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June 21, 1999

File Number: 678.0.641.01
SEL: 156-99

Mr. Edwin J. Yee
Regional Supervisor, Dangerous Goods
Manitoba Environment
160 - 123 Main Street
Winnipeg, MB
R3C 1A5

Dear Mr. Yee:

**Re: Groundwater Remediation
West Souris Station - Milepost 641.01**

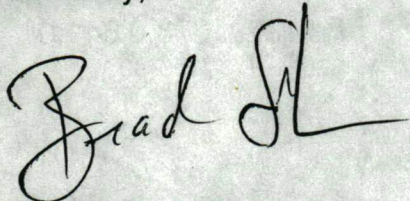
Per our discussions in late April, please find attached a description of the groundwater extraction and treatment system currently proposed for West Souris Station. The system has been designed for Enbridge by CH2M Gore & Storrie (CG&S) of Calgary, and is proposed for installation at the site later this summer.

As you will recall, a diesel fuel release occurred at West Souris station in March, 1997 as the result of a failed coupling on a newly installed Line 1 pumping unit. The release was largely contained within excavations for the new unit and the balance of spilled fuel was recovered using vacuum trucks. An Environmental Site Assessment completed in August 1997 suggested that diesel fuel not recovered during initial response operations appeared to be largely confined to the immediate spill area. Subsequent monitoring confirmed that free-phase diesel fuel remained on the water table adjacent to the Line 1 pump house.

As such, a product recovery trench was installed on site in October, 1998. In order to assist in recovery and move to more active groundwater capture/treatment, Enbridge proposes to add the "pump and treat" system outlined in the attached document. As the proposed system involves extraction, treatment, and re-injection of groundwater, Enbridge is, by way of this letter, seeking Manitoba Environment's concurrence with proposed installation. Once you have completed a review of the attached document, off-site pre-fabrication of select components will be initiated and preparation for summer installation of the system will begin.

Thank-you for your assistance with this project and please do not hesitate to contact me if you have any questions or concerns regarding the proposed groundwater extraction and treatment system.

Sincerely,

A handwritten signature in black ink, appearing to read "Brad S.", with a stylized flourish at the end.

Bradley S. Smith, P. Eng.
Environmental Analyst

BSS/bss

cc: Ron Slater - MB Environment, Brandon
Bruce Moores - NEB
Brian Kefford - Enbridge

Attach: CG&S Proposed Groundwater Extraction and Treatment System

Enbridge Pipelines Inc.
Proposed Groundwater Extraction and Treatment System
West Souris Pump Station

Background

On March 26, 1997 an estimated 850 bbls of diesel fuel was released from a failed coupling on a pumping unit at Enbridge's West Souris pumping station. The diesel filled an excavation immediately south of the pumphouse building. Enbridge recovered approximately 830 bbls of the released diesel, and removed approximately 230 m³ of fill sand from the spill area.

Enbridge retained CH2M Gore & Storrie Limited (CG&S) to undertake a contaminant investigation and review of options for remediation of the diesel spill. The site investigation, completed in August 1997, revealed that the residual diesel appears to be largely confined to the fill sand near the spill area, and is expected to exist under the pumphouse slab. Subsequent monitoring has disclosed the persistence of a free-product layer of hydrocarbon on the water table adjacent to the building and the presence of dissolved hydrocarbons, including BTEX constituents, in groundwater around the building.

CG&S recommended installation of an active interception trench and groundwater treatment system to promote groundwater capture and recovery of free product. A phased implementation approach was taken and a passive product recovery trench was installed in October 1998. An additional 1200 tons of hydrocarbon-contaminated soil was excavated from the site during trench installation. Pump testing of the recovery trench revealed that a groundwater removal rate of approximately 2 gpm is adequate to provide both contaminated groundwater capture and diesel recovery. The next phase of the remediation program will involve installation of a groundwater extraction and treatment system.

This document describes the proposed groundwater extraction and treatment system recommended in CG&S' Technical Memorandum No. 1, dated November 23, 1998.

System Description

The system will be designed for three-season (spring/summer/fall) operation. A progressive cavity recovery pump housed in a small enclosure will be installed adjacent to the existing sump. It will extract groundwater from the sump at a nominal rate of 5 gpm and transfer it to a storage tank. The pump will operate in an on/off manner, controlled by high and low level switches in the sump. To promote recovery of diesel floating on the water table, the level switches will be installed to routinely draw the sump water level down below the top of the interception trench drainage laterals. A high/high

level switch on the storage tank will shut down the recovery pump and prevent it from starting if the tank is full.

