

3.0 SYSTEM OVERVIEW

The remediation system consists of five (5) high-vacuum recovery wells and an equipment enclosure constructed by Maple Leaf Environmental Equipment Ltd. of Ontario, Canada. Fluid recovered by the high-vacuum system is pumped to an oil/water separator (OWS) rated for a maximum flow of 30 gpm. Separated product is gravity drained from the OWS to a 100 gallon product storage tank for future collection and recycling. Recovered groundwater is pumped from the OWS to an air-stripping tower (installed as part of the original recovery system) prior to being discharged to Indian Creek under NPDES permit NEG080084. To aid in groundwater plume control and site remediation, Recovery well RW-1 installed in 1994 will continue to be operated.

4.0 WELL CONSTRUCTION

A total of five (5), four (4) inch diameter PVC high-vacuum recovery wells (HV-1 through HV-5) were installed by HWS in January 2003. Wells were installed to depths ranging from 26 ½ to 30 feet below the ground surface using a CME-75 drill rig. Wells were constructed of four (4) inch diameter schedule 40 PVC well screen and casing. Twenty (20) feet of 0.020 inch slot well screen was used for each well. All wells were complete as above ground wells with a protective steel casing set in a concrete pad. Well locations are shown on Figure 1 and well construction details are provided in Appendix B.

To assist with the removal of groundwater and free product gasoline, a one-inch diameter stinger was placed in each well. This stinger was placed two(2) feet off the bottom of each well and is connected to the two(2) inch PVC high-vacuum line. Well head and stinger construction details are shown as figure 2.

5.0 TRENCH & PIPING CONSTRUCTION

General Excavating of Lincoln, Nebraska was the general contractor contracted for the construction of the high-vacuum free product recovery system. Trenches were excavated to a depth of three (3) feet. Independent runs of two (2) inch PVC pipe were placed in the trenches from the remediation building to each of the high-vacuum recovery wells. In addition, a three (3) inch PVC discharge line was run from the equipment shed to the stripping tower. To isolate the high-vacuum system from recovery well RW-1 and the stripping tower, a three (3) inch valve was installed below grade. This valve allows maintenance to be performed on the high-vacuum system or stripping tower, without the need to drain the OWS or stripping tower. In total over 320 feet of trench was excavated.

A total of 180 cubic yards of contaminated soil were disposed of at the Beatrice Landfill. The majority of this material came from the area of the equipment enclosure. This area had been filled in with concrete and brick rubble which required removal and replacement with clean fill for construction of a stable base for the remediation equipment building. A total of 288 cubic yards of clean fill material was used.

6.0 REMEDIATION SYSTEM EQUIPMENT & ENCLOSURE

Maple Leaf Environmental Equipment Ltd. of Ontario, Canada was selected to design and construct the remediation system equipment enclosures for this project. This structure is set on a six (6) inch thick concrete pad. A description of the equipment selected for construction of the remediation system follows:

OIL SEAL LIQUID RING PUMP SYSTEM

Oil Sealed Liquid Ring Pump Dekker DV0450B-KA2 with 30-hp 230/460V/3P EXP motor to deliver 400 ACFM at 25" Hg

Inlet of Liquid Ring Pump contains:

- Solberg inlet filter/silencer
- Sample port
- Vacuum gauge – 0-30" Hg liquid filled Stainless Steel
- Air Dilution valve with Solberg filter/silencer
- Vacuum relief valve
- Wafer check valve
- 4" PVC piping

Seal Oil separator Assembly contains:

- ½" sight glass
- Demister element
- Oil fill port
- Sample port
- Pressure gauge
- Temperature switch
- Temperature gauge
- High level alarm switch
- Low level alarm switch
- 1" drain all valve

Seal Oil Siphon line contains:

- ¼" sight glass
- ¼" copper piping

Oil discharge from Seal Oil Separator contains:

- Ball valve
- Wye strainer
- Gate valve
- Vacuum gauge

- Seal Oil cooler assembly
- Temperature gauge
- 1" Galvanized steel piping

Vapor discharge from Seal Oil Separator contains:

- Flow indicator – Pitot tube and Magnahelic gauge
- 4" galvanized steel piping

VAPOR LIQUID SEPARATOR

MLEE VLW140, 140 G Welded Steel type Vapor Liquid Separator with:

- 6" clean out
- ½" sight glass
- Demisting element
- High level alarm switch
- High level pump control switch
- Low level pump control switch
- 1" drain ball valve

Discharge of separator contains:

- Ball valve
- **Moyno Model 356 Transfer pump** with 1 HP 230/460V/3P EXP motor to deliver up to 20 GPM
- Pressure gauge
- Sample port
- Gate valve
- Check valve
- 1" ABB MTH Water flow meter (water flow up to 53 GPM)
- 1 1/2" PVC piping

VAPOR INLET HEADER

One 4" Vapor Inlet header with five 2" zones, each zone contains:

- Globe valve
- Vacuum gauge
- Sample port

OIL WATER SEPARATOR

Separator tank, MLEOWS-30 GPM with:

- Adjustable rotary skimmer
- Removable media
- Integral 200 G water sump tank

- High level alarm switch
- Pump control switch
- Four 1" drain ball valves

Water Discharge contains:

- Ball valve
- **Gould's NPE 1ST discharge pump** with 3/4 HP 230/460V/3P EXP motor
- Pressure gauge
- Sample port
- Gate valve
- Check valve
- 31.5" PVC piping

REMEDIATION SHIPPING CONTAINER

Built to NEC Class 1 Div 2 standards, all wiring intrinsically safe and all equipment pre-piped factory tested and mounted on inside of building.

Modified 20' shipping container with exterior siding (*Side man door and barn-style rear doors*)

Interior is rated hazardous and contains the following:

- LRP System and influent manifold
- Groundwater treatment system
- Controls will be mounted on the exterior of container
- Lifting eyes on upper corners
- Insulation
- Hazardous CL 1 DIV 2 lighting
- Hazardous CL 1 DIV 2 ventilation fan with thermostat
- Hazardous CL 1 DIV 2 heater with thermostat
- Passive vent louvers

All influent, effluent, and drain lines are plumbed to outside of building

RELAY BASED CONTROL PANEL

The relay based control panel includes:

- Nema 4 control panel (UL listed) to be mounted to exterior of building
- Relays for control circuitry
- Primary circuit protection using 200 amp fused main disconnect (150A Fuses)
- Branch circuit protection for all motors with circuit breakers
- Circuit breaker distribution panel for branch circuit protection for:
 - Building light

- Building heater
- Building ventilation fan
- Surge and lightning protection
- Five (5) motor starters with overload protection:
 - LRP motor
 - LRP heat exchanger motor
 - VLS transfer pump motor
 - OWS transfer pump motor
 - Ventilation fan motor

The outside cover of the control panel contains the following:

- Three (3) HOA switches with green run lights:
 - LRP motor
 - VLS transfer pump motor
 - OWS transfer pump motor
- Six (6) Red alarm indicator lights:
 - Seal oil tank high level alarm
 - Seal oil tank low level alarm
 - Seal oil tank high discharge temperature alarm
 - VLS high level alarm
 - OWS high level alarm
 - Air Stripper interlock alarm
- One (1) alarm reset button
- One (1) hour meters for:
 - LRP motor
- Control transformer
- Twelve (12) IS Barriers
- 3 KVA transformer
- Control panel heater with thermostat

7.0 WELL ABANDONMENT

To allow for construction of the high-vacuum remediation system, recovery well RW-2 installed in 1994 was abandoned along with the meter pit. This well was located near the current high-vacuum well HV-5.