



TWIN STATE ENVIRONMENTAL CORP.

P.O. Box 719, Commercial Park, 1A Huntington Road, Richmond, VT 05477

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January 29, 1998

Mr. Richard E. St. Pierre
J & L Service Center
171 South Main Street
St. Albans, Vermont 05478

**RE: Emergency Corrective Action and Initial Site Investigation Summary Report
J & L Service Center
South Main Street, St Albans, VT
TSEC Project # 97-101**

Dear Mr. St. Pierre

Enclosed please find one copy of the above referenced summary report. This report has been completed to satisfy the requirements of the State of Vermont Sites Management Section (VTSMS) relative to the response and investigation of a release of gasoline to the subsurface at the above-referenced SITE. A second copy of the summary report has been submitted for documentation and review with the VTSMS. Additional information relative the Site Characterization Proposal dated December 4, 1997, will be presented in a Supplemental Site Investigation (SSI) Report to be submitted to J & L Service Center and the VTSMS by late February.

TSEC is currently operating a product recovery system at the SITE as an initial corrective action measure and preparing the above referenced SSI Report. Approximately 451 gallons of gasoline have been recovery by the system as of January 22, 1998. Free-phase gasoline remains in the subsurface proximal to the gasoline UST systems and has been discovered to have migrating to the west of the dispenser island.

If you have any questions please feel free to contact me at (802) 434-3350.

Sincerely

TWIN STATE ENVIRONMENTAL CORPORATION

Andrew Shively
Staff Scientist

cc: Mr. Matt Moran, VTSMS
as:/project/97101/caisilr.doc

Jan 30 10 07 AM '98



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Phase (check one)	Type (check one)
<input checked="" type="checkbox"/> Initial SITE Investigation	<input type="checkbox"/> Work Scope
<input type="checkbox"/> Corrective Action feasibility Investigation	<input checked="" type="checkbox"/> Technical Report
<input type="checkbox"/> Corrective Action Plan	<input type="checkbox"/> PCF Reimbursement Request
<input checked="" type="checkbox"/> Corrective Action Summary Rpt	<input type="checkbox"/> General Correspondence
<input type="checkbox"/> Operations & Monitoring Report	

EMERGENCY CORRECTIVE ACTION AND INITIAL SITE INVESTIGATION STATUS REPORT January 28, 1998

J & L Service Center
St Albans, Vermont
UST Facility # 1423
SMS SITE # 97-2257
TSEC # 97-101

UST Owner:
Property Owner:

Mr. Richard E. St Pierre
171 South Main Street
St Albans, Vermont
(802) 524-9070

Written By:
Andrew Shively _____
Staff Scientist

Reviewed By:
Kenneth J. Bisceglia *Kenneth J. Bisceglia*
Technical Director

Jan 30 10 07 AM '98

1.0 INTRODUCTION

This report has been prepared by Twin State Environmental Corporation (TSEC) on behalf of Mr. Richard E. "Joe" St. Pierre, owner of J & L Service Center (SITE), to provide a summary of the SITE work performed by TSEC relative to the release of petroleum to the environment resulting from a ruptured gasoline transmission line. The SITE is located on the east side of Route 7 (S. Main St.), approximately one hundred feet north of the intersection of Routes 7 and the Interstate Access Route to I-89, in the City of St. Albans, Franklin County, Vermont (see **Figure 1**, SITE Location Map, and **Figure 2**, SITE Map). The data and information provided in this report was collected in conjunction with the implementation of corrective measures to recover free phase product (product) from the subsurface. Product transmission line repair measures were concurrently initiated with recovery measures. A groundwater monitoring well installation program was initiated January 6 and 7, 1998.

1.1 SITE History

The SITE has been operated as a retail gasoline distribution facility for over 30 years. Mr. St. Pierre has operated the facility since 1975 and has owned the facility since 1982. The convenience store located at the SITE was modified from a single story retail gasoline facility to its current two story condition after the appropriation of the property by Mr. St. Pierre. A service center garage constructed in 1992 is located south-east of the convenience store in the area of a former residence. All four (4) motor-fuel underground storage tanks (USTs) which currently exist at the SITE were installed in 1986 (see **Figure 2**, SITE Map). The waste-oil UST was installed in 1992.

UST System upgrades were performed in 1990 that include product transmission and vent piping, stage II vapor recovery piping, spill containment and submersible pump containment sumps (sump) for the three (3) gasoline USTs (see Photo Summary, Photos # 1 and # 2). The upgrade was performed to meet release detection, overfill and spill requirements as established under Vermont Underground Storage Tank Regulations 10 V.S.A. Chapter 59. A Veeder-Root, model TLS-250, automatic in-tank monitoring system, was also installed at all five (5) USTs as part of the upgrade. Replacement of the submersible pump containment sumps of the gasoline USTs was completed in 1992 due to the inadequate construction materials of the containment sumps installed in 1990 (see Photos #3 and #4).

2.0 INITIAL EMERGENCY RESPONSE, SITE CHARACTERIZATION AND PRODUCT RECOVERY MEASURES

2.1 Initial Emergency Response, Product Recovery and Receptor Assessment

2.1.1 Initial Response

On the morning of October 29, 1997, TSEC was contacted to respond to a suspected release of gasoline (product) at the SITE. The monthly reconciliation report for the month of October indicated a discrepancy of approximately 1,300 gallons for the 6,000 gallon super-grade gasoline UST (UST # 3). To verify the potential release, Mr. St. Pierre inspected the sump of UST #3 and observed accumulated product in the

sump. Mr. St. Pierre also observed the flow of product into the sump from the secondary containment piping when the pump was activated. The UST #3 was taken out-of-service and TSEC was contacted.

Upon arrival at the SITE, TSEC inspected the UST #3 sump. Approximately 4 inches of product (approximately 20 gallons) had accumulated within the sump (42 inch diameter). The submersible pump was not activated to avoid aggravating any potential release. Based on the observation of back-flowing product, the integrity of the primary product line was suspected to be the source of the release. Based on the difference of the quantity of the inventory discrepancy and the actual quantity of product accumulated in the sump, the integrity of the containment sump was in question. Two, four (4) inch diameter groundwater monitoring wells (TWs), located within the UST cavity at the sump end of the USTs (see Figure 2, SITE Map), were inspected for the presence of product as measured by a Solinst, Model 122, interface meter (Solinst). TW-1, located closest to the convenience store building yet opposite UST # 3, exhibited a product thickness of approximately 2.1 feet with depth to water measured at 5.19 feet below grade (fbg). TW-2, located adjacent to UST # 3, did not exhibit a product thickness with water observed within 0.5 feet of the top of casing. The TW monitoring wells are both constructed of polyvinyl chloride plastic and are screened from surface to well bottom at maximum depths of 9.4 and 9.6 fbg.

UST #3 was then taken fully out-of-service. Electrical service to the pump was shut down at the breaker, the impact valves at the dispensers were closed and the product grade was identified to be out-of-service at the dispensers.

Mr. Bob Haslam of the Vermont Department of Environmental Conservation (VTDEC), Waste Management Division (WMD), Sites Management Section (SMS) was contacted at 10:15 am, October 29, 1997, to report the release of gasoline to the environment. A brief history of the release situation, the abatement measures initiated and an initial receptor impact assessment plan was outlined with Mr. Haslam at that time.

Mr. Ted Unkles of the VTDEC UST Program was contacted at 10:30 am, October 29, 1997 to discuss the out-of-service status of the UST and to seek approval to allow the remaining 3,800 gallons of super-grade product to remain in UST # 3 until product transfer to the special-grade UST (UST #1) could be accommodated. The St. Albans Fire Department was aware of the release situation by association of a Service Center employee with the Fire Department.

The product laden portion of UST # 3 was tested for integrity by means of the Veeder-Root in-tank volumetric leak check procedure. The UST did not show a product loss upon termination of the leak check after a duration of approximately 5 hours (see Attachment 1, Leak Monitor Report).

2.1.2 Emergency Product Recovery

Emergency product recovery measures were initiated the afternoon of October 29, 1997 utilizing a 3,500 gallon active vacuum containment truck (vac-truck) provided by Clean Harbors Environmental Services (CHES) of Bow, N.H. Upon arrival of the vac-truck, a safety zone was established around TW-1 and the UST concrete apron, and product remaining in the UST # 3 sump was evacuated with the vac-truck. Product recovery from TW-1 was initiated at approximately 2:30 pm in an effort to skim product from the groundwater / product interface. Product skimming was accomplished in 5 minute evacuation and 15

minute equilibration cycles which allowed for the recharge of an adequate product column and minimized unnecessary groundwater evacuation. The product recharge rate was monitored with the Solinst during equilibration cycles. Based on the initial data collected, recharge of product into TW-1 was calculated to range from 2.76 to 2.88 gallons per hour (gph). After 4 hours of recovery efforts, approximately 80 gallons of fluid were removed from TW-1 and the containment sump, with approximately 40 gallons constituting product (see Table 1, Summary of Free Phase Product Recovery). The fluids recovered were transported for off-SITE disposal as hazardous waste under EPA Generator ID # VTP000008035.

Ambient air quality was monitored during product evacuation activities using a Thermo Environmental Instruments, Model 580B OVM, Photoionization Detector (PID) instrument equipped with a 10.6 eV lamp, calibrated to an isobutylene standard. A peak response of 66 parts per million volume (ppmv) was recorded 1.0 foot above ground level within 10 linear feet immediately downwind of the vac-truck exhaust stack and within the safety zone perimeter established during evacuation activities. Air quality improved to a background response of <5.0 ppmv as monitored 1.0 foot above ground level within 25 linear feet downwind of the vac-truck and outside the safety zone. There was a steady western wind occurring October 29 which provided a degree of dispersion of volatile organic compounds (VOCs) at the SITE.

2.1.3 Initial Receptor Assessment

An initial receptor impact assessment was performed on October 29 and 30, 1997 to identify all sensitive receptors in the immediate vicinity of the SITE and to determine if free phase or vapor phase product was impacting those receptors. The receptors evaluated included the breathing zones within on-SITE buildings (0-6 feet above grade), basement zones of adjacent buildings (residential and commercial), the municipal sewer line, surface/storm water drainage basins and surface drainage features (see Figure 3, SITE Map w/ Subsurface Features). The receptor evaluation was performed by PID detection of VOCs in reference to an isobutylene standard.

The breathing zones within the convenience store was monitored throughout the building, with a focus in the area nearest to TW-1. Specific features evaluated include the point of contact of the walls and floors, cracks or holes in the wall or floor and points of entry of utility and service conduits. A peak concentration of 6.4 ppmv was detected under the counter, within a closed cabinet, at the corner of the southern and western walls nearest TW-1. No other concentration above a background of <1.0 ppmv was detected within the convenience store building. A peak concentration of 3.1 ppmv was detected in the service bay area of the Service Center garage building. The concentration detected within the garage building is not likely to be representative of a vapor impact due to subsurface release and is more likely to be representative of the automobile repair activities conducted within the services bays of the garage building.

The breathing zones within the convenience store were reevaluated on October 30, 1997, including the location within the closed cabinet. No VOCs were detected above a background of <1.0 ppmv during this screening event. The VOC concentration detected within the convenience store on October 29, 1997 may have been a result of ambient air flow of VOCs from the vac-truck exhaust stack or the gasoline dispenser area.

The basement breathing zones of six (6) residences and one (1) commercial building located topographically downgradient of the SITE, across Route 7, were screened for the presence of liquid and

vapor phase VOCs. No VOCs were detected above a background of <1.0 ppmv in any basement breathing zone during the screening event. Five (5) surface/storm water drainage basins and a single sewer manway were identified in the immediate area of the SITE. No VOCs were detected above a background of <1.0 ppmv in any storm drain basin during this screening event.

The City of St. Albans Department of Public Works (DPW) was contacted for the purpose of access to the sewer manway located in the middle of Route 7, directly adjacent to Nason Street. The DPW arrived at the location and set-up at the manway to divert traffic and access the sewer main. The initial vapor concentration was evaluated with a PID as the manway was opened in order to account for the potential accumulation of rising vapors within the sewer. The PID was then lowered to the bottom of the sewer main with a rope to record any vapor concentrations. No VOCs were detected above a background of <1.0 ppmv during either procedure.

An emergency utility clearance request under Dig-Safe # 974404522 and interviews with a St. Albans DPW representative identified several subsurface utilities bounding the western perimeter of the SITE. The location of natural gas, sewer and water mains, and telephone connections to the SITE buildings were also identified. Other relevant subsurface SITE features identified which could act as preferential pathways for migration of product include an abandoned electrical conduit, active electrical conduits servicing the UST systems and the product transmission lines. Two culvertized drainage systems were identified subsequent to the initial characterization effort. These culvertized systems terminate at separate filtration stone beds (see Figure 3, SITE Map w/ Subsurface Features). The construction specifications of the culvert systems and stone beds is not documented.

3.0 INTERIM CORRECTIVE MEASURES

3.1 Product Recovery Evaluation

On October 30, 1997, product recovery was again initiated at TW-1 in order to evaluate the recovery and recharge trends and remedial/product recovery options for the SITE. A low flow pneumatic dual diaphragm pump was employed to pump product only from TW-1. The recovery tubing was attached to the pump and a 10 foot section of 1" poly-vinyl chloride (PVC) riser pipe and suspended in the TW (see Photo # 5). The intake elevation of recovery tubing inlet was consistently adjusted to compensate for groundwater column recharge and product thickness changes during the recovery episodes.

The product thickness (PT) was initially gauged to be 2.13 feet in TW-1. Recovery initially proceeded at a rate of 66 gph in order to a PT of 0.8 feet. The product column was then allowed to equilibrate and the recharge rate was calculated to be 3.12 gph. Recovery proceeded to a PT of 0.2 feet and the recovery rate was adjusted to approximately 3.0 gph. The PT gradually increased during the initial sustained recovery period and the recovery rate correspondingly was increased to approximately 3.6 gph.

The PT was monitored for a duration of 2.5 hours at a recovery rate of approximately 3.6 gph. A static product column of 0.2 feet was maintained during this recovery evaluation period with depth to groundwater (DTW) measured at 3.75 fbg. Recovery was terminated and the product column was monitored in 3 minute cycles for 15 minutes. The product column recharged by 1.3 feet to a static PT of 1.5 feet. The post-recovery recharge rate was calculated to be 3.12 gph (see Table 2, Free Phase Product

Recovery and Recharge Trend Analysis for TW-1). Approximately 16 gallons of product were recovered during the evaluation period. The recovered product was temporarily contained on-SITE in a DOT approved 55 gallon drum and later transferred to a 300 gallon above ground storage tank (AST) utilized for recovered product storage.

3.2 Product Recovery System Evaluation and Installation

At the request of Mr. Matthew Moran of the SMS, TSEC evaluated several product recovery technologies which would be appropriate relative to the parameters established during product recovery and recharge evaluation activities at TW-1. Parameters considered when evaluating recovery systems include the :

- equipment availability.
- ability to operate in the upcoming winter conditions with minimal system weatherization requirements.
- ease of installation in existing monitoring well (TW-1).
- flexibility for incorporation with groundwater dewatering equipment.

Clean Earth Technology, Inc's Magnum Spill Buster (MSB) was considered the most appropriate equipment for product recovery efforts at the SITE based on lease rate, programmability, versatility, and integrability (**Appendix 2**, MSB Operations Manual). The MSB unit currently in operation at the SITE was ordered on November 6, 1997 and installed in TW-1 on November 12, 1997 (see Photo # 6).

Product recovered by the MSB is contained on-SITE in a grounded 300 gallon skid mounted AST provided by Ultramar Energy, Inc. of St. Albans, VT. A six (6) inch recovery override float switch provided with the MSB system was installed in the AST to avoid overfills, restricting the maximum storage capacity of the AST to 265 gallons during recovery system operation. Product recovery tubing is plumbed directly from the "AutoSeek" spool of the MSB unit to the AST and is protected from disruption and the elements by PVC piping. The MSB controller console is located on the second floor of the convenience store building. Controller console cables are routed through a window above the recovery system and routed directly to the recovery system. The MSB is protected by concrete "Jersey" barriers which surround TW-1 and the AST (recovery area).

The recovery area is identified by orange snow fencing and caution tape. "No Smoking" signs are posted to be visible from all angles of approach. The AST is similarly identified to contain a flammable material and hazardous waste. The recovery system was inspected by a State of Vermont Department of Labor and Industry representative and a State Fire Marshal the date of installation. The MSB has recovered approximately 451 gallons of product as of January 22, 1997 (see **Table 3**, Free Phase Product Recovery Trend Analysis).

The recovery system is currently monitored on a weekly basis for total product accumulation in the AST, TW-1 product thickness and overall system operation. As indicated in **Table 3**, recovery rates of the system have diminished since installation yet a degree of rate fluctuation exists. The AST was pumped out on December 4, 1997. A second pump-out event is anticipated before mid-February, 1998.

4.0 INITIAL SUBSURFACE CHARACTERIZATION

The initial SITE characterization program included shallow subsurface borings advanced by Geoprobe® direct push soil sampling and hand auger sample recovery. The intent of the initial SITE characterization was to attempt to identify any additional locations of and the extent of gasoline on the SITE. Soils retrieved from each boring were logged by Unified Soil Classification System (USCS) criteria and screened for contamination by headspace methodology utilizing a PID (see Appendix A, Boring Logs). Soils from each boring interval were inspected for visual signs of contamination and discrete samples were obtained for screening by a PID. Borings were located based on known subsurface features and in areas of suspected preferential pathways in an effort to identify product migration (see Figure 4, SITE Map w/ Boring Locations). TW-2 was also monitored for product infiltration during this phase of SITE activities. The following timeline describes the steps of the initial SITE characterization.

4.1 November 4, 1997

Subsurface soils were sampled by advancement of Geoprobe® Macrocore sampling tool at six (6) points adjacent to and downgradient from the UST system locations as shown on Figure 3. Soils were obtained in four (4) foot intervals to depths ranging from 7.0 to 12.0 fbg. Refusal of Geoprobe® tool advancement was encountered at approximately 7.0 fbg at boring locations B-2 and B-3. The peak concentration of 525 ppmv as measured by a PID was found in soil samples obtained adjacent to UST # 3 (B-2) at 4.0 to 5.0 fbg. Near surface soil samples (0.0 to 4.0 fbg interval) obtained from B-5 and B-6 exhibited peak concentrations ranging from 62.8 to 47.4 ppmv as measured by a PID.

4.2 November 6, 1997

One shallow soil boring (B-7) was advanced with a hand auger to a depth of 4.0 fbg in the center downgradient area of the dispenser island pad. This boring was advanced in an effort to determine if product had migrated along the UST system piping trench and was pooling under the dispenser island concrete apron. In order to accomplish this boring, a 4.0 inch concrete core was removed by water cooled, diamond tip drill bit advancement through the concrete apron. Soils recovered from B-7 are characterized as uniform tan, dry, medium to coarse sand which did not exhibit VOC concentrations <1.0 ppmv as measured by a PID.

Water contained within TW-2 was evacuated on this date to evaluate if the water present was representative of a groundwater table or of trapped water / perched water. The static DTW in TW-2 was measured at 0.50 feet from top of casing (TOC). The static water column was purged with a new disposal bailer and discharged directly to the surface. Following evacuation, the DTW was measured at 7.30 feet from TOC. After a duration of 4.0 hours, the DTW was measured to be 6.35 feet from TOC.

4.3 November 25, 1997

↳ has TW-2 been checked since 11/6

One additional shallow soil boring (B-8) was advanced with a hand auger to a depth of 4.0 fbg at the downgradient terminal point of an abandoned electrical conduit which exists at the SITE. This boring was advanced in an effort to determine if product had migrated along the piping trench. Soils recovered from B-8 did not exhibit VOC concentrations <1.0 ppmv as measured by a PID.

The soils observed at the SITE during initial characterization efforts can be characterized within two soil unit types, native and fill material. Native materials as exhibited during the boring of B-1 through B-6 and B-8 generally consisted of brown, loose, dry, fine to coarse silty sand with some gravel overlying tan / brown, medium dense, damp, very fine to fine silty sands with some gravel. The single boring advanced within the fill material area (B-7) consisted of uniform tan, dry, loose, medium to coarse sand. No appreciable water table or highly conductive water bearing zones were identified during this boring program.

5.0 RELEASE EVALUATION

The sump of UST # 3 was evaluated on November 12, 1997 to determine its integrity. The sump was filled with water to the level of the secondary containment piping within the sump (approximately 5.5 inches). The water level within the sump was monitored for a duration of 3 hours. The water level within the sump decreased to 4.0 inches within this timeframe. Due to the numerous possible escape routes from the sump, the exact location of the release point could not be determined by this evaluation.

Repair of the UST #3 product transmission piping and sump was performed between December 4 and 6, 1997 by Mr. Bob Cross of Sheldon, VT, as contracted by the SITE owner. A >1/8th inch hole was identified at the connection of the braided steel flexible connection off the pump and the primary fiberglass piping immediately outside where the secondary containment piping exits the sump. The primary and secondary piping was severed for repair adjacent to the sump. The remainder of the primary product line was pressure tested with nitrogen and was shown to be tight. The repair to the primary and secondary line was completed and the UST # 3 system was tested on December 12, 1997 (see Attachment 1, Certification of UST System Testing).

During line repair activities, the integrity of the sump was further evaluated in an effort to locate the exact point of release from the sump. Soils were screened for the presence of VOCs during hand excavation of the sump area. Petroleum-stained soil and free-phase product were observed directly adjacent to one (1) of the electrical conduit exit points on the northern side of the sump.

Six (6) soil samples obtained during excavation activities exhibited VOC concentrations ranging from 204 to <1000 ppmv. The samples which exhibited the highest concentrations were obtained adjacent to the northern side of the of the sump and exhibited significant petroleum-staining. Two (2) soil samples obtained directly adjacent to and under the point of the identified piping failure exhibited VOC concentrations of 413 and 204 ppmv respectively.

A release situation occurred during line repair activities on December 4, 1997. A CHES vac-truck was requested to be on-SITE in order to evacuate the contents of the recovery system AST and to provide support during line repair activities. Following AST pump out, and during removal of the replaced piping section, at least 100 gallons of the contents of the vac-truck back-flowed into the line repair excavation and impounded within the excavation. Adequate vacuum had not been achieved prior to initiating a line pumpout event in the excavation, thereby permitting recovered product in the vac-truck to flow back out of the truck when the hose end was lowered into the excavation. Adequate vacuum was achieved within 3 to 5 minutes and the back-flowed product was again recovered. Based on the observation of impounding product within the excavation and the short duration of impoundment, it is estimated that at least 95% of back-flowed product was recovered once vacuum was achieved.

Prior to the incident, product was observed at a depth of 4.5 to 5.0 fbg in soils surrounding the sump release point. Following the incident, a temporary 1.0" PVC monitoring point was advanced by hand to approximately 7.5 fbg in the product area. Groundwater was not intercepted within this temporary well and the PT was measured to be 2.67". An attempt to recover product from this monitoring point did not succeed due to equipment failure. The monitoring point was later removed due the inadequate total depth that could be obtained and the lack of a groundwater intercept elevation. Product remains proximal to the UST transmission piping system route to the dispenser island area. This piping system route could act as a preferential pathway for migration of product due to the porous characteristics of the fill material as compared to native materials. All contaminated soil encountered during line repair activities was returned to the excavation.

6.0 INTERPRETATIONS AND CONCLUSIONS

Based on the limited characterization completed at the SITE and information detailed in this report, TSEC presents the following interpretations and conclusion:

- Gasoline has been released to the environment resulting from a leak in the primary product line and subsequent leakage from the submersible pump containment sump at the 6,000 gallon, super grade UST.
- Initial emergency product recovery activities conducted with a vac-truck on October 29, 1997 yielded a total of 40 gallons from TW-1 and the sump, with a calculated product recharge rate range of 2.76 to 2.88 gph in TW-1.
- Sensitive receptors identified during the initial receptor assessment activities did not exhibit VOC concentrations >1.0 ppmv as measured by a PID.
- A test conducted to evaluate product recovery and recharge rates yielded a total of 16 gallons with a calculated recovery rate of approximately 3.6 gph from TW-1 and a recharge rate of 3.12 gph into TW-1.
- Based on the soil boring program initiated during this phase of the investigation, the extent of product was determined to be primarily within the UST cavity. Preferential pathways and utility conduits in the area of product were identified during investigation activities.
- The primary product line of the super grade UST has been repaired and placed back in service following the completion of a precision tank and line test. Repair activities identified the location of the line failure and point of sump release to the environment.
- A product recovery system was installed at TW-1 and has recovered approximately 451 gallons (± 6.2 gallons per day) since November 12, 1997. Recovery system monitoring and operations are conducted on a weekly basis. Product recovery trends indicate a decrease in recovery rate since product line repair activities.

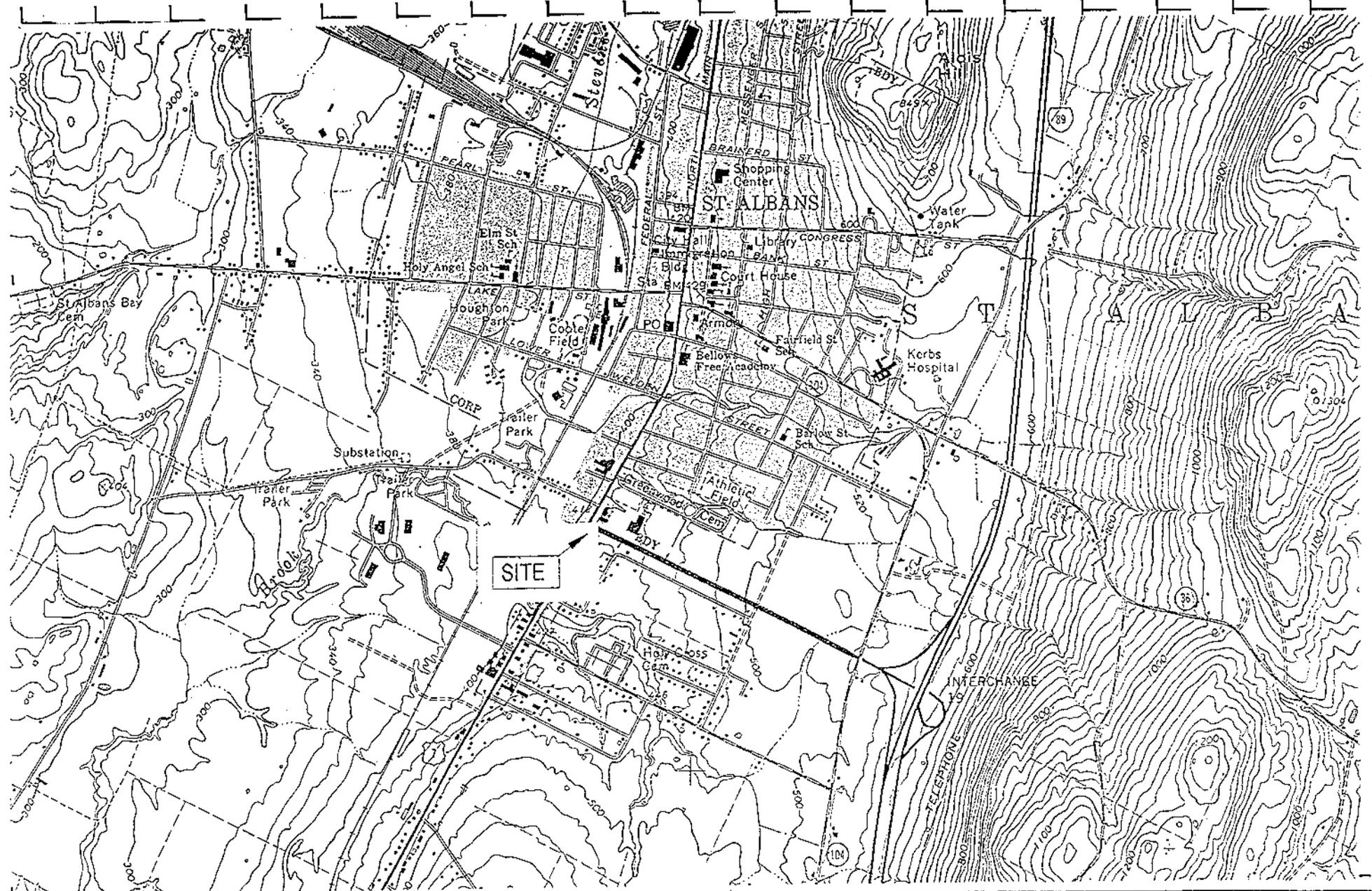
7.0 RECOMMENDATIONS

Considering the data and information presented above, Twin State Environmental offers the following professional recommendations:

- TSEC is currently performing a SITE characterization program which will further evaluate and define the degree and extent of free-phase and dissolved-phase contamination at the SITE, establish a conceptual model of fate and transport mechanisms effecting the release, further evaluate the sensitive receptors which may be impacted by the release and discuss the status and strategy of current remedial measures at the SITE. The report should be completed toward the later part of February 1998.
- The product recovery system currently in operation at the SITE should continue to be monitored on a weekly basis. An evaluation of product recovery trends and the remedial strategy for the SITE will be included as part of the above referenced report.

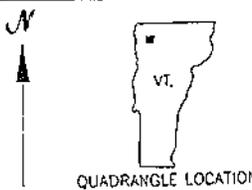
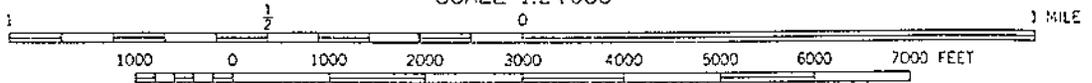
as:\project\97101\emgcasi.doc

FIGURES



SITE

SCALE 1:24 000



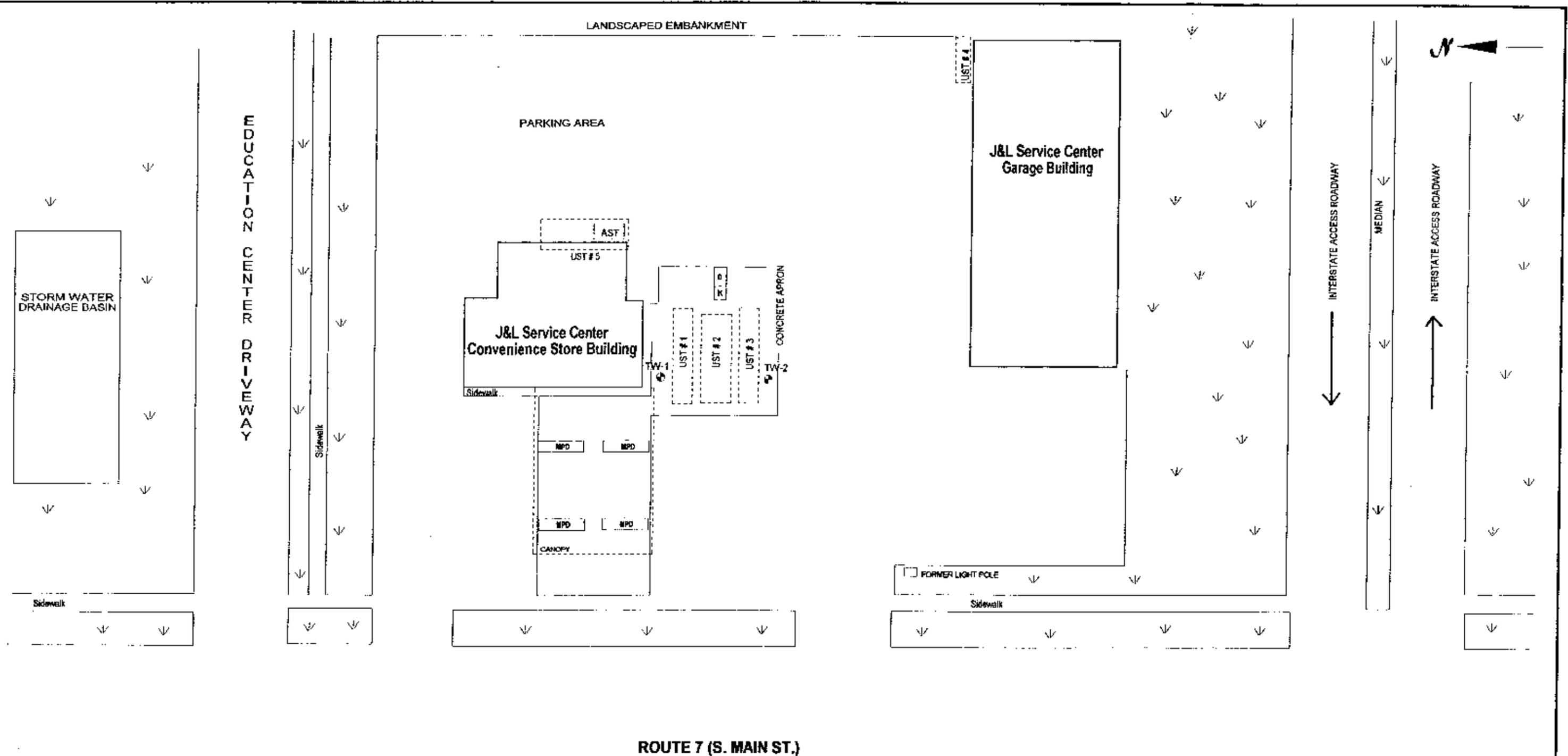
Source: USGS St. Albans, VT Quadrangle.

