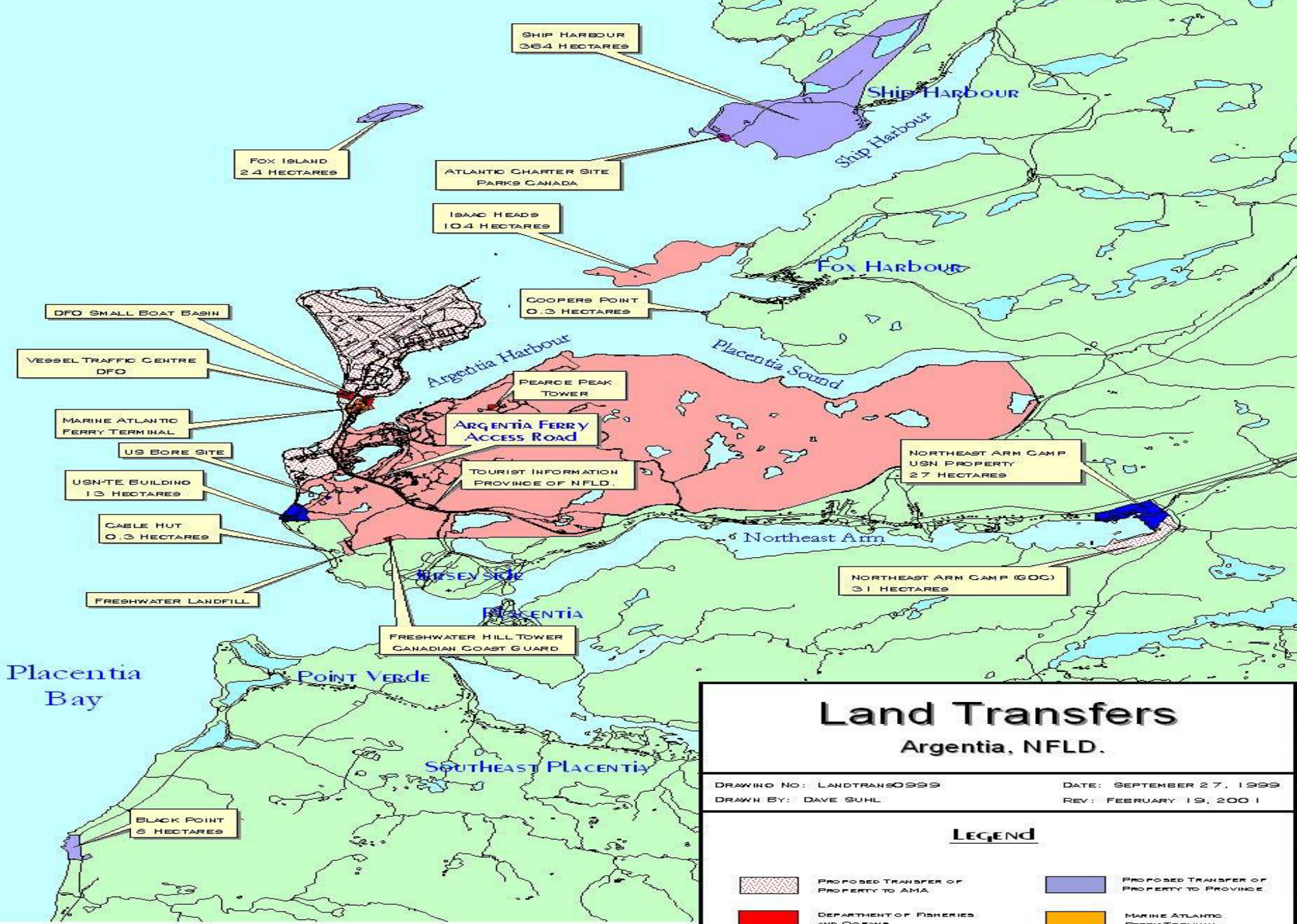
Fleet Dock

Ro-Ro Ramp

Marine Atlantic

Berry Bros.. Wharf

Small Boat Basin



Scale: 1:150000

Land Transfers Argentia, NFLD.

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DRAWN BY: DAVE SUHL

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	PARKS CANADA		ARGENTIA MANAGEMENT AUTHORITY (AMA) 321.2 HECTARES
			

U.S. Property: TE-Bldg. & Satellite Tracking



03 12 2003



REMEDIATION PROJECTS



Service and Solutions

Building Demolitions/Dismantling



Public Works and
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Canada

Canada



N/Side Power Plant (Bldg.. # 4)



8 20 '97



'97 4 5



'98 3 16





DEERE

ROUTE 47
KEEP
PUBLIC



'87 1 4





Combined Bachelor's Quarters (CBQ)



Combined Bachelors Quarters (CBQ)



- **10 Storey Concrete Structure**
- **Concrete: 20,000 Tonnes Rebar: 500 Tonnes**
- **1959 – NL’s Largest Residential Building (24,000 m2)**
- **Command/Hospital/Library/Chapel/Ballroom/Lounges.....**
- **Historical - FHBRO - Community Sensitivity - Political**
- **No Identified Re-use- Asbestos.. - Upgrades \$10-12M**
- **Contract: Philip’s Environmental/Dykon \$2.4M**
- **Nov. 6, 1999: NL’s First “IMPLOSION”**





11 15 93



2000. 1. 17



The Green House





Concrete Screening



Hiking Trails- Backlands



RO
2

10 199



Hazardous Materials Removal



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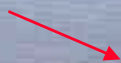
Canada







Fox Island





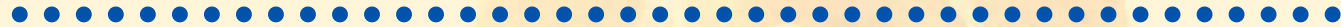
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REMEDIATION PROJECTS



Service and Solutions


Landfills



Public Works and
Government Services
Canada

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Services gouvernementaux
Canada

