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OPERATIONAL REPORT FOR FREE PRODUCT RECOVERY AT BUILDING R-12 NWS EARLE NJ

4/19/2001

FOSTER WHEELER ENVIRONMENTAL CORPORATION

OPERATIONAL REPORT
FOR FREE PRODUCT RECOVERY AT BUILDING R-12
NAVAL WEAPONS STATION - EARLE
COLTS NECK, NEW JERSEY

Issued:

April 19, 2001

Prepared for:

Department of the Navy
Engineering Field Activity, Northeast
Naval Facilities Engineering Command
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REMEDIAL ACTION CONTRACT N62472-94-D-0398
DELIVERY ORDER NO. 0051

OPERATIONAL REPORT
FOR FREE PRODUCT RECOVERY AT BUILDING R-12
NAVAL WEAPONS STATION - EARLE
COLTS NECK, NEW JERSEY

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1.0 INTRODUCTION/PROJECT OBJECTIVES

Foster Wheeler Environmental Corporation (Foster Wheeler Environmental) was contracted by the Navy to recover free product from the sub-surface utilizing the existing recovery wells adjacent Building R-12, at the Naval Weapons Station (NWS) Earle located in Leonardo, NJ.

This Operational Summary Report is being submitted to satisfy the post-construction submittal requirements included in paragraph 1.2.1, Pre- and Post-Construction Documentation of the Statement of Services for Delivery Order No. 0051 under Remedial Action Contract No. N62472-94-D-0398.

The objective for the product recovery operation at Building R-12 was the collection and removal of recoverable free product by means of an oil skimmer pump, supplied by the Navy. The skimmer pump was to be periodically moved between three existing recovery wells to maximize recovery while minimizing costs.

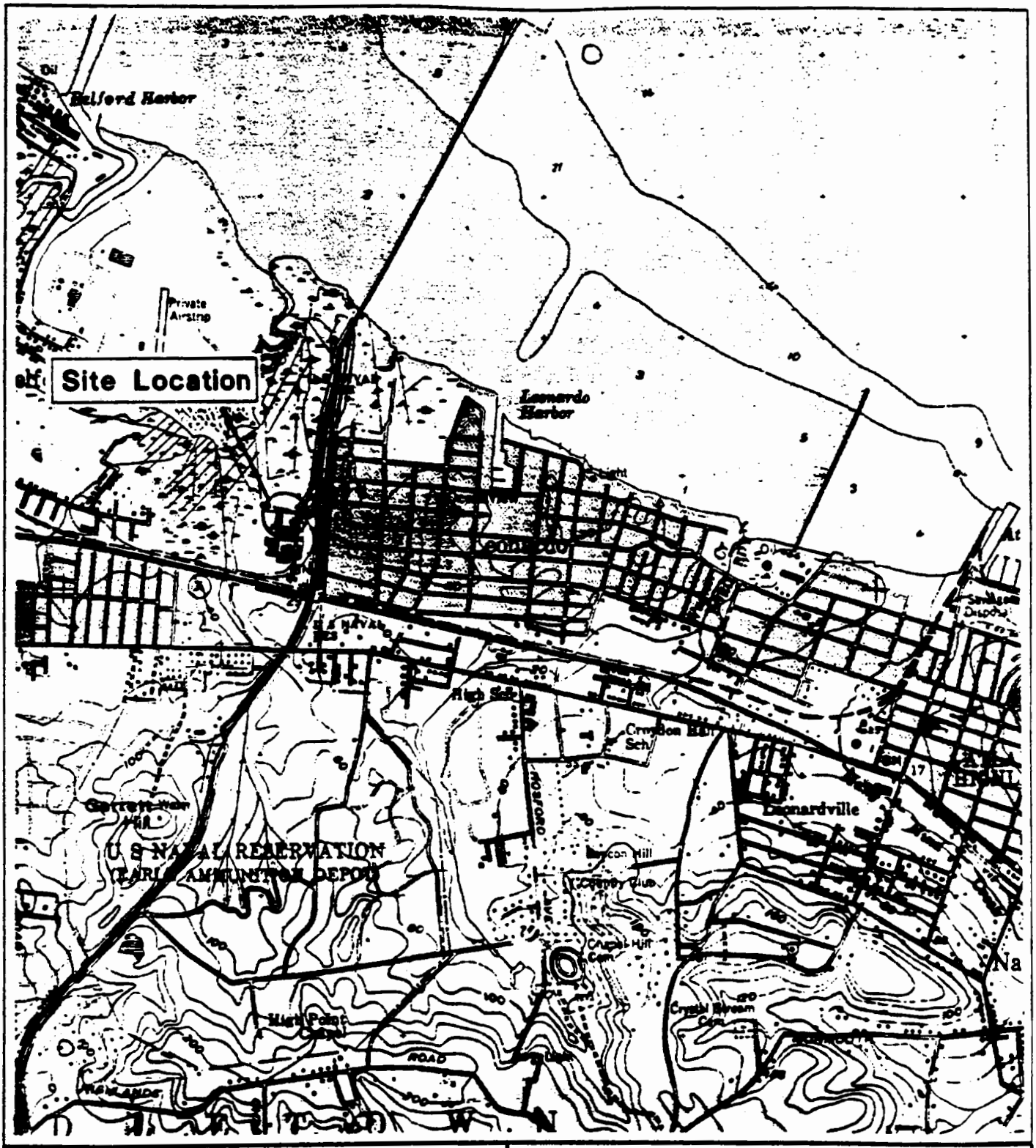
This report summarizes the operation of the skimmer pump since its installation in November 1999, and offers suggestions for continued product recovery at the site.

2.0 PROJECT LOCATION AND DESCRIPTION

Naval Weapons Station Earle (NWS-Earle) is located in Monmouth County in east-central New Jersey as presented on Figure 2-1, Site Location Map. The base consists of a Mainside area and a Water Front area occupying a total of approximately 11,134 acres. The Mainside of the base is located approximately 10 miles inland from the Atlantic Ocean. The Mainside and the Waterfront areas of the base are linked by a narrow tract of land that serves as a right-of-way for a government road and railroad line.

NWS Earle is responsible for furnishing ammunition to the naval fleet, and coordinates all port services and logistical support for home-ported and visiting ships. The base also conducts safety inspections, supervises ammunition loading for the United States Coast Guard, and provides marine fire fighting capability and standby tug services. The Waterfront consists of an ammunition depot and associated piers for loading and servicing the naval fleet.

Building R-12 is located in the Waterfront area of NWS-Earle along Road R1. Figure 2-2 depicts the site layout. The area of concern (AOC) is a small, grassy area located behind Building R-12, at the northeast corner of the building. The three monitoring wells that are to be incorporated into the product recovery system are located proximal to the building and each other. The wells are 4-inch diameter PVC wells screened from 4 feet to approximately 10 feet below grade. The source of contamination and free product is believed to have emanated from an underground storage tank (UST) near Building R-12 that was abandoned in place.



Source: U.S.G.S. Topographic Maps (7.5 Minute)
Sandy Hook, NJ Quadrangle

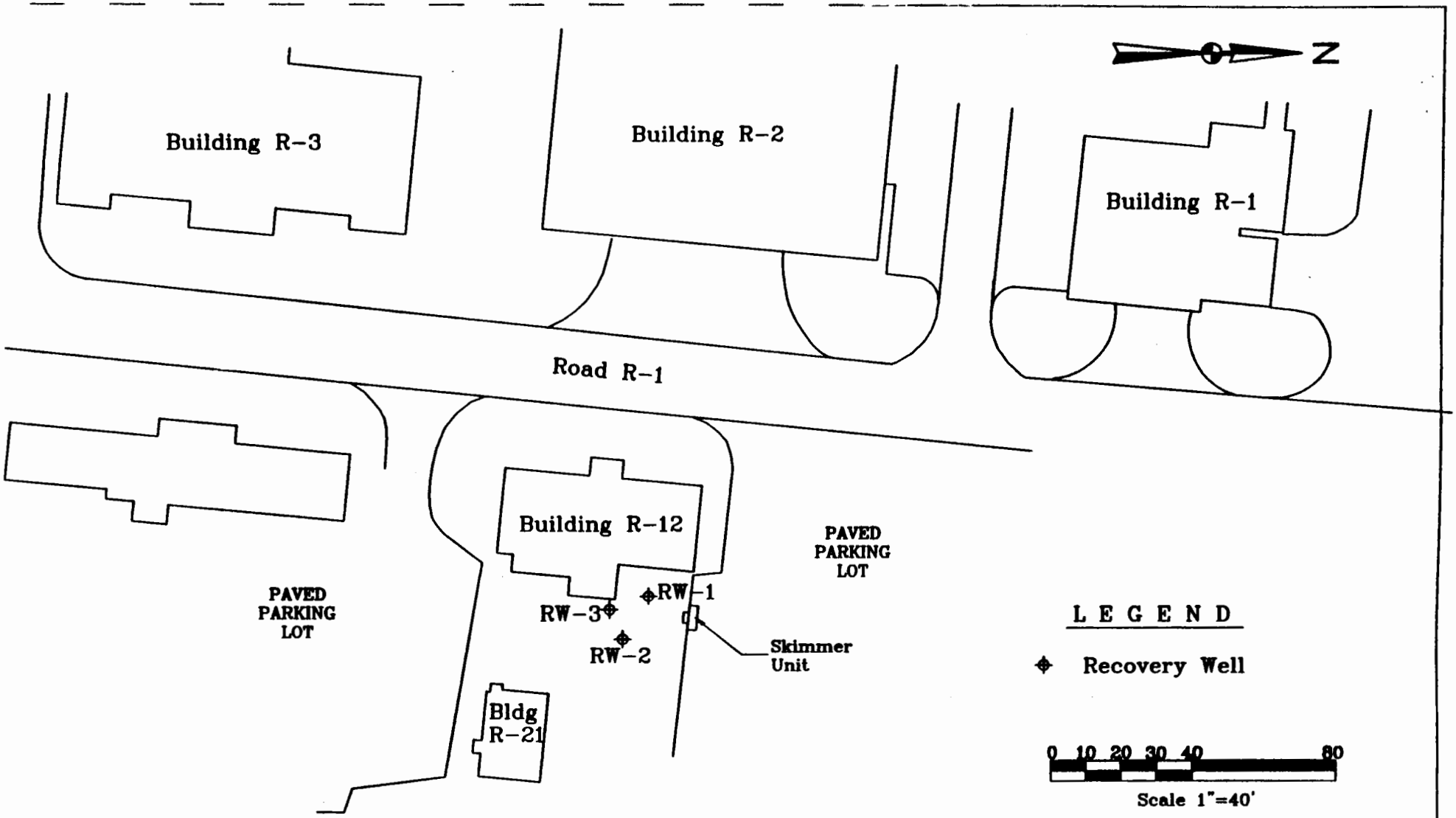
NWS – Earle

Colts Neck, N.J.