1964
 PHOTOREVISED 1987
 DNMA 6373 1 SE--SERIES V813

Project No: 10716	Designed By: kjb
	Checked By:
	Approved By:
	Drawn By:
	Date: 12/05/87

TWIN STATE ENVIRONMENTAL CORP.
 1A Huntington Rd.
 P.O. Box 719
 Richmond, Vermont
 (802) 434-3350

FIGURE 1
 SITE LOCATION MAP
 J & L Service Center
 St. Albans, Vermont



LEGEND

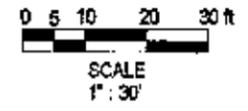
- TW-1 Tank Cavity Groundwater Monitoring Well
- UST #4 Underground Storage Tank
- MPD Multi-Product Dispenser
- D.K. Diesel / Kerosene Dispenser
- AST Above Ground Storage Tank Kerosene
- Grass Area

as:\project\97101\siteplan.skd

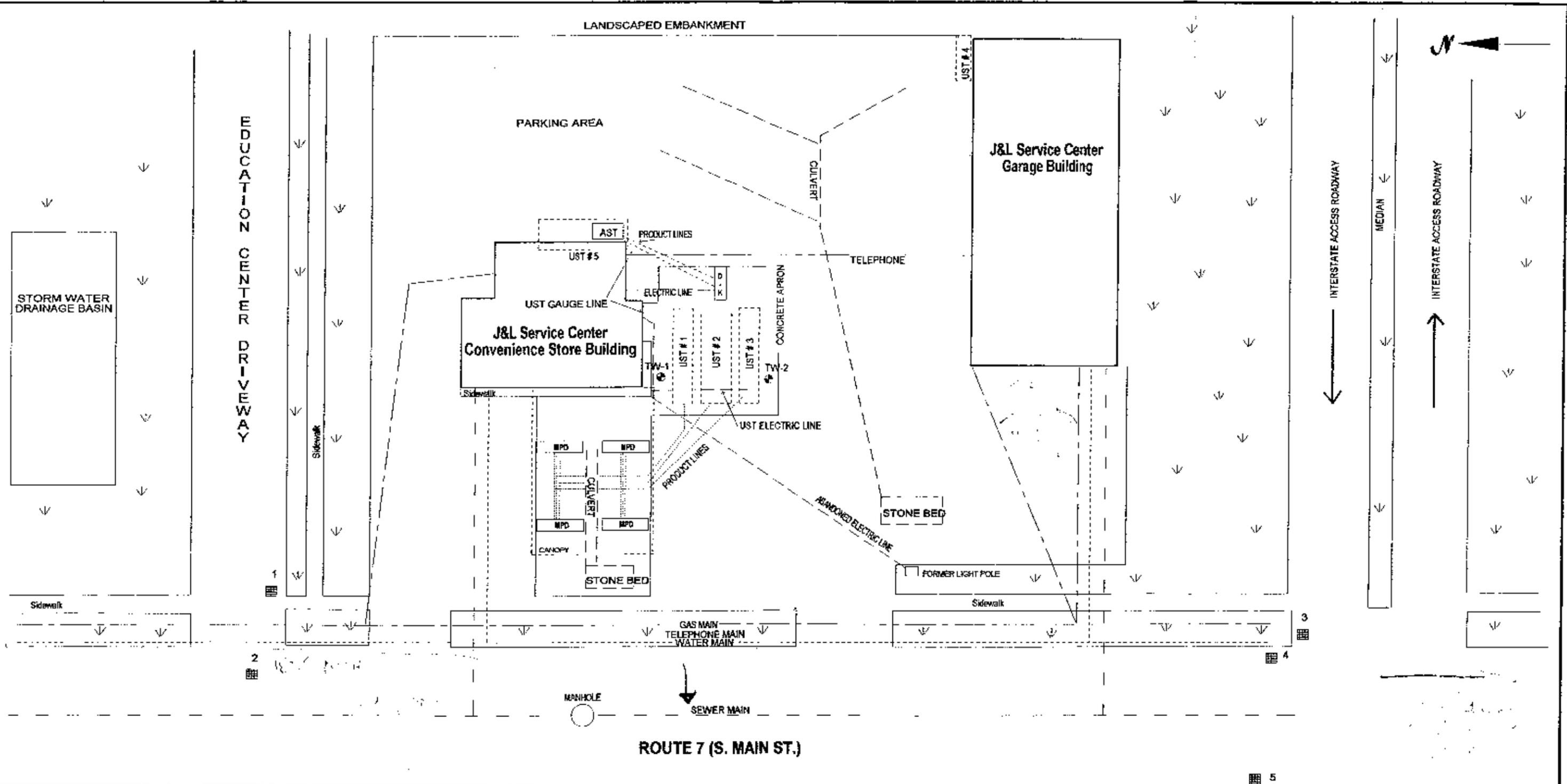
NASSON ST

ROUTE 7 (S. MAIN ST.)

UST NOTES:
 UST #1 - 6,000 gal. Special gasoline
 UST #2 - 10,000 gal. Regular gasoline
 UST #3 - 6,000 gal. Super gasoline
 UST #4 - 4,000 gal. waste oil
 UST #5 - 10,000 gal. diesel



Project No: 97-101	Designed By:	TWM STATE ENVIRONMENTAL CORP. 66 Huntington Rd. P.O. Box 799 Richmond, Vermont (802) 434-3360	FIGURE # 2 SITE Map J & L Service Center St. Albans, VT
	Approved By:		
	Drawn By: AS		
	Scale: 1" = 30'		
Date: 1/3/98	Revised: 1/9/98		



LEGEND

TW-1 Tank Cavity Groundwater Monitoring Well

UST #4 Underground Storage Tank

MPD Multi-Product Dispenser

D-K Diesel / Kerosene Dispenser

AST Above Ground Storage Tank Kerosene

Grass Area

Storm drain catch basin

as:\project\97101\siteplan.skd

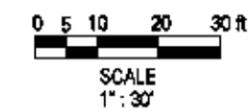
N 2020 S 1

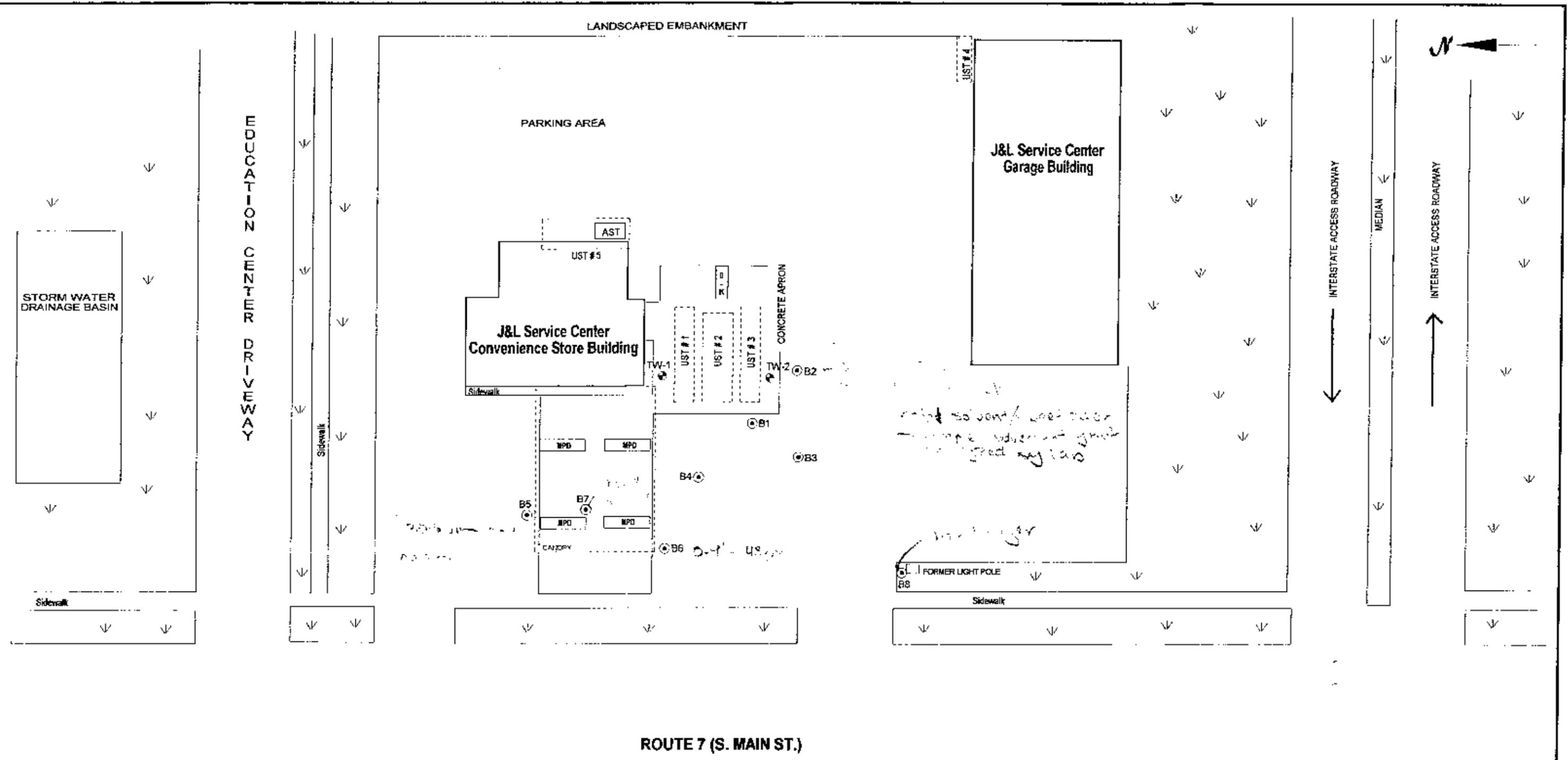
UST NOTES:
 UST #1 - 8,000 gal. Special gasoline
 UST #2 - 10,000 gal. Regular gasoline
 UST #3 - 8,000 gal. Super gasoline
 UST #4 - 4,000 gal. waste oil
 UST #5 - 10,000 gal. diesel

Project No: 97-101	Designed By:	
	Approved By:	
	Drawn By:	AS
	Scale:	1" = 30'
	Date:	1/3/98
	Revised:	1/9/98

TWIN STATE ENVIRONMENTAL CORP.
 86 Huntington Rd.
 P.O. Box 719
 Richmond, Vermont
 (802) 434-3360

FIGURE 3
 SITE Map
 w/ Subsurface Features
 J & L Service Center
 St. Albans, VT





LEGEND

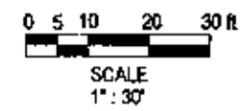
- TW-1 Tank Cavity Groundwater Monitoring Well
- B6 Soil Boring Location
- UST #4 Underground Storage Tank
- M.P.D. Multi-Product Dispenser
- D.K. Diesel / Kerosene Dispenser
- AST Above Ground Storage Tank Kerosene
- Grass Area

as:\project\97101\siteplan.skd

N
A
S
O
N
S
T

ROUTE 7 (S. MAIN ST.)

UST NOTES:
 UST #1 - 6,000 gal. Special gasoline
 UST #2 - 10,000 gal. Regular gasoline
 UST #3 - 6,000 gal. Super gasoline
 UST #4 - 4,000 gal. waste oil
 UST #5 - 10,000 gal. diesel



Project No: 97-101	Designed By:
	Approved By:
	Drawn By: AS
	Scale: 1" = 30'
	Date: 1/3/98
	Revised: 1/9/98

TWIN STATE ENVIRONMENTAL CORP.
 66 Huntington Rd.
 P.O. Box 719
 Richmond, Vermont
 (802) 434-3360

FIGURE # 4
 SITE Map
 w/ Boring Locations
 J & L Service Center
 St. Albans, VT

TABLES

TABLE 1

Summary of Free Phase Product Recovery

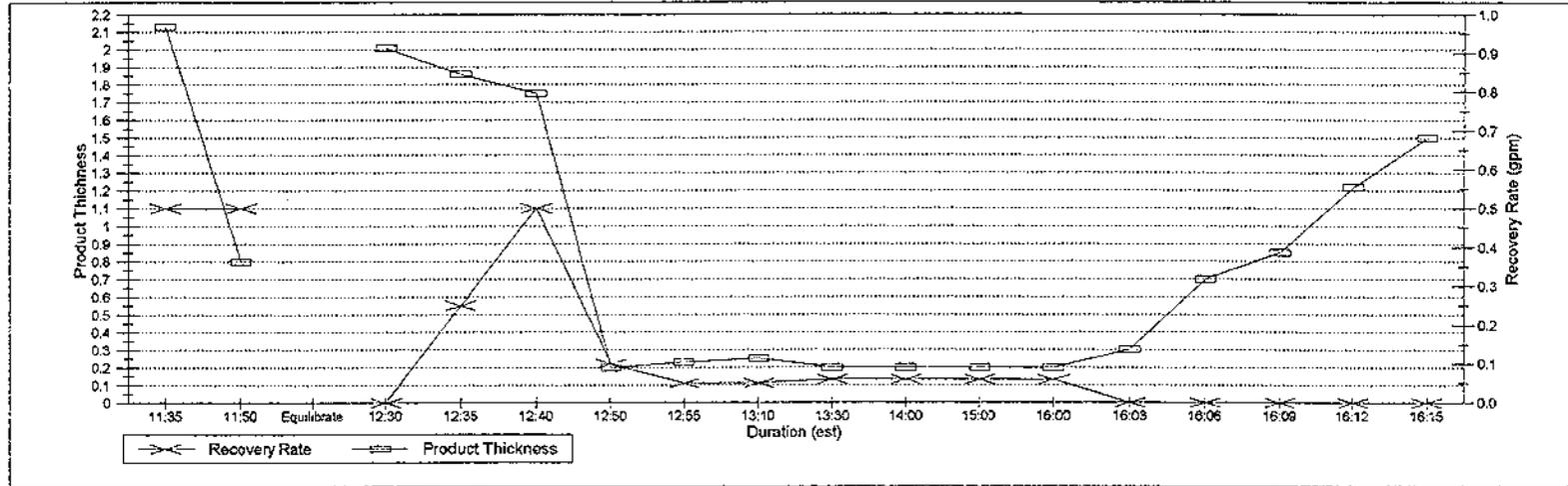
**J & L Service Center
 St Albans, VT**

Date	Inches\diamond	Gallons*	Total Σ	Recovery Status and Comments
10/29/97	NA	40	40	Vac-truck recovery from TW-1 and Sump
10/30/97	NA	16	56	Recovery and recharge evaluation of TW-1
11/12/97	0	0		MSB recovery system installed. Auto. cycle intervals.
11/13/97	5.0	23	79	System operating on Auto. cycle intervals.
11/15/97	6.5	33.5	89.5	System operating on Auto. cycle intervals.
11/18/97	14.0	98.5	154.5	Reset system to 20 min. cycle intervals.
11/24/97	24.5	201	257	System operating on 20 min. cycle intervals.
11/25/97	26.0	215	272	System operating on 20 min. cycle intervals.
12/1/97	32.0	265	321	System shut down pending AST pump-out.
12/4/97	0	0	321	AST pump-out complete, System restart on 20 min cycle intervals. UST Line repair initiated.
12/8/97	8.75	52	373	System operating on 20 min. cycle intervals.
12/12/97	11.75	77.5	398.5	System operating on 20 min. cycle intervals.
12/17/97	14.0	98.5	419.5	System operating on 20 min. cycle intervals.
12/23/97	15.75	115	436	System operating on 20 min. cycle intervals.
1/2/98	17.5	132.5	453.5	System operating on 20 min. cycle intervals.
1/7/98	20.0	157.0	478	System operating on 20 min. cycle intervals.
1/15/98	21.5	172.0	493	System operating on 20 min. cycle intervals.
1/22/98	23.0	186	507	System operating on 20 min. cycle intervals.

- \diamond - Recovered product as measured in inches as contained in 300 gallon above ground storage vessel
- * - Recovered product as measured in gallons as contained in 300 gallon above ground storage vessel
- Σ - Total gallons of recovered product as measured in gallons.

as:\project\97-101\tbl1.doc

TABLE 2
Free Phase Product Recovery and Recharge Trend Analysis for TW-1
J & L Service Center
October 30, 1997

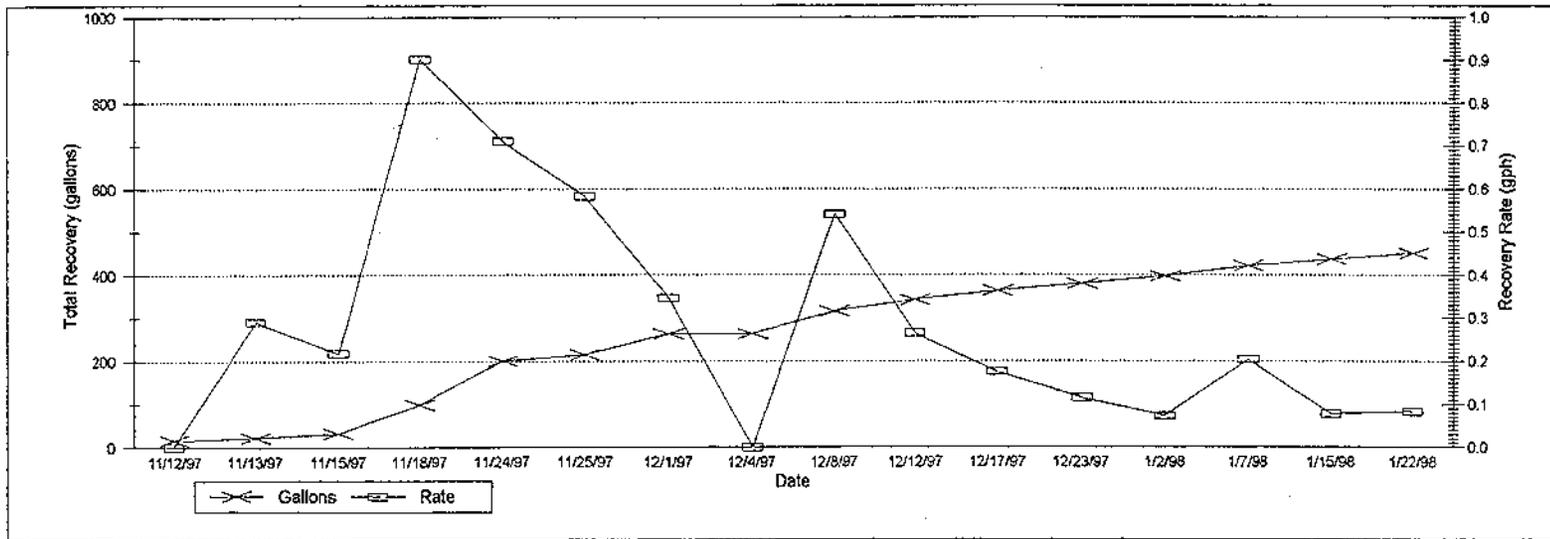


Time	11:35	11:50	Equilibrate	12:30	12:35	12:40	12:50	12:55	13:10	13:30	14:00	15:00	16:00	16:03	16:06	16:09	16:12	16:15
DTW	5.20	6.70		5.05	4.95	4.90	3.75	3.78	3.80	3.75	3.75	3.75	3.75	3.80	4.10	4.21	4.50	4.67
DTP	3.07	5.90		3.04	3.09	3.15	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.50	3.40	3.36	3.28	3.17
Rate	0.50	0.50		0.00	0.25	0.50	0.10	0.05	0.05	0.06	0.06	0.06	0.06	0.06	0.00	0.00	0.00	0.00
Pth	2.13	0.80		2.04	1.86	1.75	0.20	0.23	0.25	0.20	0.20	0.20	0.20	0.30	0.70	0.86	1.22	1.50

Notes:

1. DTW - Depth to water as measured insitu using a Solinst, Model 122, Interface Meter and referenced to the top of PVC riser.
2. DTP - Depth to free phase petroleum product as measured insitu using a Solinst, Model 122, Interface Meter and referenced to the top of PVC riser.
3. Recovery Rate - Flow rate of product recovery as measured by a laboratory grade graduated cylinder.
4. Pth - Free phase product thickness as measured insitu using a Solinst, Model 122, Interface Meter and referenced to the top of PVC riser.
5. Duration (est) - Duration of product recovery and recharge evaluation as established by Eastern Standard Time
6. Equilibrate - Period of time following evacuation exercise where MW-1 was allowed to equilibrate before recharge evaluation exercise was initiated.

TABLE 3
Free Phase Product Recovery Trend Analysis
J & L Service Center
TW-1



subcycle function
 did not work
 3 gallons recovered
 but not reported
 1/13/98

Date	11/12/97	11/13/97	11/15/97	11/18/97	11/24/97	11/25/97	12/1/97	12/4/97	12/8/97	12/12/97	12/17/97	12/23/97	1/2/98	1/7/98	1/15/98	1/22/98
Duration	0	24	48	72	144	24	144	72	96	96	120	144	240	120	192	168
Gallons	16	23	33.6	98.5	201	216	265	265	317	342.6	363.5	380	397.5	422	437	451
Rate	0.00	0.29	0.22	0.90	0.71	0.58	0.35	0.00	0.54	0.27	0.18	0.11	0.07	0.20	0.08	0.08

Notes:

1. Total Recovery of Free Phase Product expressed in gallons as measured in 0.25" increments from the recovery AST.
2. Date of SITE visit and Operations and Monitoring of Recovery System
3. Duration expressed in hours between SITE visits.
4. Gallons recovered to date of SITE visit.
5. Rate expressed in gallons per hour.

PHOTO SUMMARY

PHOTO SUMMARY
J & L Service Center
St Albans, VT

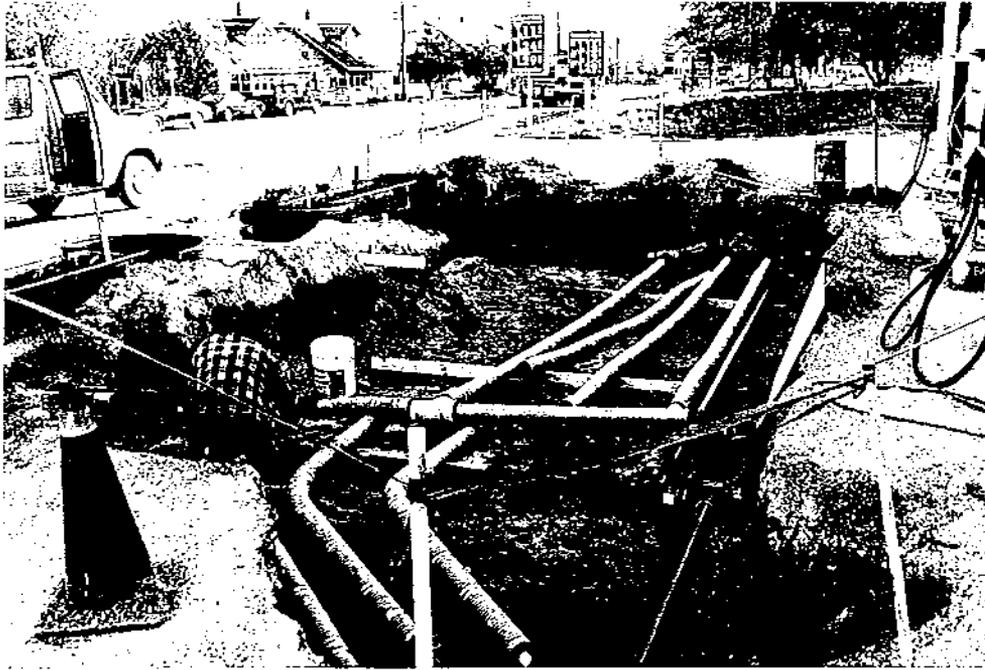


PHOTO # 1
Gasoline UST piping installation as viewed to the north, circa 1990.

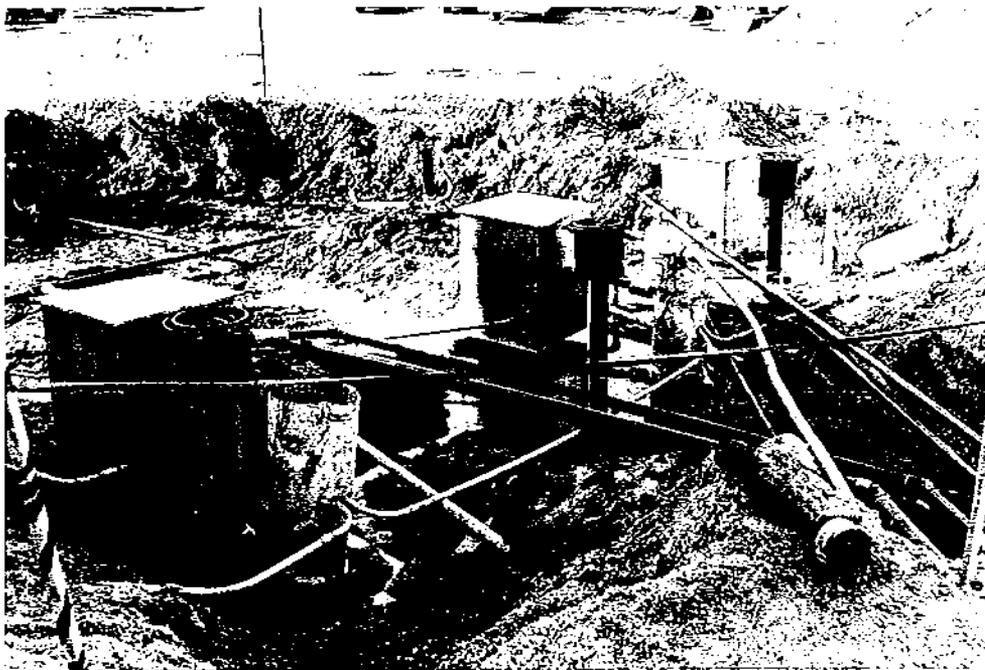


PHOTO # 2
Gasoline UST submersible pump containment sumps, as viewed to the south, circa 1990.

PHOTO SUMMARY
J & L Service Center
St Albans, VT



PHOTO # 3

UST submersible pump containment sump replacement activities, as viewed to the north, circa 1992.

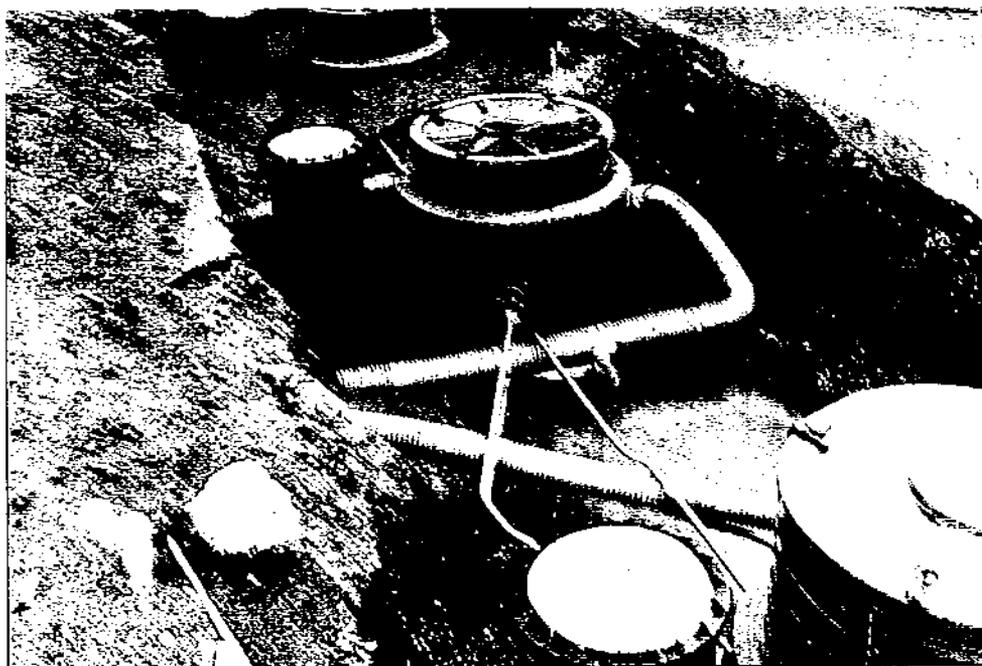


PHOTO # 4

UST submersible pump containment sump replacement, circa 1992. Note electrical conduit.

PHOTO SUMMARY
J & L Service Center
St Albans, VT

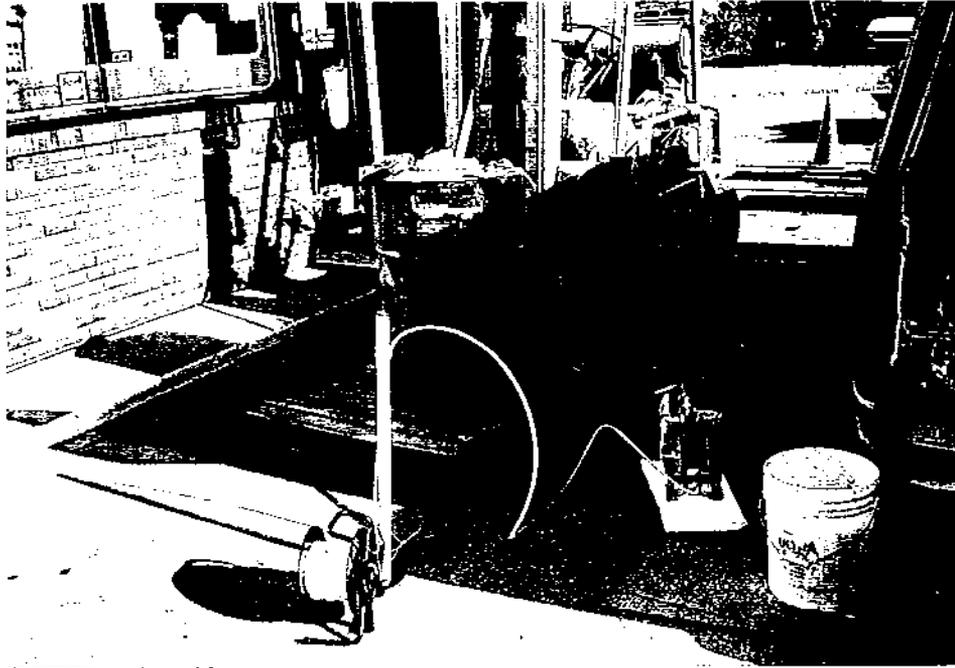


PHOTO # 5

Product recovery and recharge evaluation at TW-1. October 30, 1997.