Canada



Southside Landfill # 1 (SLF-1) Seawall Construction

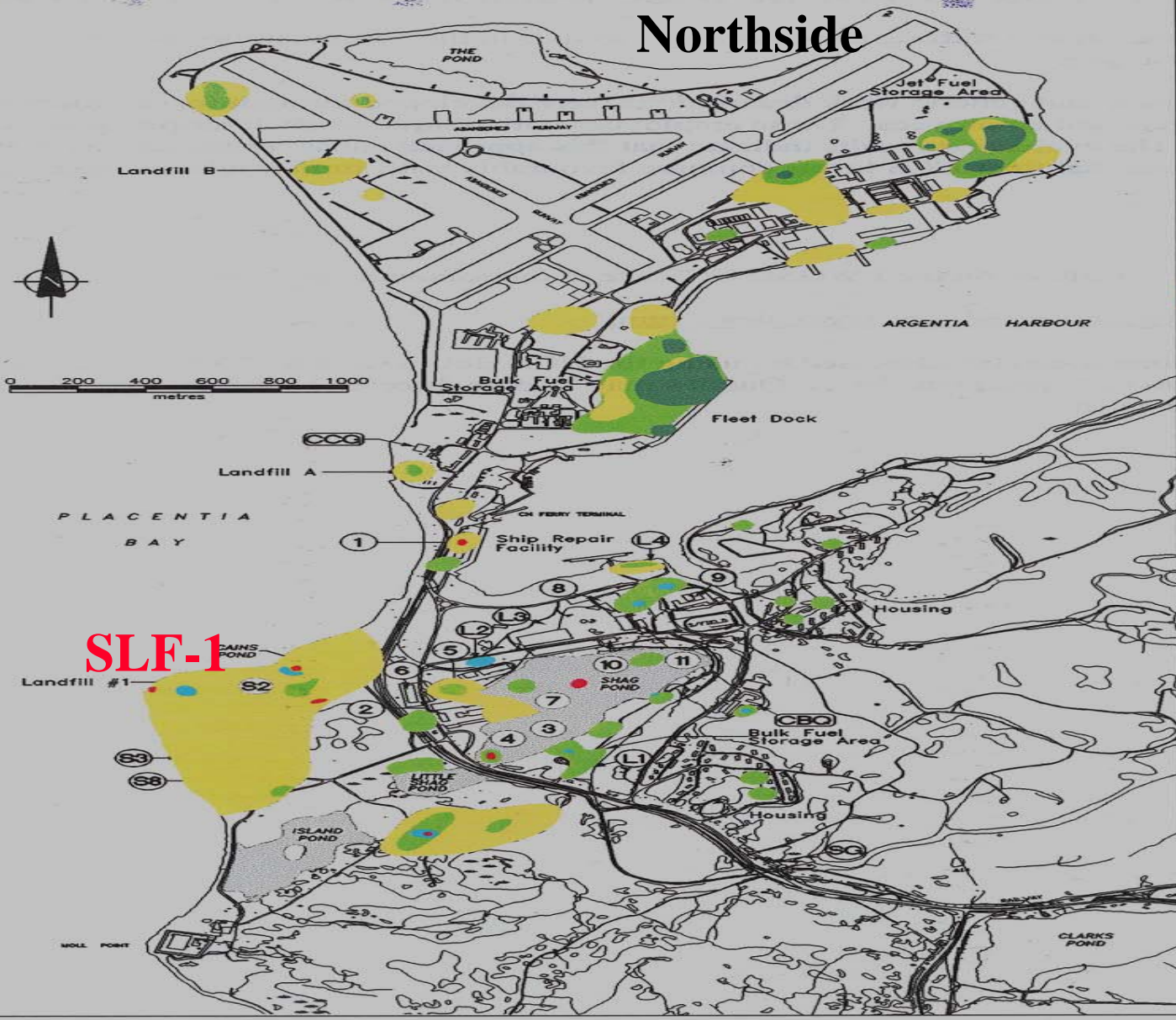
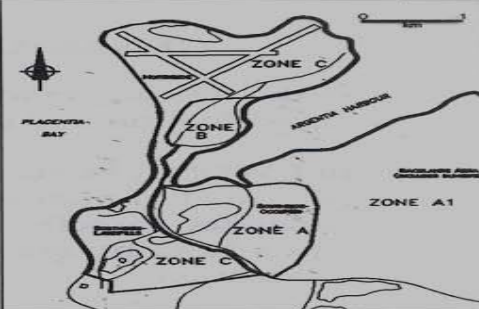


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Northside



LEGEND

- PONDS**
- METAL CONCENTRATIONS IN WATER OR SEDIMENTS EXCEEDING ASSESSMENT GUIDELINES
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 - PCBs AT ELEVATED LEVELS
 - APPROXIMATE LIMIT OF CONTAMINATED AREAS

LOCATION KEY

- | | | |
|-----|------|---|
| 1 | 305M | Ship Repair Facility |
| 2 | 500M | Vehicle Maintenance Garage |
| 3 | 502M | Warehouse and Fire Station |
| 4 | 504M | Equipment Storage and Vehicle Maintenance |
| 5 | 507M | Warehouse and Electrical Substation |
| 6 | 771M | Public Works Administration |
| 7 | 772M | Shops and Storage |
| 8 | 646M | Recreation/Club Facility |
| 9 | 550M | A.L. Bristol School |
| 10 | 724M | Boating Alley |
| 11 | 587M | Gymnasium |
| CBO | 545M | Combined Bachelor's Quarters |
| L1 | | Loading Area 1 |
| L2 | | Loading Area 2 |
| L3 | | Loading Area 3 |
| L4 | | Loading Area 4 |
| S2 | | Landfill 2 |
| S3 | | Landfill 3 |
| S8 | | Sanitary Landfill |
| CCG | | Canadian Coast Guard Building |
| SG | | Security Gate |

VERSION DATE: APRIL 12, 1994

SLF-1



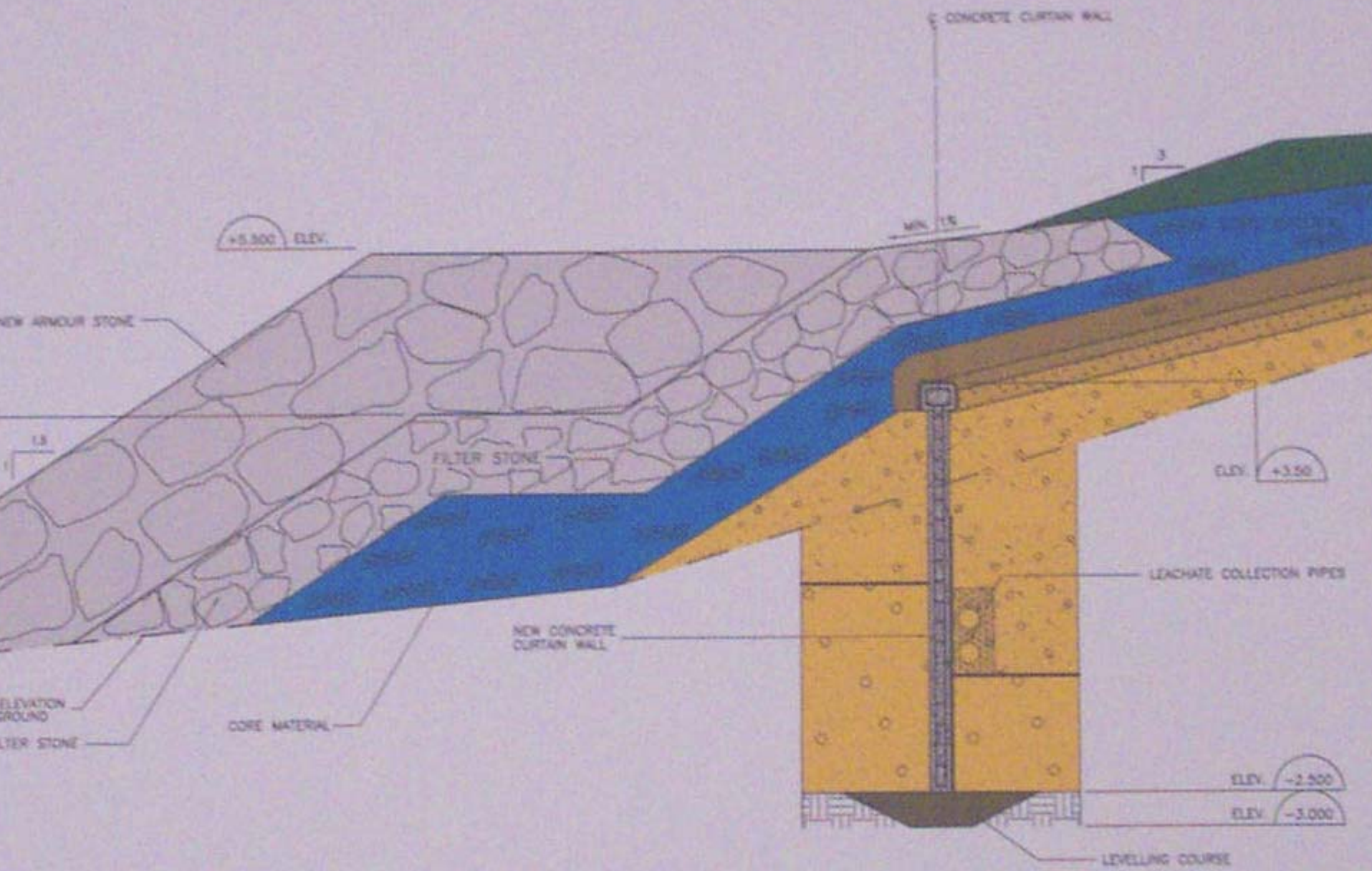
PUBLIC WORKS AND GOVERNMENT SERVICES CANADA	SCALE: N.T.S.	DATE: DEC. 1999	ARGENTIA REMEDIAION GROUP
PRE-DESIGN STATEMENT FOR SLF1	DRWN: D.B.C.	CHK'd: C.R.S.	
SLF1 AERIAL PHOTOGRAPH	FIGURE No: 2-2		





