

AN ENVIRONMENTAL OVERVIEW ON HORNEPAYNE YARD

Presented by KGS Group



Objectives

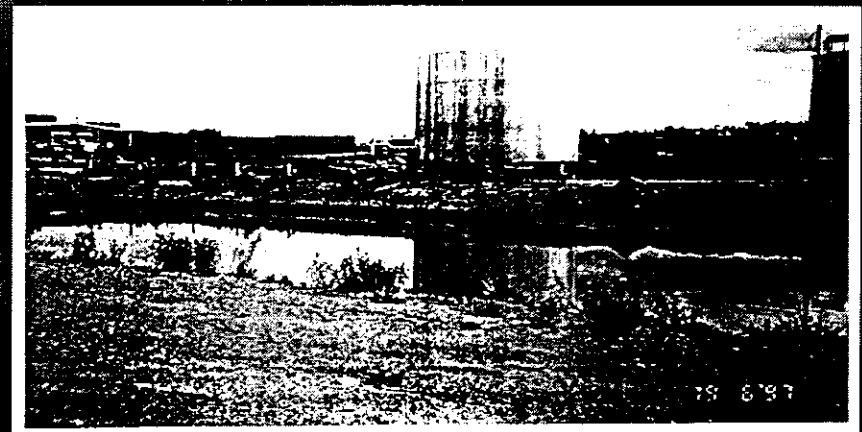
- The objective of the this overview is to provide an idea as to the amount and type of work that has been completed to determine and mitigate the environmental effects associated with the operations at the Hornepayne Yard.
- As well this presentation is to provide an idea as to the performance of installed Remedial Systems, and Pilot Systems. This performance is measured against the CN mandate to contain all environmental impacts onsite and to limit offsite releases.
- A look to future remedial works will also be presented.

Site History

- Began Operations in the early 1900's
- Locomotive, Crew change and track maintenance main function
- Indoor turntable in roundhouse, locomotive and car maintenance.
- Diesel Fuel Operations began in the 1950's.
- Fuelling completed in four (4) areas
 - ◆ West End
 - ◆ East End
 - ◆ VIA Station
 - ◆ Shop Track

Site History (Con't)

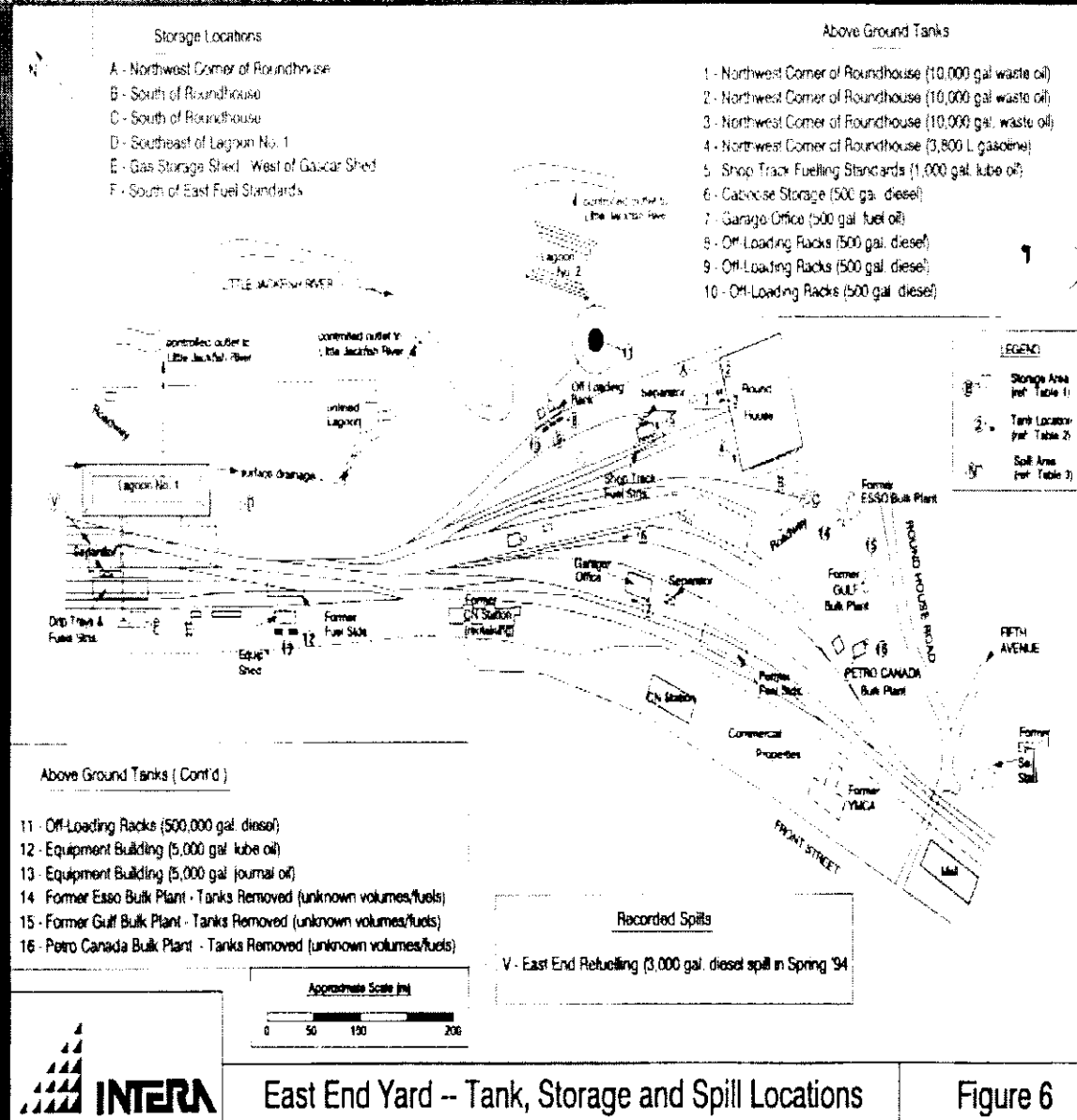
- A 1.9 million litre aboveground storage tank was installed and served the initial locations of the east and west bound fuelling areas.
- This tank served both the former East Bound and West Bound Fuelling Standards.