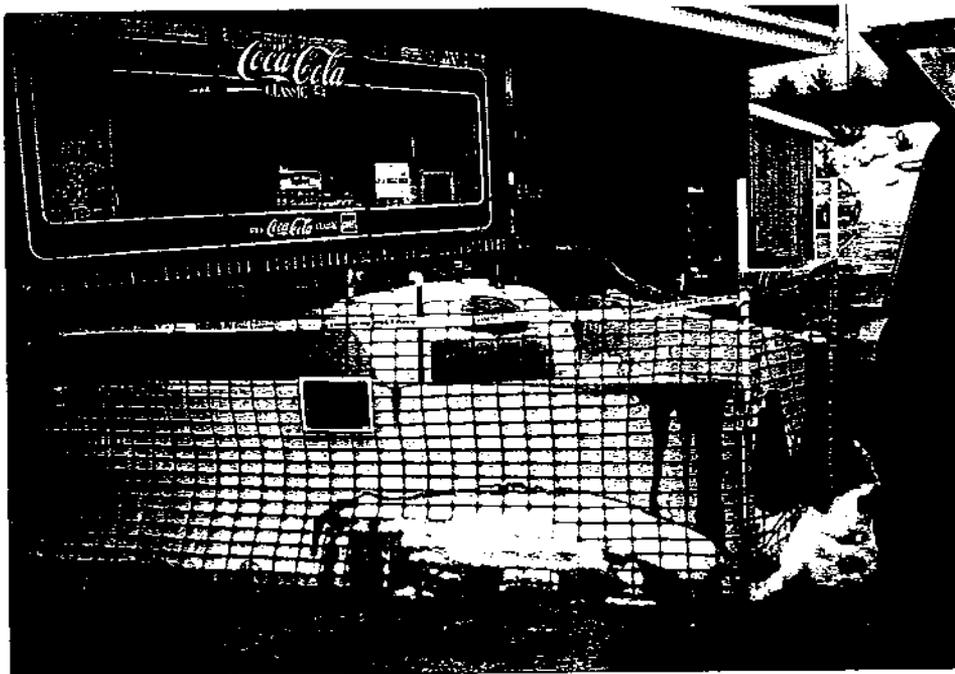


PHOTO # 6

Magnum Spill Buster product recovery system, installed November 12, 1997.

APPENDIX A



TWIN STATE ENVIRONMENTAL CORPORATION

65 Huntington Road, P.O. Box 719 Richmond, Vermont 05477
 (802) 434-3350 FAX: (802) 434-4478

MONITORING WELL/SOIL BORING LOG

WELL/BORING NO:	B-1	WELL DEPTH:	N/A	BORING DEPTH:	12.0 feet
PROJECT NAME:	J&L Service Center	DEPTH TO WATER:	Not encountered		
PROJECT NO:	97-101	SCREEN DIA:	N/A	DEPTH:	N/A
INSTALL DATE:	November 4, 1997	SCREEN TYPE/SIZE:	N/A		
TSEC REP:	A. Shively	RISER TYPE:	N/A		
DRILLING CO:	TSEC	RISER DIA.:	N/A	DEPTH:	N/A
DRILLING METHOD:	Geoprobe®	GUARD TYPE:	N/A		
SAMPLING METHOD:	Macrocore Sampler	RISER CAP:	N/A		
REMARKS:	Boring was backfilled with cuttings and bentonite, and finished with asphalt patch.				

DEPTH IN FEET	WELL PROFILE	SAMPLE DEPTH (FT)	PID (PPMV)	BLOWS/6" AND RECOVERY	SOIL DESCRIPTION AND NOTES	LEGEND
0	N	0-4	6.2	3.5 ft recovery	0.0-1.0: Asphalt and gravel base. Grey, black, dry	CEMENT GROUT
1	O				1.0-2.0: Medium to coarse silty sand with trace of clay and gravel. Brown, dry.	NATIVE BACKFILL
2					2.0-3.5: Very fine to fine silty sand with fine to medium gravel. Tan, dense, dry.	BENTONITE SEAL
3	W				4.0-8.0: Very fine to fine silty sand with fine to medium gravel. Tan, dense, dry.	SAND PACK
4	E	4-8	5.3	4.0 ft recovery	8.0-9.0: Very fine to fine silty sand with fine to medium gravel. Tan, dense, dry.	WELL SCREEN
5	L				9.0-12.0: Very fine silty sand with medium gravel. Dense, grey.	RISER PIPE
6	L				End of Sampling = 12.0 feet End of Boring = 12.0 feet	HEAD SPACE
7						WATER LEVEL (APPROX)
8	I	8-12	8.5	4.0 ft recovery		
9	N					
10	S					
11	T					
12	A					
13	L					
14	L					
15	E					
16	D					
17						
18						
19						
20						
21						
22						
23						
24						
25						

GRANULAR SOILS		COHESIVE SOILS		PROPORTIONS USED	
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	TRACE	0-10%
0-4	V.LOOSE	<2	V.SOFT	LITTLE	10-20%
4-10	LOOSE	2-4	SOFT	SOME	20-35%
10-30	M.DENSE	4-8	M.STIFF	AND	35-50%
30-50	DENSE	8-15	STIFF		
>50	V.DENSE	15-30	V.STIFF		
		>30	HARD		

NOTES:
1. See Figure 2, SITE Plan, for boring locations
2. PID readings were obtained using a Thermo Environmental Instruments Model 580 B PID equipped with a 10.6eV lamp. Conventional headspace techniques were used.



TWIN STATE ENVIRONMENTAL CORPORATION

65 Huntington Road, P.O. Box 719 Richmond, Vermont 05477
 (802) 434-3350 FAX: (802) 434-4478

MONITORING WELL/SOIL BORING LOG

WELL/BORING NO:	B-2	WELL DEPTH:	N/A	BORING DEPTH:	7.0 feet
PROJECT NAME:	J&L Service Center	DEPTH TO WATER:	Not encountered		
PROJECT NO:	97-101	SCREEN DIA:	N/A	DEPTH:	N/A
INSTALL DATE:	November 4, 1997	SCREEN TYPE/SIZE:	N/A		
TSEC REP:	A. Shively	RISER TYPE:	N/A		
DRILLING CO:	TSEC	RISER DIA.:	N/A	DEPTH:	N/A
DRILLING METHOD:	Geoprobe®	GUARD TYPE:	N/A		
SAMPLING METHOD:	Macrocore Sampler	RISER CAP:	N/A		
REMARKS:	Boring was backfilled with cuttings and bentonite, and finished with asphalt patch.				

DEPTH IN FEET	WELL PROFILE	SAMPLE DEPTH (FT)	PID (PPMV)	BLOWS/6" AND RECOVERY	SOIL DESCRIPTION AND NOTES	LEGEND
0	N	0-4	268	3.0 ft recovery	0.0-0.5: Asphalt and gravel base.	CEMENT GROUT
1	O		260		0.5-1.5: Fine to medium sand. Brown, dry.	NATIVE BACKFILL
2			1.7		1.5-2.0: Very fine silty sand with medium to coarse gravel. Brown.	BENTONITE SEAL
3	W				2.0-3.0: Very fine silty sand with medium to coarse gravel. Dry.	SAND PACK
4	E	4-8	525	3.0 ft recovery	4.0-7.0: Very fine silty sand with medium to coarse gravel. Dense, brown, dry. (sweet/solvent odor).	WELL SCREEN
5	L		172			RISER PIPE
6	L		164			HS HEAD SPACE
7					Refusal at 7.0 feet	WATER LEVEL (APPROX)
8	I				End of Boring = 7.0 feet	
9	N				End of Sampling = 7.0 feet	
10	S					
11	T					
12	A					
13	L					
14	L					
15	E					
16	D					
17						
18						
19						
20						
21						
22						
23						
24						
25						

GRANULAR SOILS		COHESIVE SOILS		PROPORTIONS USED		NOTES: 1. See Figure 2, SITE Plan, for boring locations 2. PID readings were obtained using a Thermo Environmental Instruments Model 580 B PID equipped with a 10.6eV lamp. Conventional headspace techniques were used.
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	TRACE	0-10%	
0-4	V.LOOSE	<2	V.SOFT	LITTLE	10-20%	
4-10	LOOSE	2-4	SOFT	SOME	20-35%	
10-30	M.DENSE	4-8	M.STIFF	AND	35-50%	
30-50	DENSE	8-15	STIFF			
>50	V.DENSE	15-30	V.STIFF			
		>30	HARD			



TWIN STATE ENVIRONMENTAL CORPORATION

65 Huntington Road, P.O. Box 719 Richmond, Vermont 05477
 (802) 434-3350 FAX: (802) 434-4478

MONITORING WELL/SOIL BORING LOG

WELL/BORING NO:	B-3	WELL DEPTH:	N/A	BORING DEPTH:	12.0 feet
PROJECT NAME:	J&L Service Center	DEPTH TO WATER:	Not encountered		
PROJECT NO:	97-101	SCREEN DIA:	N/A	DEPTH:	N/A
INSTALL DATE:	November 4, 1997	SCREEN TYPE/SIZE:	N/A		
TSEC REP:	A. Shively	RISER TYPE:	N/A		
DRILLING CO:	TSEC	RISER DIA.:	N/A	DEPTH:	N/A
DRILLING METHOD:	Geoprobe®	GUARD TYPE:	N/A		
SAMPLING METHOD:	Macrocore Sampler	RISER CAP:	N/A		
REMARKS:	Boring was backfilled with cuttings and bentonite, and finished with asphalt patch.				

DEPTH IN FEET	WELL PROFILE	SAMPLE DEPTH (FT)	PID (PPMV)	BLOWS/6" AND RECOVERY	SOIL DESCRIPTION AND NOTES	LEGEND
0	N	0-4	0.2	3.0 ft recovery	0.0-0.5: Asphalt and gravel base.	CEMENT GROUT
1	O				0.5-1.5: Medium to coarse silty sand with fine to coarse gravel.	NATIVE BACKFILL
2					Brown, dry.	
3	W				1.5-2.0: Fine to medium sand. Brown.	BENTONITE SEAL
4	E	4-8	0.2		2.0-3.0: Very fine silty sand with medium-coarse gravel. Brown, dry.	SAND PACK
5	L				4.0-7.0: Very fine silty sand with medium-coarse gravel. Brown, dry.	WELL SCREEN
6	L				Refusal at 7.0 ft.	RISER PIPE
7					End of Sampling = 7.0 feet	HS HEAD SPACE
8	I				End of Boring = 7.0 feet	WATER LEVEL (APPROX)
9	N					
10	S					
11	T					
12	A					
13	L					
14	L					
15	E					
16	D					
17						
18						
19						
20						
21						
22						
23						
24						
25						
GRANULAR SOILS		COHESIVE SOILS		PROPORTIONS USED		NOTES: 1. See Figure 2, SITE Plan, for boring locations 2. PID readings were obtained using a Thermo Environmental Instruments Model 580 B PID equipped with a 10.6eV lamp. Conventional headspace techniques were used.
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	TRACE	0-10%	
0-4	V.LOOSE	<2	V.SOFT	LITTLE	10-20%	
4-10	LOOSE	2-4	SOFT	SOME	20-35%	
10-30	M.DENSE	4-8	M.STIFF	AND	35-50%	
30-50	DENSE	8-15	STIFF			
>50	V.DENSE	15-30	V.STIFF			
		>30	HARD			



TWIN STATE ENVIRONMENTAL CORPORATION

65 Huntington Road, P.O. Box 719 Richmond, Vermont 05477
 (802) 434-3350 FAX: (802) 434-4478

MONITORING WELL/SOIL BORING LOG

WELL/BORING NO:	B-4	WELL DEPTH:	N/A	BORING DEPTH:	10.0 feet
PROJECT NAME:	J&L Service Center	DEPTH TO WATER:	Not encountered		
PROJECT NO:	97-101	SCREEN DIA:	N/A	DEPTH:	N/A
INSTALL DATE:	November 4, 1997	SCREEN TYPE/SIZE:	N/A		
TSEC REP:	A. Shively	RISER TYPE:	N/A		
DRILLING CO:	TSEC	RISER DIA.:	N/A	DEPTH:	N/A
DRILLING METHOD:	Geoprobe [®]	GUARD TYPE:	N/A		
SAMPLING METHOD:	Macrocore Sampler	RISER CAP:	N/A		
REMARKS:	Boring was backfilled with cuttings and bentonite, and finished with asphalt patch.				

DEPTH IN FEET	WELL PROFILE	SAMPLE DEPTH (FT)	PID (PPMV)	BLOWS/6" AND RECOVERY	SOIL DESCRIPTION AND NOTES	LEGEND
0	N	0-4	4.4	3.0 ft recovery	0.0-1.0: Asphalt and gravel base.	CEMENT GROUT
1	O				1.0-2.0: Very fine coarse silty sand with medium to coarse gravel. Brown, loose, dry.	NATIVE BACKFILL
2			0.8		2.0-3.0: Very fine silty sand with fine to medium gravel. Brown, dry, dense.	BENTONITE SEAL
3	W				4.0-7.5: Very fine silty sand with fine to medium gravel. Brown, dry, dense.	SAND PACK
4	E	4-8	7.1	4.0 ft recovery	7.5-8.0: Very fine silty sand with fine to medium gravel. Grey, dry.	WELL SCREEN
5	L				8.0-10.0: Very fine silty sand with fine to medium gravel. Grey, dry.	RISER PIPE
6	L				End of Sampling = 10.0 feet End of Boring = 10.0 feet	HEAD SPACE
7			3.8			WATER LEVEL (APPROX)
8	I	8-12	1.1	2.0 ft recovery		
9	N					
10	S					
11	T					
12	A					
13	L					
14	L					
15	E					
16	D					
17						
18						
19						
20						
21						
22						
23						
24						
25						

GRANULAR SOILS BLOWS/FT DENSITY 0-4 V.LOOSE 4-10 LOOSE 10-30 M.DENSE 30-50 DENSE >50 V.DENSE		COHESIVE SOILS BLOWS/FT DENSITY <2 V.SOFT 2-4 SOFT 4-8 M.STIFF 8-15 STIFF 15-30 V.STIFF >30 HARD		PROPORTIONS USED TRACE 0-10% LITTLE 10-20% SOME 20-35% AND 35-50%		NOTES: 1. See Figure 2, SITE Plan, for boring locations 2. PID readings were obtained using a Thermo Environmental Instruments Model 580 B PID equipped with a 10.6eV lamp. Conventional headspace techniques were used.
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TWIN STATE ENVIRONMENTAL CORPORATION

65 Huntington Road, P.O. Box 719 Richmond, Vermont 05477
 (802) 434-3350 FAX: (802) 434-4478

MONITORING WELL/SOIL BORING LOG

WELL/BORING NO:	B-5	WELL DEPTH:	N/A	BORING DEPTH:	11.0 feet
PROJECT NAME:	J&L Service Center	DEPTH TO WATER:	Not encountered		
PROJECT NO:	97-101	SCREEN DIA:	N/A	DEPTH:	N/A
INSTALL DATE:	November 4, 1997	SCREEN TYPE/SIZE:	N/A		
TSEC REP:	A. Shively	RISER TYPE:	N/A		
DRILLING CO:	TSEC	RISER DIA.:	N/A	DEPTH:	N/A
DRILLING METHOD:	Geoprobe®	GUARD TYPE:	N/A		
SAMPLING METHOD:	Macrocore Sampler	RISER CAP:	N/A		
REMARKS:	Boring was backfilled with cuttings and bentonite, and finished with asphalt patch.				

DEPTH IN FEET	WELL PROFILE	SAMPLE DEPTH (FT)	PID (PPMV)	BLOWS/6" AND RECOVERY	SOIL DESCRIPTION AND NOTES	LEGEND
0	N	0-4	62.8	2.5 ft recovery	0.0-0.5: Asphalt and gravel base.	CEMENT GROUT
1	O				0.5-1.0: Sand.	NATIVE BACKFILL
2			32.6		1.0-2.5: Very fine silty sand with medium gravel. Brown, dry, dense.	BENTONITE SEAL
3	W					SAND PACK
4	E	4-7		4.0 ft recovery	4.0-7.0: Very fine silty sand with medium gravel. Brown, dry, dense.	WELL SCREEN
5	L					RISER PIPE
6	L					HS HEAD SPACE
7		7-11			7.0-8.0: Very fine silty sand with medium gravel. Brown, dry.	WATER LEVEL (APPROX)
8	I			2.0 ft recovery	8.0-10.0: Very fine silty sand with fine to medium gravel. Tan, dry.	
9	N				10.0-11.0: Very fine silty sand with fine to medium gravel. Tan, dry.	
10	S				End of Sampling = 11.0 feet	
11	T				End of Boring = 11.0 feet	
12	A					
13	L					
14	L					
15	E					
16	D					
17						
18						
19						
20						
21						
22						
23						
24						
25						

GRANULAR SOILS		COHESIVE SOILS		PROPORTIONS USED		NOTES:
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	TRACE	0-10%	
0-4	V.LOOSE	<2	V.SOFT	LITTLE	10-20%	
4-10	LOOSE	2-4	SOFT	SOME	20-35%	
10-30	M.DENSE	4-8	M.STIFF	AND	35-50%	
30-50	DENSE	8-15	STIFF			
>50	V.DENSE	15-30	V.STIFF			
		>30	HARD			

1. See Figure 2, SITE Plan, for boring locations
 2. PID readings were obtained using a Thermo Environmental Instruments Model 580 B PID equipped with a 10.6eV lamp. Conventional headspace techniques were used.



TWIN STATE ENVIRONMENTAL CORPORATION

65 Huntington Road, P.O. Box 719 Richmond, Vermont 05477
 (802) 434-3350 FAX: (802) 434-4478

MONITORING WELL/SOIL BORING LOG

WELL/BORING NO:	B-6	WELL DEPTH:	N/A	BORING DEPTH:	11.0 feet
PROJECT NAME:	J&L Service Center	DEPTH TO WATER:	Not encountered		
PROJECT NO:	97-101	SCREEN DIA:	N/A	DEPTH:	N/A
INSTALL DATE:	November 4, 1997	SCREEN TYPE/SIZE:	N/A		
TSEC REP:	A. Shively	RISER TYPE:	N/A		
DRILLING CO:	TSEC	RISER DIA.:	N/A	DEPTH:	N/A
DRILLING METHOD:	Geoprobe®	GUARD TYPE:	N/A		
SAMPLING METHOD:	Macrocore Sampler	RISER CAP:	N/A		
REMARKS:	Boring was backfilled with cuttings and bentonite, and finished with asphalt patch.				

DEPTH IN FEET	WELL PROFILE	SAMPLE DEPTH (FT)	PID (PPMV)	BLOWS/6" AND RECOVERY	SOIL DESCRIPTION AND NOTES	LEGEND
0	N	0-4	47.4	2.0 ft recovery	0.0-1.0: Asphalt and gravel base.	CEMENT GROUT
1	O				1.0-2.0: Fine to med. sand with fine to medium gravel. Dry, brown.	NATIVE BACKFILL
2						
3	W					
4	E	4-8	7.6	4.0 ft recovery	4.0-8.0: Very fine silty sand with fine to medium gravel. Brown, dry, loose.	BENTONITE SEAL
5	L					
6	L					SAND PACK
7						
8	I	8-12	9.4	2.0 ft recovery	8.0-9.0: Very fine silty sand with fine to medium gravel. Brown, dry, loose.	WELL SCREEN
9	N				9.0-11.0: Very fine and fine sand. Tan, dry.	RISER PIPE
10	S				End of Sampling = 11.0 feet	
11	T				End of Boring = 11.0 feet	
12	A					HEAD SPACE
13	L					
14	L					WATER LEVEL (APPROX)
15	E					
16	D					
17						
18						
19						
20						
21						
22						
23						
24						
25						
GRANULAR SOILS		COHESIVE SOILS		PROPORTIONS USED		NOTES: 1. See Figure 2, SITE Plan, for boring locations 2. PID readings were obtained using a Thermo Environmental Instruments Model 580 B PID equipped with a 10.6eV lamp. Conventional headspace techniques were used.
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	TRACE	0-10%	
0-4	V.LOOSE	<2	V.SOFT	LITTLE	10-20%	
4-10	LOOSE	2-4	SOFT	SOME	20-35%	
10-30	M.DENSE	4-8	M.STIFF	AND	35-50%	
30-50	DENSE	8-15	STIFF			
>50	V.DENSE	15-30	V.STIFF			
		>30	HARD			



TWIN STATE ENVIRONMENTAL CORPORATION

65 Huntington Road, P.O. Box 719 Richmond, Vermont 05477
 (802) 434-3350 FAX: (802) 434-4478

MONITORING WELL/SOIL BORING LOG

WELL/BORING NO:	B-7	WELL DEPTH:	N/A	BORING DEPTH:	3.25 feet
PROJECT NAME:	J&L Service Center	DEPTH TO WATER:			Not encountered
PROJECT NO:	97-101	SCREEN DIA:	N/A	DEPTH:	N/A
INSTALL DATE:	November 6, 1997	SCREEN TYPE/SIZE:	N/A		
TSEC REP:	A. Shively	RISER TYPE:	N/A		
DRILLING CO:	TSEC	RISER DIA.:	N/A	DEPTH:	N/A
DRILLING METHOD:	Hand Auger	GUARD TYPE:	N/A		
SAMPLING METHOD:	Hand Auger	RISER CAP:	N/A		
REMARKS:	Boring was backfilled with cuttings and bentonite, and finished with concrete patch.				

DEPTH IN FEET	WELL PROFILE	SAMPLE DEPTH (FT)	PID (PPMV)	BLOWS/6" AND RECOVERY	SOIL DESCRIPTION AND NOTES	LEGEND
0	N	NA	NA	NA	0.0 - 0.75 : Concrete core.	
1	O	0.75-4.0	1.0	3.25 ft recovery	0.75-4.0: Medium to coarse tan sand (backfill material). Dry.	
2			0.7			
3	W		0.4		3.0-3.25: Medium to coarse gravel w/pea stone. Tan, dry.	
4	E		0.7			
5	L				End of Sampling = 3.25 feet End of Boring = 3.25 feet	
6	L					
7						
8	I					
9	N					
10	S					
11	T					
12	A					
13	L					
14	L					
15	E					
16	D					
17						
18						
19						
20						
21						
22						
23						
24						
25						

GRANULAR SOILS BLOWS/FT DENSITY 0-4 V.LOOSE 4-10 LOOSE 10-30 M.DENSE 30-50 DENSE >50 V.DENSE		COHESIVE SOILS BLOWS/FT DENSITY <2 V.SOFT 2-4 SOFT 4-8 M.STIFF 8-15 STIFF 15-30 V.STIFF >30 HARD		PROPORTIONS USED TRACE 0-10% LITTLE 10-20% SOME 20-35% AND 35-50%		NOTES: 1. See Figure 2, SITE Plan, for boring locations 2. PID readings were obtained using a Thermo Environmental Instruments Model 580 B PID equipped with a 10.6eV lamp. Conventional headspace techniques were used.
--	--	--	--	---	--	---



TWIN STATE ENVIRONMENTAL CORPORATION

65 Huntington Road, P.O. Box 719 Richmond, Vermont 05477
 (802) 434-3350 FAX: (802) 434-4478

MONITORING WELL/SOIL BORING LOG

WELL/BORING NO:	B-8	WELL DEPTH:	N/A	BORING DEPTH:	4.0 feet
PROJECT NAME:	J&L Service Center	DEPTH TO WATER:	Not encountered		
PROJECT NO:	97-101	SCREEN DIA:	N/A	DEPTH:	N/A
INSTALL DATE:	November 25, 1997	SCREEN TYPE/SIZE:	N/A		
TSEC REP:	A. Shively	RISER TYPE:	N/A		
DRILLING CO:	TSEC	RISER DIA.:	N/A	DEPTH:	N/A
DRILLING METHOD:	Hand Auger	GUARD TYPE:	N/A		
SAMPLING METHOD:	Hand Auger	RISER CAP:	N/A		
REMARKS:	Boring was backfilled with cuttings and bentonite, and finished with native materials to surface.				

DEPTH IN FEET	WELL PROFILE	SAMPLE DEPTH (FT)	PID (PPMV)	BLOWS/6" AND RECOVERY	SOIL DESCRIPTION AND NOTES	LEGEND
0	N	0-3	0.4	4.0 ft recovery	0.0-0.5: Grass, vegetation, and sandy topsoil.	CEMENT GROUT
1	O		0.7		0.5-1.5: Medium to coarse silty sand with fine to medium gravel.	NATIVE BACKFILL
2			0.4		Brown, dry, dense.	
3	W		0.7		1.5-4.0: Very fine to fine silty sand with fine gravel. Tan, dry, very dense	BENTONITE SEAL
4	E		0.4		End of Sampling = 4.0 feet	SAND PACK
5	L				End of Boring = 4.0 feet	WELL SCREEN
6	L					RISER PIPE
7						HS HEAD SPACE
8	I					WATER LEVEL (APPROX)
9	N					
10	S					
11	T					
12	A					
13	L					
14	L					
15	E					
16	D					
17						
18						
19						
20						
21						
22						
23						
24						
25						

GRANULAR SOILS		COHESIVE SOILS		PROPORTIONS USED		NOTES:
BLOWS/FT	DENSITY	M.OWS/FT	DENSITY	TRACE	0-10%	
0-4	V.LOOSE	<2	V.SOFT	LITTLE	10-20%	
4-10	LOOSE	2-4	SOFT	SOME	20-35%	
10-30	M.DENSE	4-8	M.STIFF	AND	35-50%	
30-50	DENSE	8-15	STIFF			
>50	V.DENSE	15-30	V.STIFF			
		>30	HARD			

- See Figure 2, SITE Plan, for boring locations
- PID readings were obtained using a Thermo Environmental Instruments Model 580 B PID equipped with a 10.6eV lamp. Conventional headspace techniques were used.

ATTACHMENT 1

Leak Monitor Report

J & L Service Center
St Albans, VT
October 29, 1997

STOP LEAK MONITOR
OCT 29, 1997
6:27 PM

LEAK MONITOR REPORT

TEST STARTING TIME:
OCT 29, 1997
1:06 PM

TEST HOURS 1-4

TNK3

DEGREES F

55.1

GALLONS

-0.0

-0.0

-0.0

-0.0

DEGREES F

55.2

FINAL LEAK RATES:

		0.20
		GAL/HR
TANK	GAL/HR	TEST
3	0.00	PASSED

TEST ENDING TIME:
OCT 29, 1997
6:27 PM

CERTIFICATE OF UNDERGROUND STORAGE TANK SYSTEM TESTING



TANKNOLOGY-NDE
 8900 SHOAL CREEK, BUILDING 200
 AUSTIN, TEXAS 78757
 (512) 451-6334
 FAX (512) 459-1459

TEST RESULT SITE SUMMARY REPORT

TEST TYPE: Sure Test **PURPOSE:** REQUEST

TEST DATE: 12/12/97 **WORK ORDER NUMBER:** 7107204

CLIENT: TWIN STATE ENVIRO CORP **SITE:** J & L SERVICE CENTER MOBIL
 P.O. BOX 719, COMMERCIAL PARK 171 SOUTH MAIN STREET
 1A HUNTINGTON ROAD ROUTE 7
 RICHMOND, VT 05477 SAINT ALBANS, VT 05478
ATTN: ANDREW SHIVELY

The following test(s) were conducted at the site above in accordance with all applicable portions of Federal, NFPA and local regulations

Tank Tests

TANK NUMBER	PRODUCT	TANK CAPACITY (Gallons)	TANK DIAMETER (Inches)	TANK RESULTS	VOLUME CHANGE (gph)	ULLAGE RESULT
1	SUPER	6,016	96.00	PASS	0.021	PASS

Line and Leak Detector Tests

TANK NUMBER	PRODUCT	VOLUME CHANGE (gph)				LINE RESULT (P=pass, F=fail, I=inconclusive)				LEAK DETECTOR PRESENT		LEAK DETECTOR RESULT	
		A	B	C	D	A	B	C	D	#1	#2	#1	#2
1	SUPER	0.007				P							

TANKNOLOGY-NDE appreciates the opportunity to serve you, and looks forward to working with you in the future. Please call any time, day or night, when you need us.