Figure 2–1
Building R-12

FOSTER WHEELER ENVIRONMENTAL CORPORATION

earle\siteloc.dwg



U.S. Navy RAC
Naval Weapons Station – Earle

Figure 2-2
Building R-12
Product Recovery Wells

FOSTER WHEELER ENVIRONMENTAL CORPORATION

avyrac\earle\bldgR-12

2.1 PREVIOUS INVESTIGATIONS

A previous remedial investigation conducted by Tetra Tech NUS, Inc. (TtNUS) indicated that contamination and free product existed in the vicinity of the UST that was abandoned in place near Building R-12. The three recovery well locations were selected based on the free product plume delineated during the remedial investigation. A bail down test conducted by TtNUS in February 1999, indicated that passive skimming is an acceptable and appropriate method for removing the free phase product from the area of concern. Results of the bail down test, and additional information used in selecting the remedial method is included the TtNUS "Letter Report of Bail-down Test Results" (TtNUS Letter Report, 1999), Appendix A of this report.

Additional information on the remedial investigation performed by TtNUS can be found in the following NJDEP approved reports:

- TtNUS, September 1998, Final Report-"Phase 1 Remedial Investigation Report for the Group 3 Underground Storage Tank Sites."

- TtNUS, November 1998, Final Report -"Remedial Action Work Plan and Classification Exception Area Documents for Buildings R6/7 and R-12."

2.2 SITE CONDITIONS

Local topography at Building R-12 is relatively flat, approximately 150 feet above sea level. The three recovery wells are located in a grassy area to the east of Building R-12.

2.2.1 Site Geology

NWS-Earle is situated in the Coastal Plain Physiographic Province of New Jersey. The Coastal Plain consists of a series of seaward-dipping unconsolidated sediments of Cretaceous through Quaternary Age, deposited atop pre-Cretaceous bedrock. The Coastal Plain sediments were deposited in continental, coastal, and marine depositional environments, and consist of numerous sequences of sand and gravel, silt, and clay. These deposits generally strike northeast-southwest, and dip to the southeast at 10 to 60 feet per mile. The Coastal Plain section is nearly 900 feet thick beneath NWS-Earle.

Previous investigations that occurred at Building R-12 indicated that the soils in that area were of the Englishtown formation. The Englishtown Formation consists of tan and gray, fine and medium grained sand with local clay beds. Site borings describe the soils as mainly silty, clayey fine-grained sand and silty fine-grained sand with some silty clay layers (TtNUS Letter Report, 1999).

C contains photos of the skimmer system set-up. An intrinsically-safe tank overfill protection device (float switch assembly) is to ensure a maximum product level within the drum. When the float switch is activated at 8" below the top of the drum, the system is shutdown

The skimmer pump and air compressor are self-operating and require little maintenance. The typical maintenance conducted over the past year includes:

- Ensuring the pump is situated at the proper depth interval in the well to ensure the hydrophobic filter is in contact with the product interface;
- Switching the pump between the recovery wells;
- Ensuring the air compressor has oil, and changing out the oil as needed;
- Checking air filter;
- Ensuring that minimal or no water is being recovered with the product;
- Adjusting the timer to cycle the pump as required;
- Trouble shooting the pump and compressor when problems develop.

Some of the primary operation and maintenance functions that have been undertaken during the operational period include:

- Upon arrival of the skimmer pump at the site in October 1999, the pump was taken apart and the diaphragms and worn tubing inside the pump were replaced;
- In February 2000, a defective/faulty electrical air pulse module was replaced and new product transfer tubing was also installed.
- In April 2000, the skimmer pump began to extract water. The diaphragm on the skimmer pump was replaced again.
- In July 2000, the air compressor on the skimmer unit was replaced. In May 2000, the compressor began to exhibit signs of fatigue and failure. Compressed air was being expelled through dipstick port. FWENC notified the manufacturer, and determined the compressor was no longer under warranty, and rebuilding costs would be comparable to purchasing a new air compressor.
- In September 2000, a timer was installed on the skimmer pump in order to decrease the amount of water being recovered with the product. If all the product is removed from the well with the skimmer pump, the pump tends to begin to pump water through the hydrophobic filter. The timer was set to operate the skimmer pump intermittently to decrease the removal of water.
- During October 2000, a pilot study using vacuum-enhanced skimming was conducted at the site. The pilot study report was submitted as a separate report submittal.

3.2 PRODUCT MEASUREMENTS

An oil-water interface probe (Solonist) was used to gauge the apparent product thickness and depth to water in the recovery wells. Appendix D contains the product/water measurements obtained from the wells during the entire period of performance. Appendix D also contains a summary of the amount of product recovered during the period of performance.

4.0 CONCLUSIONS

The skimmer pump operated over the past one year and five months with minor operational problems. The problems encountered were typical operation and maintenance problems that can be expected to be encountered with such a system. When the skimmer pump was operational in a recovery well, the pump removed all the free product from the well, down to a sheen. The installation of a timer on the skimmer pump was instrumental in reducing the recovery of any water with the free-phase oil.

The TtNUS Report stated that the volume of free product released was estimated to be 471 gallons, and approximately 421-gallons of that were recoverable. As identified in the TtNUS Report, and other references, the analysis and evaluation of data from bail-down tests for the purpose of determining actual product thickness and volumes can be speculative (Testa and Paczawski, 1989). Comparison of estimated recoverable product volume to actual volume of product recovered is the only reasonable method for estimating recoverable volumes considering the variables associated with the product the capillary zone and the aquifer matrix (Testa and Paczawski, 1989). During the 16 months of operation, 42-gallons of product were recovered by rotating the skimmer pump between the various recovery wells. If the TtNUS estimate of recoverable product is accurate, approximately 10% of the total recoverable product has been recovered to date. As demonstrated by the apparent product thickness measurements in the graphs contained in Appendix D, there has been a continued decrease in the apparent product thickness measurements since the start of the recovery operation.

The product skimming pump has been working as per its design capabilities. Based on the minimum amount of free-product available for recovery at the site, the passive product recovery approach is the most cost-effective method for product recovery.

There are several options available for consideration in the continued removal of free-phase product from the areas east of Building R-12:

- Option # 1: Continue operation of the one skimmer pump, rotating the pump between the recovery wells (No additional equipment costs);
- Option # 2: Install skimmer pumps in all three recovery wells (approximately $2,900 per skimmer pump plus $500.00 for a larger air compressor unit);
- Option # 3: Keep the skimmer pump in one of the recovery wells, and install passive product collection devices in the other two wells (approximately $900.00 per collection device).

Option # 3 would be the recommended approach. Based on the operation of the skimmer pump over the past year and five months, RW-3 produces and recovers the most product. RW-1 and RW-2 were slow to recover once the product was pumped from the well. It is suggested that the skimmer pump be maintained in RW-3, and passive product collection devices be installed in RW-1 and RW-2. Appendix E contains some product information on one type of passive product collection device for wells. The product collection devices can be emptied into the

product drums during the scheduled operation and maintenance visit to the skimmer pump. It is also recommended that all the wells be redeveloped in order to ensure maximum product infiltration into the recovery wells. The product and water can either be processed through the oil/water separator at the Bilge Water Plant or the Bioslurper Unit.

5.0 REFERENCES CITED

Tetra Tech NUS, Inc. 1999. Letter report of Results, Building R-12 Bail-Down Test, NUS-Earle, Colts Neck, NJ.

Testa, Stephen and Paczkowski, Michael, 1989. Volume Determination and Recoverable Free Hydrocarbon, published in Groundwater Monitoring Review, Winter 1989,

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(610) 491-9688 ▪ FAX (610) 491-9645 ▪ www.tetratech.com

C-51-2-9-42

February 25, 1999

Mr. Brian Helland, Code 1812
Senior Environmental Engineer
Northern Division
Naval Facilities Engineering Command
10 Industrial Highway Mail Stop 82
Lester, Pennsylvania 19113

Reference: Contract No. N62472-90-D-1298(CLEAN)
Contract Task Order No. 206

Subject: Letter Report of Results
Building R-12 Bail-down Test
NWS Earle - Colts Neck, New Jersey

Dear Mr. Helland:

Tetra Tech NUS (TtNUS) is pleased to provide this letter report of results for the bail-down test conducted at Building R-12, at the Naval Weapons Station Earle. You will note that we performed the work between February 10 and February 15, 1999.

Background Information:

TtNUS installed 3 recovery wells, R12-RC-01, R12-RC-02, and R12-RC-03, in early June, 1998. The well locations were selected based on the results of a remedial investigations performed by TtNUS that delineated the extent of contamination and free-phase product within the immediate vicinity of the abandoned-in-place UST at the northeast side of Building R-12. Refer to Figure 1 in Attachment A, for the well locations, and a summary of the results for soil and groundwater samples from the previous investigations. Refer to Figures 2, 3, and 4 in Attachment A for copies of the well construction diagrams.

Previous investigations have indicated that the abandoned UST at Building R-12 lies in Cretaceous sediments of the Englishtown Formation, which consists of tan and gray, fine- to medium-grained sand with local clay beds. Site borings describe the soils as mainly silty, clayey fine-grained sand and silty fine-grained sand with some silty clay layers. The depth to groundwater in the UST vicinity was 9 to 11 feet below grade. Additional details regarding the remedial investigations are included in the following New Jersey Department of Environmental Protection (NJDEP)-approved reports:

- TtNUS, September 1998, Final Report – "Phase I Remedial Investigation Report for the Group 3 Underground Storage Tank Sites."
- TtNUS, November 1998 Final Report – "Remedial Action Work Plan and Classification Exception Area Documents for Buildings R-6/7 and R-12."