Site History (Con't)

■ Due to increase in rail traffic and the size of trains, an updated fuelling system was completed in 1979.

– The upgrade consisted of the relocation of the East End Fuelling Standards to its current location.



East End Yard -- Tank, Storage and Spill Locations

Figure 6

Site History (Con't)

- The West End Fuelling Standard was constructed in its current location approximately 2.5 km from the town. It was serviced by a new 1.4 million litre AST



Site History (Con't)

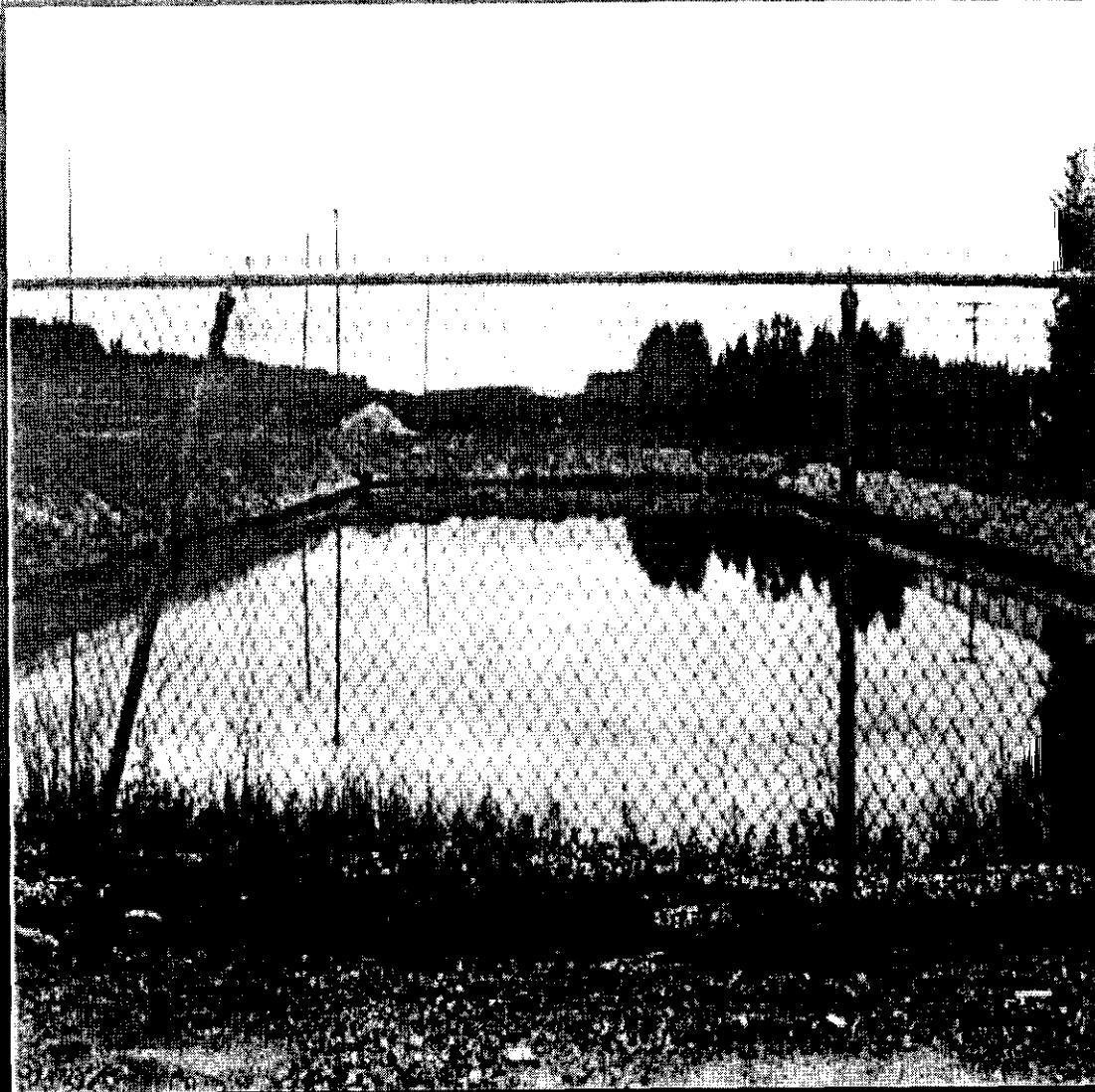
➔ Infrastructure

- Up to 1995 there had been approximately 25 AST's located at various locations around the yard
 - These tanks held diesel fuel, gasoline, journal oil and waste oil.
 - This number has been reduced to approximately 15 present day
- There have been approximately 7 reported spills in the Hornepayne Yard totalling over 300,000 litres.