9/30/95







SEAWALL CONSTRUCTION (SLF1)

.....
Service and Solutions

- **Shoreline Stabilization**
- **Armour Stone Revetment**
- **Leachate Retention & Collection**
- **Issue: Integrity/Durability of Concrete vs. SSP Curtain Wall**
- **Pre-Cast Concrete Curtain Wall: 527m L x 6m H**
- **Health and Safety During Construction**
- **Contract: \$5.8M (C) : Monitoring Required**







1999.3.6







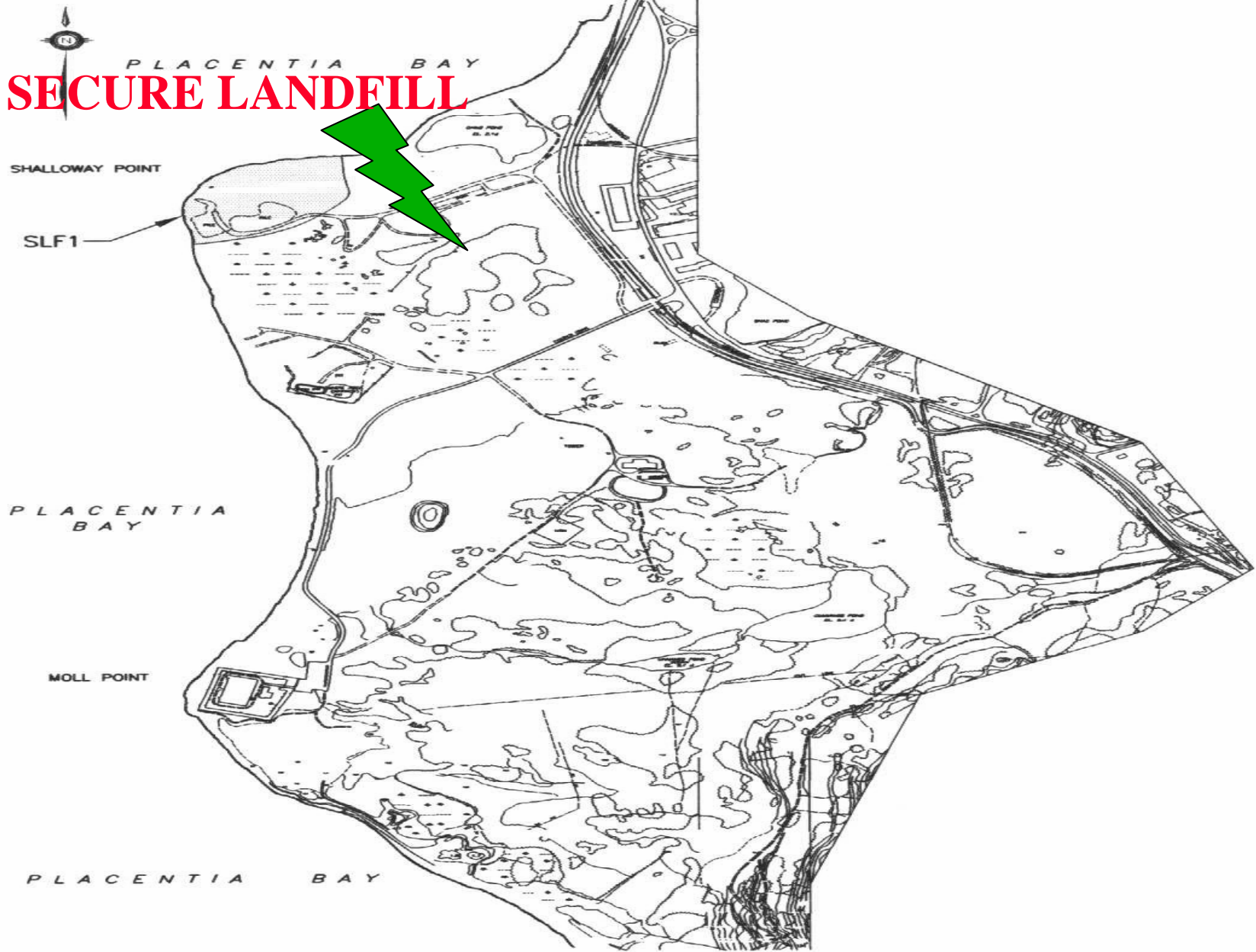
Secure Landfill

.....
Service and Solutions

- Hazardous/Non-Hazardous Wastes
- Volume: 30,000 cubic metres
- Approximately 1.5 Ha.
- Landfill Subdivided into 3 Cells
- Engineered Double Liner
- Designed to CCME & EC Guidelines
- Contract: \$1.98M Final



SECURE LANDFILL



1999\214\1030

C:\CAD\985044\SLF1-FIG\FIG1.DEC\1999\FIG2-1

PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

PRE-DESIGN STATEMENT FOR SLF 1

LOCATION PLAN

SCALE: N.T.S.

DRWN: G.A.L.