Bail-down Test Summary:

The purpose of the bail-down test was to characterize the product recovery rate in the recovery wells and to estimate the true product thickness in the formation around the UST. This information can be used to make conclusions and recommendations regarding further testing (e.g., pilot tests, bailing) and the selection of appropriate product removal methods.

The bail-down test was initiated on February 10, 1999. Pre bail-down product and groundwater levels were recorded at each well. Available free product was then extracted from each well with a peristaltic pump. Immediately following extraction, product and groundwater levels were recorded at increasing time intervals over a 123-hour period.

During the first 5 hours after the initial bail-down, product and groundwater level measurements were recorded in the 3 recovery wells at increasing minute and hourly intervals. Figure 5 in Attachment A presents a plot of the free product recovery data for this period. Table 1 in Attachment B identifies product and groundwater level measurements recorded during the initial 5-hour recovery period. Two additional product and groundwater level measurement events were conducted approximately 21-hours and 123-hours respectively, after the initial bail-down. Table 2 in Attachment B identifies and compares key measurements throughout the duration of the test.

Weather conditions during the bail-down and measurement events were dry and cold, with temperatures ranging between the 30°F and 50°F. Note that all product, groundwater, and decontamination liquids were containerized at the site and delivered to the bilge-water oil-water separator for final disposal. It should also be noted that based on the well construction diagrams, the depth to product in all three recovery wells was at least four feet below the elevation of the top of the well screen.

The following table summarizes the observed free product recoveries at each well and provides an estimated daily recovery rate for the noted time intervals following the bail-down:

Measurement Event	Product Thickness (ft.)	% Recovery (of static thickness)	Estimated Daily Recovery Rate(gal/day)
(Pre-bail-down)			
RC-01	1.1	N/A	N/A
RC-02	1.97	N/A	N/A
RC-03	2.38	N/A	N/A
RC-01 (+5 hours)	0.26	24	0.82
RC-02 (+4 hours)	0.43	22	1.7
RC-03 (+3 hours)	0.43	18	2.2
RC-01 (+21 hours)	0.36	33	0.26
RC-02 (+20 hours)	0.53	27	0.41
RC-03 (+19 hours)	0.52	22	0.43
RC-01 (+123 hours)	0.8	73	0.1
RC-02 (+122 hours)	0.68	36	0.09
RC-03 (+121 hours)	0.63	26	0.08

The EPA (1996) suggests that the daily recovery rate applicable to skimming type recovery systems can be estimated from the time it takes to achieve 80 percent of the maximum recovered thickness (following bail down). For wells RC-01 and RC-02 approximately 80 percent of the maximum recovered thickness (e.g., 0.53 ft of 0.68 ft for well RC-02) occurred at about 20 hours after bailing. Therefore, expected recovery rates for RC-01 and RC-02 are about 0.4 gallons per day as shown in the above table. For RC-01 the 80 percent recovery level occurred between 21 and 123 hours after bailing and a skimming recovery rate between 0.26 to 0.1 gallons per day is expected.

Product Thickness in the Formation:

The product bail-down test data were used to estimate the true thickness of the mobile hydrocarbon layer in the formation based on the methods of Hughes, et al (1988). Using this method the thickness of the mobile free product in the formation is graphically determined as the distance between the point of the initial product recovery rate change and the static depth to the top of the hydrocarbon layer prior to bailing (see Figures 6,

however require frequent labor input to remove product from the skimming devices and will likely result in a longer period of recovery.

Recommendations:

Since further migration of the observed free-product plume appears to be limited, and since an accelerated regulatory agency mandated time frame for product recovery is not being pursued, TtNUS recommends mechanical or passive skimmer-technology. However, this recommendation does not consider the Navy's plans for future use and disposition of the site. If the Navy requires an accelerated final disposition regarding free product at the site, active product removal methods, which would be more costly, could be considered. Further recommendations regarding the selection of the appropriate equipment, operating, and maintenance scenarios would require additional input form the Navy regarding target costs, time-frames, and site use planning and management.

In addition, given the close proximity of Building R-12 with the free-product plume, and the observed groundwater flow direction, TtNUS recommends periodic inspection of the sub-grade rooms in R-12 for vapors and/or the presence of product in floor drains or around foundations.

As always, TtNUS appreciates the opportunity to provide technical services to the Navy. Please contact me if you have additional questions or comments, or if you need additional copies of the report.

Sincerely

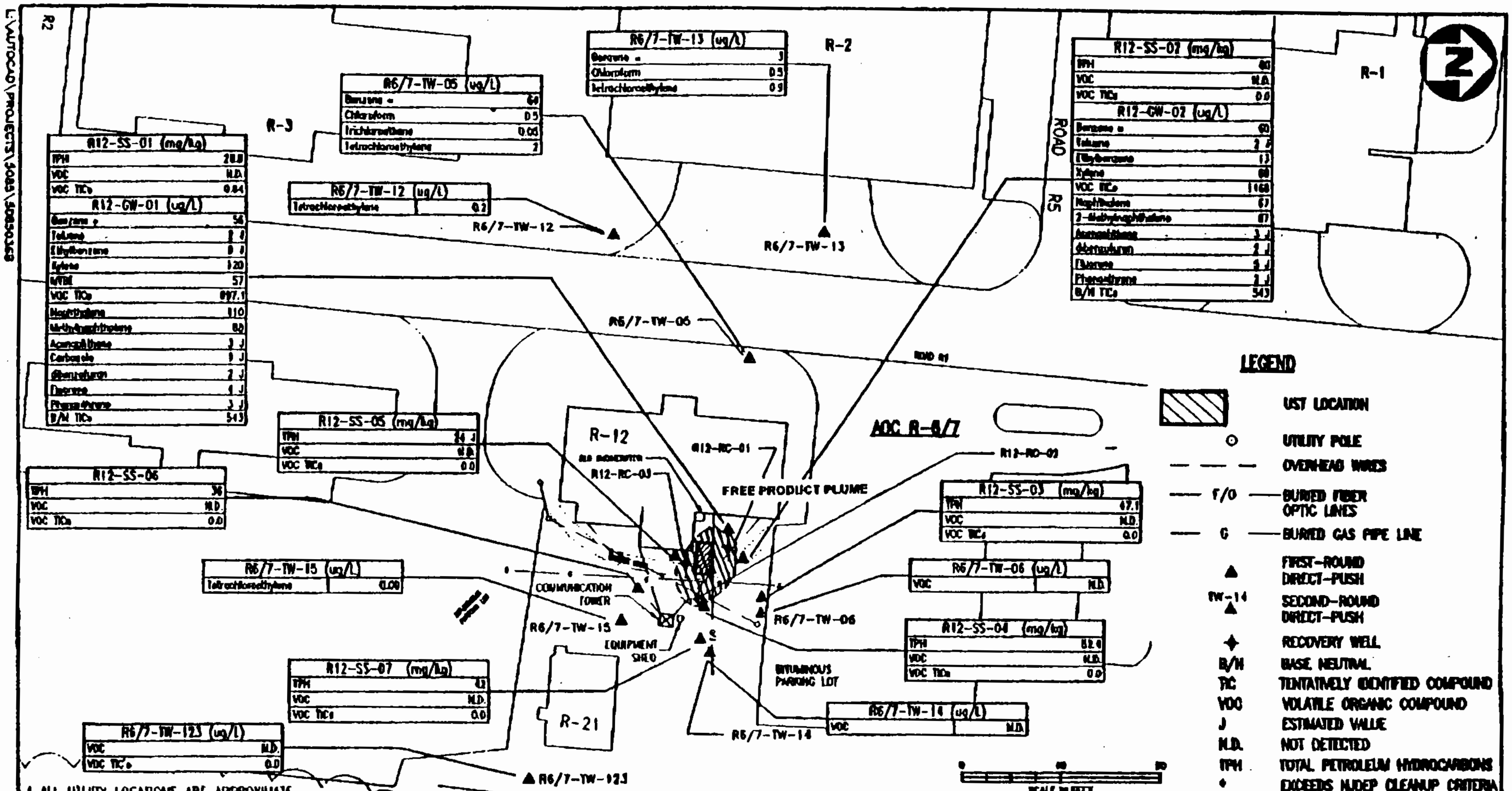
Richard J. Gorrell
Project Manager

RJG/ejc

c: Lawrence Burg, Navy - NWS Earle
John Trepanowski, P.E. - TtNUS
Garth Glenn - TtNUS
Russ Turner - TtNUS

ATTACHMENT A

MAPS and FIGURES



NO.	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES

DRAWN BY A.S.M. DATE 8-28-1998
CHECKED BY DATE
COST/SCHED-AREA
SCALE 1 in. = 40 ft.

Tetra Tech NUS, Inc.

AOC R-12
PHASE I RI-GROUP 3 UST SITES
NWS EARLE
COLTS NECK, NEW JERSEY

CONTRACT NO. N62472-90-D-1298
OWNER NO.
APPROVED BY DATE
APPROVED BY DATE
DRAWING NO. FIGURE 1 REV. 0

ADVANCED DRILLING, INC.	PROJECT: Navel Weapons Station Earl	CLIENT: Tetra Tech NUS, Inc.	PROJECT NO.: ADV 562	HOLE NUMBER: R12MW3

MUNICIPALITY	COUNTY	STATE	COORDINATES	WELL PERMIT NO.
Colts Neck	Monmouth	New Jersey	29 : 22: 327	29 38484

START DATE	COMPLETION DATE	DRILLER	DRILLER LICENSE NO.	BORING DIA.	TOTAL DEPTH
6-1-98	6-1-98	Roger Logel	M 1166	10.25	19 Ft.