Site History (Con't)

➔ Infrastructure (Con't)

- Historically, there were a total 6 drainage lagoons in Hornepayne Yard.
 - Lagoons 1, 2 and 5 acted as oil/ water separators
 - ◆ Prior to 1997 the East End drip trays drained directly to Lagoon 1.
 - In 1997 this number was reduced to five after Lagoons 4 and 5 were removed and the DRL was created in the West End.



Site Investigation History

⇒ First Environmental Investigations were conducted in 1994, following is a list of Audits, Risk Assessments, Pilot Studies and Environmental Site Assessments (ESA) that have been completed at the Hornepayne Yard

Site Investigation History (Con't)

- Phase I Audit Risk Assessment, Hornepayne Yard, Interra, January 1995
- Phase II ESA, Hornepayne Yard, XCG, January 1995
- Phase I ESA, Hornepayne Yard, Interra, August 1994.
- Phase III ESA, Hornepayne Yard, XCG, June, 1996
- Free Phase Product Containment/Recovery, Biogenie SRDC Inc. April, 1997
- Phase IV Remedial Action Plan, West End Diesel Recovery System Construction Report, January, 1998, KGS Group
- Phase IV Remedial Action Plan, 1997 Annual Report, KGS Group, March, 1998
- East End Remediation System Pilot Report, KGS Group, March, 1998
- Phase IV Remedial Action Plan, 1998 Annual Report, KGS Group, February 1999
- Phase IV Remedial Action Plan, 1998 Annual Report, KGS Group, February 1999

Site Investigation History (Con't)

- Phase I V Remedial Action Plan - West End 1999 Annual Report, KGS Group, March 2000
- Phase IV Remedial Action Plan - East End 1999 Annual Report, KGS Group, March 2000
- Phase IV Remedial Action Plan - West End 2000 Annual Report, KGS Group, February 2001
- Phase IV Remedial Action Plan - East End, 2000 Annual Report, KGS Group, April 2001
- Phase IV Remedial Action Plan, 2001 Annual Report, KGS Group, February 2002
- Pilot Remedial System Study, former Shop Track Fuelling Area, KGS Group, August 2002

Other Studies

⇒ Groundwater Monitoring and Sampling Program

- Since 1997 there has been an annual groundwater monitoring and sampling program completed to help define
- Separate report produced until 2001 when it was amalgamated into the Phase IV RAP Annual Report
- Provided information on where the groundwater flows to and how fast it is moving, as well as providing information on the liquid and dissolved phase hydrocarbons.
- The information is used to determine where, if necessary, remedial efforts should be focused.

Other Studies (Con't)

→ Surface Water Monitoring and Sampling Program

■ Conducts monitoring and sampling at discharge points.

- Information is compiled into a national database to ensure that all discharges meet regulatory guidelines.

Other Studies (Con't)

⇒ Other studies were conducted to help evaluate environmental operations at

- Waste Oil Study CN Capreol and Hornepayne Yards, KGS Group, June 1999

Environmental Monitoring Operations

Environmental Monitoring Operations Overview: physical monitoring operations in the yard.

- To date there has been over 130 monitoring wells installed to monitor for potential hydrocarbon groundwater contamination.

- In 2000, a program was initiated to protect view wells in 2000 and consisted of placing highly visible markers at wells and recessing the monitoring well covers below grade in high traffic areas.

- There has also been in excess of 60 test pits excavated that provided information on soil type and hydrocarbon impacts.

General Observations (Cont'd)

➔ East End

- Originally (1996) there were 7 free product plumes identified.
- Subsequent investigations and monitoring programs indicate that there are 2 plumes.
 - Former VIA Fuelling Stand(6)
 - Lagoon #2 (5), Shop Track Fuelling(3) and Former Pumphouse Area (4)
- The remaining areas that measured product in 1996, have not had product measured since,

* Note: some wells in these areas have been destroyed.