FIGURE No:

DATE: DEC. 1999

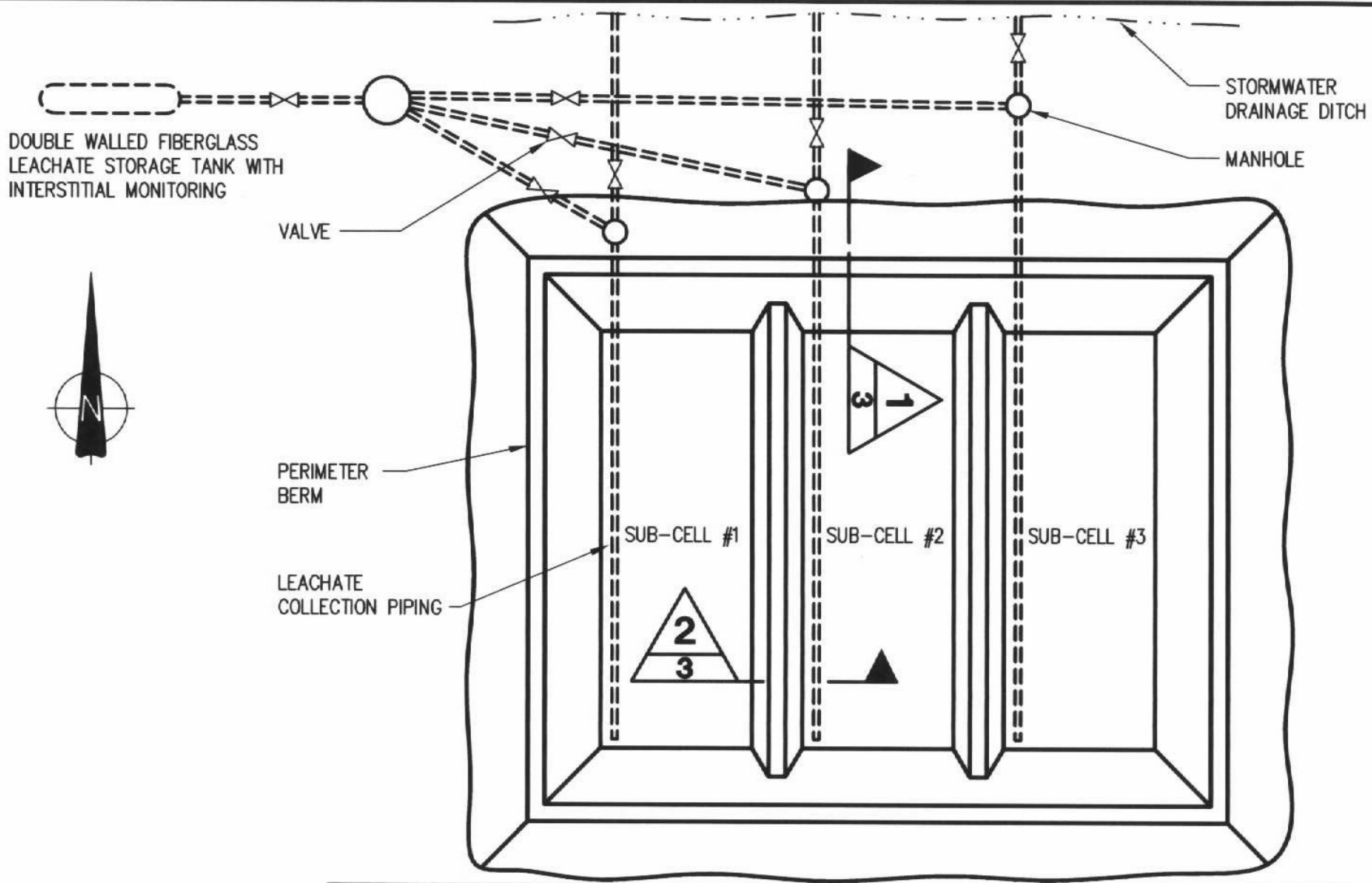
CHK'D: C.R.S.

2-1

**ARGENTIA
REMEDICATION
GROUP**



Secure Landfill



PUBLIC WORKS AND GOVERNMENT SERVICES CANADA	SCALE: N.T.S.	DATE: JAN. 2000
ARGENTIA SECURE LANDFILL	DRWN: T.L.R.	CHK'D: C.R.S.
SUB-CELL LAYOUT AND PRIMARY LEACHATE COLLECTION SYSTEM	FIGURE No: 2	

**ARGENTIA
REMEDIAION
GROUP**

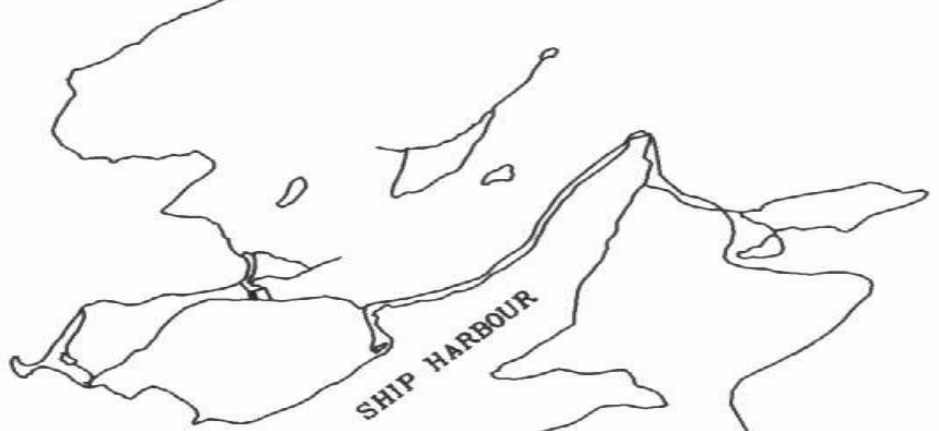


Secure Landfill Cell # 1





PLACENTIA BAY



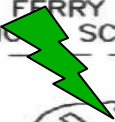
SHIP HARBOUR

FOX HARBOUR

ISAAC'S HEAD

MILLION DOLLAR HOLE

FERRY SERVICE TO
NEW SCOTIA (SEASONAL)