TANKNOLOGY-NDE Representative:
 TOM PRESNAL

Test conducted by:
 MILVERTON E CHATTOO

Reviewed:

Technician Certification Number: 3027

INDIVIDUAL TANK/LINE/LEAK DETECTOR TEST REPORT

TANKNOLOGY-NDE

TEST DATE: 12/12/97
 CLIENT: TWIN STATE ENVIRO

WORK ORDER NUMBER: 7107204
 SITE: J & L SERVICE CENTER

TANK INFORMATION			
Tank ID:	1	Material:	STEEL
Product:	SUPER	Bottom to top fill in inches:	128.5
Capacity in gallons:	6,016	Bottom to grade fill in inches:	128.5
Diameter in inches:	96.00	Vent manifolded:	Fill pipe length in inches: 32.5
Length in inches:	192	Vapor recovery manifolded:	Fill pipe diameter in inches: 4.0
Tank age (years):		Impact Valves Operational:	Y
Fuel pure rating:		Overfill protection:	YES
		Overspill protection:	YES
		Stage I vapor recovery:	COAX
		Stage II vapor recovery:	NONE
		Installed:	ATG
COMMENTS			

TANK TEST RESULTS	LEAK DETECTOR RESULTS
Test Method: <i>sure Test</i>	Test method: <i>RTA</i>
PSI at tank bottom: 1.31	New/passed L.D. #1
Fluid level in inches: 48.50	Failed/replaced L.D. #1
UFT/OFT: UFT	New/passed L.D. #2
Fluid volume in gallons: 3,047	Failed/replaced L.D. #2
Tank water level in inches: 0.00	Make:
Test time: 10:28-12:43	Model:
Number of thermisters: 5	S/N:
Specific gravity: 0.750	Open time in sec:
Water table depth in inches: 40.00	Holding psi:
Determined by (method): SURVEY	Resiliancy cc:
Leak rate in gph: 0.021	Test leak rate ml/m:
Result: PASS	Metering psi:
	Calib. leak in gph:
COMMENTS	Results:
	COMMENTS

ULLAGE TEST RESULTS	LINE TEST RESULTS
Test Method: <i>UTS-4T</i>	Test type: <i>proline Test Series 111</i>
Test time: 13:18-13:50	Material: FIBERGLASS
Ullage volume: 2,969	Diameter (in): 2.0
Ullage pressure:	Length (ft): 80.0
Results: PASS	Test psi: 50
DATA FOR UTS-4T ONLY:	Bleedback cc: 430
Time of test 1:	Test time (min): 30
Temperature:	Test 1: Start time: 12:02
Flow rate (cfh):	Finish psi: 48
Time of test 2:	Vol change cc: 6
Temperature:	Test 2: Start time: 12:12
Flow rate (cfh):	Finish psi: 49
Time of test 3:	Vol change cc: 4
Temperature:	Test 3: Start time: 12:22
Flow rate (cfh):	Finish psi: 49
	Vol change cc: 4
	Final gph: 0.007
COMMENTS	Result: PASS
	Pump type: PRESSURE
	Pump make: RED JACKET
	COMMENTS

Printed 12/16/97 07:44 KOHLMAYER

SITE DIAGRAM



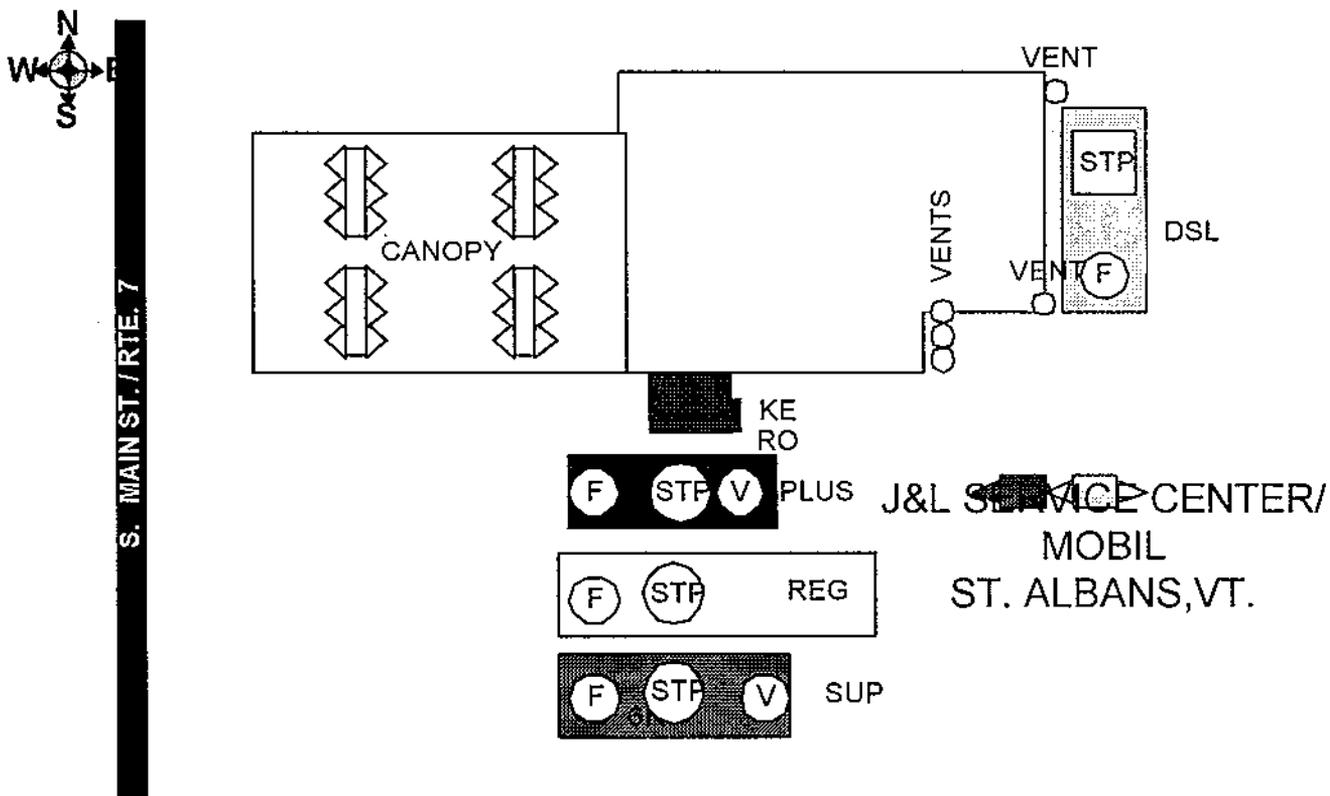
TANKNOLOGY-NDE
8900 SHOAL CREEK, BUILDING 200
AUSTIN, TEXAS 78757
(512) 451-6334
FAX (512) 459-1459

TEST DATE: 12/12/97

WORK ORDER NUMBER: 7107204

CLIENT: TWIN STATE ENVIRO CORP

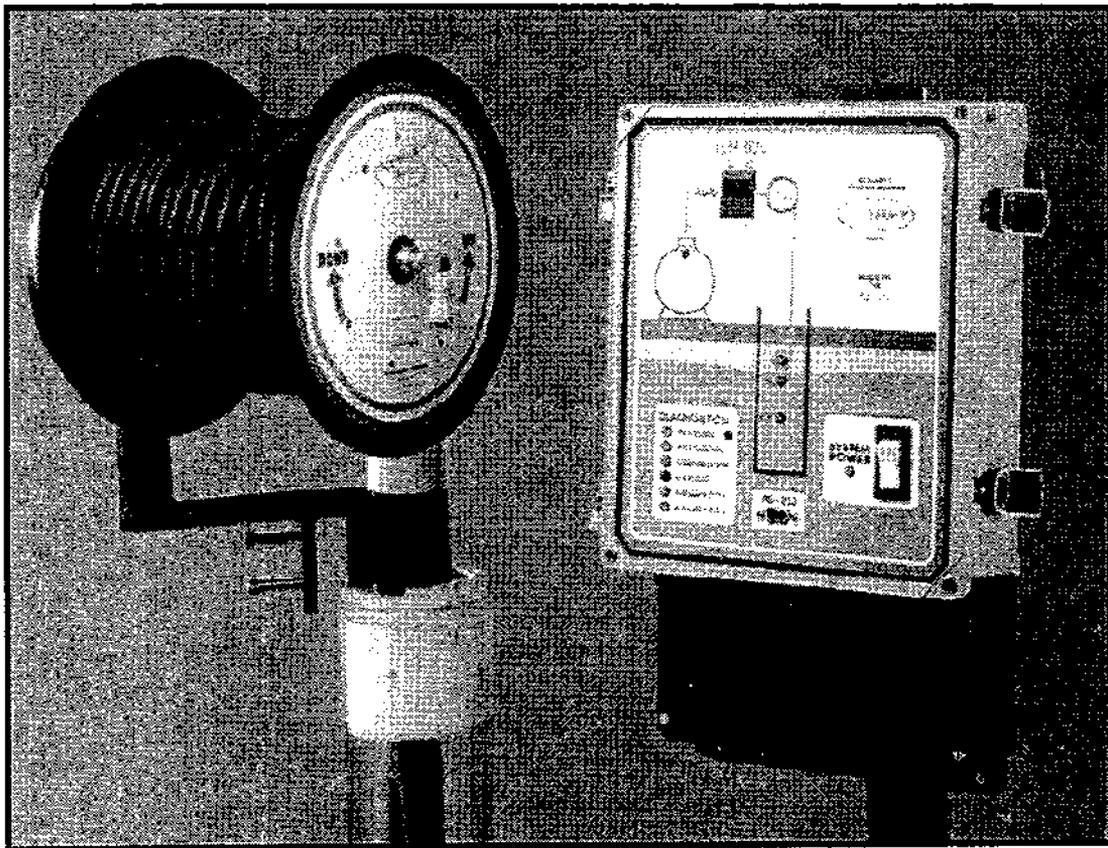
SITE: J & L SERVICE CENTER MOBIL



ATTACHMENT 2

MAGNUM SPILL BUSTER

PRODUCT RECOVERY SYSTEM



OPERATION'S MANUAL



\$20.00
REVISION 1 5/9/97

CLEAN EARTH TECHNOLOGY
NORTH FERRISBURGH, VERMONT





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MAGNUM SPILL BUSTER SYSTEM Limited Warranty

All references to the Customer herein shall mean the Purchaser or the Lessee as applicable. CLEAN EARTH TECHNOLOGY, INC. (Clean Earth) warrants the Magnum Spill Buster System to be free of substantial defects in material and workmanship for one year from date of shipment. Pumps are warranted for 90 days. Clean Earth's sole responsibility under this warranty shall be to either repair or replace, at its option, any component which fails during the applicable warranty period because of defect in workmanship or material. No other liabilities shall be assumed by the manufacturer or its agents, nor are they expressed or implied.

Clean Earth will, upon receipt of warranty item shipped freight prepaid, repair and return the item, freight prepaid, within 1 to 2 weeks.

This warranty is contingent upon proper use of the Magnum Spill Buster System by the Customer in accordance with Clean Earth's published specifications. This warranty shall not be valid if the alleged defect is the result of abuse, misuse, accident, alteration, neglect, or unauthorized repair. Any repair shall be deemed unauthorized unless it is made by Clean Earth, or with the written consent of Clean Earth. This warranty is the sole warranty made by Clean Earth to the Customer and is in lieu of all other warranties or obligations, express or implied.

System upgrades will be made available to customers as they are completed. Clean Earth Technology is not obligated to provide those upgrades without cost.

WARNING: Logic board dip switch settings other than those shown herein are not approved by Clean Earth Technology Inc. and may cause spillage of product. Please consult the factory for alternate settings.

WARNING: In the event that equipment is returned to the factory for any reason, a complete decontamination must be done before shipment. See Section 8 of this manual, "Equipment Return Policy." Shipping hazardous materials improperly may be a federal offense.

Clean Earth Technology, Inc.
Long Point Road
RR 1 Box 735
North Ferrisburgh, Vermont 05473-9711
802/425-3710
FAX 802/425-2896



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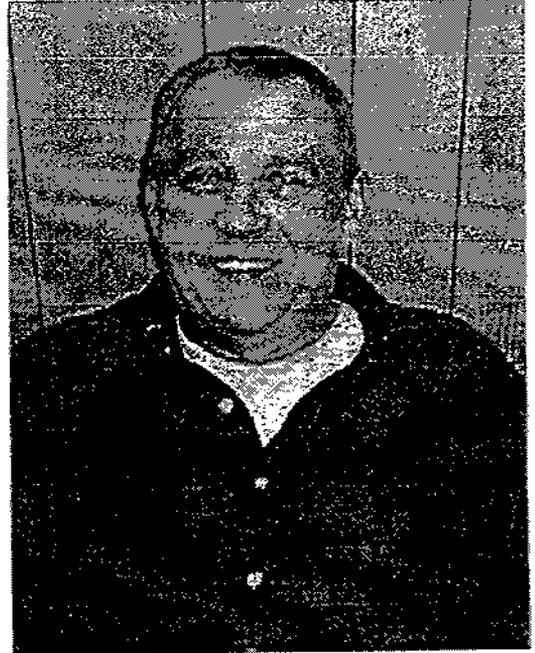
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Voices on the Phone...

DAVE BOWLES



DAVE LAMPHERE



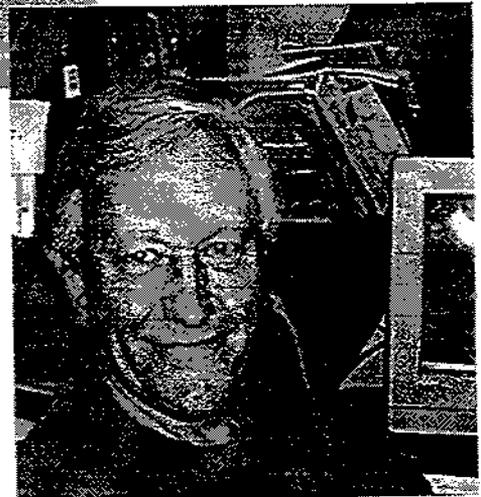
TONY CARUSO



TOM BUFFARD



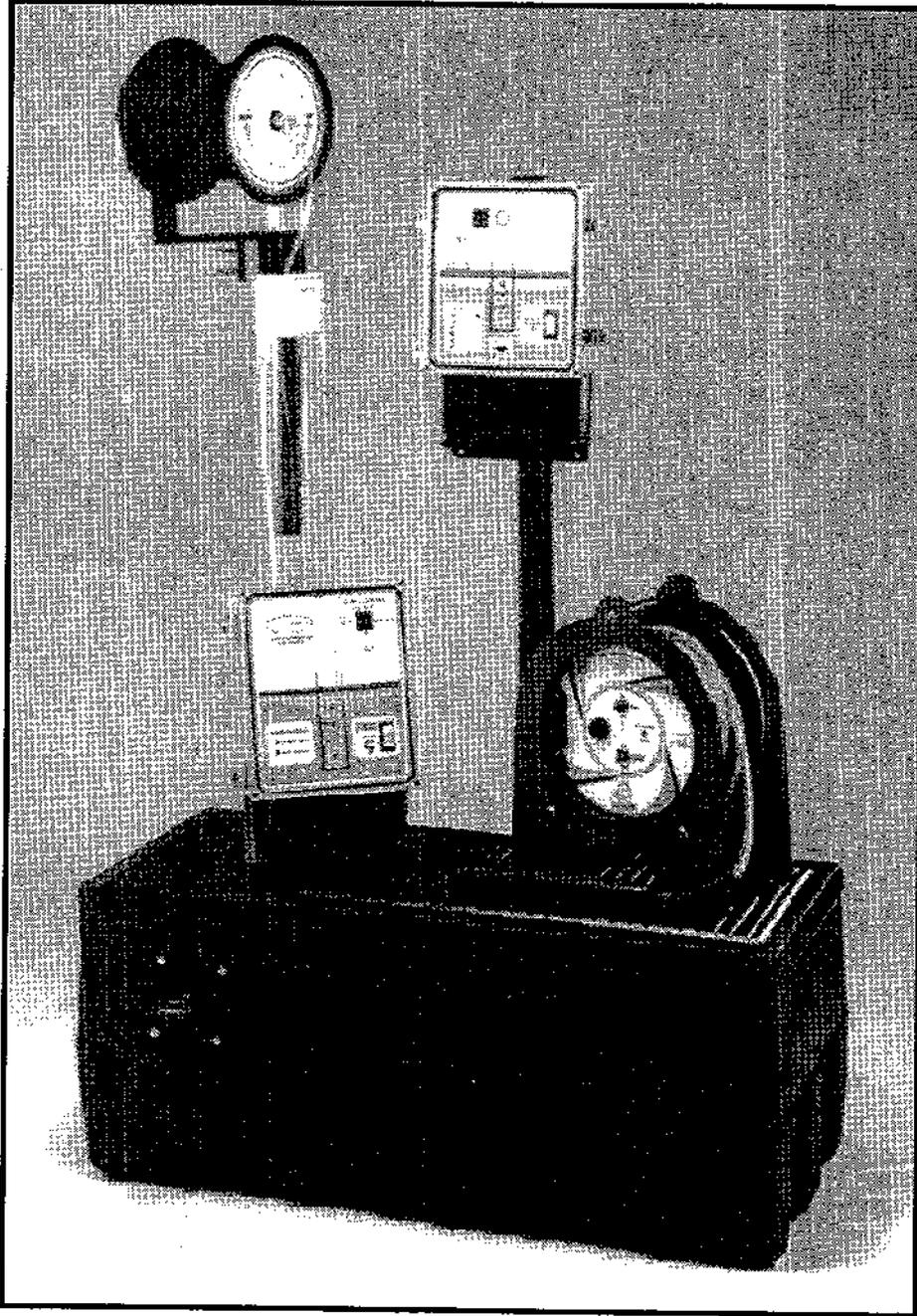
BRIAN NOYES



BILL ROBERTS

Clean Earth Technology Family of Products

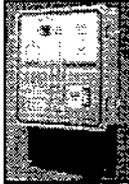
clockwise from top: Auto Seeker with Magnum Spill Buster; Site Buddy;
Immediate Response Box; and Water Terminator



Ask your local Clean Earth Products distributor about demonstrations!

1.0 Installation

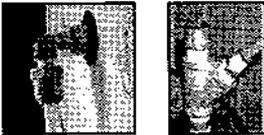
7 Easy Installaton Steps



1. Set up Control Box, Page 10



2. Install Auto Seeker on Well Head, Page 11



3. Install Product Tank Inlet Fitting and Product Tube, Page 12



4. Install Product Tank Override Probe, Page 13



5. Ground System, Pages 14



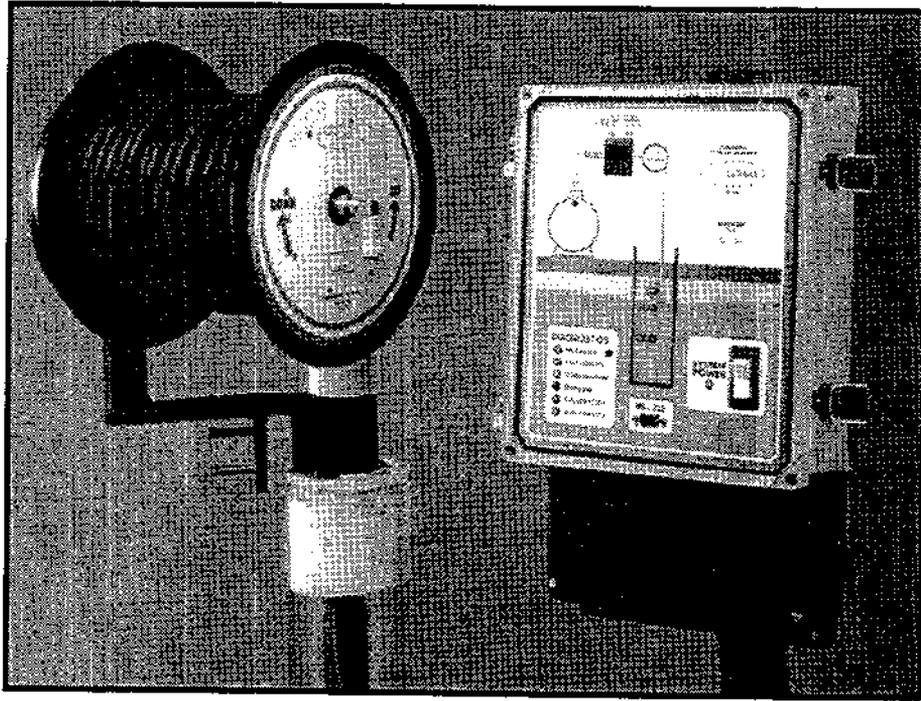
6. Connect System Cables and Power Cables, Pgs 16-24

**Product Pump/Power
Test Procedure**

7. Do Product Pump/Power Test, Page 25

Time: Set-up time for the complete system should take from 30 to 60 minutes.

1.0 STANDARD SYSTEM INSTALATION



Standard Equipment:

NEMA 4 weatherproof main Control Box (NON-Explosion proof)

Auto Seeker System with 25 foot power cable

Product Probe with 50 foot probe product tube

Product Tank Inlet Fitting

100 foot product discharge tube

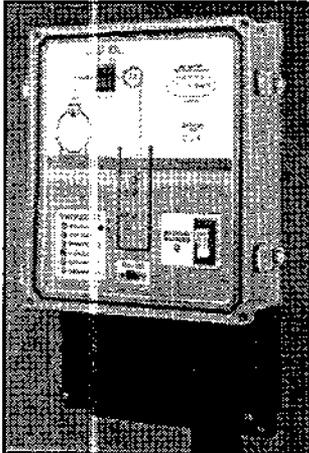
Product Tank Override Probe with bung and 25 foot cable

25 foot Probe power cable extension

Well head bracket and PVC adaptors

Operations Manual

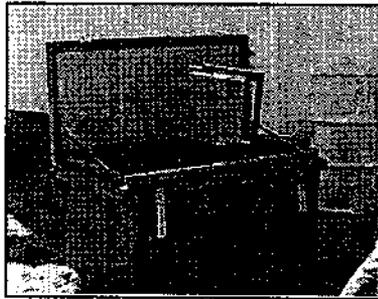
Control Box Installation



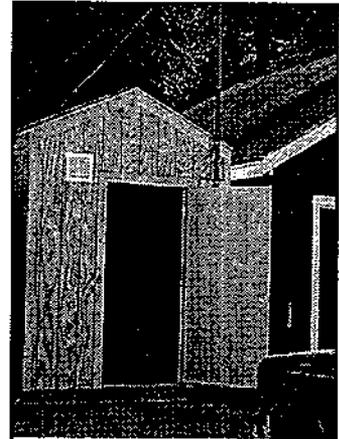
Location

Mount the Control Box in a suitable location (**minimum of 25 feet from any hazardous area**). Typical installations are in sheds, vaults, on the side of a building, or on a utility type pedestal mount. If the control box door is latched and the I/O Extension cover is correctly installed, the unit is weatherproof.

WARNING
Control box is not explosion proof, and should be located more than 25 feet from any hazardous area where explosive vapors may be present.



Control Box in optional Immediate Response Box

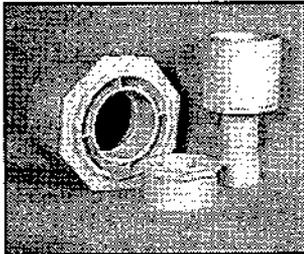


Control Box in I R Box in shed

Site Security

Secure every site. Locked sheds, vaults and fenced enclosures are good examples of a secured site. Clean Earth Technologies does not warranty damage to equipment due to vandalism or negligence.

Install Auto Seeker System on Well Head



A variety of well head adapters for proper installation of the Auto Seeker system is available to custom fit your site.

The Auto Seeker system is an integral part of the Magnum Spill Buster System. It is turned ON and OFF simultaneously with the System Power switch on the Control Panel. The Auto Seeker is controlled by the Product Recovery Cycle (PRC) control switch.

Adaptors

The well head adapter bracket provides a reinforced area to mount the Auto Seeker unit and also locates the Auto Seeker reel and Probe directly over the well for proper operation. PVC fittings are available to accommodate well head diameters from 2" to 8". Use PVC adhesive and install the appropriate fittings to reduce the well head to a 2" diameter. If you did not receive the appropriate fittings for your application, please contact the factory. A clamp is incorporated into the adaptor for steel well heads 3" and larger, if applicable.

"Home" Position

The Auto Seeker system is shipped from the factory with the Probe fully wound on the reel. This is its "home" position. **It is critical that the Probe NOT be unwound from the reel except by use of the motorized reel.**



The Auto Seeker can also clamp onto a steel wellhead.

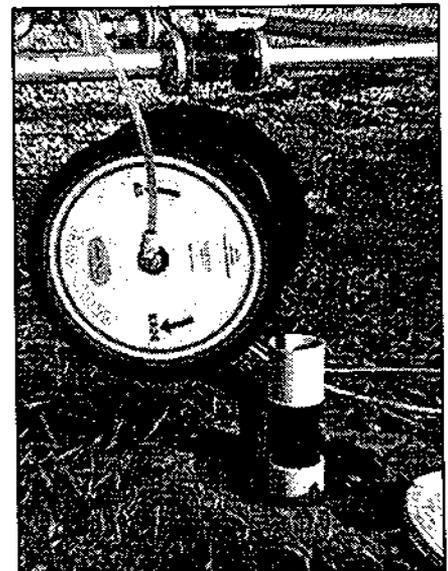
Installation

Position Auto Seeker over well and guide probe into well. Slide Auto Seeker fitting into the 2" PVC well head adaptor. Slide the Auto Seeker adaptor fully onto the well head.

Upon installation, the Product Probe must be fully wound on the reel [see photo at left], and at the limit of its upward movement at the top of the well. The position of the Probe on the reel is synchronized with a cable inside the reel housing. The Magnum Spill Buster system logic assumes that the Auto Seeker is starting from the "home" position, and uses this as a point of reference to determine the approximate position of the probe in the well when the system is operating.

Seeking

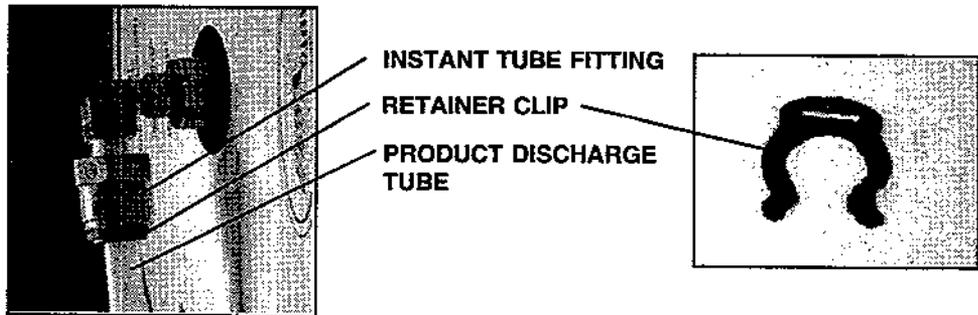
When the system is ON, Auto Seeker will automatically track the water table. [See 2.0 System Operation - Product Terminator System Cycle, page 31.]



Auto Seeker installed in a 2" well at tank farm in South Burlington, VT.

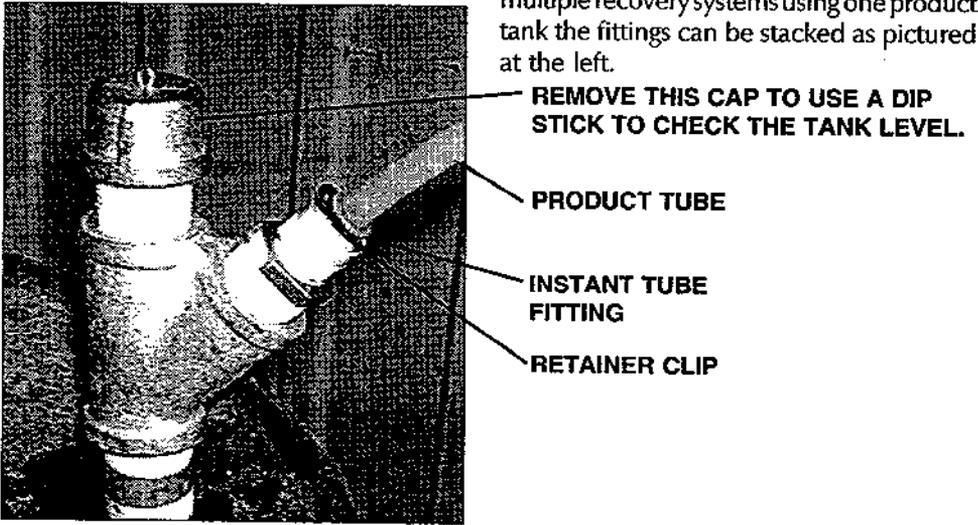
Product Discharge Tubing

Connect the Product Discharge Tubing to the Instant Tube fitting on the front of the Auto Seeker reel unit by pushing the tube firmly into the fitting until it "snaps." Secure with a retainer clip. [To remove tubing, remove retainer clip and push locking sleeve of fitting squarely into the fitting while pulling on tube.] **NOTE: The retainer clip is an integral part of the Instant Tube Fitting and must be in place to maintain the integrity of the fitting. Failure to install the retainer clip could cause a leaking joint.**

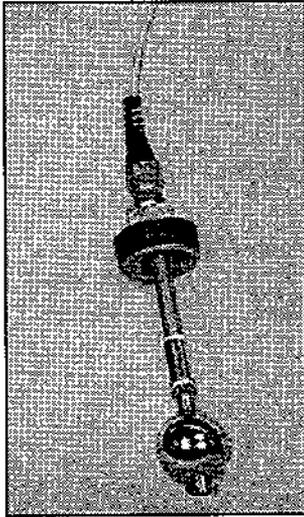


Product Tank Inlet Fitting

The Product Tank Inlet Fitting screws into a standard 3/4" NPT fitting. Connect the product discharge tube coming from the Auto Seeker to the inlet fitting using the Instant Tube fitting supplied on the fitting assembly. First remove the red retainer clip on the fitting. Push the product discharge tube firmly into the fitting until it "snaps" into place. Re-install the retainer clip. **NOTE: The retainer clip MUST be installed to insure against leaks.** The product tank level can be checked manually by unscrewing the cap from the the top of the fitting and inserting a dipstick into the product tank. The cap also contains a small vent. In the case of multiple recovery systems using one product tank the fittings can be stacked as pictured at the left.

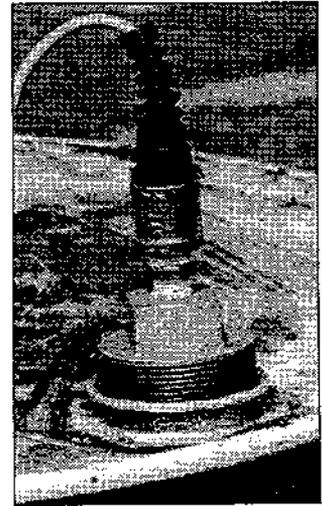


Product Tank Override Probe



NOTE
The Product Tank Override Probe must be connected to the control box prior to system operation. There is an electrical interlock to prevent the product pump from operating without having the Product Tank Override Probe connected. Dip Switch S2-4 will override this interlock when turned ON.

Install the product tank override probe in the product tank and plug the cable into the plug marked INHIBIT in the I/O Extension of the Control Box [See Section 1, Standard System Installation, pg. 30]. The tank fitting screws into a standard 2" bung threaded hole. Other options are available such as a "splitter" to allow use of multiple recovery systems using one product tank override probe. Please call your local distributor with your requirements.

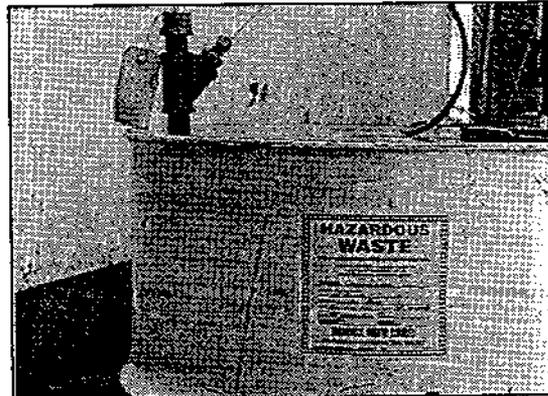


The Product Tank Override Probe fitting screws into a 2" bung.

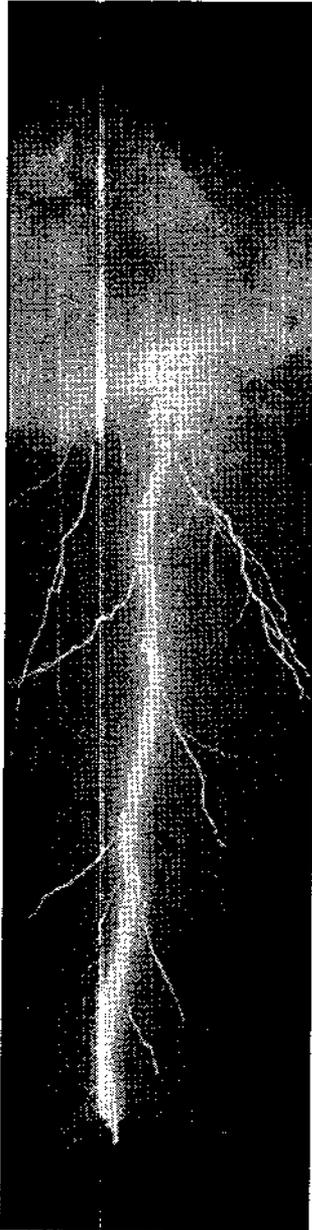
Product Tanks

Product tanks are NOT part of the Magnum Spill Buster system. Suitable receptacles for recovered product should be sized for the specific job and site, and should be monitored at regular intervals, along with the rest of the system.

Product tanks are the responsibility of the contractor. Recovered product should be labeled and disposed of in an appropriate manner.



System Grounding



A proper ground is not an option! Correct grounding is absolutely necessary for the system to work properly and safely!

WARNING!
CORRECT GROUNDING IS ABSOLUTELY NECESSARY FOR THE SYSTEM TO WORK PROPERLY.

The interface sensors operate by the shielding effect of ground water normally present. The control box senses this shielding effect and therefore must also be referenced to ground. Grounding procedures are described in the following sections for five different installations:

1. Standard utility connection.
2. Remote power installations (with a portable generator).
3. Bench testing where the test water is not connected to earth ground.
4. 24 VDC battery operation.
5. 24 volt Solar operation.

NOTE: A missing ground connection is indicated when the HI and LOW LIMIT light stay off when the probe is immersed in water.

Grounding A Utility Connection

When connecting to a utility power source, **the green grounding wire must be connected to the proper power input terminal in the control box.** This connection is marked on the overlay below the power input terminal block. A three-prong plug with a three-lead cable must be used for system power; typically a black "hot" lead, a white "neutral" lead, and a green grounding lead. However, in some cases due to poor wiring, it may be necessary to install a grounding rod, as described below.

System Grounding (cont.)



A grounding rod employing a 5/8" copper rod, 12 gage wire and copper clamp.