LOT	BLOCK	DRILLING METHOD	SAMPLE TYPE	DEPTH OF GROUNDWATER
N/A	N/A	Hollow Stem Augers	From Cuttings	5 Feet

PROTECTIVE CASING	NOTES
Flush	

Soil Boring Cross-Reference R12MW3
Town and City Colts Neck
County and State Monmouth, New Jersey

Installation Date (s) 6-1-98

Drilling Method Hollow Stem Augers
Driller Roger Logel
Drilling Fluid None

Static water level after drilling ft.
Well developed for _____ hours at _____ gpm
Method of development Not recorded

Well Purpose Monitoring

Remarks

Prepared By Roger Logel
Date Prepared 7-13-98

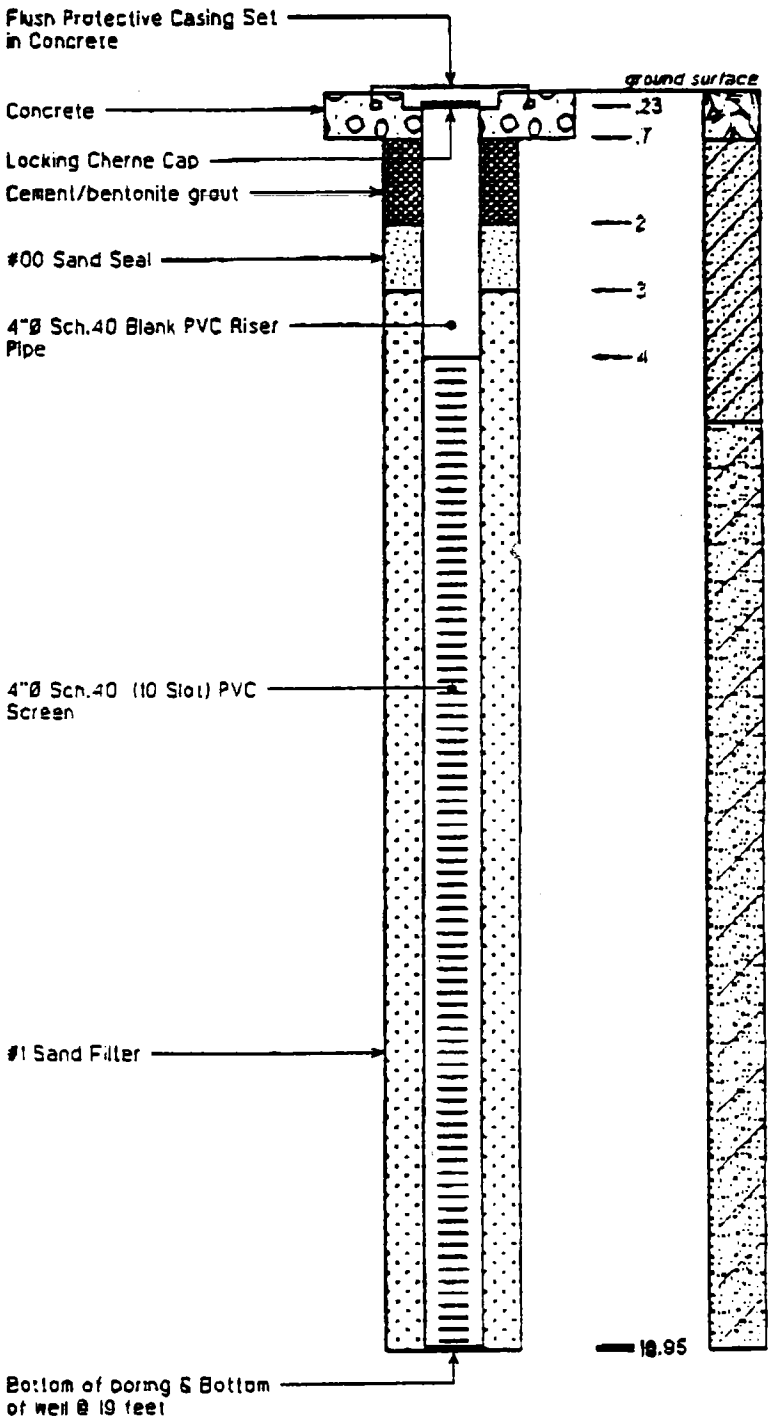


FIGURE 2

RC-02

ADVANCED DRILLING, INC.	PROJECT: Navel Weapons Station Earl	CLIENT: Tetra Tech NUS, Inc.	PROJECT NO.: ADV 562	HOLE NUMBER: R12MW2
MUNICIPALITY: Colts Neck	COUNTY: Monmouth	STATE: New Jersey	COORDINATES: 29 : 22: 327	WELL PERMIT NO.: 29 38463
START DATE: 6-2-98	COMPLETION DATE: 6-2-98	DRILLER: Roger Logel	DRILLER LICENSE NO.: M 1166	BORING DIA.: 10.25
TOTAL DEPTH: 19 Ft.	LOT: N/A	BLOCK: N/A	DRILLING METHOD: Hollow Stem Augers	SAMPLE TYPE: From Cuttings
DEPTH OF GROUNDWATER: 5 Feet	PROTECTIVE CASING: Flush	NOTES:		

Soil Boring Cross-Reference R12MW2
Town and City Colts Neck
County and State Monmouth, New Jersey

Installation Date (s) 6-2-98

Drilling Method Hollow Stem Augers
Driller Roger Logel
Drilling Fluid None

Static water level after drilling ft.
Well developed for _____ hours at _____ gpm
Method of development Not recorded

Well Purpose Monitoring

Remarks

Prepared By Roger Logel
Date Prepared 7-13-98

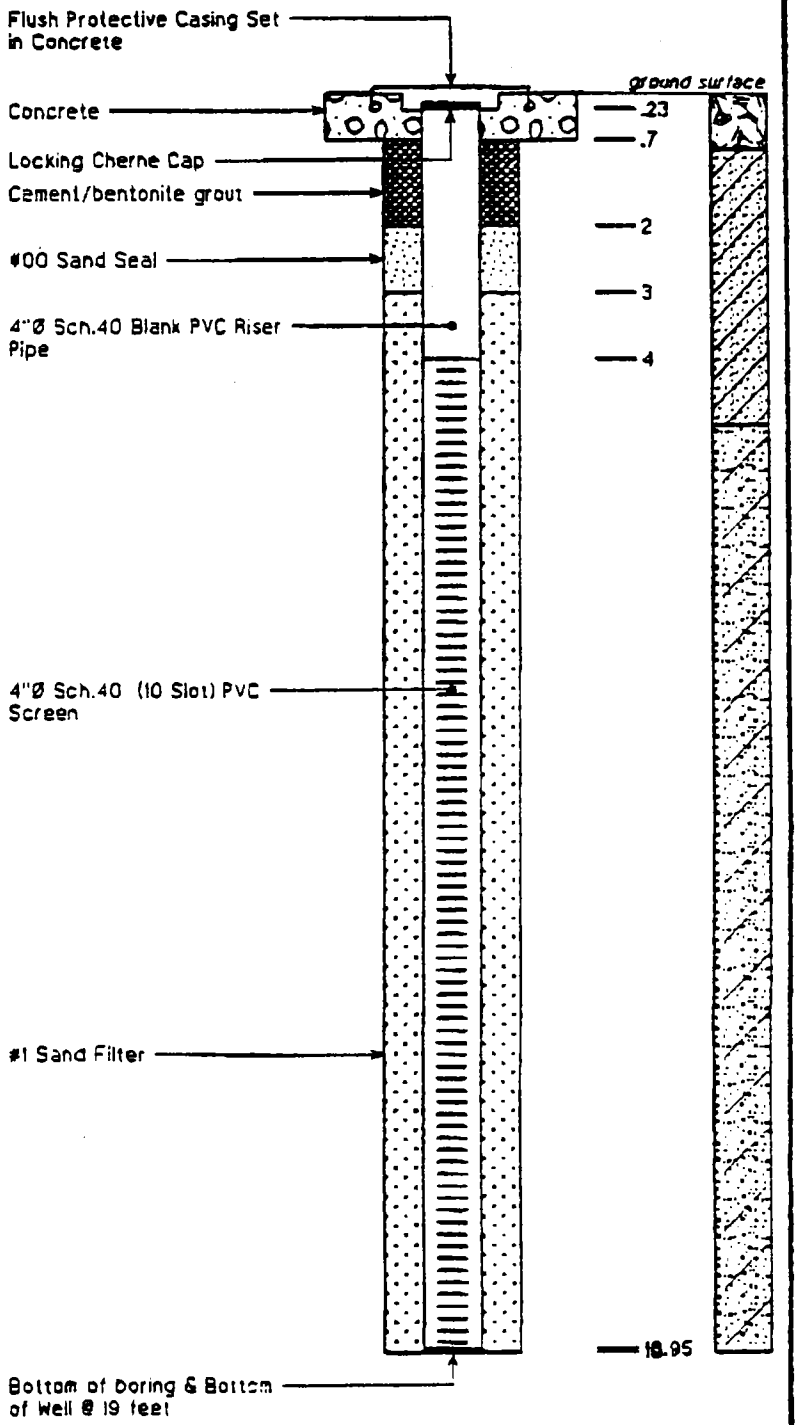


FIGURE 3

RC-03

ADVANCED DRILLING, INC.	PROJECT: Navel Weapons Station Earl	CLIENT: Tetra Tech NUS. Inc.	PROJECT NO.: ADV 562	HOLE NUMBER: R12MW1

MUNICIPALITY	COUNTY	STATE	COORDINATES	WELL PERMIT NO.
Colts Neck	Monmouth	New Jersey	29 : 22: 327	29 38462

START DATE	COMPLETION DATE	DRILLER	DRILLER LICENSE NO.	BORING DIA.	TOTAL DEPTH
6-2-98	6-2-98	Roger Logel	M 1166	10.25	18 Ft.