NORTHSIDE ARGENTIA

ARGENTIA HARBOUR

SOUTHSIDE

SITE LOCATION

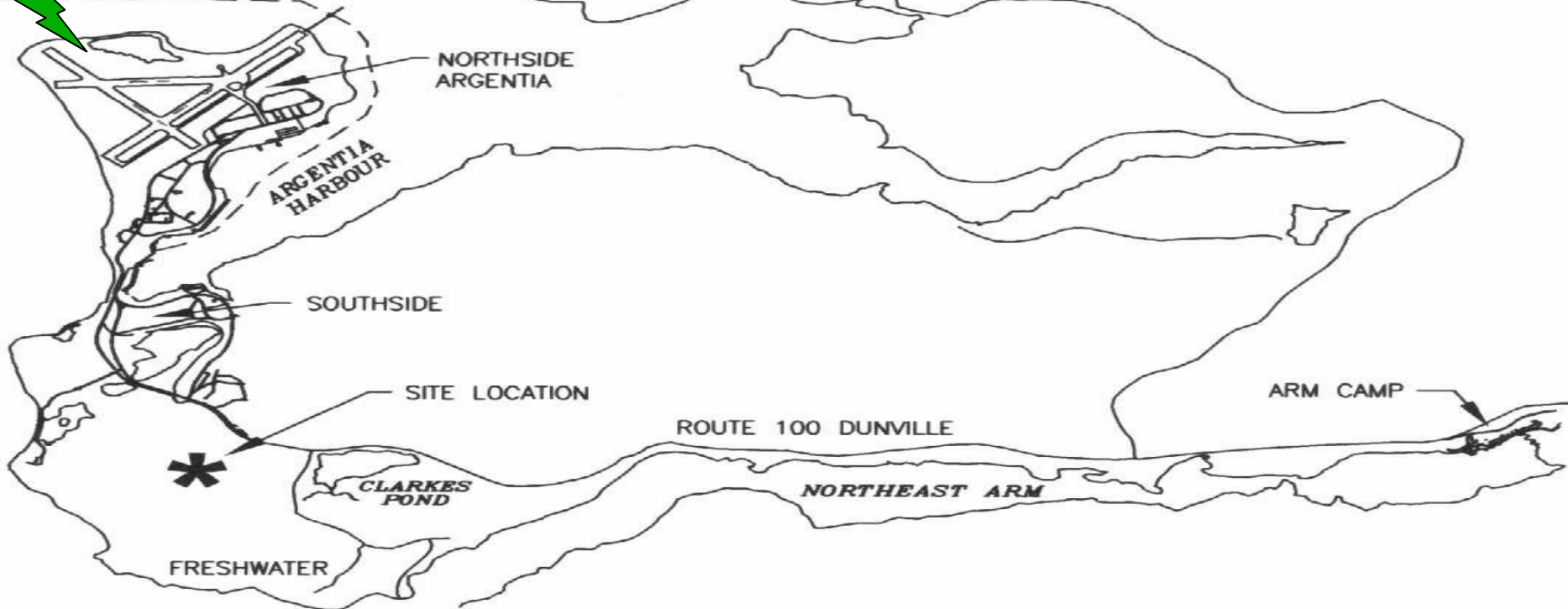
ROUTE 100 DUNVILLE

ARM CAMP

CLARKES POND

NORTHEAST ARM

FRESHWATER



Million Dollar Hole Area Northside Argentina



May 3, 1943



Million Dollar Hole !

- **Original 1995 RAP Revisited**
- **Contaminant Migration**
- **Reclamation/Mining Former Landfill**
- **Health and Safety- Unknowns- EOD, etc.**
- **Contract- EOD Expert, CIH, on site**







02 10 2001





Million Dollar Hole - Screen Conveyor Belt and Magnet



Settling Ponds





Oil Recovery





26 10 2001



2008 8 1

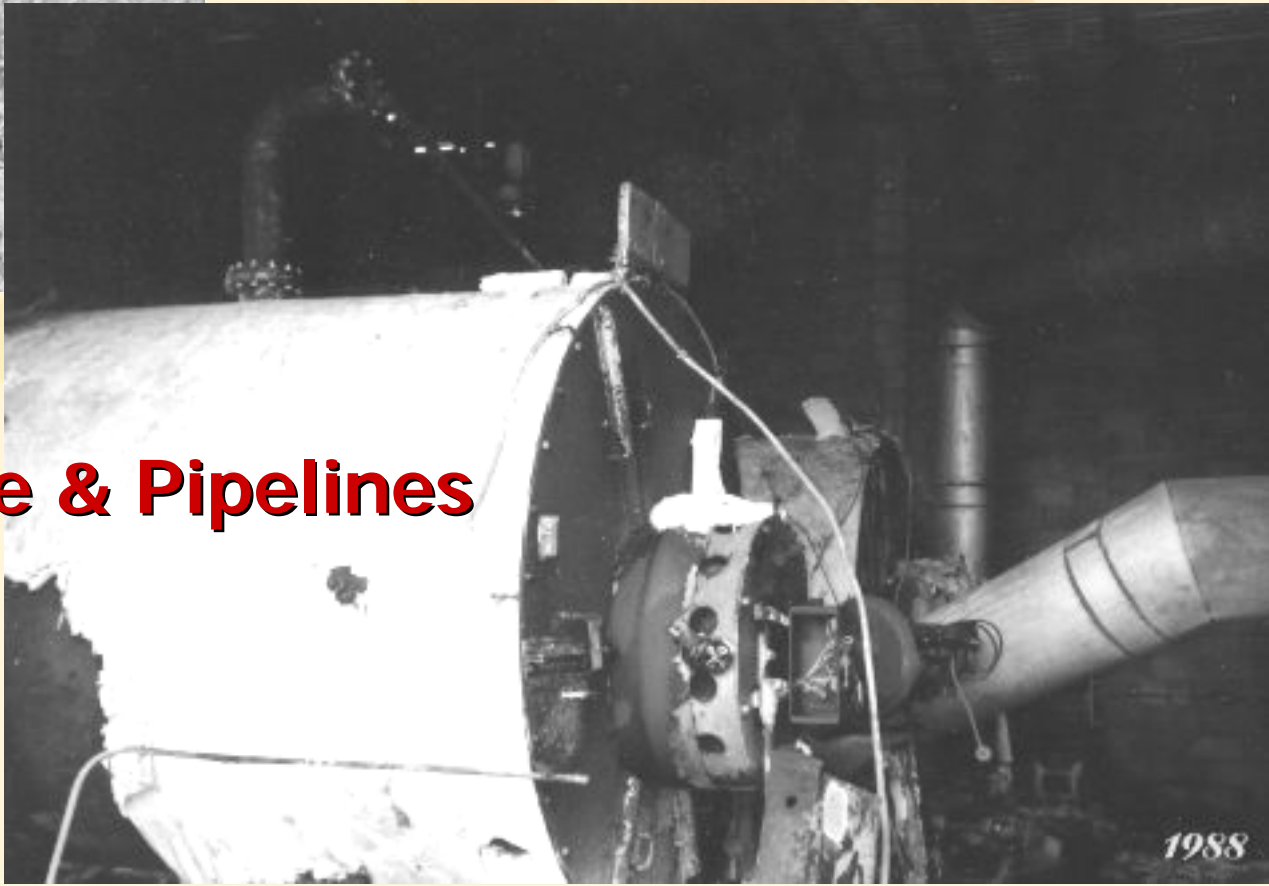






Hydrocarbon Treatment Plant





Bulk Fuel Storage & Pipelines



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Canada







NORTHSIDE BULK FUEL FARM (NBFF)