Grounding A Portable Generator

A three-lead cable must be run from the generator to the control box; typically, a black "hot" lead, a white "neutral" lead, and a green grounding lead. In addition, the generator must be bonded to an earth ground. Recommendations are as follows: (following page)

- 1) The metal casing of a driven well can be used as a ground, or
- 2) Use a grounding rod constructed as follows:
 - Drive a copper rod approximately 6 feet into undisturbed soil; use a 5/8" Copperweld type rod
 - Connect a No. 12 or larger copper wire from the ground rod tied to the ground lug of generator.
 - Clean up any corrosion on the lug first! Make certain connections are free of corrosion or oxidation.

NOTE: All connections must be clean without any oxidized layers.

Grounding For Lab Or Bench Testing

For temporary operation in a lab or on the bench, where the test water is not connected to earth ground, the water must be grounded. This can be accomplished by submerging at least 6 inches of bare copper wire in the water and attaching the other end to the green grounding terminal in the control box.

Grounding For Battery Operation

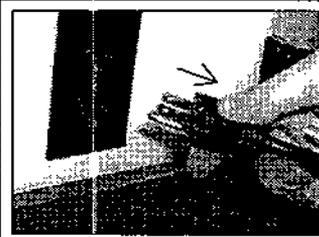
NOTE: It is absolutely necessary to ground every battery operated system! Always call the factory before using battery operation.

Magnum Spill Buster systems operated from a battery must have the **negative** terminal of the battery grounded directly to a copper rod driven into the ground.

Some examples of battery locations requiring a ground rod and cable for operation are:

- a vehicle battery, whether in or out of a vehicle.
- a battery inside an Immediate Response Box (whether on the ground, in a truck, etc.)
- a battery with a solar (photovoltaic) panel

Connect System Cables and Power Cables



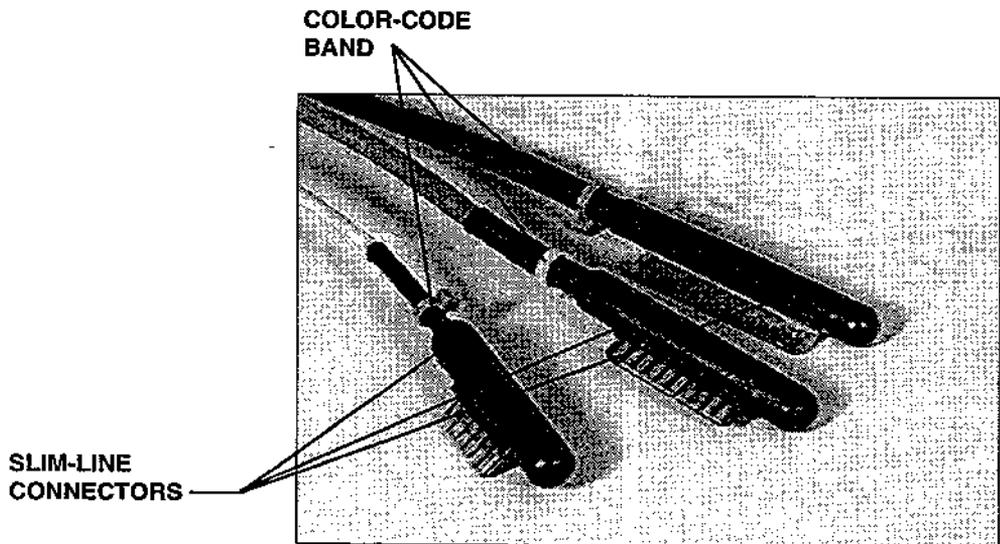
WARNING
All AC Power wiring must be done by a qualified electrician. Disconnect AC power at its source prior to connecting/disconnecting any wires at the terminal block. Electrical shock may result in serious injury or death.

Installing the System Cables

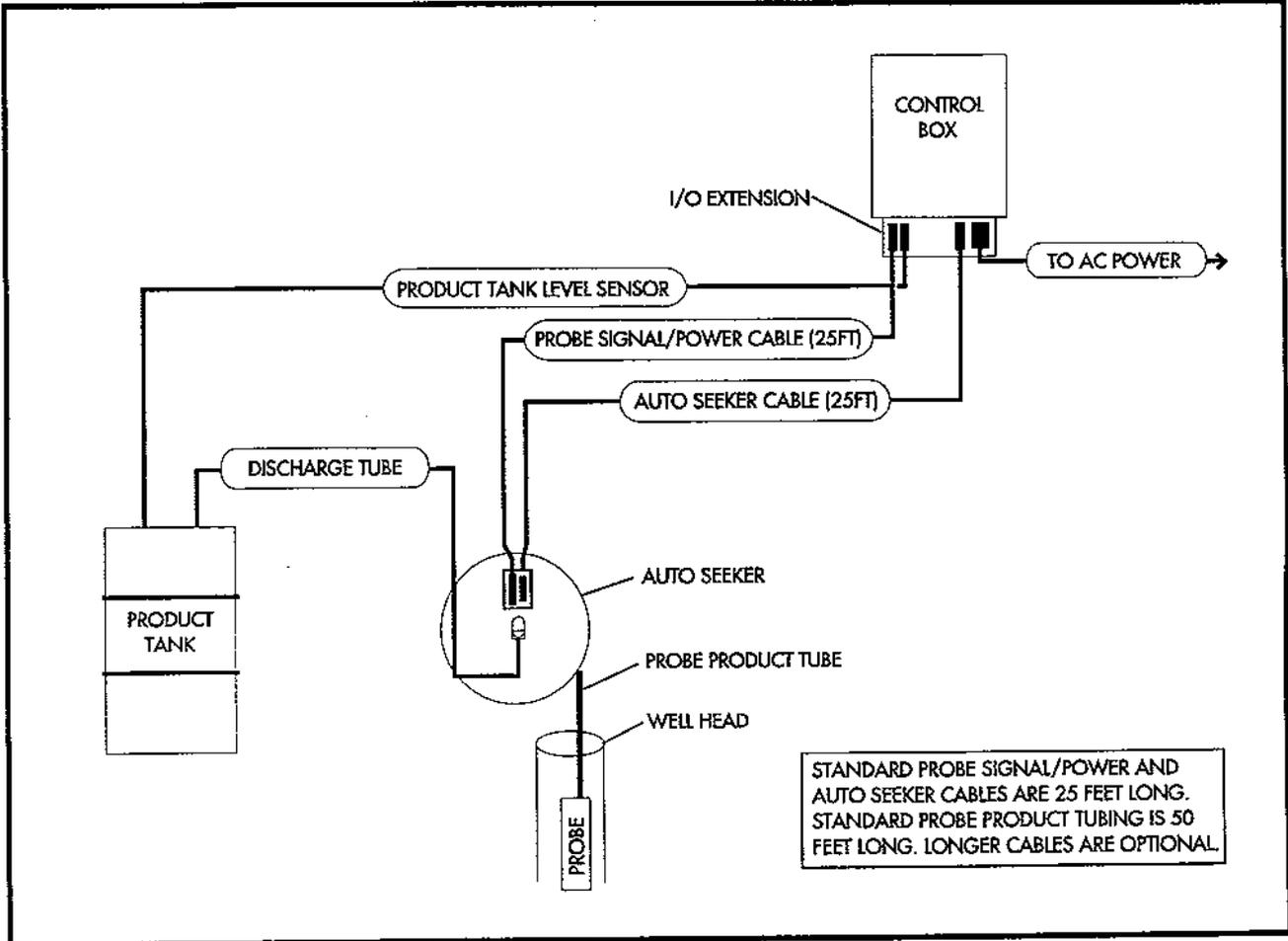
Make sure all cable connectors are free of dirt and debris before making connection. All of the cables are available in custom lengths as well as standard "off the shelf" lengths. [See chart, pg 51.] The product tube coming out of the well must always be left on the reel of the Auto Seeker. If PVC conduit pipe is run between the control box and the well head, the minimum recommended diameter is 4" pipe. Use long "sweep" type elbows in a conduit installation. This will help prevent any damage to system cabling caused by forcing cable connections through a smaller diameter pipe. Excess cable from the installation should be coiled and stored in a protected area.

Cable Connectors

NOTE: Turn off power before removing or connecting cables.



System Wiring Diagram



TYPICAL CABLE CONFIGURATION FOR **STANDARD** PRODUCT TERMINATOR SYSTEM (See chart, pg. 51)

Pulling Cables through Conduit

Typical cable segment

THE WRONG WAY TO PULL THE CABLES THROUGH A PIPE!



NOTE: Do not pull too hard on cables!!



Do not use smaller than 4" PVC.

Do not leave connectors exposed to contamination, especially during cable pulling operations.

Do not allow the pull rope knot to slide up the cable. It will pull on the connector and the terminations inside.

THE RIGHT WAY TO DO IT!



Use 4" diameter pipe or larger. Tape the pull rope in place on the cable to prevent it from sliding up to the connector. Tape the connectors to prevent contamination. Distribute the connectors over a few feet; don't bunch them in one place.

Cable Connections at the Control Box

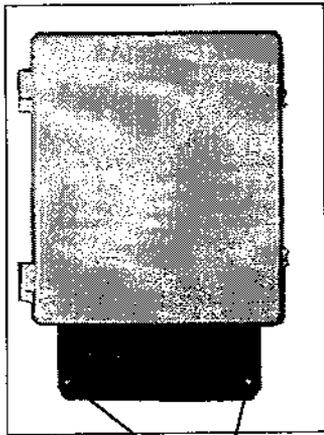
WARNING

Disconnect AC power at its source prior to connecting/disconnecting any wires at the terminal block. Electrical shock may result in serious injury or death. All AC Power wiring must be done by a qualified electrician.



I/O Extension

All cables enter the Control Box via the I/O Extension (or I/O Pouch), which makes up the bottom portion of the control box. Access into the I/O Extension is gained by loosening the two screws on the front of the I/O Pouch and removing the lid. RS-485 cable, slim-line connector cables and power cable for the system feed through the bottom of the I.O. Extension.

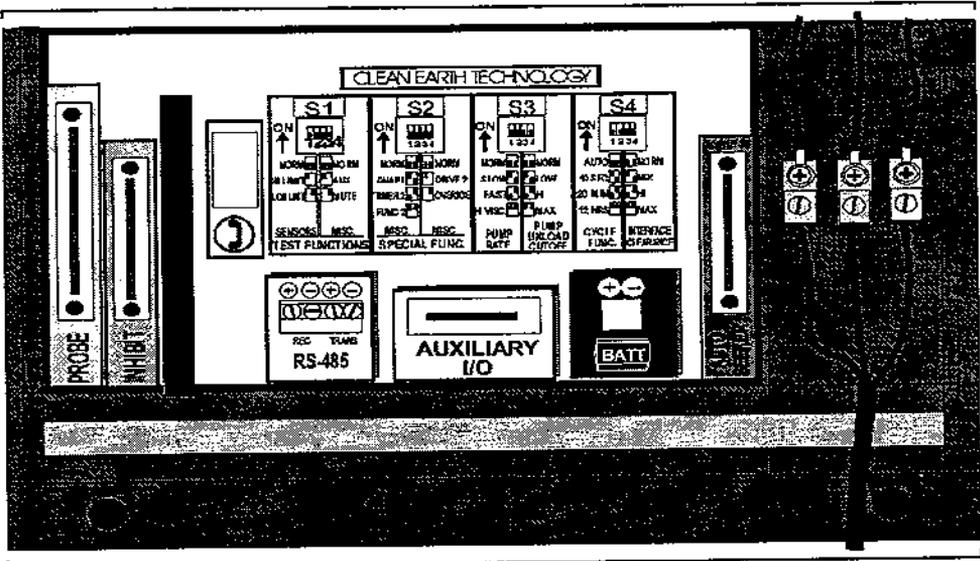


I/O
EXTENSION
ACCESS
SCREWS

Connect Slim-line™ connectors to receptacles, as labeled. Slim-line™ connector receptacles are color- and size-coded to help facilitate proper placement of plugs. Cables have corresponding color bands.

The power cable connects to the terminal block inside the I.O. Extension. **NOTE: The System must be properly grounded for correct operation. AC terminal block shown without protective cover and clamp for clarity.**

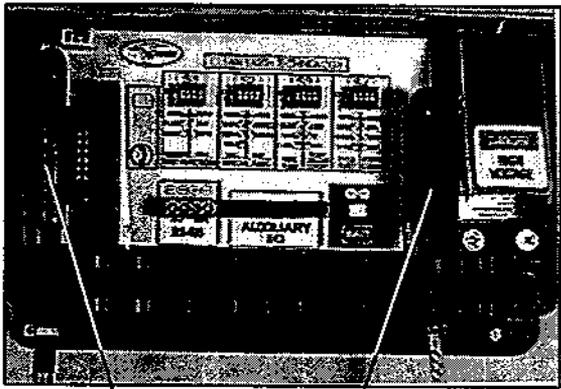
I/O Board and Terminal
Block inside I/O extension



Connecting Probe Cable and Auto Seeker Cable

The Probe cable and the Auto Seeker cable have male Slim-line™ connectors on both ends, and are size-coded and color-coded to aid in installation. The Probe and Auto Seeker extension cables will plug into the connector box on the Auto Seeker, and to the labeled receptacle on the I/O Board inside the I/O Extension.

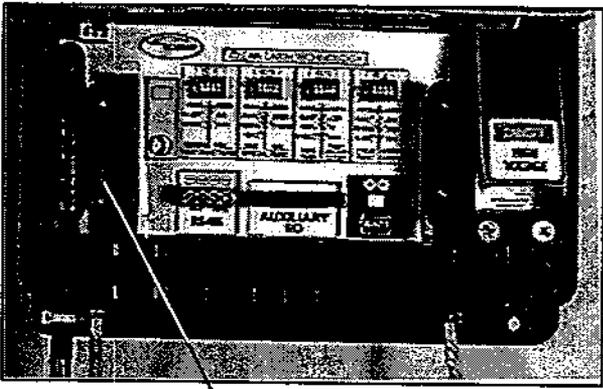
1



AUTO SEEKER
CONNECTOR (GREEN BAND)
PROBE CONNECTOR
(YELLOW BAND)

Connecting Override Probe Cable

2



OVERRIDE PROBE CONNECTOR
(ORANGE BAND)

Next, plug in the Override Probe connector as shown. NOTE: The Magnum Spill Buster system will not function unless the Override Probe is connected or the Override dip switch (S2-4) is ON. [See Dip Switches, pgs. 36-37.]

Control Box Terminal Block

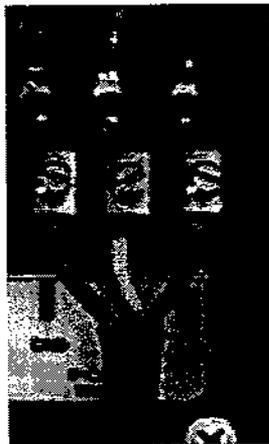


WARNING
All AC Power wiring must be done by a qualified electrician. Disconnect AC power at its source prior to opening the control panel or accessing the terminal block or connector panel. Electrical shock may result in serious injury or death.

Hardwiring AC Power

The Product Terminator is designed to run either 115 or 230 VAC Power without any modifications to the internal wiring.

Attach hardwiring to the Control Box as shown on the Power Cable overlay. The incoming power cable must be able to handle a minimum of 10 Amps.



Terminal Block shown with the protective cover removed.



115/230 Volt Terminal Block with the protective cover attached.

Control Box Terminal Block (cont.)

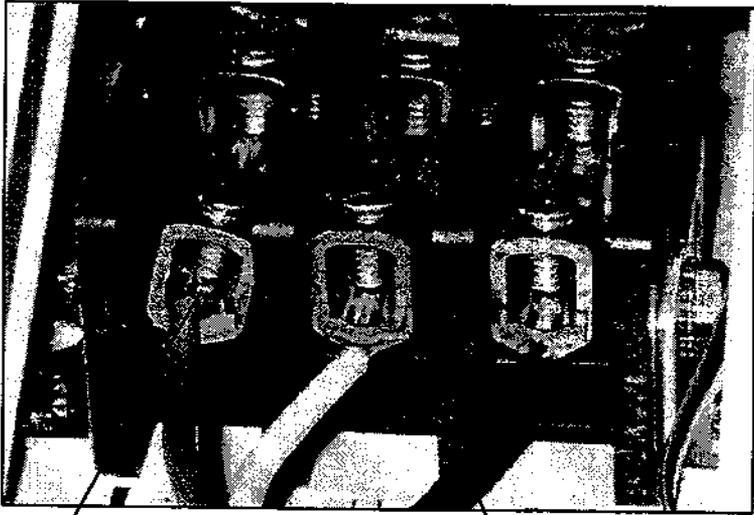
Correct Terminal Block Connections

PLACE WIRE IN THIS HOLE (UNDER PLATE)

CORRECT INSTALLATION



This view looking at the side of the terminal block shows the correct location to insert the AC supply wire.



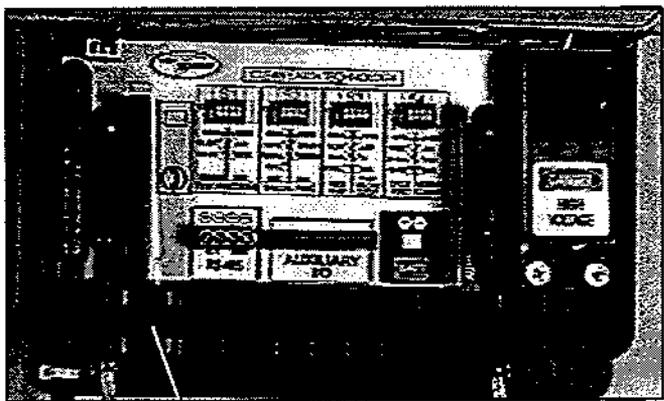
Installing the AC supply wire in the terminal block. The wire must be installed correctly as shown.

DO NOT PLACE WIRE DIRECTLY UNDER SCREW!

CORRECT INSTALLATION (UNDER PLATE)

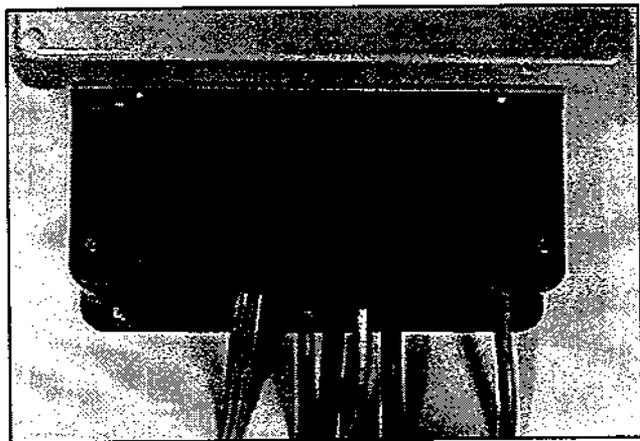
NOTE: Always replace the protective cover on the terminal block after installation or prior to providing power to the system.

Sealed I/O Extension with Cables Installed



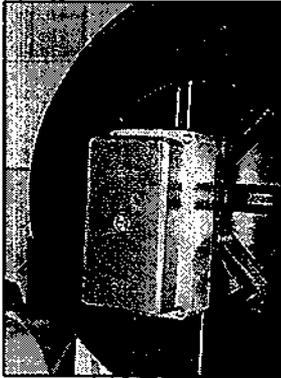
I/O EXTENSION RUBBER GASKET SEAL

All cables must exit the I/O Extension through the appropriate sized slot in the bottom of the pouch in order to create a dust- and weather-proof seal. The perimeter of the lid and body of the I/O Extension is lined with a foam rubber gasket that serves as weather stripping. The weather stripping will cause the lid to seal automatically against the cables when the lid is closed and fastened with the screws. The weather stripping will seal holes in the I/O Box, whether they contain cables or not.

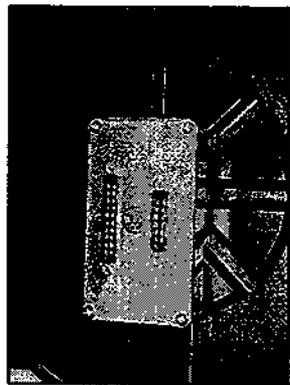


I/O Extension must be closed and sealed for safety and weatherization!

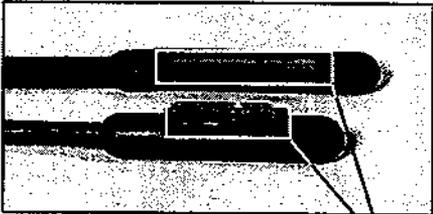
Connecting Auto Seeker Cabling



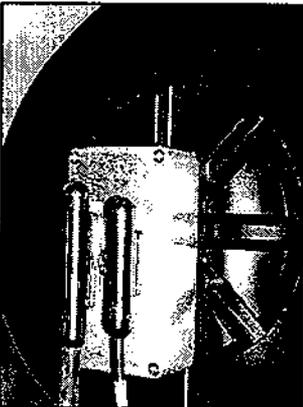
1 Remove safety cover from Slim-line™ connector box.



2 Use Probe and Auto Seeker Slim-line™ connectors with rubber gaskets affixed.



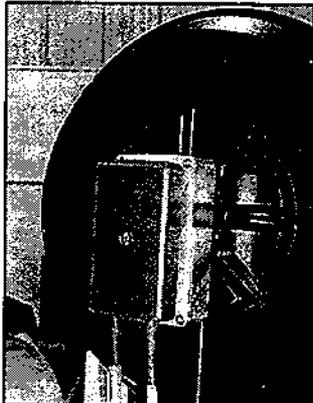
RUBBER GASKETS
(OUTLINED IN WHITE)



3 Plug in Slim-line™ connectors to size-coded receptacles.

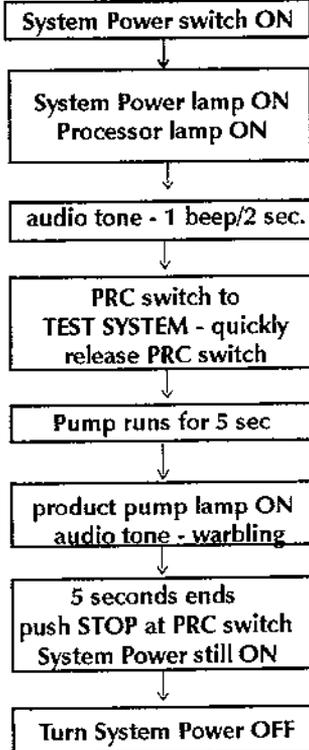
4

Replace Slim-line™ safety cover onto connector box and tighten screw down snugly.



Product Pump/Power Test

Product Pump/Power Test Procedure

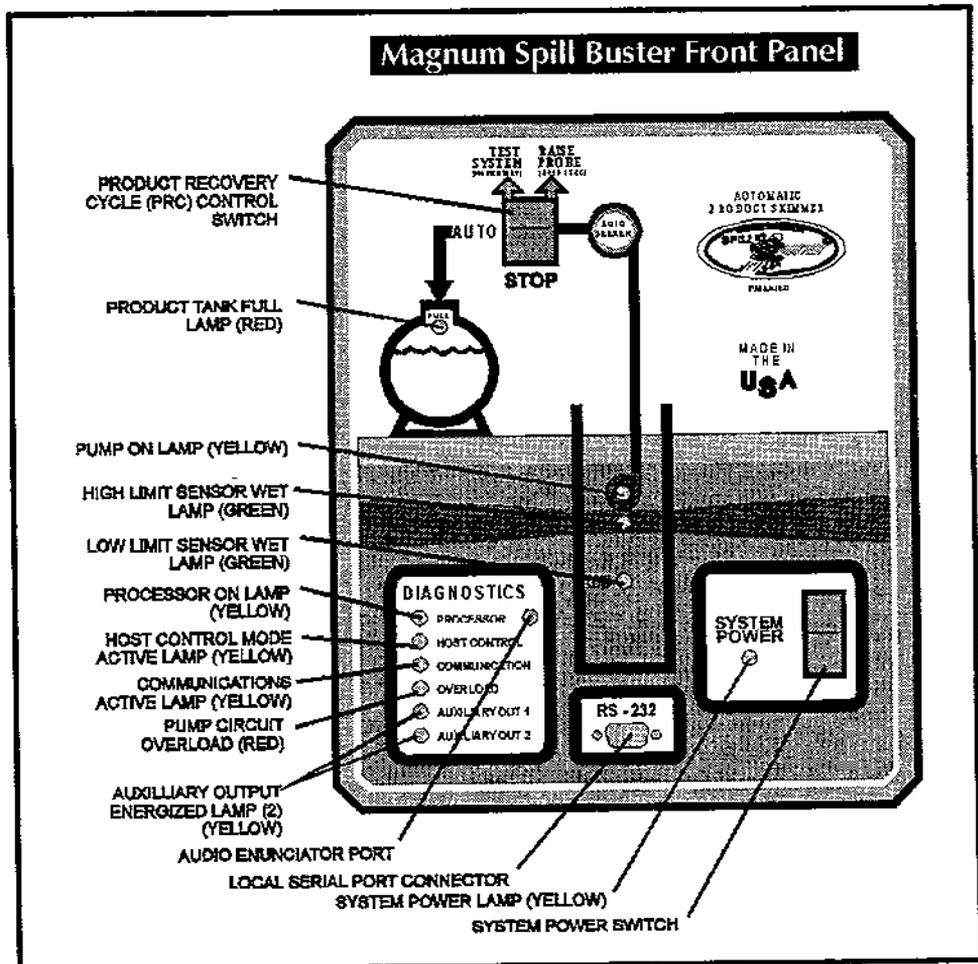


When all cabling and system components are connected, the system ground is installed, and power is supplied to the system, it is preferable to test the product pump for operation prior to putting the probe in the well. It is convenient to have two people for this operation; one near the Auto Seeker system to listen to the pump in the Probe, and one to operate the Control Box.

Turn the System Power switch ON. The System Power lamp, and Processor lamp, on the control panel will turn ON, and the audio tone in the control box will begin to beep once every 2 seconds.

Press and release quickly the TEST SYSTEM side of the Product Recovery Cycle (PRC) control switch. The product pump (in the probe) will operate for approximately 5 seconds and then stop. The yellow product pump lamp on the control panel will light and the audio tone in the control box will produce a warbling tone while the pump is ON. Simultaneously, along with the audible motor sound, starting the pump usually causes the entire probe and cable to visibly twist and jerk as a result of the pump torque reaction.

Immediately after the test, push STOP at the PRC switch. Otherwise, Auto Seeker will begin to cycle and unwind Probe cabling off the reel. The probe is now ready to install into the well.

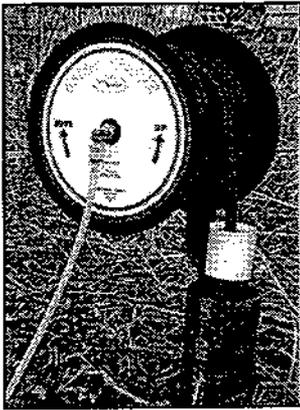


1.0 STANDARD SYSTEM INSTALATION

NOTES

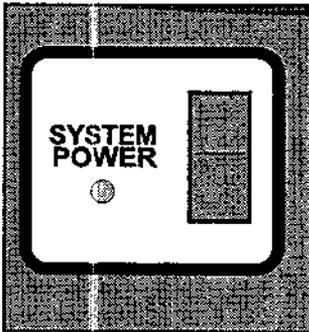
2.0 Standard System Operation and Test Operations

Easy Operation Steps



1. Initial Power-up, Page(s) 28
2. Front Panel, Page(s) 29
3. Magnum System Cycle, Pages 30
4. System Cycle and Schematic, Page(s) 31
5. Indicator Lamps & Audible Indicators, Page 32
6. Product Recovery Cycle Control Switch, Page(s) 33
7. System Cycle Operation w/o Auto Seeker, Page 34

Initial Power Up

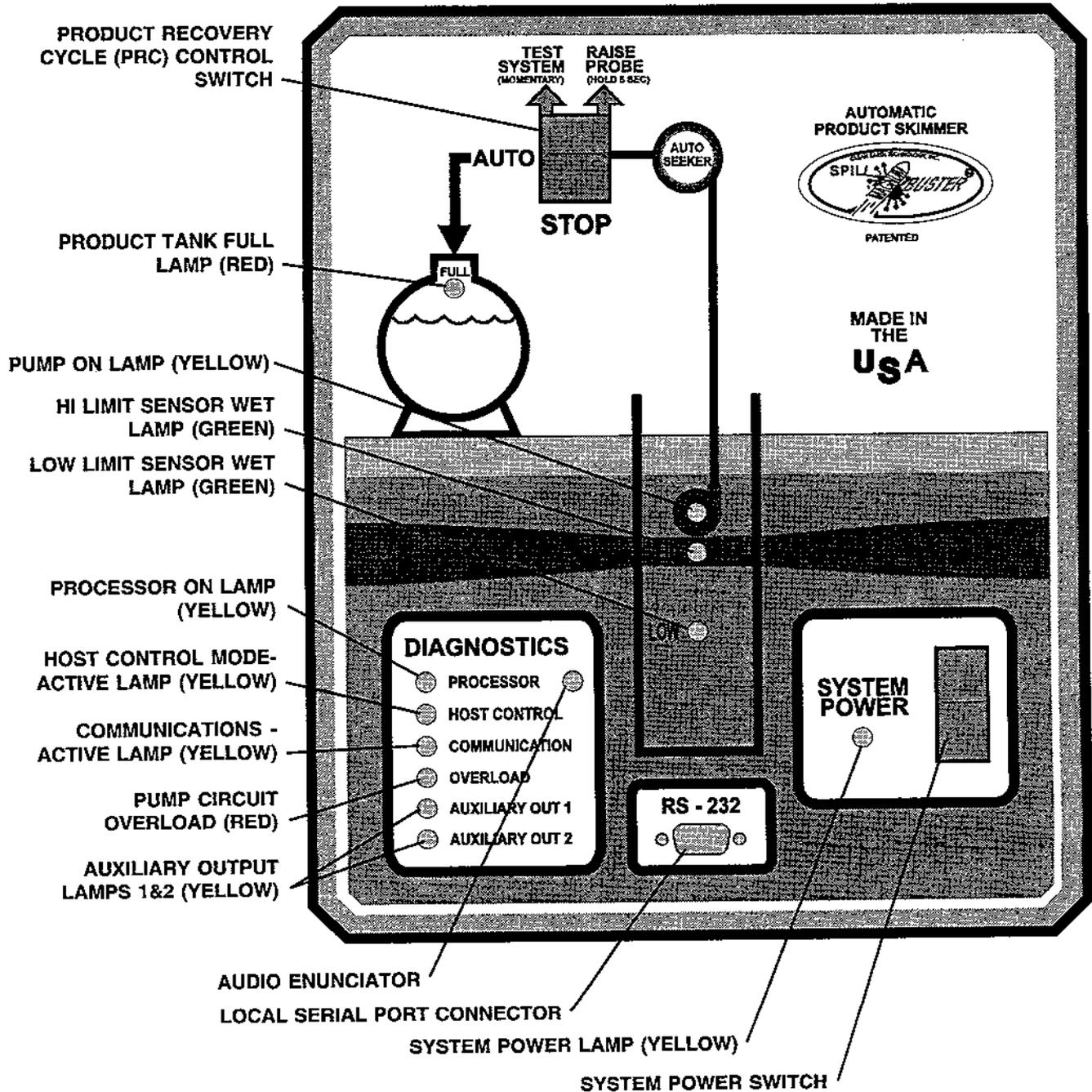


SYSTEM POWER SWITCH

The System Power Switch governs **all** power to the system when it is connected to an AC power source, including the Control Box, Probe, and Auto Seeker. A yellow lamp will light indicating that system power is ON. **NOTE: When the system is connected to a battery, the function of the switch is overridden.** After the system is turned ON and the PRC switch is in the AUTO position, the system will begin its cycle after a 5 second delay.