LOT	BLOCK	DRILLING METHOD	SAMPLE TYPE	DEPTH OF GROUNDWATER
N/A	N/A	Hollow Stem Augers	From Cuttings	5 Feet

PROTECTIVE CASING	NOTES
Flush	

Soil Boring Cross-Reference R12MW1
Town and City Colts Neck
County and State Monmouth, New Jersey

Installation Date (s) 6-2-98

Drilling Method Hollow Stem Augers
Driller Roger Logel
Drilling Fluid None

Static water level after drilling ft.
Well developed for _____ hours at _____ gpm
Method of development Not recorded

Well Purpose Monitoring

Remarks

Prepared By Roger Logel
Date Prepared 7-13-98

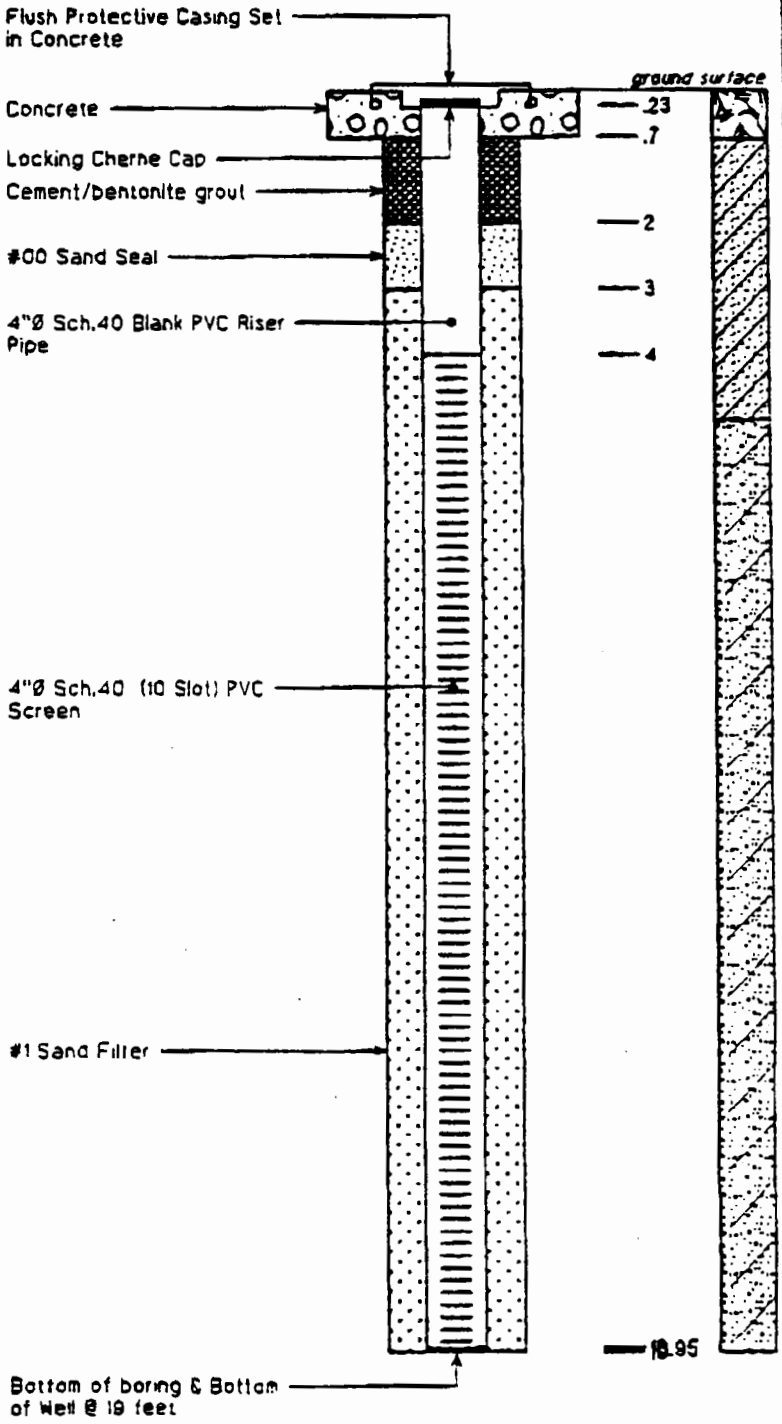
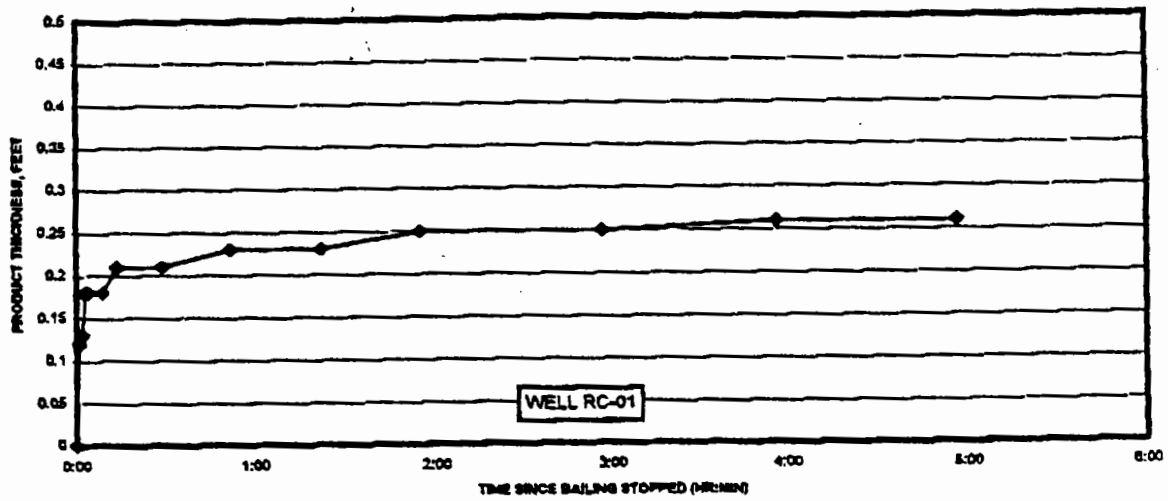
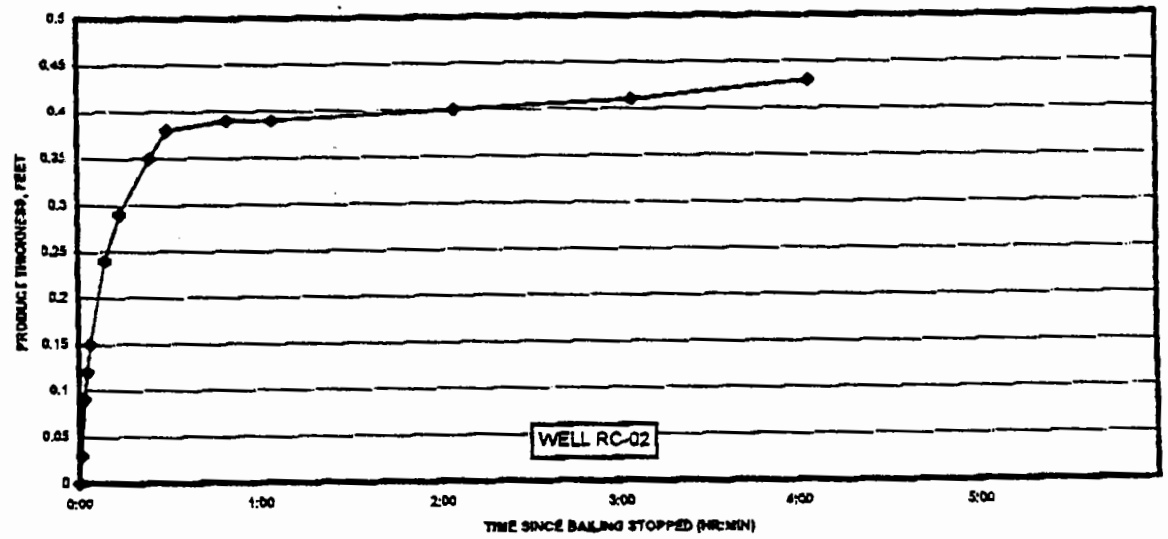
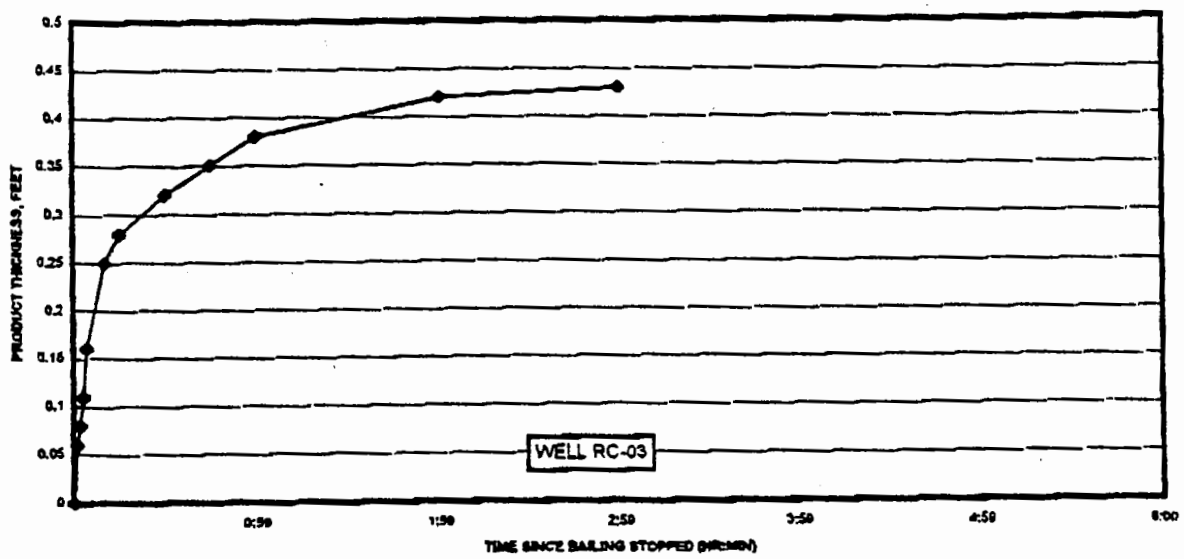