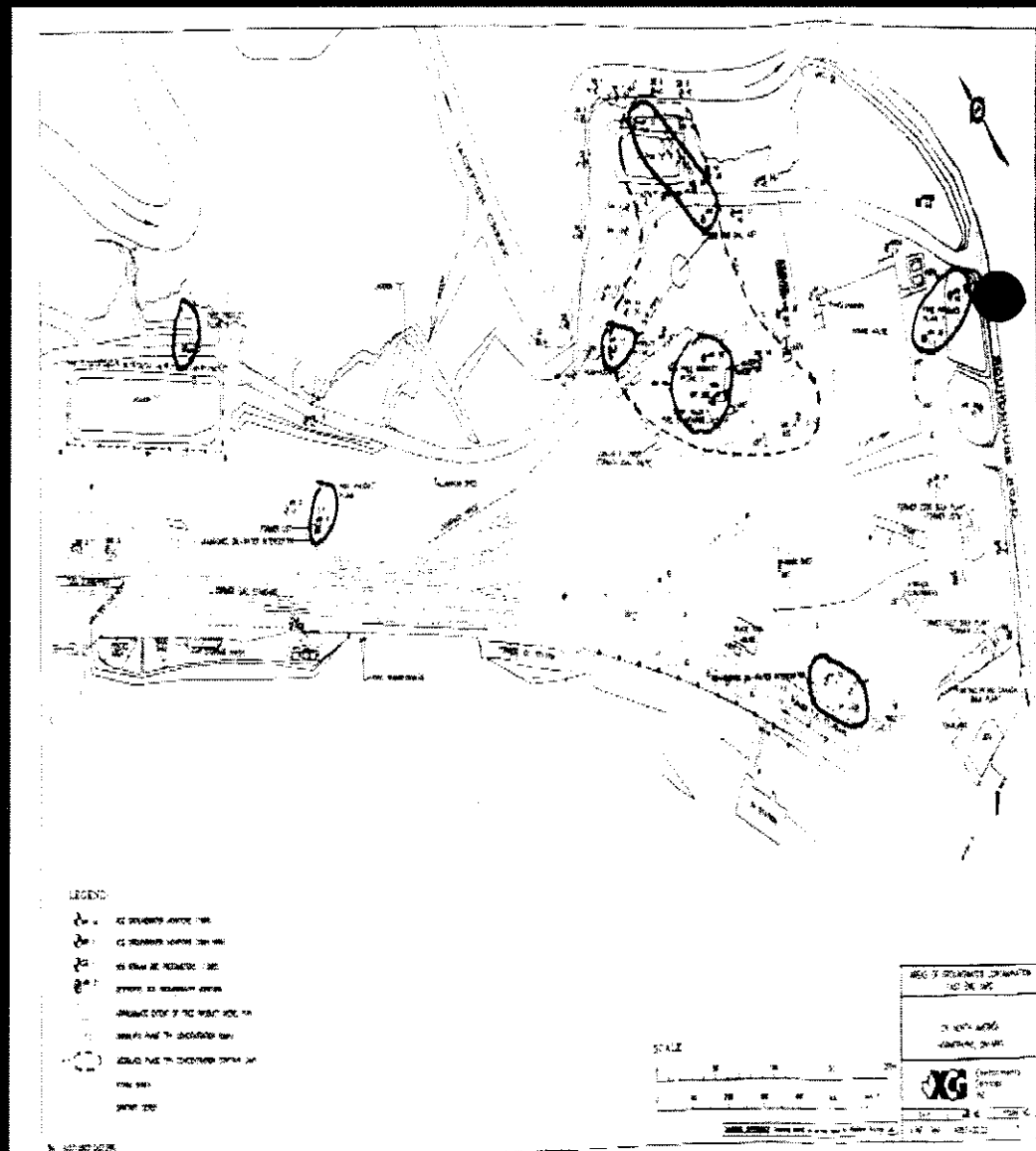
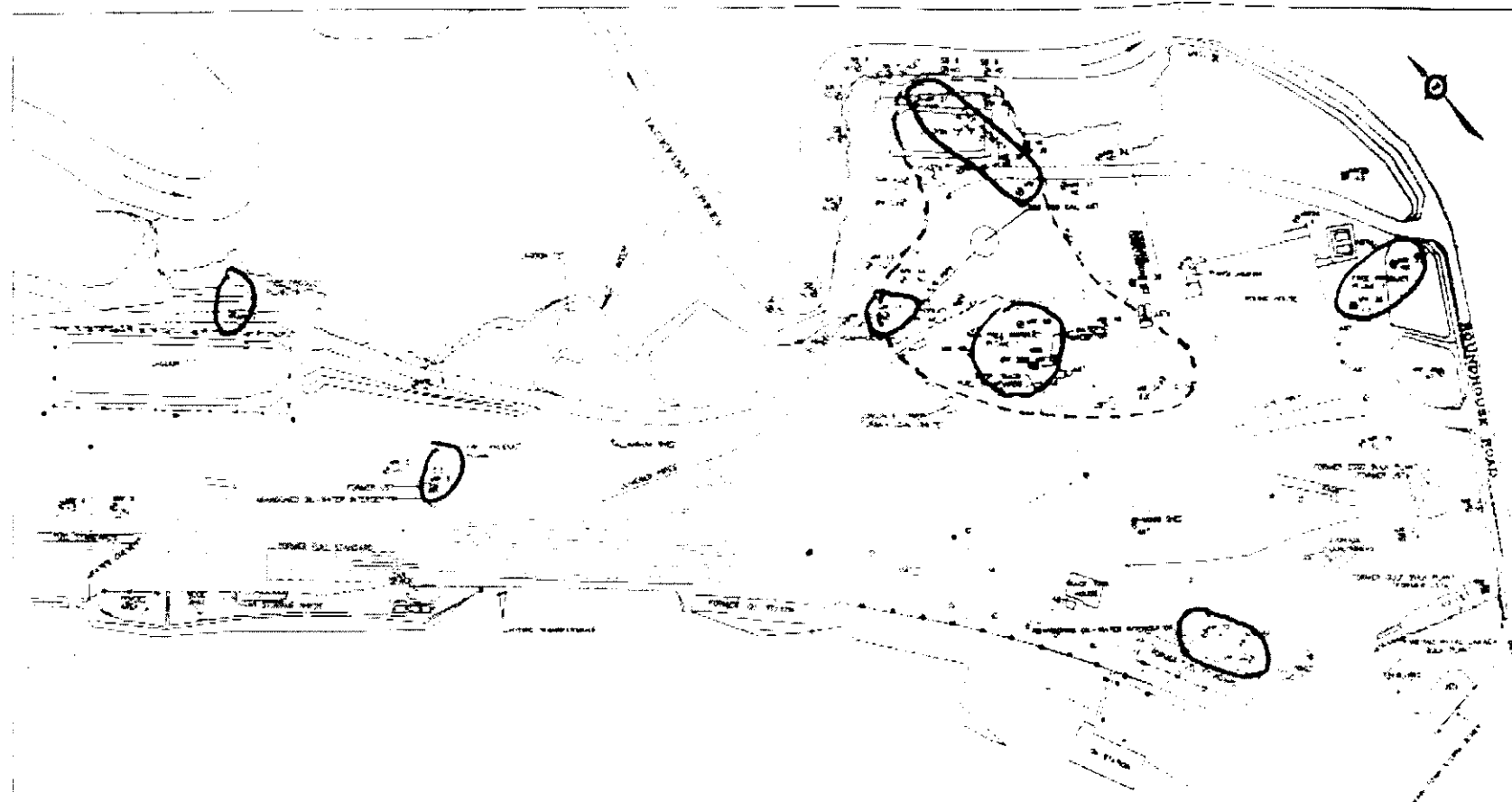
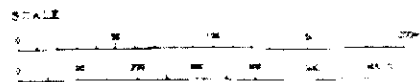