NOTE: Audio tones operate for approx. 5 minutes after the system power is turned ON. See charts for Indicator Lamps and Audio Indicators on page 32. The tones can be turned OFF altogether by altering DIP Switch S1-4 in the I/O Extension. [See Dip Switch Settings, page 36-37.]

Magnum Spill Buster Front Panel



Magnum Spill Buster System Cycle

Seeking the Interface

There is a 5 second delay between the time that the System Power switch is turned ON and the moment the cycle begins. The system will begin to automatically seek the water table by lowering the Probe. The Audio Enunciator in the Control Box will beep every 2 seconds. The Probe will pass through the layer of product and seek the level of water in the well. When the Low Limit sensor contacts water, the Low Limit lamp will light, and the system will beep 2 times per second. When the HI Limit sensor contacts water, the HI Limit lamp will also light, and the Audio Enunciator will emit a continuous tone. When the HI limit sensor gets wet, Auto Seeker will raise the Probe until the HI limit band is dry, and then an additional amount, as determined by "Interface Clearance" dip switch S4-3 and S4-4. [See DIP Switch Settings, pg. 36-37.] The HI limit lamp will go out when the sensor is dry.

Pump Cycle

The pump will begin to pump product, and the yellow Pump lamp will light, and the system will emit a warbling tone. The pump will continue to pump until it pumps air (or unloads).

Cycle Delay Time

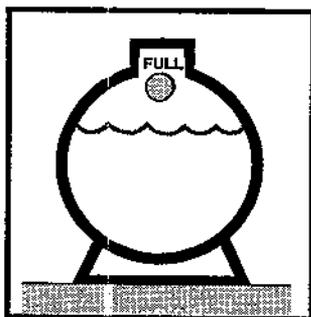
The system cycle enters a time delay to allow more product to flow into, or recharge, the well. The Magnum Spill Buster system will automatically adjust the delay time interval from 10 seconds up to 12 hours based on the length of the pump cycle, according to the standard factory configuration of the dip switches. The system cycle delay time is a function of the recharge rate. [See Dip Switch Settings, pg. 36-37.]

Pump Override

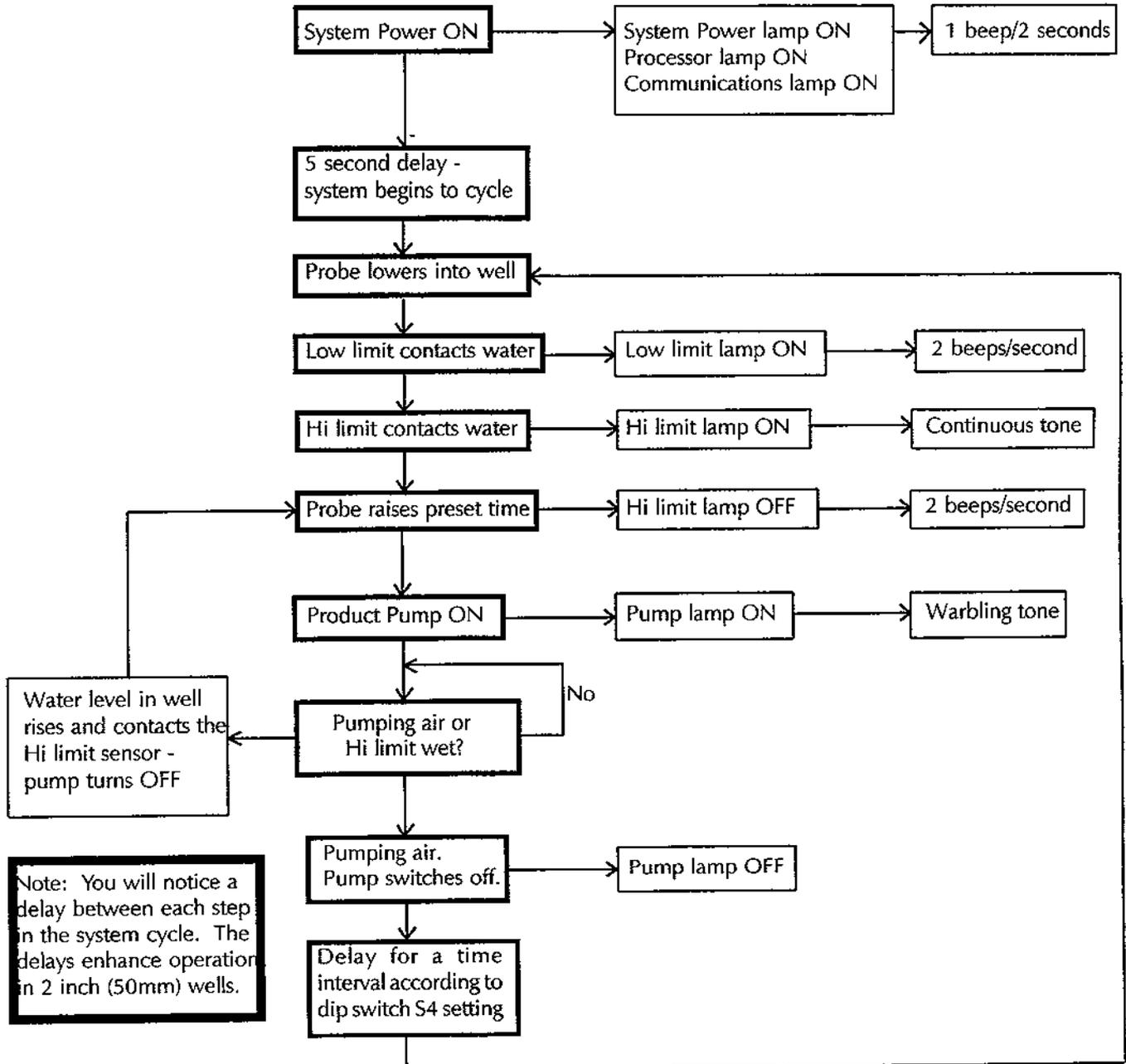
The Magnum Spill Buster system is configured with a Product Tank Override Probe. This Override Probe will inhibit pump operation when the product tank is full, or when the Product Tank Override Probe is missing. When one of these two conditions exists, the "full" lamp will light in the product tank on the Control Panel. A Dip Switch is available to override this function when a Product Tank Override Probe is not used. [See Dip Switches Settings, pg. 36-37].

NOTE: The Product Tank lamp should not light when the system is turned on, unless the Product Tank is full, or the product tank override probe is not connected.

Many system parameters including cycle time, pump rate, and probe interface clearance, may be altered by changing dip switches. See DIP Switch Settings, pg 36-37.



System Cycle Schematic with Auto Seeker



2.0 STANDARD SYSTEM OPERATION AND TEST OPERATIONS

Indicator Lamps		
Label	Color	Indication
System Power	yellow	ON when unit has been switched ON
Overload	red	ON when a pump overload condition has occurred
Full	red	ON when product tank is full (float switch closed) or when Product Tank Override Probe is missing.
Pump ON	yellow	ON when product pump is energized
HI	green	ON when the high limit probe sensor is contacting water
LO	green	ON when the low limit probe sensor is contacting water
Processor	yellow	ON indicates normal control function. Blinks when (a) pump circuit overloaded (e.g. failed pump) (b) pump circuit is open, or (c) Override Probe is disconnected
Communications	yellow	ON when RS-485 network communications are active*
Host Control	yellow	ON when RS-485 network communications are active*
Aux 1	yellow	Used in conjunction with custom features**
Aux 2	yellow	Used in conjunction with custom features**

* Refer to page 41-44 if you have the RS-485 network communications option

** Auxillary output channels are controlled by the RS-485 software.

Audible Indicators		
Tone Sequence	Indication	Priority
Continuous tone	HI limit sensor is contacting water	highest
Warbling tone	Product pump is operating	...
2 beeps/second	LO limit sensor is contacting water	...
1 beep every 2 seconds	System Power is ON	lowest

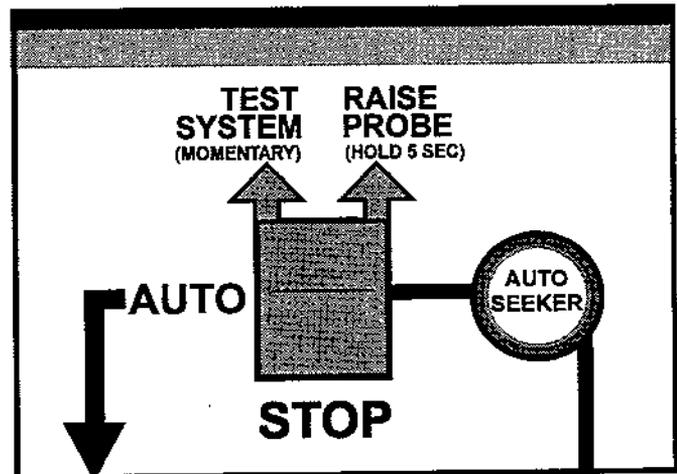
* Tone indications of a higher priority override those of a lower priority.

Product Recovery Cycle (PRC) Control Switch

The PRC is a 3-way rocker switch, and is located on the upper left-hand corner of the Control Panel.

Auto

At system power up, the PRC switch is in AUTO (its rest position), which allows the system to cycle automatically; that is, the Auto Seeker will lower the probe into the well after 5 seconds, etc. The system will start to lengthen its cycle time depending on the amount of product being pumped; i.e. a shorter cycle time for faster recharge rate. When depressed, this switch performs a test cycle, raises the probe, or stops the system from operating. **NOTE: System Power remains ON.**



NOTE: System Power remains ON.

Test System

A momentary push on the top of the PRC Control switch causes the pump to run for 5 seconds; then the system will initiate a new cycle (i.e. the probe will seek the product/water interface and start to pump the product). This Test System cycle is typically used during system installation while holding onto the probe to determine if the pump is functioning properly, prior to lowering the probe into the well. After testing, press STOP to prevent the system from beginning to cycle or AUTO to leave system operating.

Raise Probe

If the top of the PRC Control switch is depressed and held for more than 5 seconds, the Auto Seeker will raise the probe to its upper limit for ease of Auto Seeker/probe removal. The system will not start normal operations again until switch is moved to STOP and then to AUTO.

Stop

Depressing the Stop side of the PRC switch will stop the product pump or the Auto Seeker mid-cycle. **NOTE: System Power will remain ON.** Returning the switch to the AUTO position will initiate a new cycle after 5 seconds. Pressing STOP will also reset the Automatic Cycle Timer to 10 seconds if dip switches S4-1 and S4-2 are set for AUTO (both OFF). Refer to Section 3, Dip Switches.

System Cycle Operation (no Auto Seeker)

Auto Seeker system is not used in the Magnum Spill Buster system in three modes: in a water depression mode, where the Magnum Spill Buster is set up in tandem with a Water Terminator; in a DNAPLs or sinkers mode, where the probe intake will be positioned as close to the bottom of the well as practicable; and, when there is no water in the well. [See **OPTIONS: Product Terminator used for DNAPLs**, page 38-40].

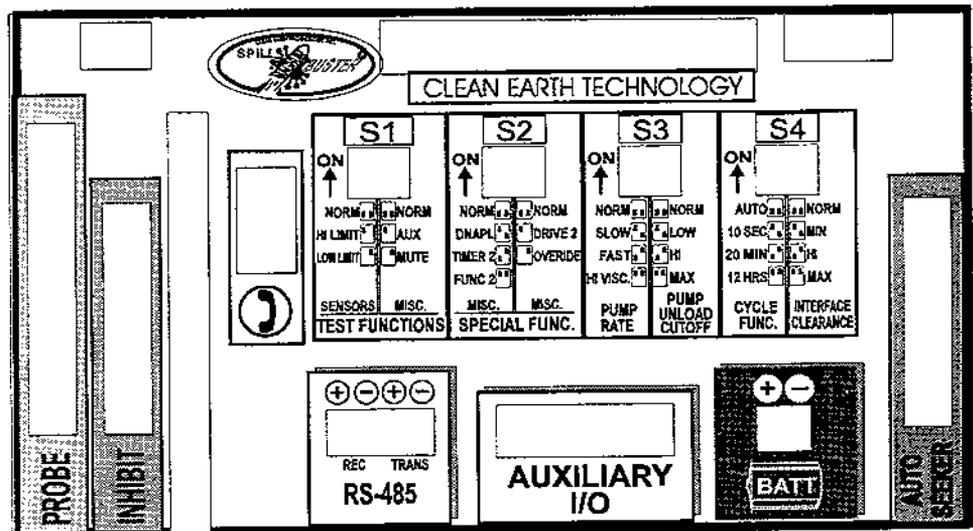
The Magnum Spill Buster system will automatically recognize that no Auto Seeker is plugged in. The pump will pump product until there is no more product to pump and it starts pumping air. The pump will cycle periodically (according to DIP Switch S4-1 and S4-2 settings, pgs. 36-37) if the Hi sensor is not contacting water. The pump will also cycle whenever the Hi sensor goes through a transition from wet to dry.

When a Water Depression Interface is connected to the Magnum Spill Buster, the Auto Seeker is not moved up or down but rather the probe is fixed at the desired water level. The depression pump will move the water/product interface past the product pump intake causing the product pump to cycle.

3.0 Standard System Advanced Operations

DIP Switches, pgs. 36-37

DNAPLs (Sinkers) Operation, pgs. 38-40



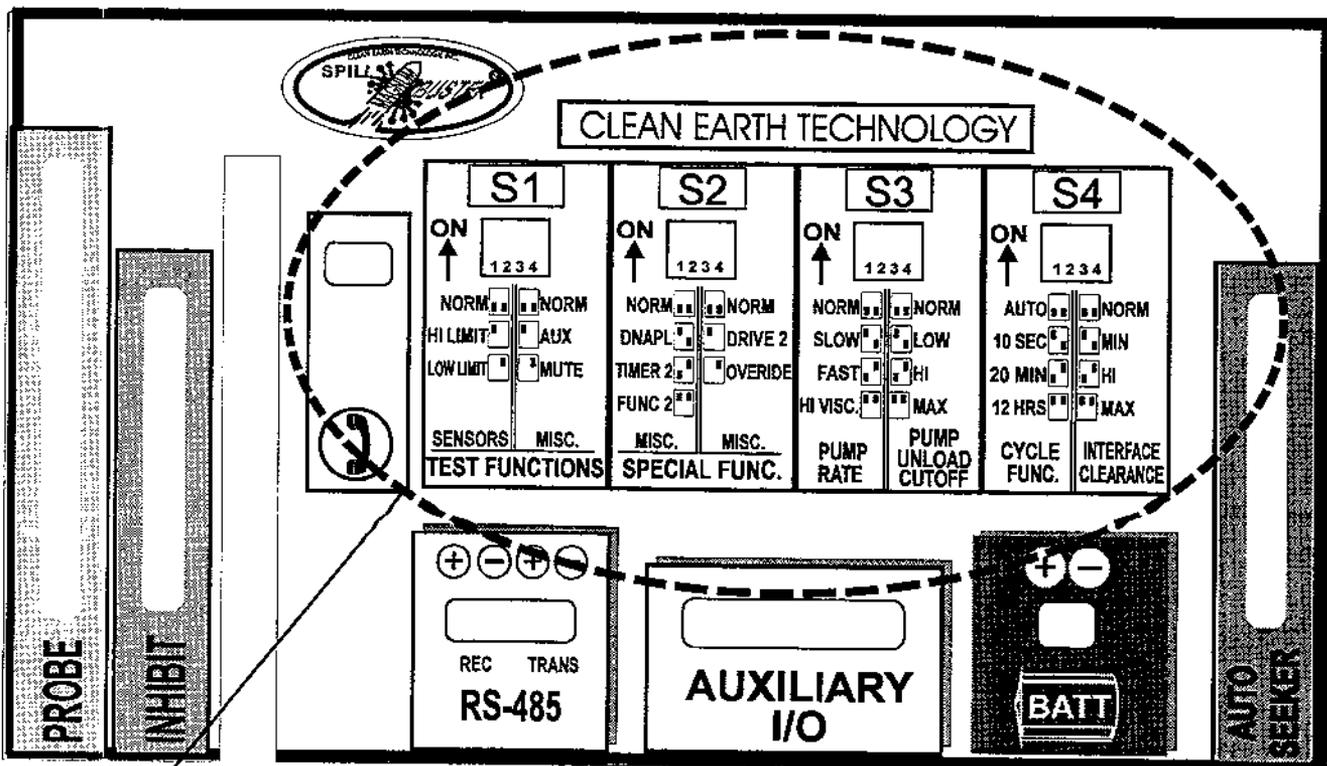
3.0 STANDARD SYSTEM ADVANCED OPERATIONS

DIP Switches

The DIP Switches are located on the I/O Board in the I/O Extension, and are labeled as per function. To access the I/O board, unscrew the two screws on the bottom corners of the I/O Extension and remove the cover.

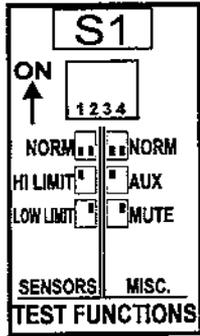
DIP Switches S3 and S4 are used to adjust and customize the Magnum Spill Buster system to individual sites and applications. Magnum Spill Buster comes from the factory with DIP Switches preset to a standard configuration which automatically adjusts the cycle delay time interval from 10 seconds up to 12 hours, according to the recharge rate. This configuration will work for most sites. In some cases, changing DIP Switches from the standard configuration may increase the rate of product recovery or may increase pump life, depending upon the specific site conditions.

DIP Switches S1-1, S1-2, S1-3, S2-2, & S2-3 are used for factory testing and troubleshooting. These DIP Switches should not be used unless directly requested by Clean Earth Technology personnel. DIP Switch Set Nos. 2 thru 4 control user functions of the system, and affect probe actions, including probe height above interface, pump speed, pump cutoff. The DIP Switch functions are discussed below. For further help and instruction with DIP Switches and the improvements they may make to your site, please call the factory.

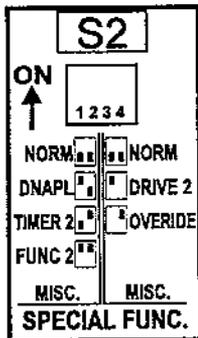


The DIP Switches are located on the I/O board in the I/O Extension, and are labeled according to function. To access the board, unscrew the screws on the I/O cover and remove cover. The figure above shows the standard factory configuration of DIP switches.

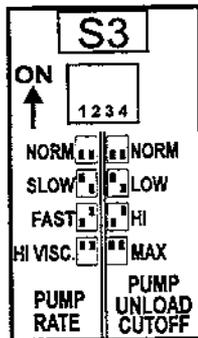
DIP Switch Settings



S1 - The group of switches labeled **S1** and **TEST FUNCTIONS** are all for CET test functions, with the exception of **S1-4**. This switch silences all audible indicators in the Magnum Spill Buster system. Normal setting is all four switches OFF.

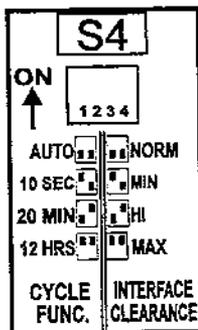


S2 - The group of switches labeled **S2** and **SPECIAL FUNCTIONS** contains more CET test functions, with the exception of **S2-1**, which enables the Magnum Spill Buster (Magnum) system to pump DNAPLs, and of **S2-4**, which allows the Magnum to operate without the product tank override probe connected. Normal setting is all four switches OFF.



S3-1 & S3-2 - The group of switches labeled **S3** and **PUMP RATE** (S3-1 and S3-2) controls the pump motor speed. Slow is the lowest speed, and may be used when the product layer is thin. A thin product layer may create foam when pumped. Normal is a middle speed, and fast is for maximum speed. Fast may be used when dealing with medium viscosity product, or greater back pressure in the product tube, or greater well depth. High viscosity is reserved for special applications and requires a special pump.

S3-3 & S3-4 - The group of switches labeled **S3** and **PUMP UNLOAD CUTOFF** selects pump current cutoff threshold. The system should be started at normal. If the Magnum pumps air and doesn't cut off, or if the pump cuts off prematurely (i.e., product remains in the well that should be pumped out), change switches **S3-3** and **S3-4** as follows: if cutoff is premature, decrease the setting; if the pump does not cut off while pumping air, increase the setting. Allow the PT to run through 2 or 3 cycles between changes in cutoff switch settings. Any change in **PUMP RATE** settings (S3-1 and S3-2) will affect **PUMP UNLOAD CUTOFF**. **Be sure the pump cuts off within 15 seconds when pumping air. Continued dry pumping will damage pump. NOTE: MAX setting is intended for set up/demo use ONLY, and in most cases will not result in a desirable recovery rate.**



S4-1 & S4-2 - The group of switches labeled **S4** and **CYCLE FUNCTIONS** determines the time delay interval between pump cycles. Automatic is the normal setting, directing the Magnum control to vary the delay time interval according to the amount of product pumped. The other three settings are fixed time intervals: 10 sec., 20 min., & 12 hrs. **NOTES: The fixed time intervals will override the automatic delay time adjustment feature of the Magnum system and it will continuously cycle at the time delays specified. The 10 second setting is for test, and may be useful when setting up the Magnum system. Do not use 10 second setting for continuous use or pump damage may result.**

S4-3 & S4-4 - the group of switches labeled **S4** and **INTERFACE CLEARANCE** determines how high the pump intake will be raised above the product/water interface. These settings are useful to avoid biological growth that accumulates at the product/water interface in some wells. The MIN setting is recommended in a well with no biological growth and will result in the maximum recovery of product. NORMAL will give a greater distance from the interface, with MAX being the highest (approx. 2").

DNAPLs Operation

**QUESTIONS?
PLEASE CALL THE
FACTORY FOR
ANSWERS!**

CLEAN EARTH
TECHNOLOGY
PH: (802) 425-3710
FAX: (802) 425-2896

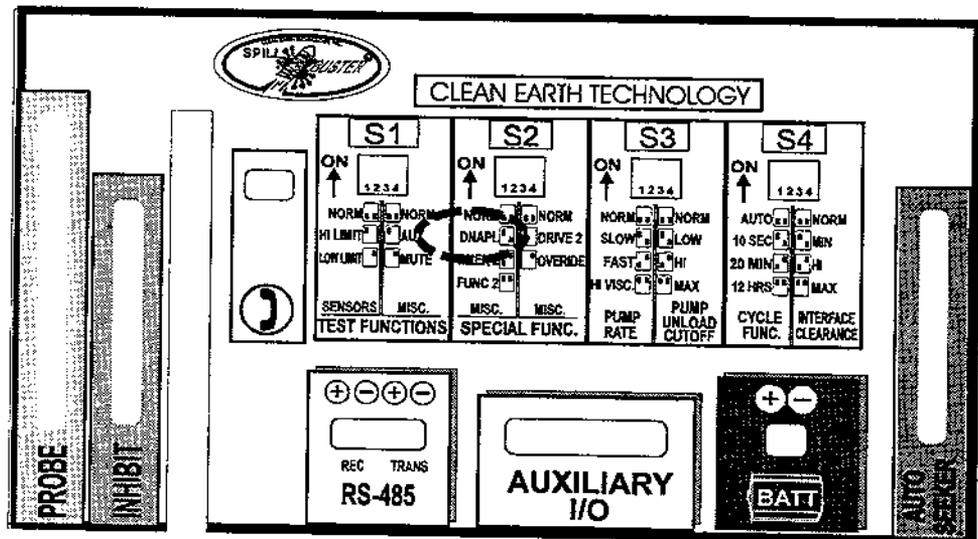
General Description

DNAPLs (or "Sinkers") refer to those products that are heavier than water and therefore are found below the water layer rather than above, as in the case of floating product. The Magnum Spill Buster may be adjusted to automatically pump low viscosity sinkers from a 2" well from depths of up to 100 feet by following the procedure below.

DNAPLs Procedure

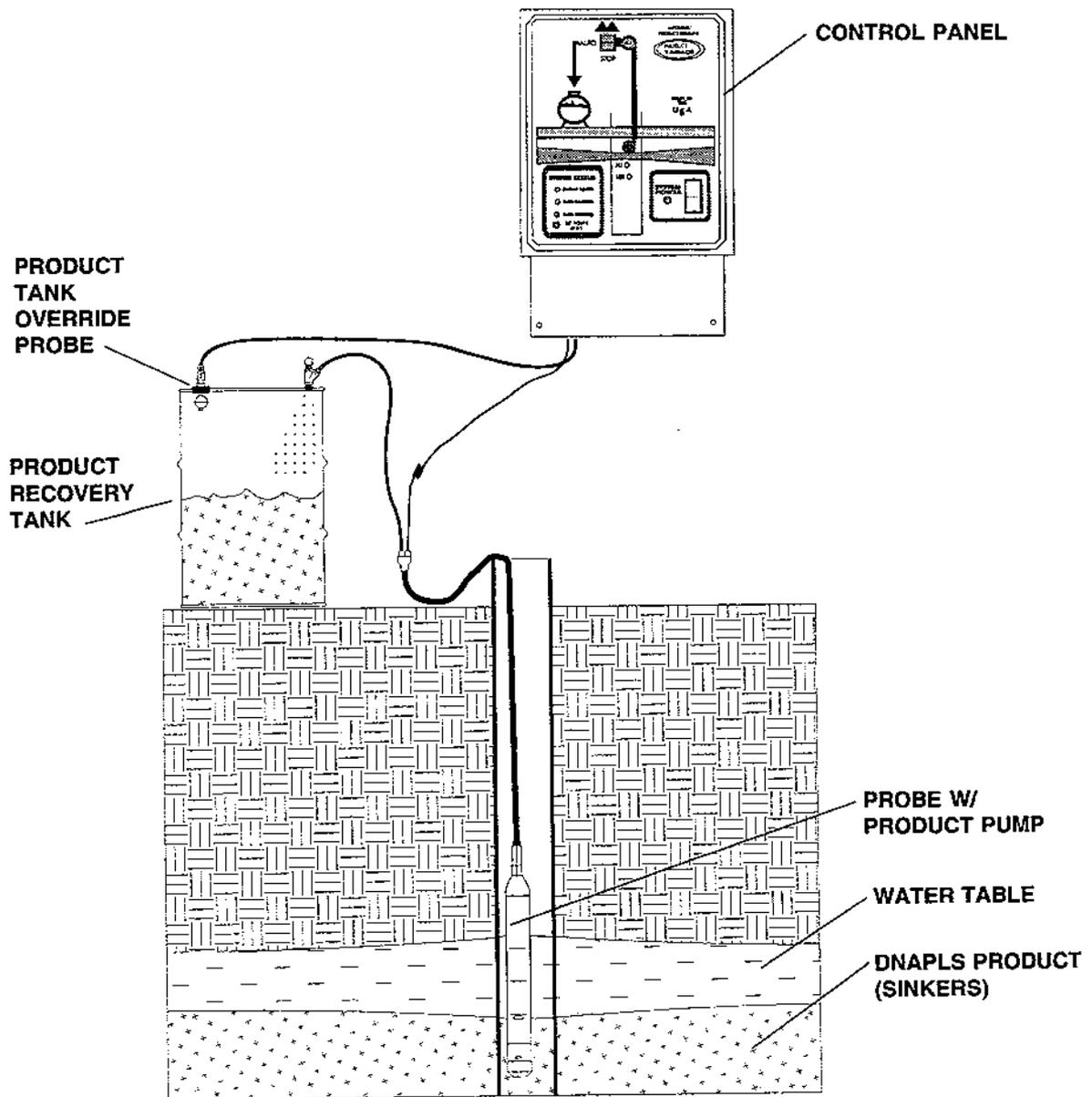
The system should be run with no Auto Seeker or with Auto Seeker disconnected. Set DIP Switches S2-1 to ON and S2-2 to OFF. Lower the probe into the well to a point 3" - 4" above the bottom. This positioning of the probe is to avoid sediment and sludge which could clog the intake.

In the DNAPL's mode, the product recovery cycle differs somewhat from the standard cycle. The pump will run periodically according to dip switch S4-1 and S4-2 setting, so long as the HI limit sensor is not contacting water. As the sinker product is pumped off, the water/product interface will drop. When the HI limit sensor contacts water, the pump will stop and a delay will occur before the next cycle. If water is not present in the well, the pump will be stopped when it begins to pump air.



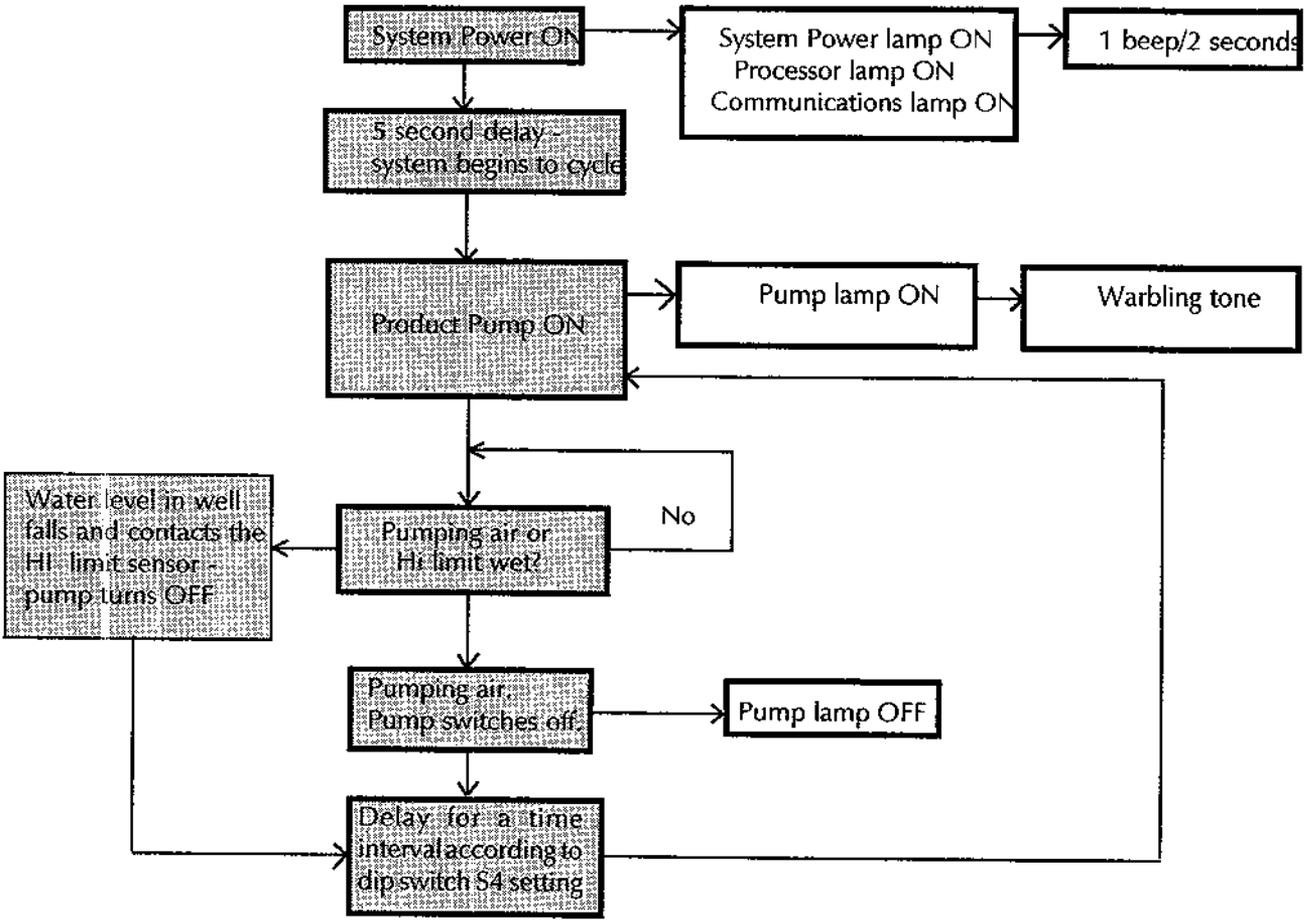
MAGNUM SPILL BUSTER DNAPLs SYSTEM

with NO AUTO SEEKER



CLEAN EARTH TECHNOLOGY
RR1 BOX 735 LONGPOINT ROAD
NORTH FERRISBURGH, VERMONT
(802) 425-3710 FAX (802) 425-2896

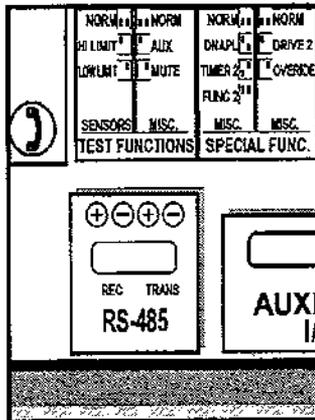
DNAPL's System Cycle without Auto Seeker



4.0 Magnum Communications

4.0 MAGNUM COMMUNICATIONS

Magnum Communications Option



The RS-485 Terminal block is located in the I/O extension.