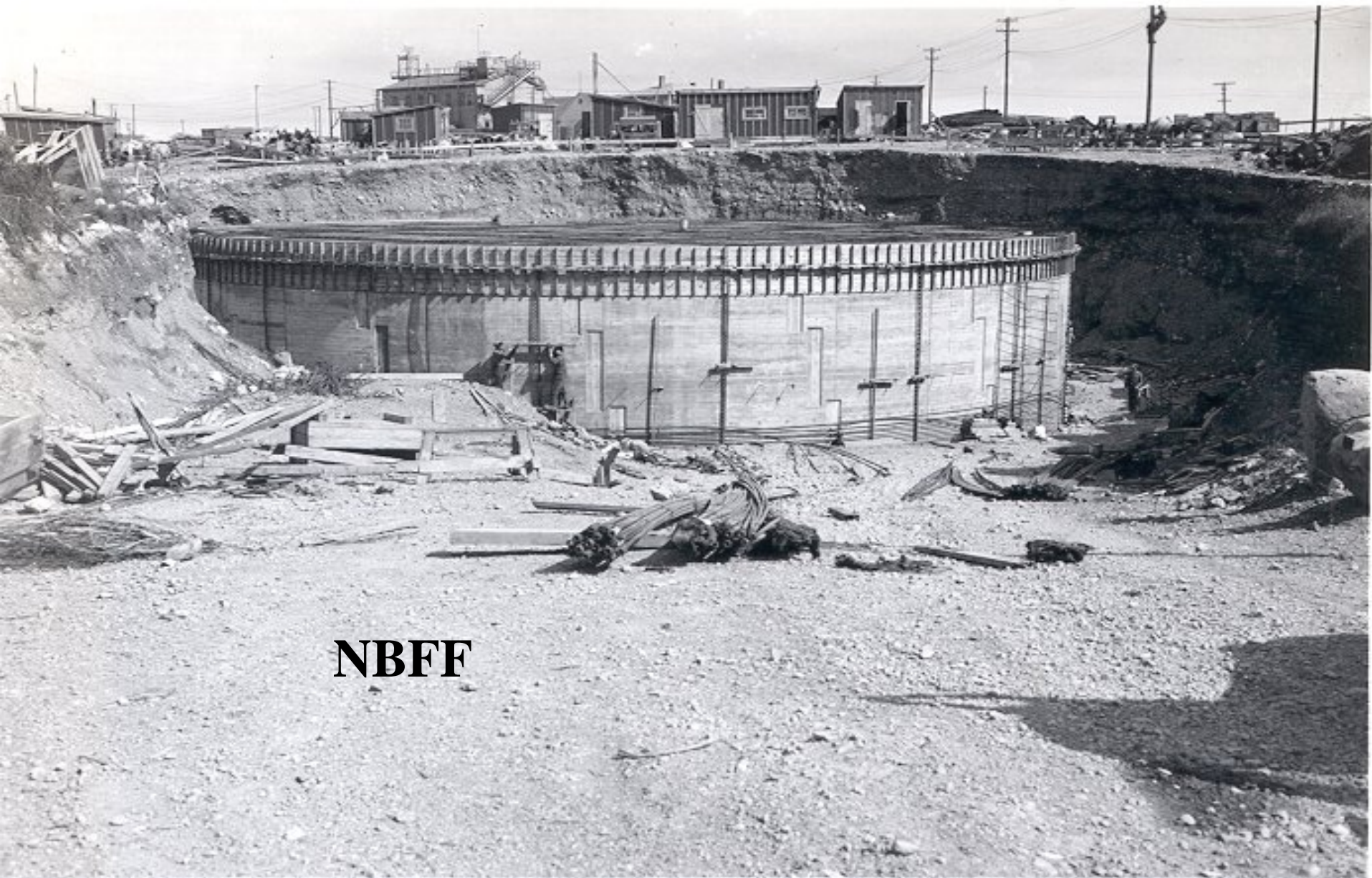
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Canada

Canada



NBFF



NBFF

NAVAL AIR STATION
TANK #4. Looking NNE.

ARGENTIA, NFLD.

NOy-4631

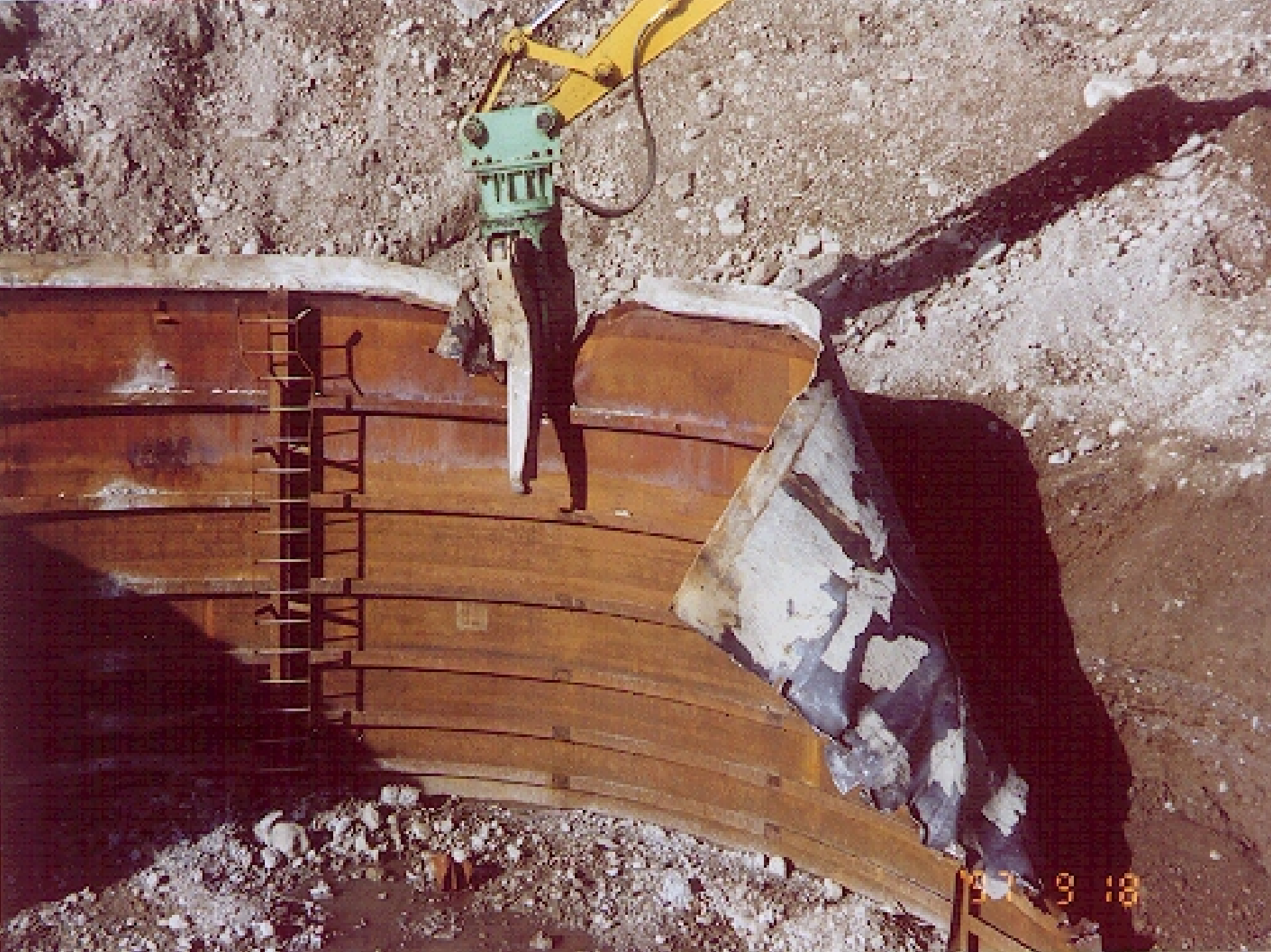
8-1-42

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NBFF





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10 10 2002



PONDS

Shag Pond In-Situ Capping



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Services gouvernementaux
Canada