Figure 2 Location of the Plumes East End



LEGEND

- ICE DISCHARGE MONITOR (199)
- ICE DISCHARGE MONITOR (199-199)
- ICE STRAIN AND MONITORING (199)
- BENTONITE ICE DISCHARGE MONITOR
- OPERATIONAL ZONE OF THE PROJECT (199-199)
- ZONE 401 (199-199) (CONCENTRATION ZONE)
- ZONE 402 (199-199) (CONCENTRATION ZONE)
- ZONE 403 (199-199) (CONCENTRATION ZONE)
- ZONE 404 (199-199) (CONCENTRATION ZONE)
- ZONE 405 (199-199) (CONCENTRATION ZONE)
- ZONE 406 (199-199) (CONCENTRATION ZONE)
- ZONE 407 (199-199) (CONCENTRATION ZONE)
- ZONE 408 (199-199) (CONCENTRATION ZONE)
- ZONE 409 (199-199) (CONCENTRATION ZONE)
- ZONE 410 (199-199) (CONCENTRATION ZONE)



WEST OF DELTA/DAVID LUNAR/MONITOR 199-199-199	
IN NORTH AMERICA (CENTRUM IN MAP)	
XG Environmental Services INC.	
199-199-199	199-199-199
(NOT TO SCALE) 199-199-199	

Figure 2 Location of the Phlox East End

General Observations (Con't)

○ East End (Con't)

- LPH sheen has been identified entering into Jackfish Creek, during extreme drawdown conditions (extremely wet or dry conditions) in several of the reports since 1995.
- Wells that were installed directly into the river bottom in this area did not detect petroleum hydrocarbons.
- Surface water collected down gradient of the yard for the 2002 MOE GUDI study did not have any concentrations of petroleum hydrocarbons present.



General Observations (Con't)

⇒ East End (Con't)

- The volume of product present in this plume ranges from approximately 280,000 L to 1.4 million litres. Approximately +/- 320,000 L are estimated to be recoverable.

Remedial Actions

What has been done with all the information gathered?

⇒ Pilot Tests

- In 1996 a cement/bentonite slurry wall was installed between Lagoon # 2 and the Jackfish Creek.
 - Limit movement of LPH off CN property.
 - A pilot test using a series of phased array product pumps and vacuums to induce a drawdown was applied to the West End plume and between the newly constructed cut off wall and the Jackfish Creek.
 - Conclusions
 - ◆ The result of the pilot test indicated although some product was recovered, the recharge rates in the silts and silty sands were too slow to support the technology. Recommendations were to look at trench based technology for the removal of LPH at the yard.