NETWORKING

The Magnum Spill Buster may be operated individually or under an optional network control. The network capabilities are provided such that the user may monitor and, if desired, control many Magnum Spill Busters from a single, central location. The physical layer configuration used by Clean Earth Technology is the industry standard RS-485 differential, multi-drop protocol. This standard provides an inexpensive and robust physical connection to up to 256 units. To this Clean Earth Technology has added a simple to use Site Master Network.

The Site Master, or host, is a Windows application and can be operated on any IBM PC compatible system running Microsoft Windows, and configures with a standard RS-485 communications engine, and is a stand-alone software package. The host software (Site Master) polls the Magnum (slaves) continuously for the present operating status. The present status of every unit on the network is displayed on the computer screen for easy monitoring. The customer can change the operating parameters of a unit, or control the unit directly through the graphical user interface of the Site Master

USING THE NETWORK

The Site Master provides all of the control and monitoring functions available at the individual units, plus some additional control and monitoring functions not accessible through the panel controls. The main window for the Site Master displays a symbol for each Magnum connected to the network. This symbol will change to inform the user of the status of the units on the network, which are polled continuously. Typical graphical status symbols are "Pumping Product," "Raising Probe/Pump Assembly," "Lowering Probe/Pump Assembly," "Product Tank Full," "Idle," etc. This main window provides the user with an immediate indication of the state of each unit, and alerts the user to any errors or faults, if they exist. The symbols can be arranged using drag-and-drop techniques to simulate the physical layout of the Magnum network. A menu bar is used on this main window to provide the ability to add or delete a Magnum from the network, broadcast messages to all units simultaneously (e.g., stop all), edit the configuration of a Magnum, and end the application.

CONTROLLING SYSTEMS ON THE SITE MASTER NETWORK

Selecting the symbol for a specific Magnum changes the display window to a form that reports more detailed information about the Clean Earth Technology unit selected. The left side of the form displays an image of the unit's front panel and duplicates all of the status lights and control functions on the actual unit panel, plus it adds indicators for

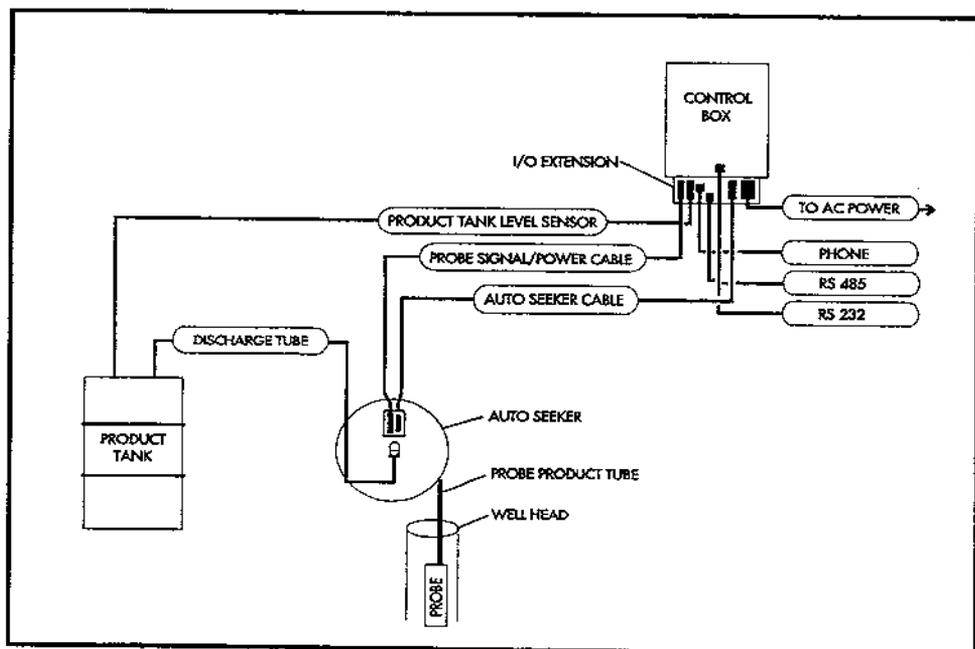
Communications (cont.)

Auto Seeker status and alarms. The instantaneous status of the unit is displayed in a text box on the bottom left. The right side of the screen displays both instantaneous and historical run time parameters such as number of cycles, duration of pump period, time until next pump cycle, etc. The right side can be changed to a Manual Control window to display instantaneous analog signal values and the manual control functions. The Manual Control window provides virtual buttons which can be used to turn the pump on, raise the probe, lower the probe, simulate sense band states, and stop all activity.

The Site Master can specify different operating parameters to different units if the user so chooses. Selecting a command button on the window described in the preceding paragraph brings up a screen that duplicates all of the switch setting options available at the local units. This screen also offers the option of having the remote unit operate under parameters specified by the local switches, or operate according to the parameters specified by the Site Master.

There are several other screens and windows not documented in this brief overview. These screens provide secondary and tertiary functions that are not needed for a basic understanding of the operation of the Clean Earth Technology Site Master Software.

Support for the exporting of event data to other Window Applications such as databases and spreadsheets is also provided.



Cable connections showing RS-485 and RS-232 communications configuration.

Communications (cont.)

INSTALLATION OF THE NETWORK

Installation of the Magnum Spill Buster communications network requires the following hardware items:

- RS-485 adapter for the PC
- Cable from the PC to the first Magnum unit
- Cables between additional Magnum units as required

RS-485 Adapter

The recommended adapter card is the ULTRA-485 from Industrial Computer Source. The following address and jumper options must be set prior to installation of the adapter into the host PC. Refer to the manufacturer's Product Manual for additional information.

1. Make the desired COM port selection via dip-switch SW-1.
2. Select the desired IRQ assignment on header E1.
3. Set jumpers as follows:

E2	N
E3	422
E4	SIO-485
E5	422
4. Set line termination options on dip-switch SW-2:

Switch 1,2,3	ON
Switch 4,5	OFF

PC to Magnum Cable

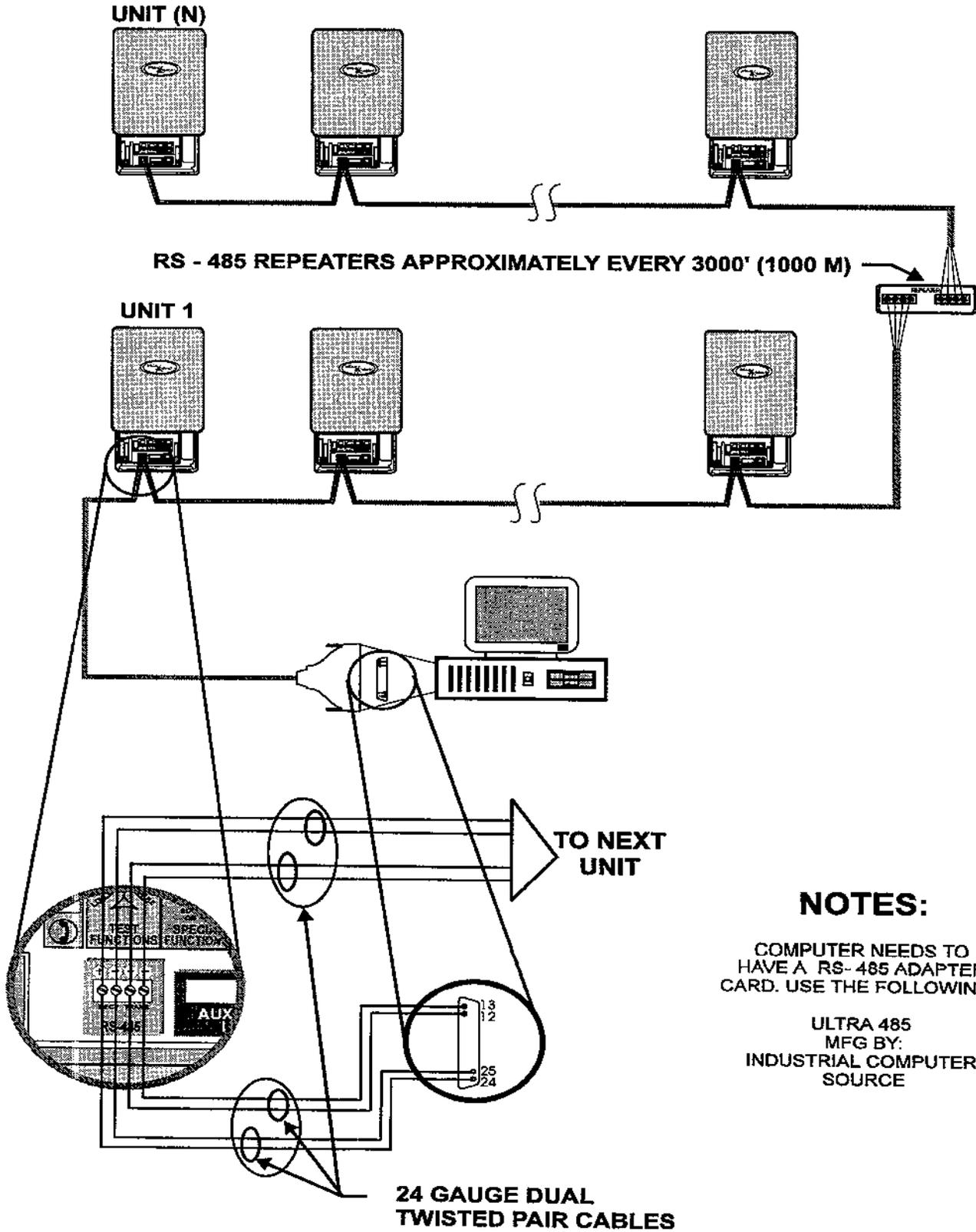
Fabricate a cable consisting of 2 twisted-pairs of 22 or 24 AWG wire. Shielding is not required, but make certain the wire pairs are, in fact, twisted. Terminate one end with a female 25 pin connector (DB25S) to mate with the ULTRA-485 adapter's port connector. Referring to Fig. 1, connect as follows:

<u>Signal</u>	<u>DB25S pin</u>
TRANS+	12
TRANS-	13
RECV+	24
RECV-	25

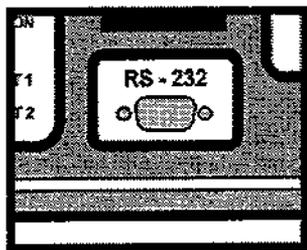
Magnum to Magnum cable

Fabricate this cable from the same 2 twisted pair cable as above. Note that this is a parallel cable; that is, signals are not crossed from end to end. Referring to Fig. 1, connect TRANS+ and TRANS- to one twisted pair, RECV+ and RECV- to the other twisted pair.

TYPICAL RS - 485 WIRING SCHEMATIC



RS-232 SERIAL PORT



The RS-232 local serial port connector is located on the front panel of the Control Box

An RS-232 port is also part of the communications package. An IBM-compatible computer can connect directly to the RS-232 port in the front of the unit. The RS-232 interface can accomplish essentially the same functions as the RS-485 network connection, but only to the unit that is directly connected to the computer.

This Interface provides a means of uploading data to the PC that the Magnum Spill Buster has accumulated. Data includes total run time, pumping time, and operating status.

A separate communications software package called UnitMaster is required to use the serial port. It is also a Windows application. A standard 9-pin male/female extension cable is used to connect the Magnum Spillbuster to the computer.

4.0 MAGNUM COMMUNICATIONS

NOTES:

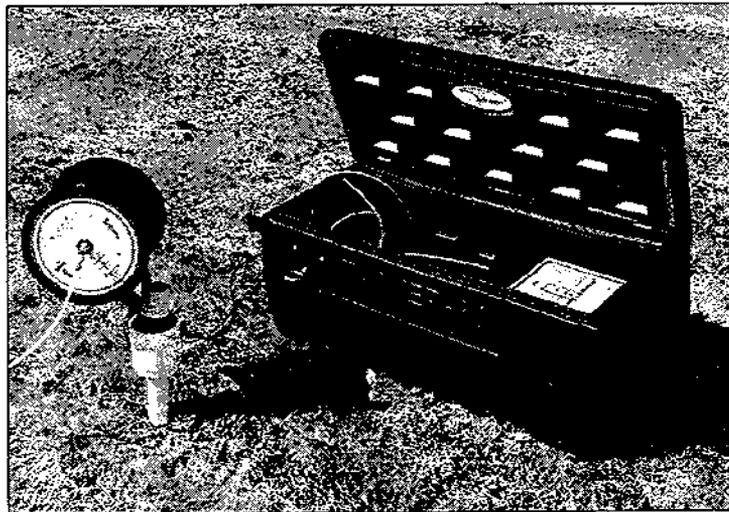
5.0 Other Options

1. Immediate Response Box, pgs. 48

2. Battery Operation, pgs 49

3. Solar Panel Charging System, pg. 50

4. Other Standard Cable Lengths, pg. 51

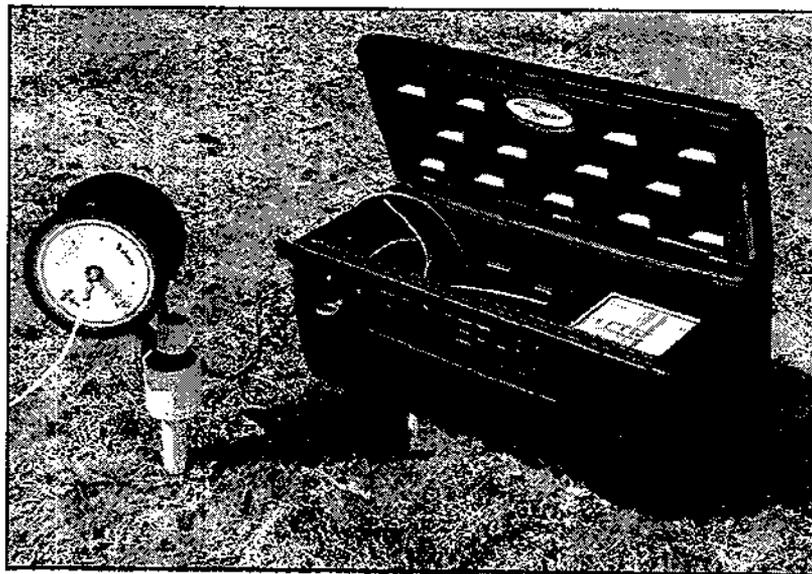


5.0 OPTIONS

Immediate Response Box

The Immediate Response Box (I.R. Box) is a rugged plastic box that contains a complete Magnum Spill Buster system including a control box, a probe, and a product tank sensor. The I.R. Box provides an extremely portable system to start removal of product in a 2" or larger well with minimal equipment set-up. A large forged shackle is attached on the rear of the box for security. Since the I. R. Box contains a standard control box, it can be used with any other SpillBuster options including the Auto Seeker system (shown below).

Magnum Spill Buster system with Auto Seeker set-up on well-head.



WARNING!

Control box must be located more than 25 feet from any hazardous area. This includes explosive atmospheres or vapors.

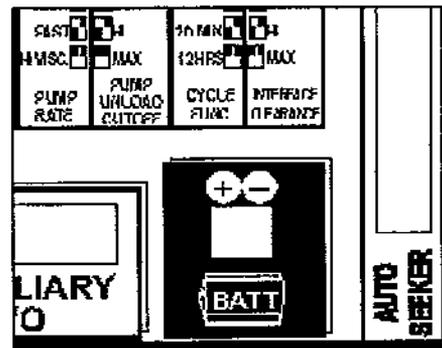
The I.R. Box can easily be carried in a small pick-up truck or van. The basic setup involves mounting the Auto Seeker onto the well head, connecting the product tank discharge tube and overflow sensor to the product tank, and connecting the Auto Seeker cable and the probe signal cable.

The system is powered by 115VAC from an extension cord (see pg. 51 for extension sizing). In addition, cables can be provided to operate the system from a 24 volt deep cycle battery. See pg. 49 for battery operation of system.

Battery Operation

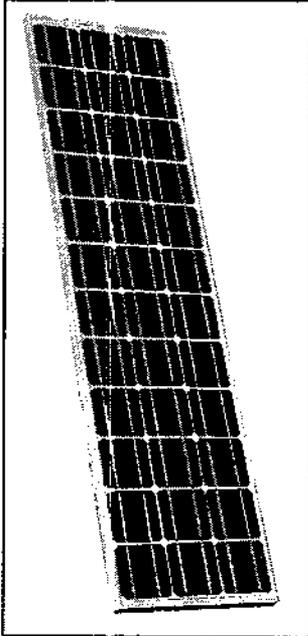
For sites with no utility connection available, batteries can be used. It is necessary to ground **EVERY** battery operated system. [See pg. 14].

The batteries should be deep cycle type. [NOTE: Use two 12 volt batteries in series for 24 volt power.] Use 14 AWG wire. One end will connect to the Control Box inside the I/O extension. Connect the other end to the battery, making sure that the polarity is correct. **NOTE: Hooking up a battery will bypass the power system switch.** When the Magnum Spill Buster is hooked up to the battery, the system will activate, as if the power switch were turned on. No dip switch settings or board changes are necessary with battery operation.



5.0 OPTIONS

Solar Panel Charging System

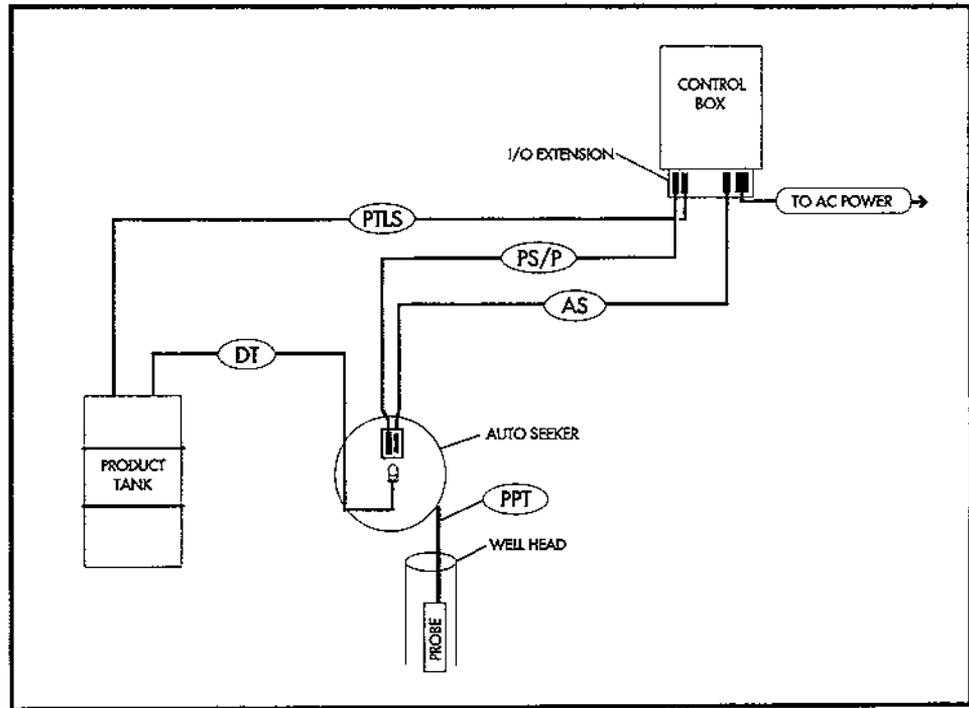


For sites with no utility connection available, batteries with a photovoltaic recharging system (solar panels) can be supplied. Solar Panels can be integrated with an Immediate Response box if desired. The Solar Panel Charging system includes heavy-duty frame and mounting hardware, deep-cycle battery, weatherproof control box with regulator, and custom cabling. Configuration of the charging system (size and number of panels) primarily depends upon the geographic location of the site and the amount of sunlight available. A secondary condition is the amount of product present at the site to determine the duty cycle or percentage of time the system will run.

As with all Clean Earth Technology products, the Solar Panel Charging system features easy set-up and operation. CET will do the preliminary wiring of the solar panels and system; the user will do the final wiring according to directions supplied with the unit. CET will assist if necessary. Please contact your Clean Earth products distributor for a quote specific to your site.

Other Standard Cable Lengths

Alternate cable lengths are readily available for deeper wells and control box placement further than 25 feet from the well head. Off the shelf cable extensions are shown in the table in the table below. The maximum allowable total cable length from the probe to the control box is 1000 feet. **Please contact your local Clean Earth distributor regarding site requirements for non-standard cable runs.**



STANDARD CABLE CONFIGURATION FOR PRODUCT TERMINATOR SYSTEM

Most of these cable lengths are standard, off-the-shelf parts. Any cable extensions other than those shown may be special ordered from the factory.

TAG	DESCRIPTION	STANDARD LENGTHS	STANDARD OPTIONS	OPTIONAL LENGTHS
PPT	PROBE PRODUCT TUBE (PROBE TO AUTO SEEKER)	50'	75', 100'	
PS/P	PROBE SIGNAL/POWER CABLE (AUTO SEEKER CONNECTOR TO CONTROL BOX)	25'	50', 75', 100'	UP TO 400'
PTLS	PRODUCT TANK LEVEL SENSOR	25'	50', 75', 100'	
DT	PRODUCT DISCHARGE TUBE (SHIPPED W/ 100' OF EXTRA TUBING IN ADDITION TO STANDARD 50')	100'	100' LENGTHS	1000'
AS	AUTO SEEKER CABLE	25'	50', 75', 100'	UP TO 400'

STANDARD AND OPTIONAL CABLE LENGTHS

5.0 OPTIONS

NOTES...

6.0 Maintenance Operations

Probe/Product Pump, pg. 54

Alpha Array™ Sensor Band Area, pg. 55

Cleaning the Probe, pg. 56

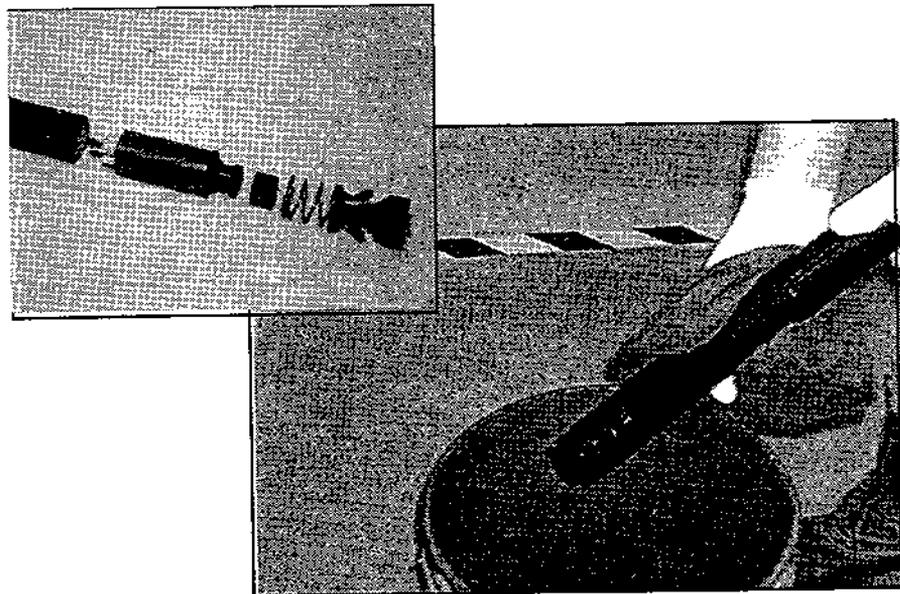
Removing the Pump, pg. 57

Product Pump, pg. 58

Logic Board and Power Supply, pg. 59

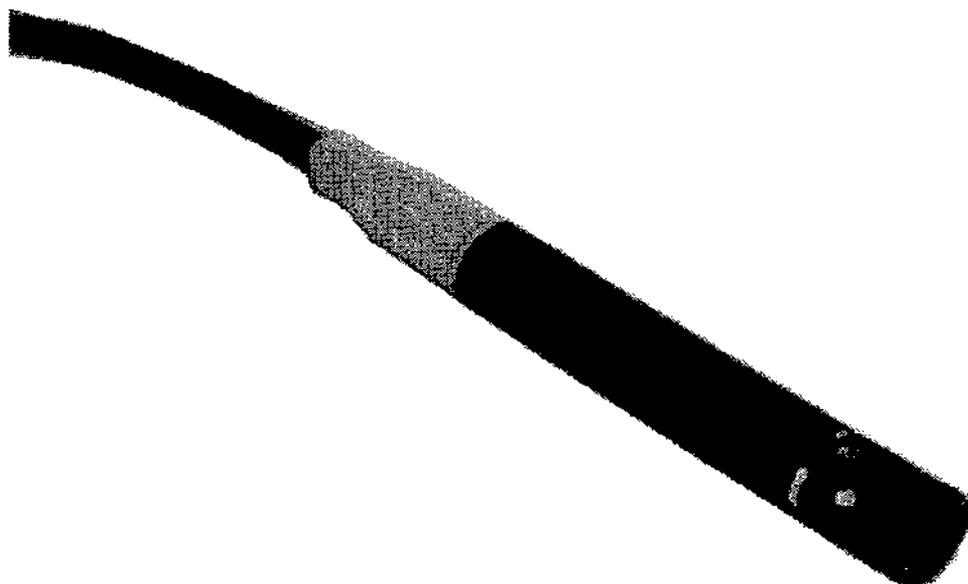
Removing the Logic Board, pg. 60

Removing Probe Product Tube from the Reel, pg. 61-62



Probe/Product Pump

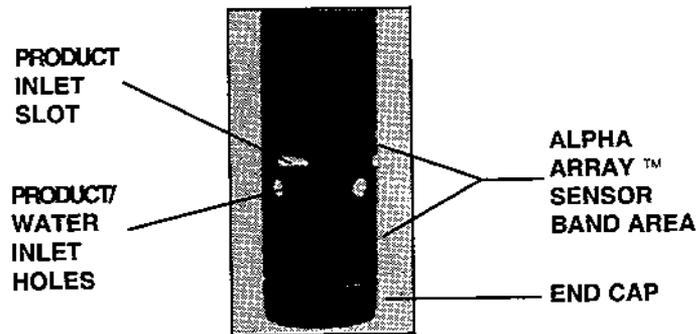
This is the down-well component of the system. The Probe/Product Pump contains circuits for sensing the product/water interface, as well as housing the product pump. Sensors assure that water will never be pumped into the product tank. The Probe/Product Pump assembly is constructed of state of the art polymer materials for very high corrosion and deterioration resistance.



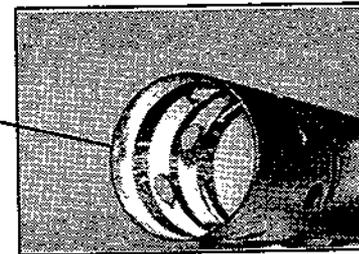
Alpha Array™ Sensor Band area

There is an array of sensor bands, internal to the probe, including one dispensing a low limit signal, and one dispensing a high limit signal. The sensors use a low frequency, omni directional signal to sense the product/water interface. The sensors operate on the principle that signal transmission varies significantly due to the transmission characteristics of the type of fluid surrounding the antenna. The variation in signal transmission is used to accurately determine the interface location relative to the product inlet. The sensors are constructed of "state of the art" polymer materials for corrosion resistance and long life.

The product inlet slots lie towards the end of the probe which allow product to flow into the pump filter. There are also several round holes which allow water and product to freely flow into the inside of the probe pump cavity where the sensor bands are located. These holes must all be kept clean.



ALPHA ARRAY™
SENSOR BAND AREA



Probe Product Tubing

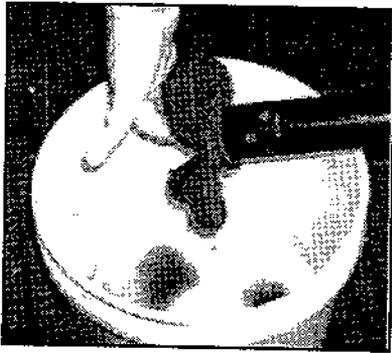
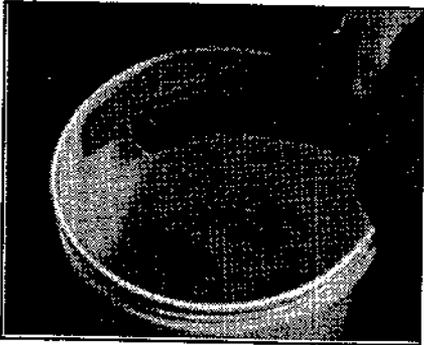
The probe product tubing is the "umbilical cord" of the down-well probe, connecting it to the above ground components. The tubing serves as the discharge tube and carries signal and power to and from the probe.

Inlet Slot

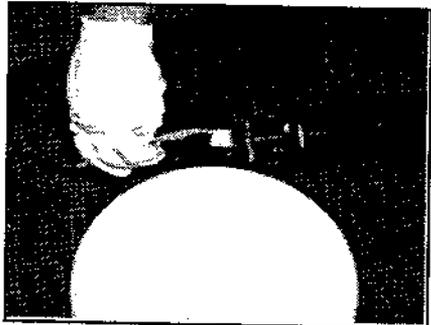
Probe Inlet slots and holes in the sensor band area of the probe body allows product and water to freely enter into the interior of the probe. These slots must be kept clean and free of debris in order for the system to function properly. Care must be taken when cleaning the inlet slots and holes to avoid damaging the probe and sensor band area. Avoid using sharp tools such as screwdrivers, knives, etc. to clean the probe inlet slots and holes.

Cleaning the Probe

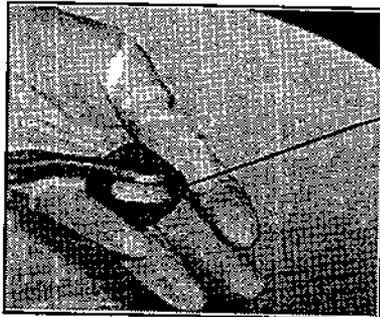
If the probe sensors become coated with a thick layer of biological growth, emulsion or other materials, the Probe will not function properly. The Probe can be cleaned, as shown below, using spray cleaner or mild dish liquid in warm water and cloth or soft bristled brush. Care must be taken to avoid damaging the probe and sensor bands, either by brushing too hard, or by using too hard a tool to perform cleaning.



Make sure that the Product Inlet Slots and holes are clear, and that the interior Alpha Array™ Sensor Band area is free of coating and debris.



If persistent residue sticks in the sensor area then a soft brush or tooth brush is recommended to fully clean sensors.



THOROUGHLY
SCRUB AND CLEAN
FILTER ELEMENT

The pump inlet screen and inlet holes should be checked and cleans also during inspection.