Intermittent removal of floating diesel from the sump and the storage tank with a vacuum truck will be required to avoid overloading the treatment system with high concentrations of free or emulsified hydrocarbons. This approach to diesel recovery is recommended over the installation of a product recovery pump in the sump and/or hydrocarbon skimming equipment in the tank because of the relatively low rates of residual diesel recovery that are expected, and the incremental cost and operator attention typically associated with such systems. Should diesel recovery rates exceed expectations, the system can be retrofitted with such product removal systems.

A 100 bbl skim/storage tank will provide sufficient residence time for free hydrocarbons recovered from the sump to separate by gravity, enabling them to be removed intermittently by a vacuum truck. Level switches in this tank will control the operation of the treatment system feed pump and shut down the groundwater recovery pump in the event of a high water level in the tank. The tank overflow will be directed back to the sump.

The water treatment system will be housed in an insulated and heated skid-mounted metal building. The water treatment system feed pump will operate between the normal high and low level settings in the skim/storage tank. It will be a progressive cavity pump with a nominal output of 5 gpm.

A bag filter will be the first treatment unit. It uses consumable fabric filter elements to remove suspended solids that could prematurely plug the downstream vessels. Bag filters with a higher affinity for hydrocarbons can be used in this vessel to protect downstream adsorbers, if carryover of free or emulsified diesel from the skim tank is expected or experienced.

Filtered effluent is then passed through an organoclay absorption media for removal of emulsified hydrocarbons that escape the skim tank and bag filter. This vessel serves to safeguard the downstream activated carbon contactors, which would be readily fouled and exhausted by exposure to free or emulsified diesel.

Two granular activated carbon (GAC) adsorption contactors connected in series are then used to remove the dissolved hydrocarbons (BTEX and total extractable hydrocarbons) from the groundwater. These contactors are designed with flexible hosing between vessels so that either vessel can be used as the lead (primary) vessel. When contaminant breakthrough is detected in the effluent of the primary vessel, indicating that the adsorptive capacity of the carbon in this unit has been exhausted, the system is shut down and the carbon is removed and replaced in this vessel. The system is then put back online with the former polisher vessel now in the lead position and the former lead vessel (now containing fresh carbon) serving as the new polisher.

Treated effluent will normally be discharged into a subsurface infiltration trench along the north side of the pump station to help sweep diesel from beneath the building slab towards the recovery trench by maintaining a high north to south groundwater gradient. This will also provide better environmental protection than offsite surface discharge of treated effluent at an unmanned facility. Should off-spec effluent be produced as a result of an undetected treatment system upset, the re-infiltrated groundwater will be recaptured and retreated, as opposed to being released offsite. The infiltration trench will be installed within the zone of fill sand surrounding the station and will be backfilled with clean washed gravel. To promote uniform distribution of effluent along the entire length of the infiltration trench it is recommended that a siphon chamber be used to fully flood the disposal line in a cyclic manner.

Intermittent discharge of treated groundwater to surface will be required to maintain the desired groundwater elevation in the vicinity of the recovery trench. Infiltration of precipitation and induced groundwater flow towards the trench from all directions will contribute to a growing inventory of water within the capture zone. To maintain the desired groundwater gradient and capture zone, with the pumping capabilities of the system, this net influx of water will need to be intermittently purged. This intermittent release could be by direct discharge to surface, spray irrigation on-site, or offsite disposal (e.g. by vacuum truck). To minimize the infiltration of precipitation, and hence the frequency and quantity of such releases, it is recommended that clean roof drainage from the pump station be routed away from the hydrocarbon-contaminated zone.

Instrumentation and Control

Pumps will be started and stopped based on level control in the recovery sump and skim/surge tank. Both pumps will operate at a constant flow rate. If it becomes evident that the treatment flow rate needs to be reduced, the pump speed will be reduced by changing the belt drive.

High or low level in the skim/storage tank will be alarmed at the control panel located on the outside wall of the treatment system building. Pump status lights will also be provided in the control panel.

Pressure gauges will be provided upstream and downstream of each vessel so that pressure drop across each vessel can be monitored. A flow meter on the final effluent line will provide local indication of flow rate and the totalized volume of water that has been treated and discharged.

S-101
GROUNDWATER RECOVERY SUMP
4.4m DEPTH
1.2m DIAMETER

P-101
RECOVERY PUMP
PROGRESSIVE CAVITY
5 GPM/35 PSI

T-101
SKIM/STORAGE TANK
100 BBL
2.9m DIA. x 2.4m H.