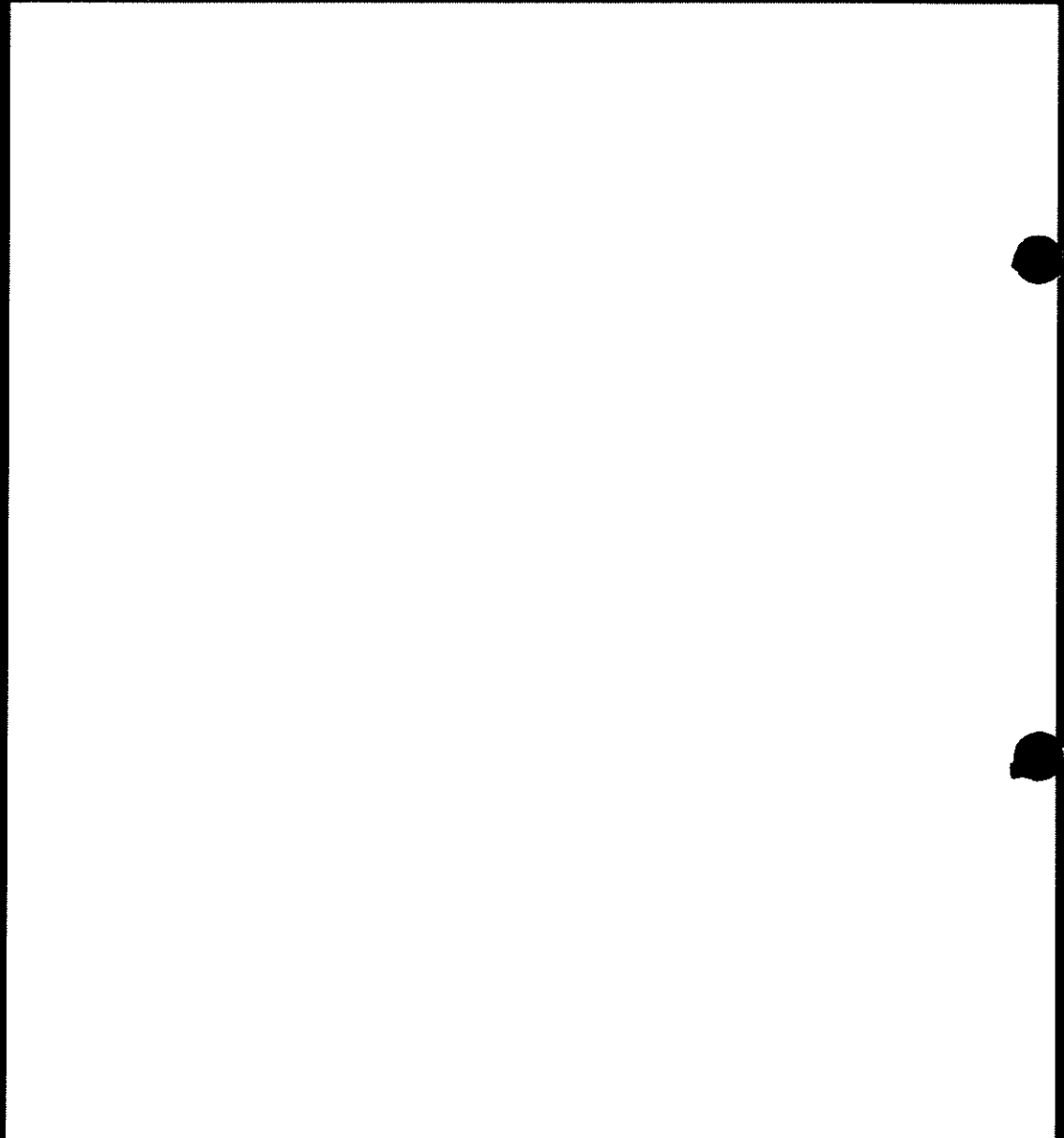
Remedial Actions (Con't)

- The containment wall provided an adequate barrier but required hydraulic control reduce the risk of lateral movement.

Remedial Actions (Con't)

A pilot study was begun in 1997 which consisted of the drilling 3 pumping wells in the East End near Lagoon #2.

- Two wells were on the southern side of containment wall and one on the northern side between the wall and Jackfish Creek.
- The pilot system was completed in 1998 and consists of two pneumatic total fluid pumps, a 15gpm coalescing oil/ water separator and an air compressor.



Remedial Actions (Cont'd)

- Total fluids are pumped from the 100 mm pumping well to the oil water separator.
- Diesel product is separated from the groundwater and pumped to a 1,100 litre AST.
- Groundwater is then pumped to Lagoon #2.
- From this action a groundwater depression is formed.

Remedial Actions (Cont)

- The purpose of the pilot was two fold:
 1. To determine if total fluids pumping would be an effective remedial technique in the saturated silty sands found in the East End.
 2. To provide immediate hydraulic control in the area of the containment wall, limiting the movement of LPH to Jackfish Creek.

Remedial Actions (Con't)

– Results

- ◆ The system has collected approximately 8,000 L of LPH in the 3.5 years it has been operating.
- ◆ Has local hydraulic control during normal operating season.
- ◆ Has limited control during high groundwater or low groundwater conditions.
- ◆ Ineffective as a main remedial system for the the East End plume.
- ◆ Should be used with alternative systems, incorporated into an overall plan to mitigate plume.

Remedial Actions (Con't)

- In 2001 a pilot study was initiated in the area of the former shop track fuelling.
 - The pilot consisted of the excavation of a 15m long trench that was 5 m in depth and 1m wide.
 - The excavation was backfilled with blast rock wrapped in geotextile.
 - A sump was installed at the west end of the trench.
 - A pump test was completed in the spring of 2002 to determine pumping rates, type of mechanical fluid recovery system and if the trench should be extended to increase the radius of influence.