FIGURE 4

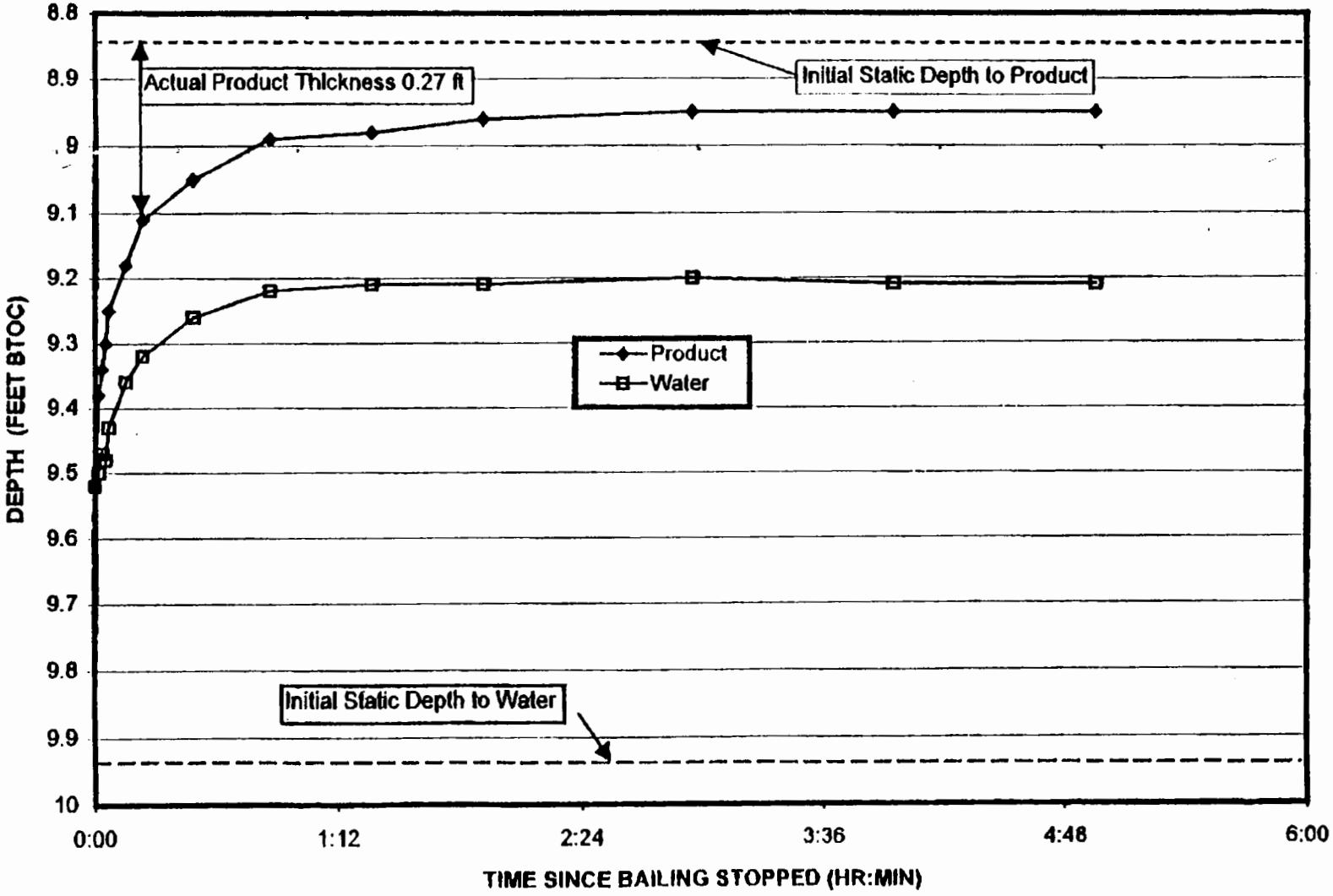
Figure 5
Product Recovery Thickness vs. Time
Building R-12
NWS Earle Colts Neck, New Jersey



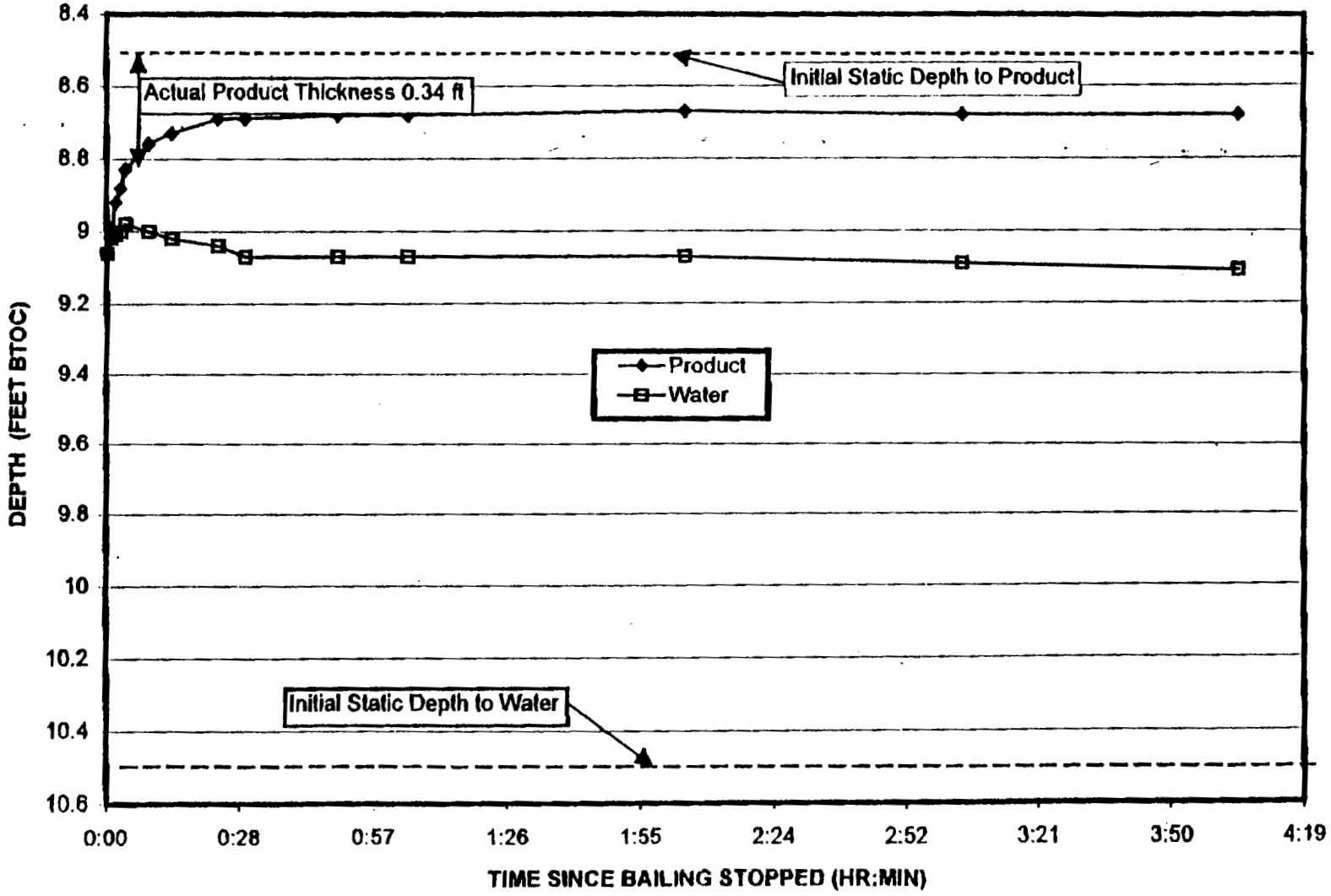




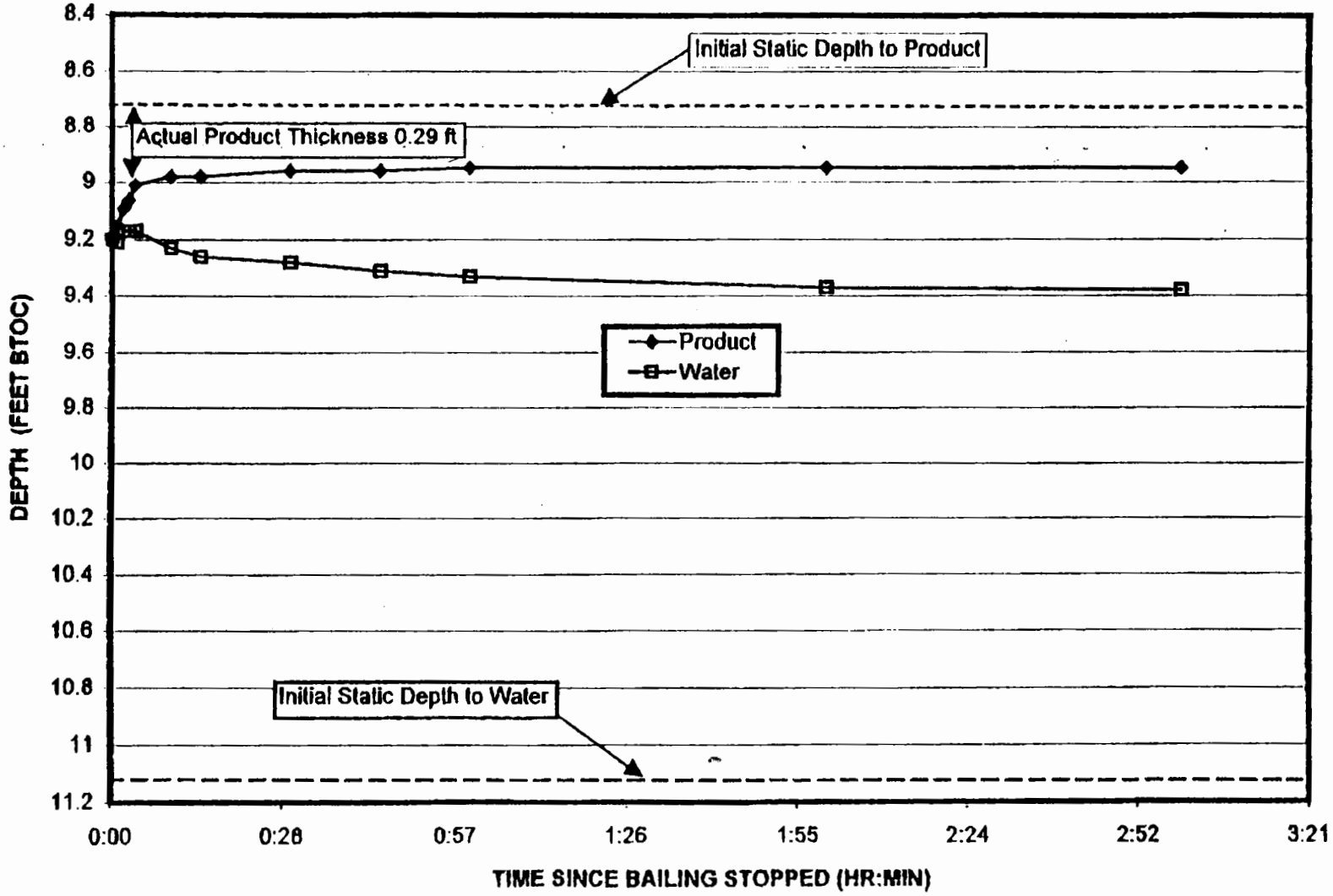
ATTACHMENT A
Figure 6
Depth to Product/Water vs. Time Ater Bailing
Recovery Well RC-01, Building R-12
NWS Earle Colts Neck, New Jersery