P-102
TRANSFER PUMP
PROGRESSIVE CAVITY
5 GPM/35 PSI

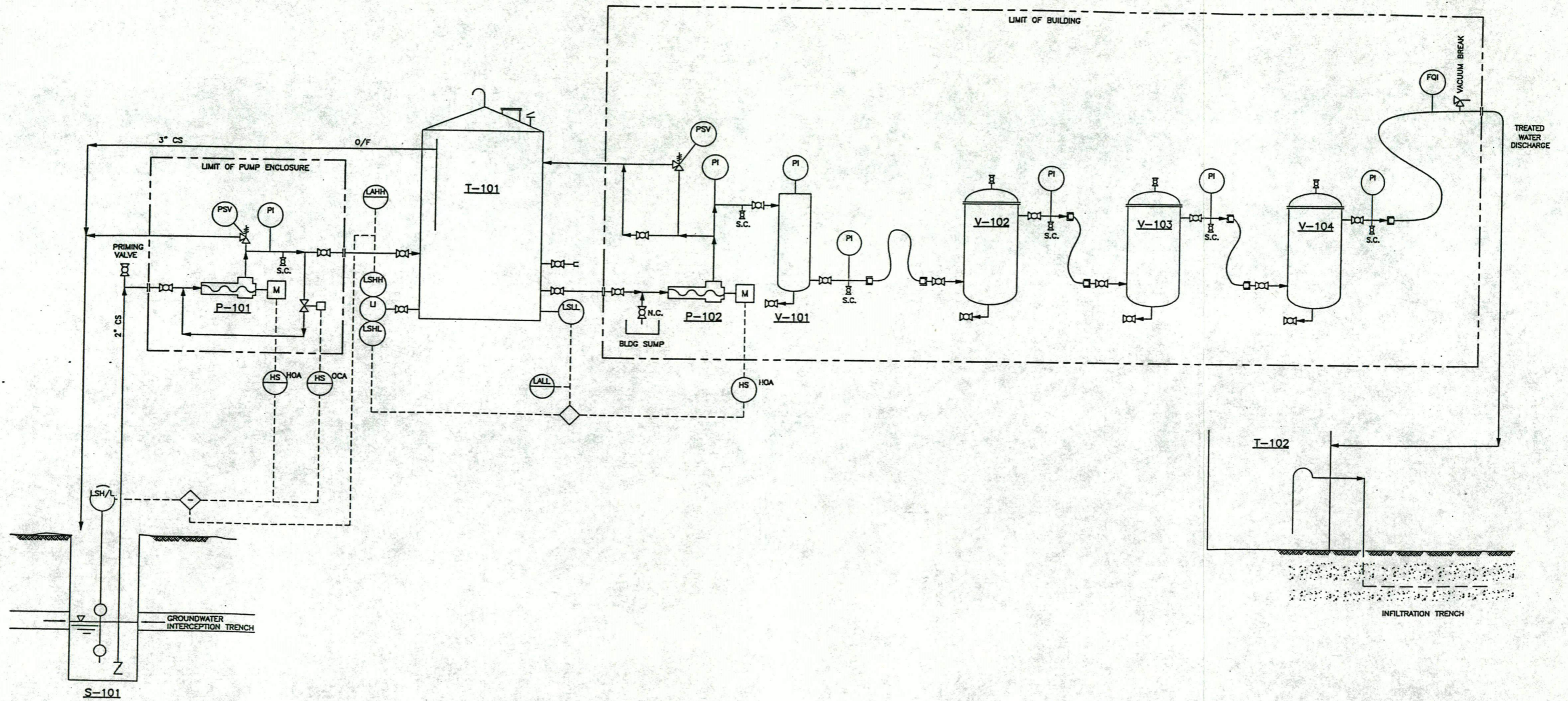
V-101
BAG FILTER
UNCOATED STEEL VESSEL
7" DIA. x 32" LONG BAG
10 MICRON

V-102
HYDROCARBON ABSORBENT MEDIA FILTER
24" DIA. x 48" HIGH
EPOXY COATED STEEL
DP: 40 PSI
400 LB OLEOPHILIC CLAY

V-103
PRIMARY GAC ADSORBER
24" DIA. x 48" HIGH
EPOXY COATED STEEL
DP: 40 PSI
200 LB ACTIVATED CARBON

V-104
SECONDARY GAC ADSORBER
24" DIA. x 48" HIGH
EPOXY COATED STEEL
DP: 40 PSI
200 LB ACTIVATED CARBON

T-102
SIPHON CHAMBER
150 USG



PERMIT	ENGINEER
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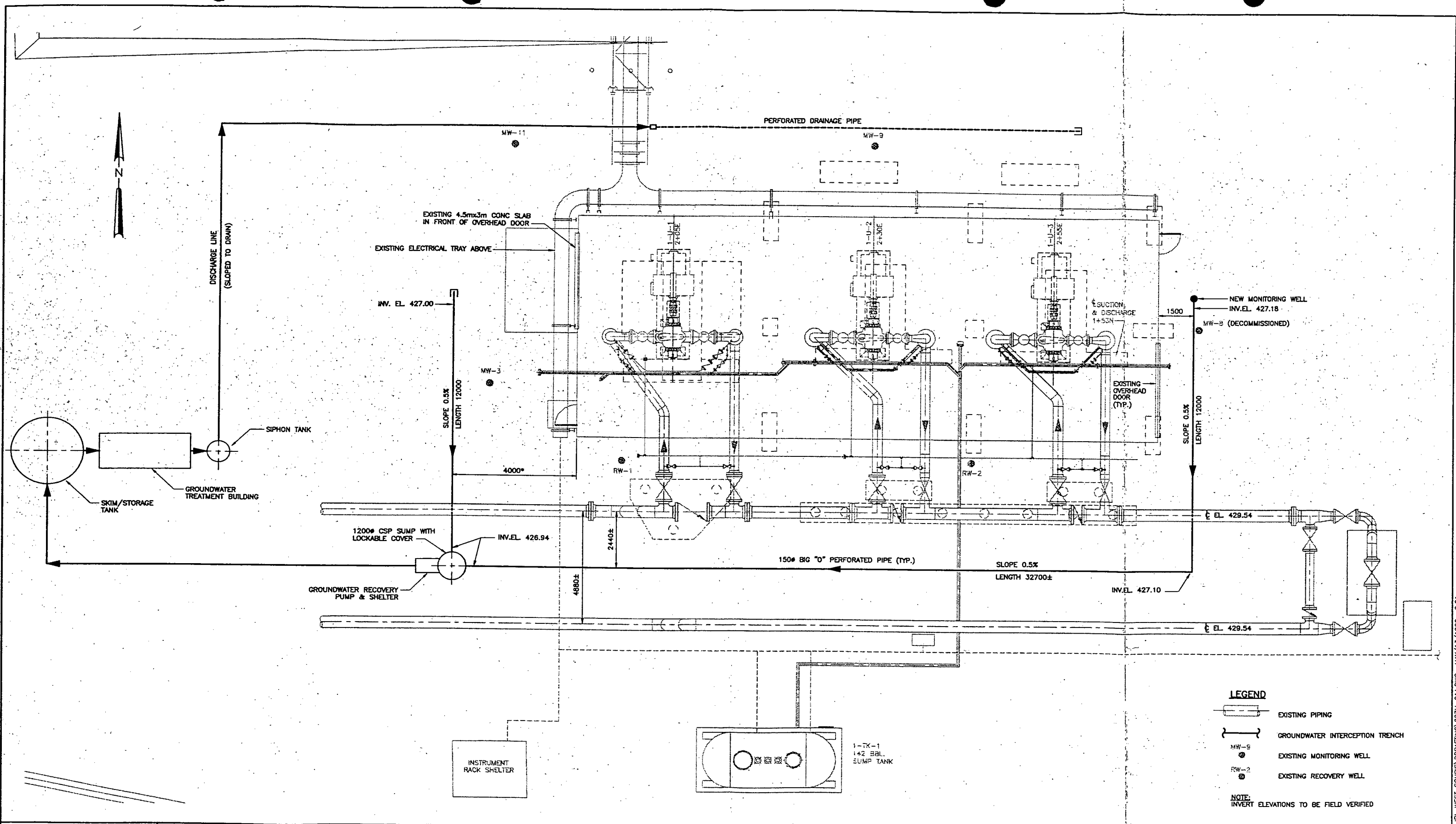
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ENBRIDGE PIPELINES INC.

WEST SOURIS PUMP STATION
GROUNDWATER RECOVERY & TREATMENT SYSTEM
PROCESS & INSTRUMENTATION DIAGRAM

DATE:	SCALE:
99/04/08	NTS
DRAWN:	REV.
A.T.	△
PROJECT NO.	
210E 0310 C004	
DRAWING NO.	
001	

P:\210E\0310\0310C004 ENBRIDGE W. SOURIS\001.dwg APR/30/1999 3:00 p.m.



LEGEND

- EXISTING PIPING
- GROUNDWATER INTERCEPTION TRENCH
- MW-9 EXISTING MONITORING WELL
- RW-2 EXISTING RECOVERY WELL

NOTE:
INVERT ELEVATIONS TO BE FIELD VERIFIED

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A	98/08/20	CLIENT REVIEW				



IPL Interprovincial Pipe Line Inc.
WEST SOURIS, MANITOBA
GROUNDWATER RECOVERY TRENCH DETAILS
PUMP STATION
SITE PLAN

DATE	98/08/19	SCALE	1:75
DRAWN	PM	REV. NO.	
PROJECT NO.	202C25827		
DRAWING NO.	M-01		