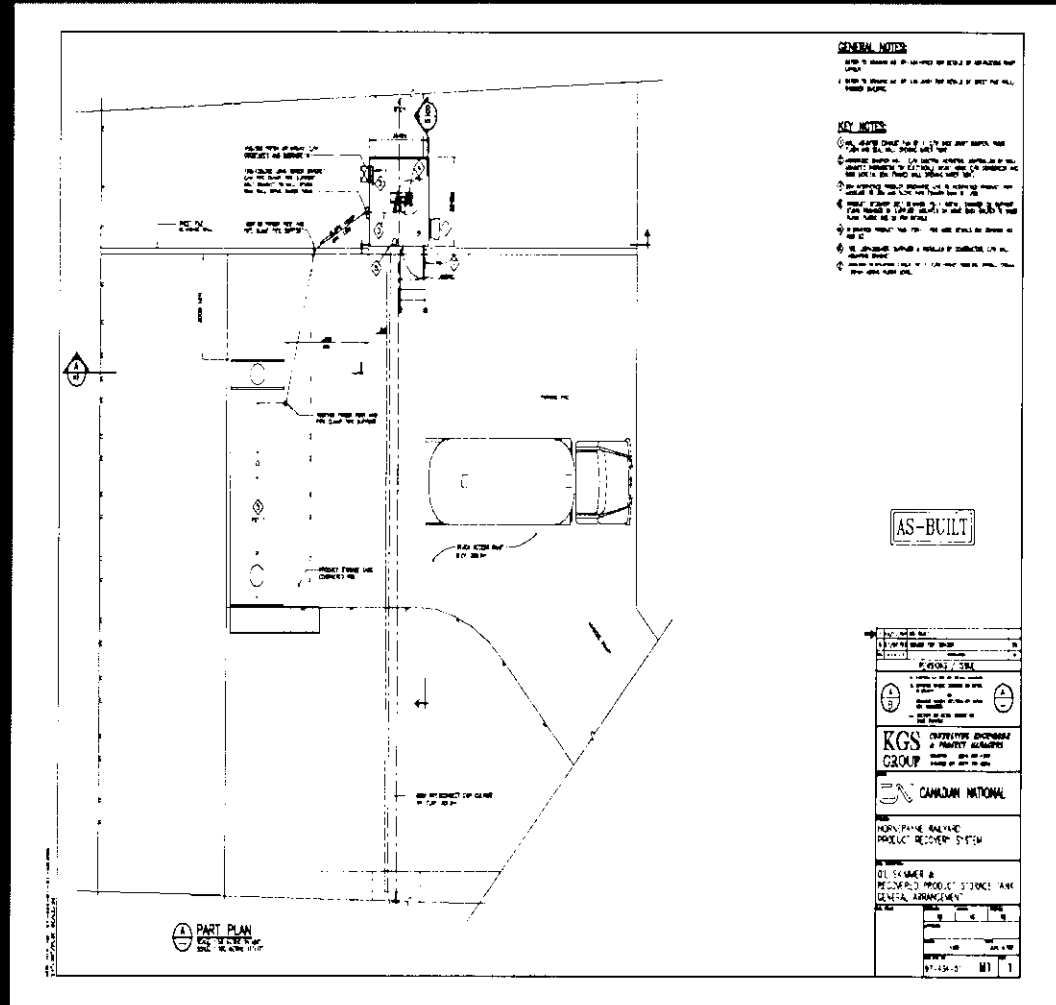
Remedial Actions (Cont)

– Results

- ◆ A trench combined with a groundwater depression pump is a suitable technology for removing LPH from the silty sands and silts found in the East End Shop Track fuelling area.
- ◆ The radius of influence created by pumping down the groundwater table was approximately 7,500 m².
- ◆ There was an increase in the LPH thickness at the collection sump
- ◆ The mechanical system could consist of a groundwater depression pump and a belt skimmer to remove product to an aboveground tank. The groundwater would be pumped to an existing oil/water separator at the Waste Oil Transfer Facility.

Remedial Actions (Cont'd)

- ◆ A belt skimmer was installed to remove all collected product and transfer it via gravity pipe to a 25,000L AST
- ◆ Groundwater collected was allowed to flow thru the retention weir via an angled pipe.
- ◆ The discharge trench was designed to retain the groundwater and allow for the volatilization of dissolved phase hydrocarbons in order to meet provincial discharge criteria.