Canada



Placentia Bay



Island Pond



Little Shag Pond

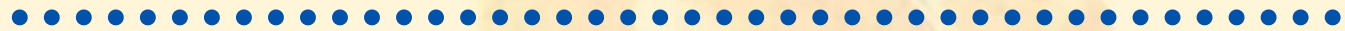


Shag Pond





ARGENTIA REMEDIATION PROJECT



Service and Solutions

- Average Depth ~ 3m; Max. ~ 6m
- ~ 70,000 m³ Contaminated Sediments(PCBs, Heavy Metals, PAHs, TPH)- Organic Material/Boulder Areas
- Ecological Risk - Driver
- Fish Contaminated; Water OK
- Revised RAP- In-Situ Capping





ARGENTIA REMEDIATION PROJECT Shag Pond

Service and Solutions

Remedial Options

- Natural attenuation (no further action)
- Dredging & treatment/disposal
- In situ capping, total infilling (ponds removed)
- In situ capping, partial infilling (ponds remain)







SHAG POND

N/End

S/End





S/End

N/End

03 08 2002



23 08 2002



22 8 03



06 07 2003



05 07 2003



07 07 2003



09 08 2003



19 11 2003

“H’...mmm; Not a bad job !!”





Southside Boiler Plant (SOBP)

Multi Phase Vapour Extraction (MPVE)

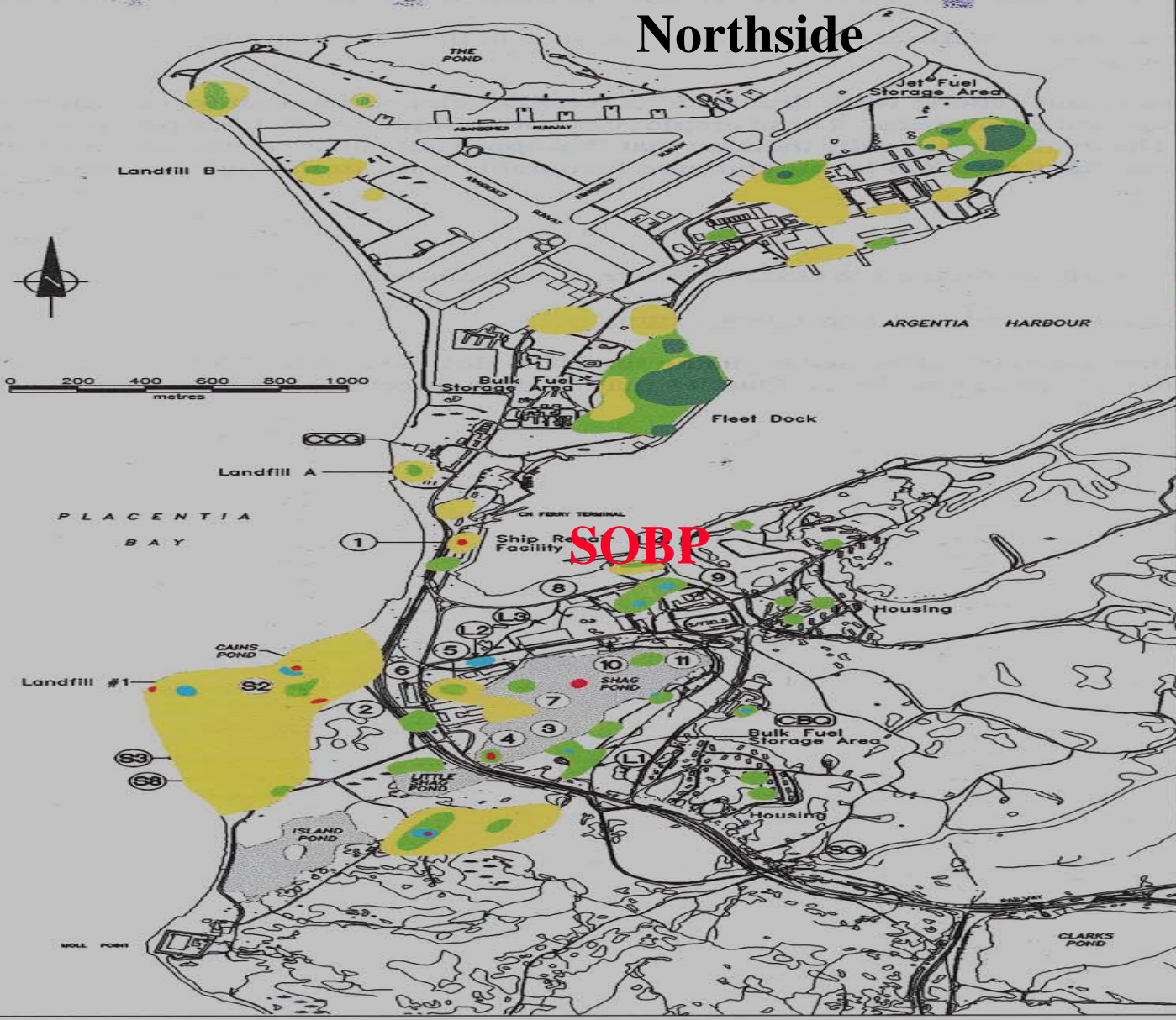
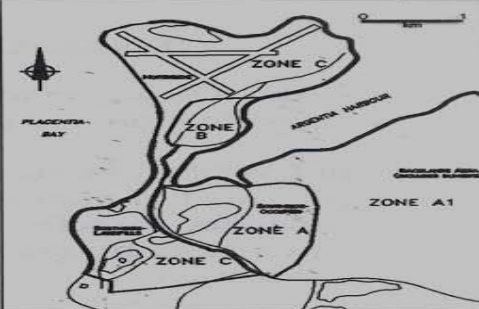
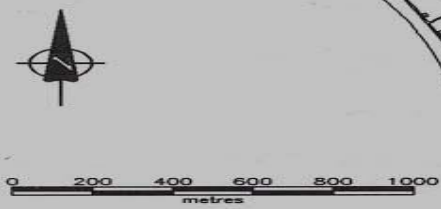


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Northside



SOBP

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- PCBs AT ELEVATED LEVELS

LAND AREAS

- PETROLEUM HYDROCARBONS (i.e. GAS, DIESEL, OIL)
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VERSION DATE: APRIL 12, 1994





30 1 8





- **18/40 MW's Used For Extraction**
- **Gas/Diesel/Bunker Plume**
- **Pilot/Commissioning Completed**
- **Approx. 250 gals/day**





Recycling Summary

Concrete	120,000 Tonnes
Reinforcing Steel	9,500 Tonnes
Fuel (Bunker "C")	> 3,000,000 Litres
Plywood	1,611 Sheets
Lumber (various)	1,500 Tonnes
Hardwood Flooring	2970 m2
Al/Cu Scrap	1,600 Tonnes
Other Ferrous Metals	8,800 Tonnes
Interior SCW Doors	840 ea..