ATTACHMENT A
Figure 7
Depth to Product/Water vs. Time Ater Bailing
Recovery Well RC-02, Building R-12
NWS Earle Colts Neck, New Jersery



ATTACHMENT A
Figure 8
Depth to Product/Water vs. Time Ater Bailing
Recovery Well RC-03, Building R-12
NWS Earle Colts Neck, New Jersery



ATTACHMENT B

DATA SUMMARY TABLES

ATTACHMENT B
Table 1
Bail-down Test Measurements
Building R-12
NWS Earle Colts Neck, New Jersey

Well/Time	Depth to Product(1)	Depth to Groundwater (2)	Product Thickness
RC-01/11:23	N/A	9.52	0
11:24	9.38	9.50	0.12
11:25	9.34	9.47	0.13
11:26	9.30	9.48	0.18
11:27	9.25	9.43	0.18
11:32	9.18	9.36	0.18
11:37	9.11	9.32	0.21
11:52	9.05	9.26	0.21
12:15	8.99	9.22	0.23
12:45	8.98	9.21	0.23
13:18	8.96	9.21	0.25
14:20	8.95	9.20	0.25
15:20	8.95	9.21	0.26
16:20	8.95	9.21	0.26
RC-02/12:25	N/A	9.06	0
12:26	8.99	9.02	0.03
12:27	8.92	9.01	0.09
12:28	8.88	9.00	0.12
12:29	8.83	8.98	0.15
12:34	8.76	9.00	0.24
12:39	8.73	9.02	0.29
12:49	8.69	9.04	0.35
12:55	8.69	9.07	0.38
13:15	8.68	9.07	0.39
13:30	8.68	9.07	0.39
14:30	8.67	9.07	0.40
15:30	8.68	9.09	0.41
16:30	8.68	9.11	0.43
RC-03/13:30	N/A	9.20	0
13:31	9.15	9.21	0.06
13:32	9.09	9.17	0.08
13:33	9.06	9.17	0.11
13:34	9.01	9.17	0.16
13:40	8.98	9.23	0.25
13:45	8.98	9.26	0.28
14:00	8.96	9.28	0.32
14:15	8.96	9.31	0.35
14:30	8.95	9.33	0.38
15:30	8.95	9.37	0.42
16:30	8.95	9.38	0.43

Notes:

(1) Depth to product measured in feet, with a Kech Interface Probe, from top of inner PVC casing to surface of free product.

(2) Depth to groundwater was measured in feet from the top of the inner PVC casing, to the surface of the water below the free-product.

ATTACHMENT B
Table 2
Bail-down Test Measurements
Building R-12
NWS Earle Colts Neck, New Jersey

Measurement Event	Depth to Product[1]	Depth to Groundwater[2]	Product Thickness (ft.)
2/10/99 (Pre-bail-down)			
RC-01	8.84	9.94	1.1
RC-02	8.49	10.46	1.97
RC-03	8.72	11.1	2.38
2/10/99			
RC-01 (+5 hours)	8.95	9.21	0.26
RC-02 (+4 hours)	8.68	9.11	0.43
RC-03 (+3 hours)	8.95	9.38	0.43
2/11/99			
RC-01 (+21 hours)	8.97	9.33	0.36
RC-02 (+20 hours)	8.69	9.22	0.53
RC-03 (+19 hours)	8.98	9.5	0.52
2/15/99			
RC-01 (+123 hours)	8.89	9.69	0.8
RC-02 (+122 hours)	8.62	9.03	0.68
RC-03 (+121 hours)	8.91	9.54	0.63

Notes:

(1) Depth to product measured in feet, with a Kech Interface Probe, from top of inner PVC casing to surface of free product.

(2) Depth to groundwater was measured in feet from the top of the inner PVC casing, to the surface of the water below the free-product.

ATTACHMENT C

CALCULATIONS

CLIENT NWS Earle – Colts Neck, New Jersey		JOB NUMBER CLEAN Task Order No. 208
SUBJECT Building R-12, Calculation of the Volume of Free Product Around Abandoned UST		
BASED ON Product Bail Down Testing		DRAWING NUMBER ATTACHMENT C
BY Allan Jenkins, TtNUS	CHECKED BY R. Gorrell	DATE 2/22/99

PROBLEM

Calculate the Volume of Free Product and of Recoverable Free Product floating on the water table surface in the vicinity of the abandoned 2,000 gallon UST.

GIVEN

Free product bail-down testing was conducted on the three recovery wells, RC-01, RC-02, and RC-03, that contained a measurable accumulation of free product. The results of the bail-down testing were interpreted using the methodology of Hughes, et.at. (1988) to estimate the true product thickness in the formation and the results are summarized in the following table. No other wells at the site demonstrated the presence of free phase hydrocarbons.

Well	Test Date	Static Product Thickness in the Well (Feet)	Estimated Product Thickness in the Formation (Feet)	Exaggeration Factor
RC-01	2/10/99	1.1	0.27	4.1
RC-02	2/10/99	1.97	0.34	5.8
RC-03	2/10/99	2.38	0.29	8.2

Free product in the formation at the site is interpreted to lie on top of the capillary fringe above the water table. Fine grained silty to clayey sand that exists at the site is expected to have a generally thick capillary fringe (14 to 59 inches, Testa and Paczkowski, 1989). The accumulated product in the well also depresses the water level in the well, thus the exaggeration factor is expected to be relatively high as shown in the above table.

CALCULATION

Volume of Formation Containing Free Product:

The volume of the formation that contains free product is defined as the area of the free product plume multiplied by the estimated true product thickness in the formation. The areal extent of the free product plume was estimated to be 560 square feet (as described in the Bail Down Test letter report). Because of the small plume size and the narrow range of the true product thickness estimates no attempt was made to contour the thickness data within the plume area. The area was therefore multiplied by the average thickness to obtain the volume of the formation containing free product, Vf, as shown below:

True Product Thickness, ft.	Area, sq. ft.	Formation Volume, cu. ft. Vf
Average = 0.30	560	168

Total Volume of Free Product in the Formation:

The volume of free product in the formation is limited to the pore space in the formation that is open to fluid migration minus the volume of residual water (the original wetting fluid) that occupies a portion of the pore space. For calculation purposes the total available porosity and the field capacity for a typical fine grained sand were used for this calculation (as referenced below):

Total Porosity for fine sand (EPA 1994) = 0.457
Field Capacity for fine sand (EPA 1994) = 0.083
Available Pore Space = 0.457 - 0.083 = 0.374

The Total Volume of Free Product, Vt, is then,

Vt = Formation Volume x Available Pore Space = 168 cu.ft. X 0.374 = 63 cu.ft., or
= 471 gallons of product

Total Volume of Recoverable Free Product in the Formation:

The recoverable volume of free product is less than the total volume of free product because a portion of the product will not drain from the pores under the influence of gravity. In general, as the viscosity of the hydrocarbon increases and the grain size decreases the specific retention of the free product (i.e., residual hydrocarbon) increases. A typical oil retention capacity for kerosene (i.e., assume similar for fuel oil) for a fine sand to silt formation is 8 gallons / cubic yard of formation (Testa and Paczkowski, 1989). Applying this retention factor to the total volume of free product calculated above results in the following estimate for the total volume of recoverable free product, Vr, as shown below:

Vr = Vt - (Vf cu.yd. x 8 gal/cu.yd.) = 471 - (6.2 cu.yd. X 8 gal/cu.yd.) = 421 gallons

INTERPRETATION OF RESULTS

The calculations provided above are predicated on many factors for which significant errors in the data area possible, such as:

- difficulty in obtaining representative thickness measurements in wells during nonequilibrium conditions
- few number of monitoring wells containing free product
- determination of true vs. apparent product thickness based on well measurements only
- extrapolation of geologic and hydrogeologic information between monitoring points
- estimation or assumption of key factors including porosity, specific yield or oil retention values
- averaging of estimated true product thickness between data points
- effects of residual trapped hydrocarbons

Because of these factors the total and recoverable free product volumes provided above should be used only for estimating the scope and level of effort associated with developing remedial alternatives. In addition, active recovery of free product hydrocarbons and natural water level variations can cause significant volumes of residual free product to occur in the formation that can not be recovered by conventional methods. The relatively thin free product thickness in the formation coupled with the higher viscosity of fuel oil (compared to water) and the likelihood of some water level fluctuation suggests that the recovery efficiency will be tend to be low.

REFERENCES

EPA/600/R-94/169a, The Hydrologic Evaluation of Landfill Performance (HELP) Model, Users Guide for Version 3, September 1994.

Hughes, J.P., Sullivan, C.R., and Zinner, RE., "Two Techniques for Determining the True Hydrocarbon Thickness in an Unconfined Sandy Aquifer": In Proceedings of the National Water Well Association of Ground Water Scientists and Engineers and the American Petroleum Institute conference on Petroleum Hydrocarbons and Organic Chemicals in Ground Water: Prevention, Detection and Restoration, Vol. I, November, 1988, p. 291-314.

CLIENT NWS Earle – Colts Neck, New Jersey		JOB NUMBER CLEAN Task Order No. 206
SUBJECT Building R-12, Calculation of the Volume of Free Product Around Abandoned UST		
BASED ON Product Bail Down Testing		DRAWING NUMBER ATTACHMENT C
BY Allan Jenkins, TtNUS	CHECKED BY R. Gorrell	DATE 2/22/99

Testa, Stephen M., and Paczkowski, Michael T. , Volume Determination and Recoverability of Free Hydrocarbon, Ground Water Monitoring Review, Winter 1989.