Systems Effectiveness

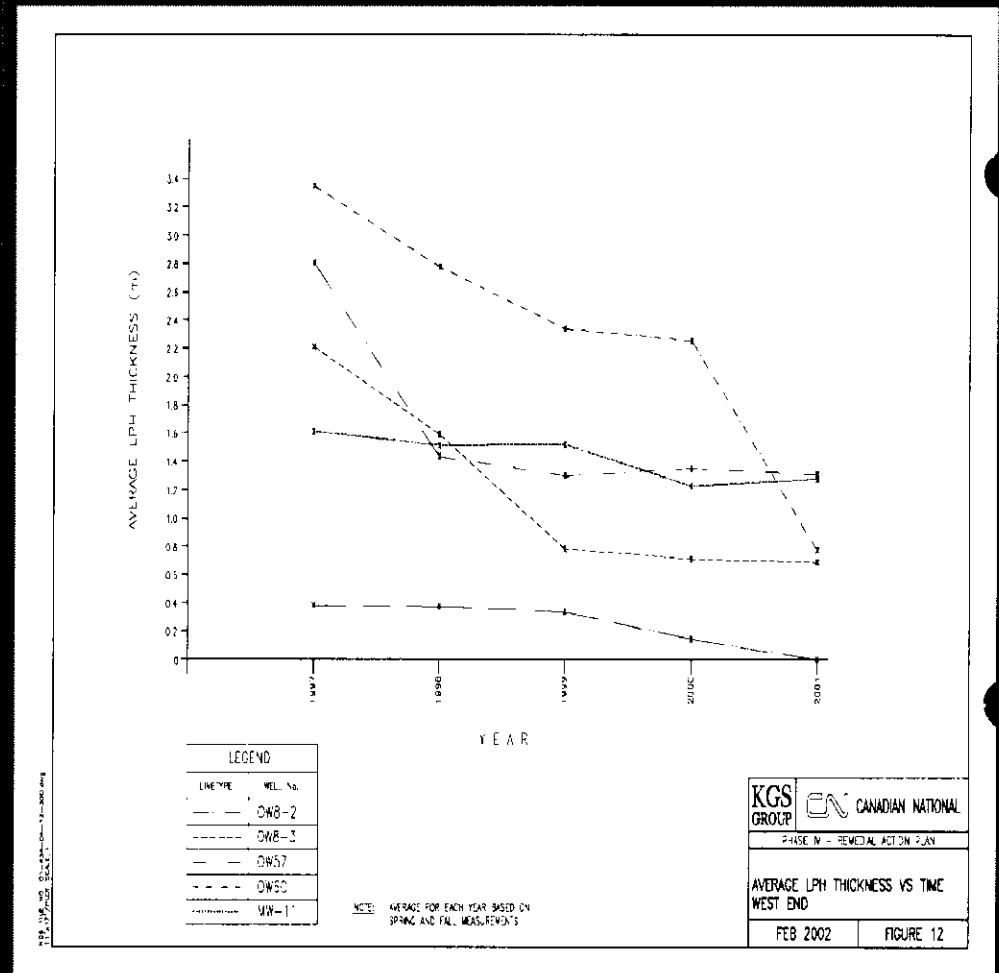
⇒ How effective have the remedial systems been?

■ West End

- To date (4.5 years) the remedial system at the West End has recovered approximately 98,000 litres of LPH
- There has been minimal downtime
 - ◆ Full product tank
 - ◆ Resizing of decanter unit
- The cost of recovering the LPH is very low (approx. \$1.65 per litre)
- The system is dependant on historical average groundwater elevations, therefore there will be years when the system is not as effective.
 - ◆ Extreme dry seasons where the groundwater table is very depressed below the underdrains or in extremely seasons where the table is above the underdrains will limit the ability of the system to capture diesel product.

Systems Effectiveness (Con't)

- West End (Con't)
 - Monitoring wells on the periphery of the LPH plume have shown a downward trend in product thickness (actual)/
 - LPH thickness has been reduced on the downgradient side of the DRL at the CSP sump, prior to the installation, reported thicknesses were approximately 30 cm or greater. Current thicknesses range from 1mm to 10mm.
 - Discharge groundwater had generally met the MOEE guidelines.



Systems Effectiveness (Con't)

- A new control structure was installed in 2000 due to the fact that impacted water (dissolved phase) bypassed the former control structure.
- It allows greater retention time and no bypass.



Other Related Projects

- In 1999 construction of a Waste Oil Transfer Facility to deal with recovered diesel fuel and waste oil from Hornepayne and Capreol Yards as well as the line operations.
 - Reduces impacts on Lagoon 1 and 2
 - Minimizes cost by separating water from the waste oil, reducing recycling costs.
- In 2002 suspected diesel impacts in deep wells at the West End were investigated.
 - The current pumping well was monitored and sampled, all results were below MOE criteria.
- In 2002 the East End platform was investigated with seven MW's and one testhole being installed upgradient and downgradient of the platform.
 - One surficial soil sample had total petroleum hydrocarbons above MOE criteria,
 - LPH was present in one MW, located east of the platform.

Other Related Projects

- Flood Study and Remedial Work
 - During the Spring of 2001 there was severe flooding of the West End.
 - Some LPH that collected in the DRL over the winter flowed through the top of of the sheet pile wall.
 - The situation was contained using absorbent booms.
 - As a result a Flood Frequency Analysis was completed and the low area behind the sheet pile wall was built up to the elevation that did not get flooded.



Other Related Projects

- Flood Study and Remedial Work (Con't)
 - A communication program was also developed to ensure that absorbent booms are put in place and frequent monitoring of the river levels are completed.

Future Works

- ➔ Installation of a full scale product recovery system in the East End.
 - Integrated system
 - Former Shop Track Fuelling Recovery System
 - ◆ Reduce Volume of LPH in the plume
 - Lagoon 2 Recovery/Groundwater Control System
 - ◆ Enhance system to more effectively remove product between Lagoon #2 and the Jackfish River.

Questions

THE END