Inco & Voiseys Bay



Public Works and
Government Services
Canada

Travaux publics et
Services gouvernementaux
Canada

Canada



Development Agreement

DEMONSTRATION PLANT (\$130M- 200/P/Y's)

- Hydrometallurgical Processing Technology - Pilot Plant
- Facility at Argentia
- Site Development Completion Date December, 2006



Southside

Fleet Dock

Demonstration Plant 







Development Agreement

PROCESSING PLANT :

HYDROMET PLANT

- 3,000 P/Y's During 3-Year Construction Period
- \$ 800M
- 400 Employed During Operations

or

MATTE PLANT

- 2, 500 P/Y's During 3-Year Construction Period
- \$ 670M
- 350 Employed During Operations





Inco ISSUES

- **Status of AMA**
- **Future Liabilities**
- **Indemnity - GOC vs. AMA**
- **AMA Legal Owners of Property**
- **Lease vs Sale**
- **PWGSC/AMA - Transfer Agreements**
- **Technical Issues**
- **Unknowns ????**





NORTHSIDE FUEL STORAGE AREA (NFSA)



Public Works and
Government Services
Canada

Travaux publics et
Services gouvernementaux
Canada

Canada



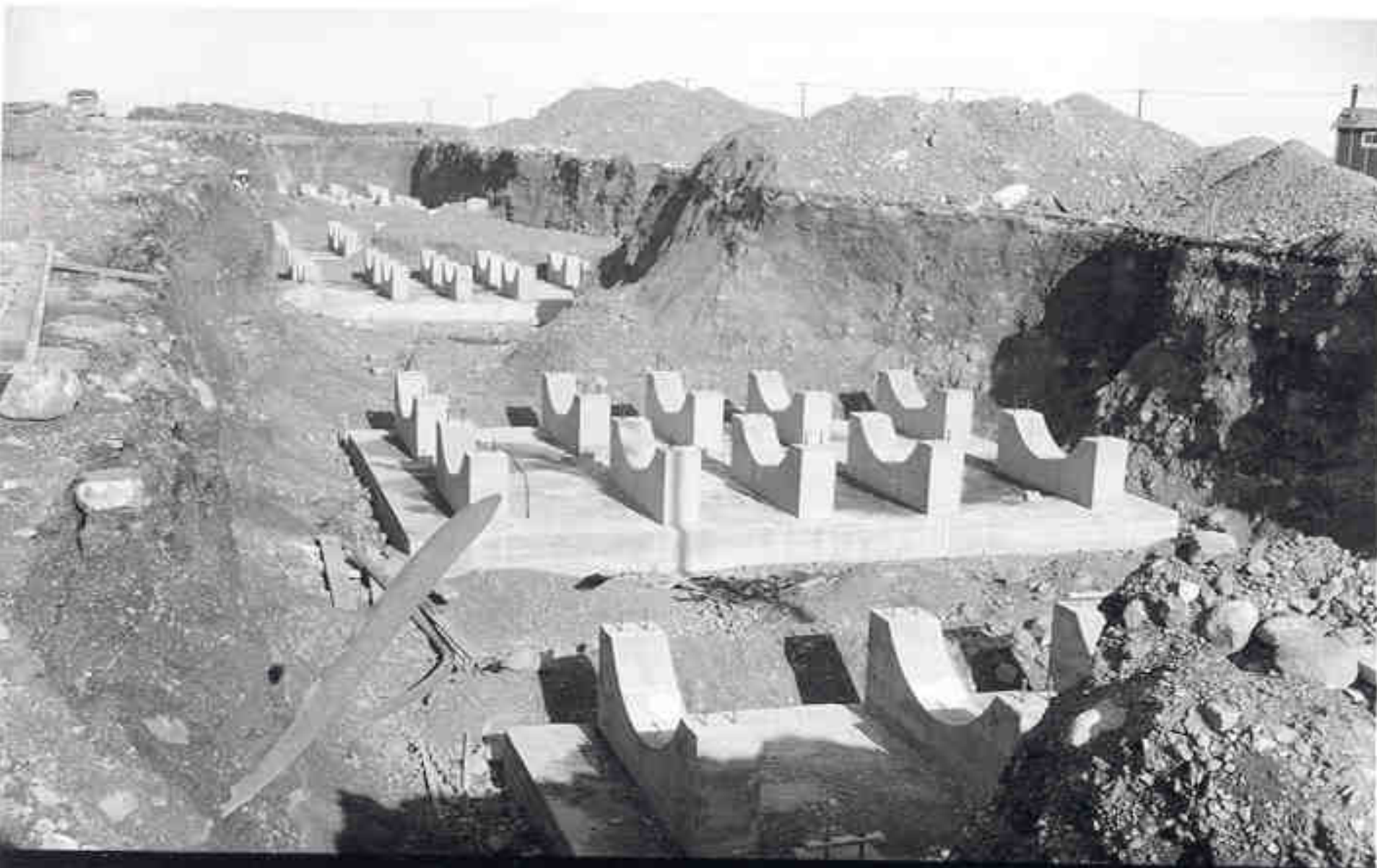
NFSA

Northside, Argentia



NFSA

Artist Rendering of Nickel Processing Facility



NAVAL AIR STATION
Base Mats & Cradles #7 to 12. Looking N.

ARGENTIA, NFLD.

10-27-41

NOy-4631

3-28



NAVAL AIR STATION

ARGENTIA, NFLD.

NOy-4631

Tanks on Mats #3 to 6. Looking N.

10-27-41

3-27



31 08 2001





04 06 2004





31 5:02



NFSA

- **Key Issues:**

- Evaluation of chronic (i.e., long term) exposure to hydrocarbon vapours.
- Acute (i.e., short term) exposure to possibly flammable/explosive conditions.
- Most significant pathway was vapour intrusion to indoor air.
- Health and Safety



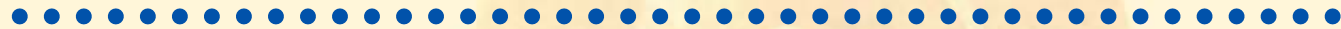


13 09 2004



Environmental Work Plan 2005/06

Total = \$12M



- **Shag Pond – Complete In-Situ Cap- S/O**
- **TPH Soil Treatment Facility – 130,000 Tonnes “MERX”**
- **NBFF Bunker “C” Fuel Recovery- S/O**
- **Capping Secure Landfill – S/O**
- **SOBP Multi Phase Vapour Extraction (MPVE)- U/C**
- **NFSA Avgas Plume – Complete RAP- S/O “MERX”**
- **Miscellaneous Sites – S/O**
- **Documentation/Reporting/Closure Plans and GIS ++**







THANK-YOU !!