Removing the Pump

The probe and product pump should be cleaned and lubricated regularly. The Product Pump is easily accessible by pushing the End Cap in to ease pressure on first button, pop first button in. Then repeat process for the second button on opposite side and pulling the End Cap out. [See below] Now tap the open end of the Probe on the palm of your hand and the pump will slide out.

NOTE: When reassembling the probe, align the product discharge tube with the product discharge seal down inside the Probe tube. Drop pump into Probe and push pump up with your thumb so that the pump contacts are seated firmly against the probe contacts. If a firm contact is not made, the pump may not function. Finally, insert the end cap such that both lock buttons snap in place.



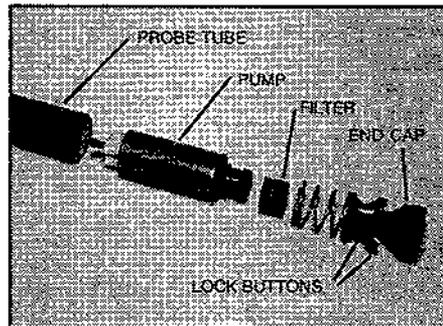
Releasing first lock button.



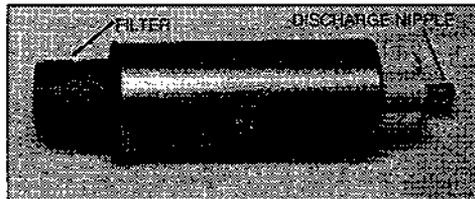
Releasing second lock button.



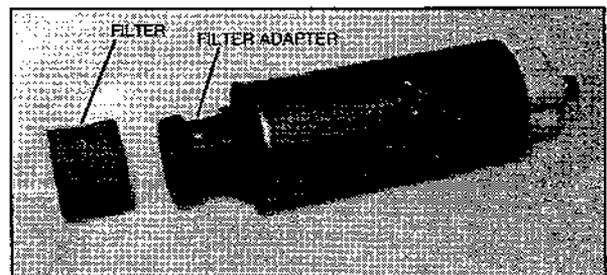
Removing the End Cap.



Probe "exploded" view.



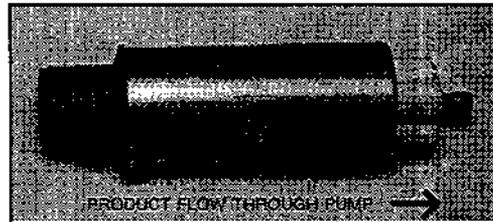
The pump will come out of the Probe with the filter screen attached.



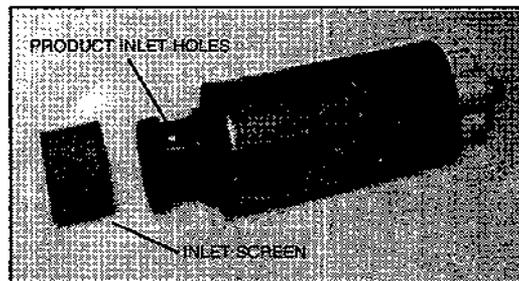
Carefully remove the filter screen and clean.

Product Pump

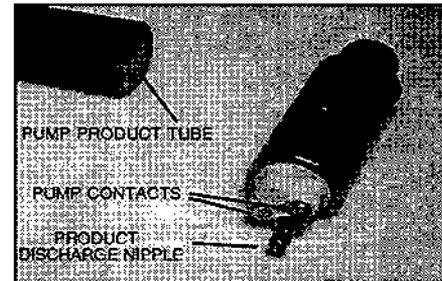
The product pump is a rugged roller vane, chemical resistant unit capable of pumping up to 1100 gallons (175 liters/hour) of low viscosity liquids (up to 25 - 30Cp) per day in shallow wells and to reliably recover product out of wells 100 feet in depth. In addition, it can withstand a certain amount of small solids such as dirt or sand passing through it. See Pump Performance Curve, pg. 68.



The product pump is located near the bottom of the probe and is easily accessible. The pump is inserted into the bottom of the Probe body and is held in place by the end cap.



Openings in the pump filter adapter allow for product intake. These should be kept clean along with the filter element.



The pump product nipple and the pump electrical contacts should also be kept clean.

Pump Maintenance

Clean product inlet holes and pump screen frequently and make sure they are free of debris. After cleaning hold pump upside down (intake holes up) and spray WD 40 (or equivalent) into intake holes to lubricate pump. This will allow lubricant to flow into working parts of pump. Also, spray lubricant into product discharge nipple in pump.

Logic Board and Power Supply

WARNING

Disconnect AC power at its source prior to connecting or disconnecting any wires, cables or plugs. Electrical shock may result in serious injury or death or damage to system.



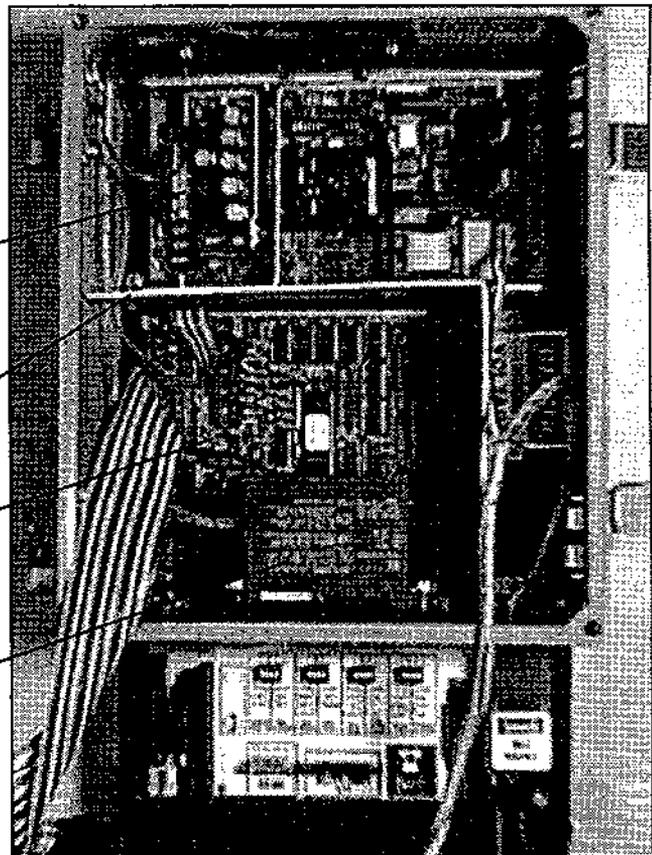
"Popping" off Front Panel with a screwdriver.



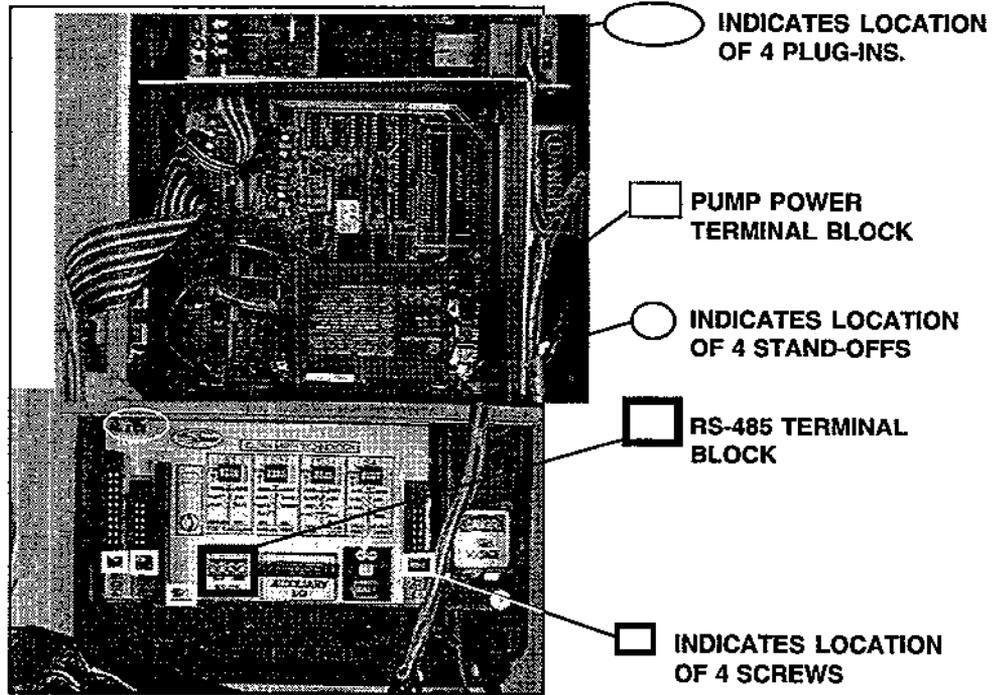
Lift off Front Panel.

The Logic Board is located on the back panel inside the Control Box. The Control Panel is held in place by four spring loaded catches (see below) . The Control Panel can be removed to expose the Logic Board and Power Supply by carefully prying the Control Panel with a screwdriver near one of the four corners. The Control Panel will then "pop" out.

- POWER SUPPLY
- HIGH VOLTAGE SAFETY BARRIER
- LOGIC BOARD
- UL APPROVED ISOLATION BARRIER (OPTIONAL)



Removing the Logic Board



1. Disconnect power.
2. Unplug four (4) plug-ins. ○
3. Remove pump power wires from terminal block. □
4. Remove RS-485 wires from terminal block. □
[Note/record position of color coded wires.]
5. Unscrew four (4) screws. □
6. Disengage four (4) stand-offs. ○
7. Slide board out bottom of box.

Removing Probe Product Tube from the Reel

There are two cases where it is necessary to remove the Probe Product Tubing from the reel: 1) If the Probe stops before reaching the interface, or, when raising the Probe, the reel stops before the Probe is fully rewound, the Auto Seeker rotation and the Probe Product Tubing are not fully synchronized. 2) It may be necessary to remove the Probe Product Tube from the reel of the Auto Seeker unit to return it to the factory for service.

Resynchronizing Product Tube with Auto Seeker Rotation

Rotate the Auto Seeker in the DOWN direction until the entire length of the Probe Product Tube is off the reel. This can best be accomplished by initiating a cycle with the PRC switch (pg. 33) while keeping the probe away from contact with a grounded surface. The system will continue to lower the Probe in search of the interface. Press STOP on the PRC switch when all the Product tubing is off the reel.

If Auto Seeker stops before the tube is fully unwound, then the Auto Seeker is in the extreme DOWN position. Press STOP and remove the remaining tubing by hand without moving the reel.

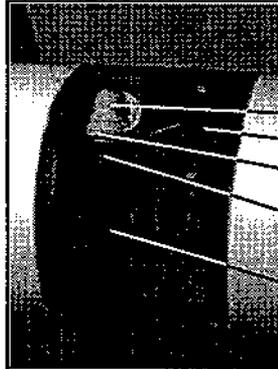
If the Auto Seeker continues to rotate past the point at which the Product Tube is fully unwound, then detach the Product Tubing from the Auto Seeker at the reel. [See instructions, following page.] Rotate the Auto Seeker BY HAND in the DOWN direction until significant resistance is felt. The Auto Seeker reel is now in the extreme DOWN position.

Now, reattach the Product Tube to the reel. Don't forget the retainer clip! Rewind the tubing onto the reel by 1) moving the HI LIMIT dip switch (S1-1) to ON [see page 37] and 2) placing the PRC switch in the AUTO position. This will cause the Auto Seeker to rotate in the UP direction. Press STOP when the Product Tube is fully wound onto the reel. [Remember to turn OFF the HI LIMIT dip switch.]

Warning:

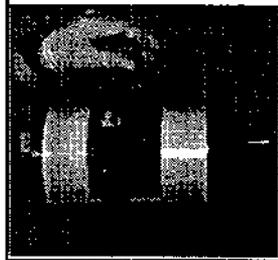
To prevent damage to the logic board, DISCONNECT the Autoseeker Extension cable from the control box before rotation of the Autoseeker by hand.

TO REMOVE THE PROBE PRODUCT TUBE FROM REEL:

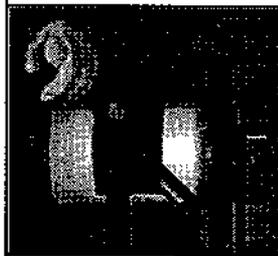


The Probe Product Tube is connected to the hub of the reel by instant Tube fittings and a Slim-line™ connector.

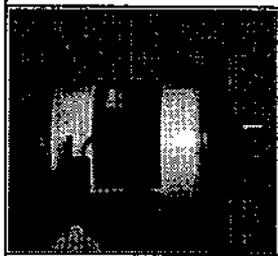
- DISCHARGE CONNECTOR
- SLIM-LINE CONNECTOR™
- RETAINER CLIP
- DISCHARGE TUBE FITTING
- TUBE TERMINATION MODUAL



Unplug the Slim-line™ connector using an allen wrench to remove screws.



After removing the slim line connector remove the red clip on the discharge tube fitting with a pair of needle nose pliers. Then push down on the locking sleeve of the discharge tube fitting with a screwdriver while pulling on the "Tee." Make sure to push the locking sleeve squarely into and against the fitting; otherwise, the tube will not be released.



After the Probe Product Tube has been removed, turn the reel BY HAND in a downward direction until significant resistance is felt. **WARNING:** To prevent damage to the logic board, DISCONNECT the Autoseeker extension cable from the Control Box before rotating the Autoseeker by hand.

7.0 Troubleshooting



7.0 TROUBLE SHOOTING

PROBLEM	System doesn't power up when System Power switch is turned ON.	
SOLUTION	Control Box is not plugged in. Problem with power source.	
PROBLEM	System powers up, but pump won't run. See also "Processor Lamp"	page 65
SOLUTION	Probe cable is not plugged in or is broken. Poor connection between pump power wires from power supply to terminal block. Product Tank lamp ON. Is Product Tank full? Product Tank sensor not connected to Control Box. Pump contacts are not seated firmly against probe contacts. Remove end cap from probe and push up pump in probe with thumb and test system. Bad product pump. Replace pump and try TEST SYSTEM on PRC switch. Stuck pump, remove and spray WD40 or equivalent into intake and discharge openings. Also try connecting 12VDC power, reverse polarity, to free a stuck pump.	page 20 page 21 page 13 page 20 page 57-58 page 57-58 page 58
PROBLEM	Probe stops before reaching interface, or When raising probe, Auto Seeker stops before being fully rewound on reel.	
SOLUTION	Auto Seeker rotation and probe product tubing are not synchronized. To correct, See Section 6.	page 61-62
PROBLEM	High Limit sensor is not sensing water or probe moves to the bottom of the well.	
SOLUTION	Not enough water in the well. There must be at least 3" of water in the well below the product. System is not grounded. Open or disconnected probe cable. Fouled sensors. Clean probe.	page 30 page 14 page 20,58 page 56-58
PROBLEM	Pump runs but no product is pumped.	
SOLUTION	Not enough product in the well. Clogged pump intake. Clean intake/sensors bands on probe. Interface clearance is excessive. Check dipswitches S4-3 & S4-4. Clogged or frozen product discharge line. Check/thaw line. Bad pump, replace. Clogged pump filter screen. Clean Screen.	page 30 page 56-58 page 37 page 58 page 57

PROBLEM	Pump runs briefly, then cuts off prematurely.	
SOLUTION	Interface Clearance set too high. Check dipswitches S4-3 & 4. Pump Unload Cutoff setting is too high. Check dipswitches S3-3 & 4.	page 37 page 37
<hr/>		
PROBLEM	System was cycling, but now appears to be inactive.	
SOLUTION	If cycle function is set to automatic (dipswitches S4-1 & 2), Product Terminator will automatically extend the pump delay time. To see if system is still functioning properly, run TEST SYSTEM on PRC switch.	page 33
<hr/>		
PROBLEM	PROCESSOR lamp on Control Panel does not light.	
SOLUTION	Lamp could be burned out. There may be a problem with the logic board. Call the factory.	page 59
<hr/>		
PROBLEM	AUTO SEEKER does not raise.	
SOLUTION	Check to see if the the cable is connected to the Control Box. Open cable. System is in DNAPL mode (Switch S2-1 is set)	page 20 page 33
<hr/>		
PROBLEM	Processor Lamp on Control panel blinks on and off.	
SOLUTION	Pump has experienced an overload. Check discharge path and intake screen. Replace pump. OR, the probe cable is not connected OR, the pump circuit is open possibly due to a failed pump. Replace pump.	page 55-58 page 20 page 58

7.0 TROUBLE SHOOTING

NOTES...

8.0 System Specifications

System Specifications

Complete Magnum Spill Buster™ System includes: Magnum Spill Buster™ Control Box, Magnum Spill Buster™ Probe with 50' cable, Auto Seeker with 25' cable, and Product Tank Shutoff Probe with 25' cable, and 100 ft product discharge tubing.

Input Power: 115vac or 230vac, 100 watts max. or 24vdc, 75 watts max. with optional battery cable and deep discharge batteries. 10 amp circuit breaker in System Power switch.

Operating Temperature Range: ambient air temperature of - 40°F to +140°F (-40°C to 60°C)

Pumping Rate: up to 46 gal/hr (175 liter/hr) @ 0 psi (zero depth & no discharge back pressure), or up to 37 gal/hr (140 liter/hr) @ 25 psi discharge back pressure.) [See Pump Performance Curve, next page.]

Product Viscosity: Products with viscosity of less than 10 Cp at 70 degrees F.

Examples: gasoline, diesel fuel, #2 heating oil, JP-4, JP-5, paint thinners.

Well Diameter: 2 inch minimum for product recovery only

Standard Well Depth: 50 ft. max

Maximum Well Depth: 100 ft. (30.5m) on special order with 100ft (30.5m) down-well cable. Special booster pumps and power supplies are available for deeper wells.

Minimum Well Head Clearance for AUTO SEEKER: 24"x24"x22" Deep (61cm x 61cm x 56.4cm deep).

Probe Dimensions: 1.93" (4.9cm) dia. x 15.25" (38.7cm) long [cable size including the discharge tube is 5/8" thickness x 1 1/2" width]. Standard Probe cable length is 50 ft. (15.2m)

Control Box Dimensions: 14" (36cm) wide x 23" (59cm) high x 6" (15.4cm) deep. An additional 10" is required below for cable exit and an additional 14" is required in front and to the left for door swing.

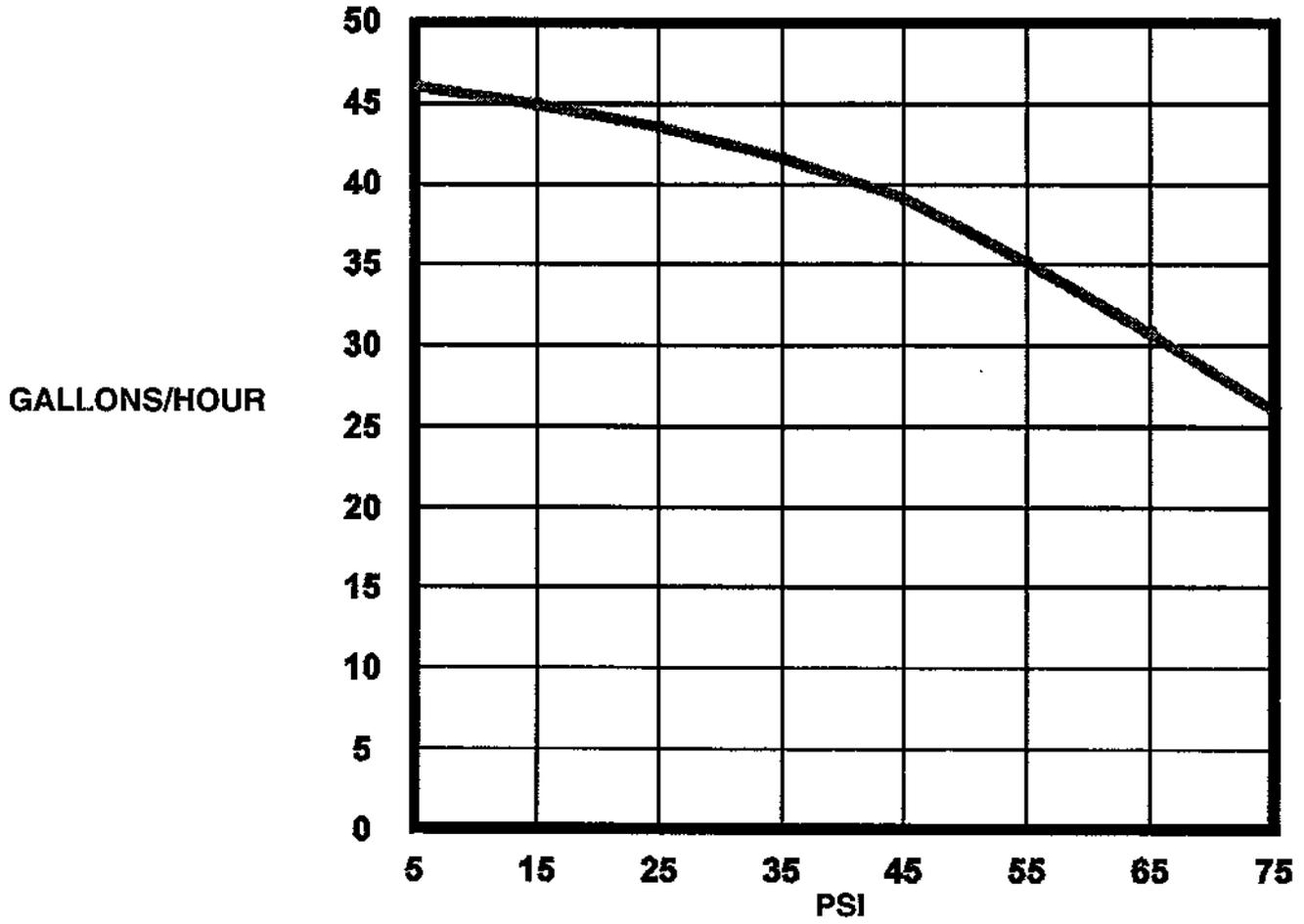
Standard cable length: 25 ft. (7.6m) from Control Box to well head.

Product Tank Probe: threads into a standard 2" barrel bung. Standard cable length is 25 ft. (7.6m)

Total System Weight: 68 Lbs. (31kg)

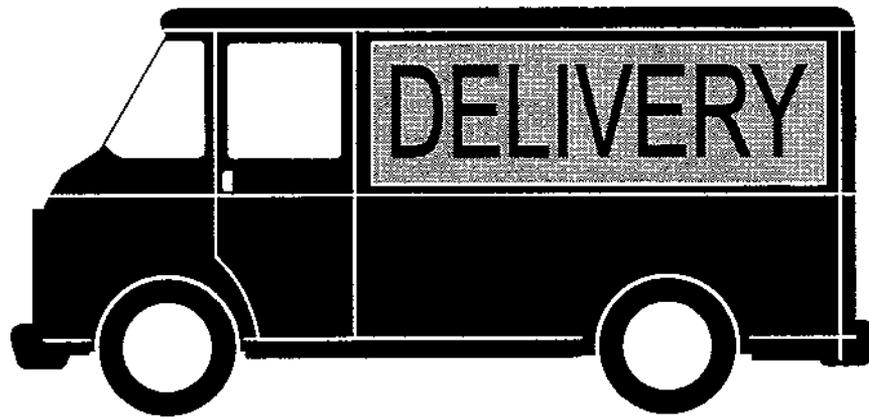
8.0 SYSTEM SPECIFICATIONS

Magnum Spill Buster Pump Performance

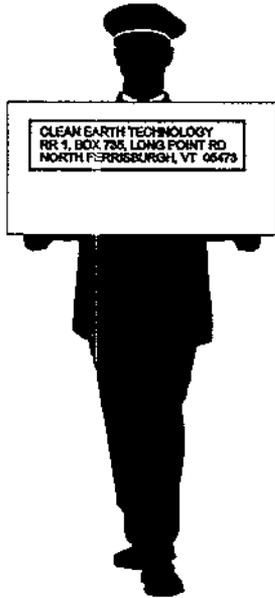


NOTES: 1.) 75 ft. Probe Product Tube
2.) Pump speed NORMAL

9.0 Equipment Return Policy



9.0 EQUIPMENT RETURN POLICY



Equipment Return Policy

Any equipment or parts return must be authorized by Clean Earth Technology (CET) prior to shipment. Call or FAX CET. A Return Material Authorization (RMA) number will be issued upon receipt of your request to return parts or equipment. An "RMA Number/REPAIR ORDER" form must be completed by the user and the RMA number should appear on the form along with reasons for the return. Your shipment to CET must have the RMA number clearly marked on the outside of each packaged item. A "RMA Number/REPAIR ORDER" form is found on the following page to copy.

This policy applies to both equipment sales and repair orders. For a Return Material Authorization, please call our service department at (802) 425-3710.

Clean Earth Technology, Inc. Environmental Equipment Return Policy

This policy refers to **ANY EQUIPMENT OR PARTS** being returned to Clean Earth Technology (CET), whether:

- Customer owned, leased, or rented
- In warranty or out of warranty

NO equipment or parts should be shipped to CET without first contacting our service department for a **Return Materials Authorization number (RMA)**. Contact our service department at (802) 425-3710 to be assigned an RMA number.

- CET reserves the right to refuse delivery of any equipment without a CET RMA number clearly displayed on the exterior of the package(s).
- CET reserves the right to refuse delivery of any equipment improperly decontaminated.
- CET reserves the right to add a fee of \$250.00 to the repair invoice of any equipment or parts not decontaminated to the satisfaction of CET.

Environmental Equipment Return Guidelines

- All equipment must be thoroughly cleaned, purged of product and decontaminated prior to shipment to CET. NOTE: CET recommends the use of Personal Protective Equipment, level C or D, as defined in OSHA 29 CFR 1910.120.

Any equipment or parts shipped to CET must include the following documentation:

- CET RMA/Repair Order form completed by customer.
- Description/name of product pumped
- Reason for return
- The CET RMA number clearly marked on the outside of ALL packages and paperwork.

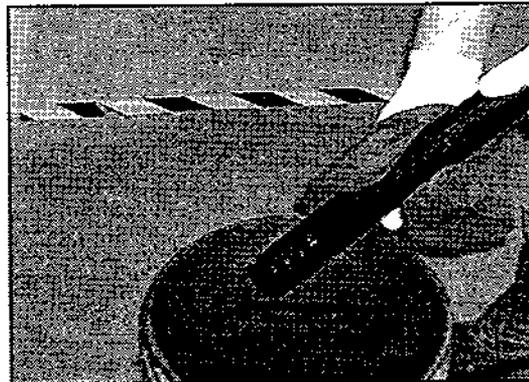
Equipment Decontamination Procedures



Prior to return to CET, all equipment must be thoroughly cleaned and decontaminated. CET must be informed as to the type of product pumped by the system, and the environment in which it is pumped. During decontamination procedures, make sure personnel are wearing the appropriate protective clothing and observing all safety precautions.

1. Call the factory for an Return Materials Authorization (RMA) number. Fill out and return or FAX RMA number/Repair Order form. See page 73, this section.
2. Clean probe and as per instructions, pg. 56.
3. Remove pump (pg. 57), wipe off and seal in plastic bag.
4. Place probe end in bucket or other suitable receptacle. Apply pressurized air to the open end of the product tube and blow out until product stops coming out of probe end. NOTE: Wear the appropriate protective gear. Be careful about splashing product around.
5. Wipe down probe again. Allow to air out in well ventilated area for 24 - 48 hours.
6. Insert absorbant pad or folded-up paper towels into the end of the probe to help prevent leaking or spillage of product. Replace end cap. DO NOT replace pump in robe.
7. FOR SPILLBUSTER JR. PROBES ONLY: Loop cable and arrange neatly in large loops (4 ft) and tie with cord or tie wrap in two places. Return in original mailing tube or similar receptacle.

NOTE: CET reserves the right to add a fee of \$250.00 to the repair invoice of any equipment or parts not decontaminated to the satisfaction of CET.



NOTES...

RMA NUMBER/REPAIR ORDER

CLEAN EARTH TECHNOLOGY, INC.
RR1 BOX 735, LONG POINT ROAD
NORTH FERRISBURGH, VT 05473
PH: (802) 425-3710 FAX: (802) 425-2896

CUSTOMER NAME AND ADDRESS:

RMA NUMBER: _____

DATE: _____

CET CONTACT: _____

TYPE OF UNIT: _____

SERIAL NUMBER: _____

PHONE No.: _____

FAX No.: _____

CUST. CONTACT NAME: _____

PRODUCT PUMPED: _____

REASON FOR
RETURN: _____

SIGNED: _____

CLEAN EARTH TECHNOLOGY, INC.
ENVIRONMENTAL EQUIPMENT RETURN POLICY

THIS POLICY REFERS TO ANY EQUIPMENT OR PARTS BEING RETURNED TO CLEAN EARTH TECHNOLOGY (CET), WHETHER:

- CUSTOMER OWNED, LEASED, OR RENTED
- IN WARRANTY OR OUT OF WARRANTY

NO EQUIPMENT OR PARTS SHOULD BE SHIPPED TO CET WITHOUT FIRST CONTACTING OUR SERVICE DEPARTMENT FOR A RETURN MATERIALS AUTHORIZATION NUMBER (RMA). CONTACT OUR SERVICE DEPARTMENT AT (802) 425-3710 TO BE ASSIGNED AN RMA NUMBER.

- CET RESERVES THE RIGHT TO REFUSE DELIVERY OF ANY EQUIPMENT WITHOUT A CET RMA NUMBER CLEARLY DISPLAYED ON THE EXTERIOR OF THE PACKAGE(S).
- CET RESERVES THE RIGHT TO REFUSE DELIVERY OF ANY EQUIPMENT IMPROPERLY DECONTAMINATED.
- CET RESERVES THE RIGHT TO ADD A FEE OF \$250.00 TO THE REPAIR INVOICE OF ANY EQUIPMENT OR PARTS NOT DECONTAMINATED TO THE SATISFACTION OF CET.

ENVIRONMENTAL EQUIPMENT RETURN GUIDELINES

- ALL EQUIPMENT MUST BE THOROUGHLY CLEANED, PURGED OF PRODUCT AND DECONTAMINATED PRIOR TO SHIPMENT TO CET.
NOTE: CET RECOMMENDS THE USE OF PERSONAL PROTECTIVE EQUIPMENT, LEVEL C OR D, AS DEFINED IN OSHA 29 CFR 1910.120.

ANY EQUIPMENT OR PARTS SHIPPED TO CET MUST INCLUDE THE FOLLOWING DOCUMENTATION:

- CET RMA/REPAIR ORDER FORM COMPLETED BY CUSTOMER.
- DESCRIPTION/NAME OF PRODUCT PUMPED
- REASON FOR RETURN
- THE CET RMA NUMBER CLEARLY MARKED ON THE OUTSIDE OF ALL PACKAGES AND PAPERWORK.

THIS DOCUMENT MAY BE DUPLICATED

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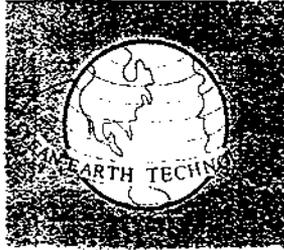
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DECLARATION OF CONFORMITY

Application of Council Directive: 89/336/EEC

Conformity Declared to Standards: EN50081/82

Manufacturer: Clean Earth Technology, Inc.
Manufacturer's Address: RR 1, Box 735, Long Point Road
North Ferrisburgh, Vermont 05473
USA

Name of Equipment: Product Terminator

Description of Equipment: Groundwater Remediation System

Model No.: PTRM 115/220

Serial No.: All

Year of Manufacture: 1996 and beyond

The Undersigned declares that the above named equipment conforms to the above Standards and Directive.

Date: 1-8-97

Signature: David F. Bowles

Clean Earth Technology, Inc.

David F. Bowles
President