Testa, Stephen M., and Winegardner, Duane L., Restoration of Petroleum-Contaminated Aquifers, Lewis Publishers, 1991.

SkimRite™

Product Skimming System

Installation & Operation Manual

ENVIRO PRODUCTS
1431 Hansen Street • Suite A • Lansing, Michigan 48910
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3684764

DAN EXT 20
517-282-04570

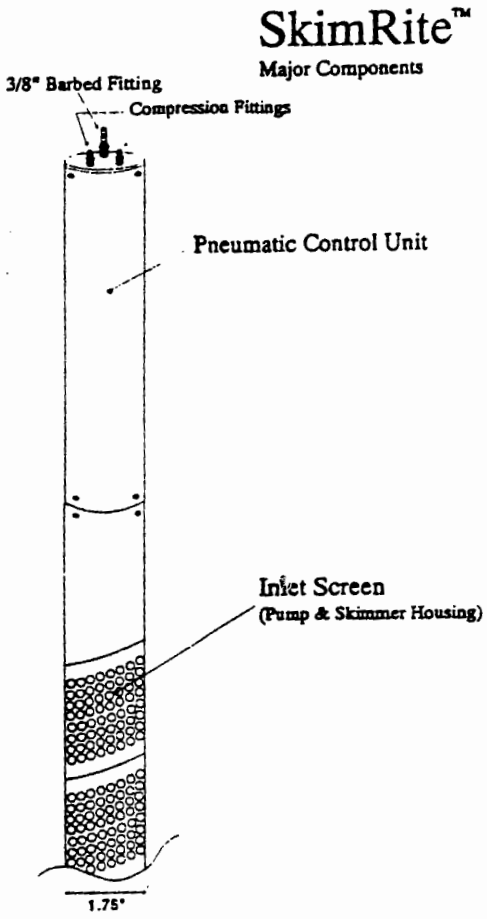
Table of Contents

System Components

Your **SkimRite™** system includes the following components:

1. **SkimRite™** (Pump/Skimmer/Controller)
2. 1 1/2 HP air compressor.
3. Air dryer/tank overfill protection panel.
4. 100 feet 5/16" O.D. nylon air line.
5. 100 feet 3/8" O.D. nylon air line.
6. 10 feet 5/16" O.D. nylon air line.
7. Locking well cap (lock not included).
8. 100 feet (30.5 meters) 3/8" I.D. discharge hose.
9. Tank overfill float switch assembly.
10. Parts kit containing the following:

    4 hose clamps
    4 compression nuts (5/16")
    4 compression nuts (3/8")
    4 nylon ferrules (5/16")
    4 nylon ferrules (3/8")
    4 screws, 6-32 flat head, slotted



IMPORTANT: Always wear eye protection when using pneumatic equipment.

Assembly Instructions

*Each component of your **SkimRite**™ system has been tested prior to shipping. Minimal assembly is required.*

1. The compressor you received with your system has been drained of oil for shipping purposes. Fill with oil before using (see compressor manual).

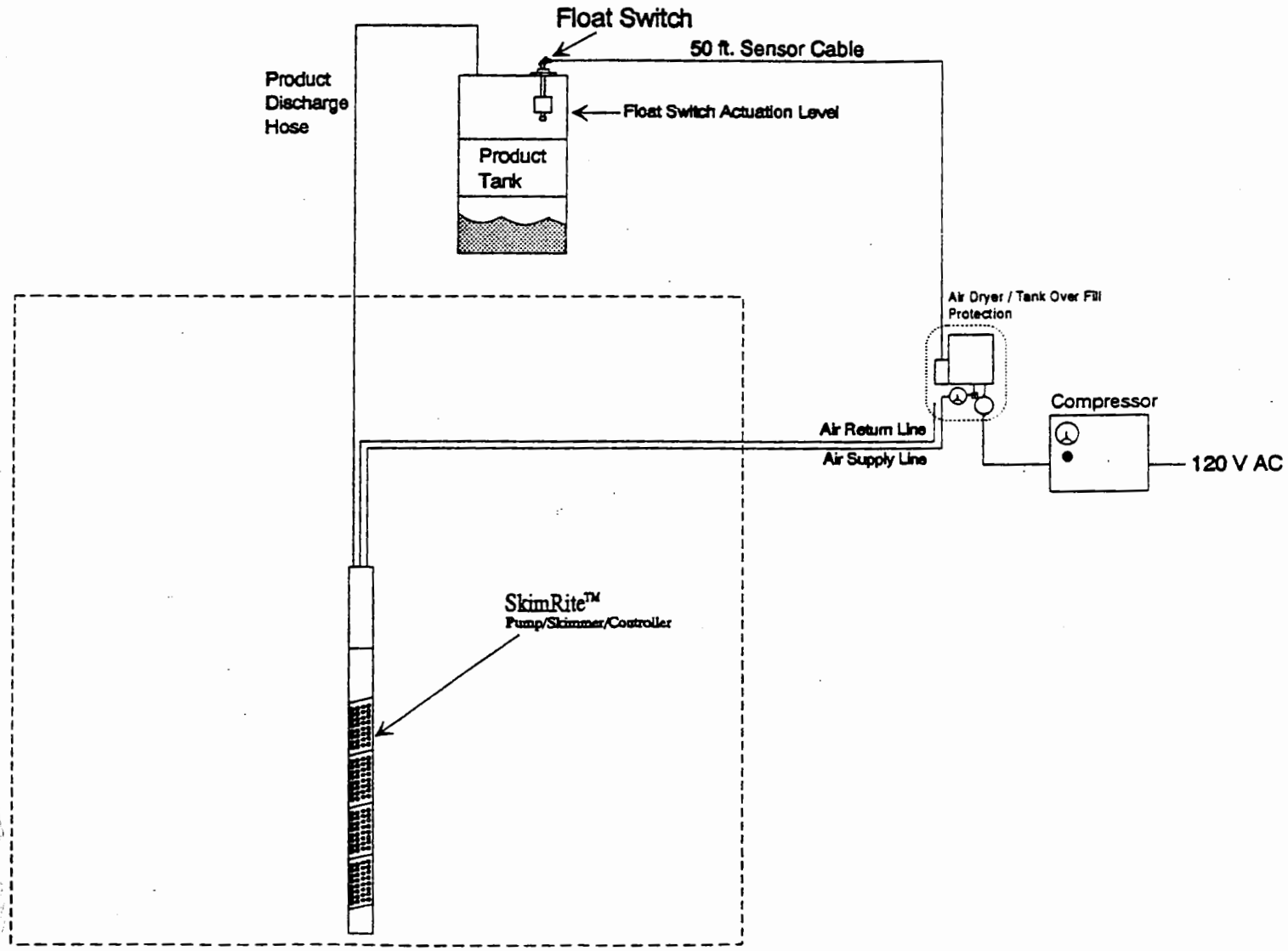
2. Small pieces of nylon tubing may have been inserted into the compression fittings on the **SkimRite**™ air dryer, and compressor. These are used to prevent damage to the fittings during shipping, and must be removed and discarded.

SkimRite™ Typical System Layout

The diagram below shows how the system is set up.

Note that the air return line and the air supply line both go from the **SkimRite™** to the air dryer.

NOTE: *It is extremely important to prevent blockage of the air return line. If water enters this line or it is blocked, the controller* ***will malfunction and damage may result.***



Installation

(Consult the diagram on page 3 for a schematic of the system configuration.)

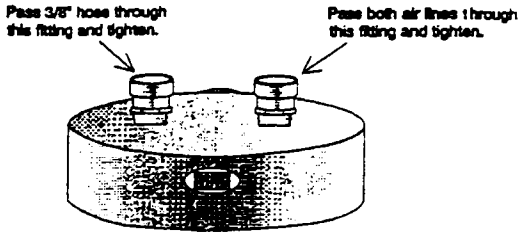
Pump/Skimmer/Controller

*The **SkimRite**™ can be used in well sizes as small as 2 inches diameter. The minimum water level in the well is 19 inches.*

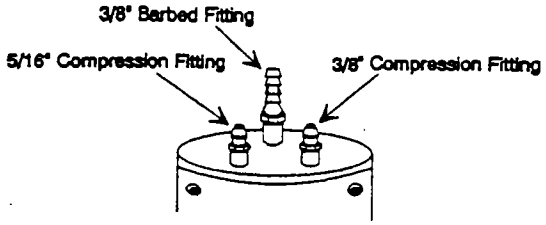
1. Measure from the top of the casing to the surface of the top liquid level in the selected well. Subtract 36.00 inches from this measurement.

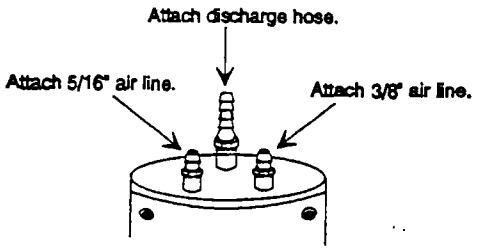
2. Using the resulting value, pull this length of the 3/8" discharge hose through one of the fittings on the well cap. Loosen the knurled nut on the fitting to allow the hose to easily slip through, then hand tighten until it clamps firmly onto the hose.

   Next, pull the same length of 3/8" and 5/16" air line through the other fitting and tighten gently.



Locking Well Cap





Top of SkimRite Control Canister

3. Connect the 3/8" discharge hose to the top of the **SkimRite**™ and secure using the supplied ear clamp.

NOTE: *The **SkimRite**™ will be suspended by this hose so be certain that the connection is tight.*

Connect the 3/8" air line to the 3/8" compression fitting on the top of the **SkimRite**™. Loosen the nut, push the tube into the fitting as far as it will go, then tighten with a wrench until secure.

Connect the 5/16" air line to the 5/16" compression fitting.

4. Lower the **SkimRite™** into the well until the well cap rests on the top of the well casing.

5. Secure the well cap to the casing by tightening the set screws located on the inner ring of the well cap.

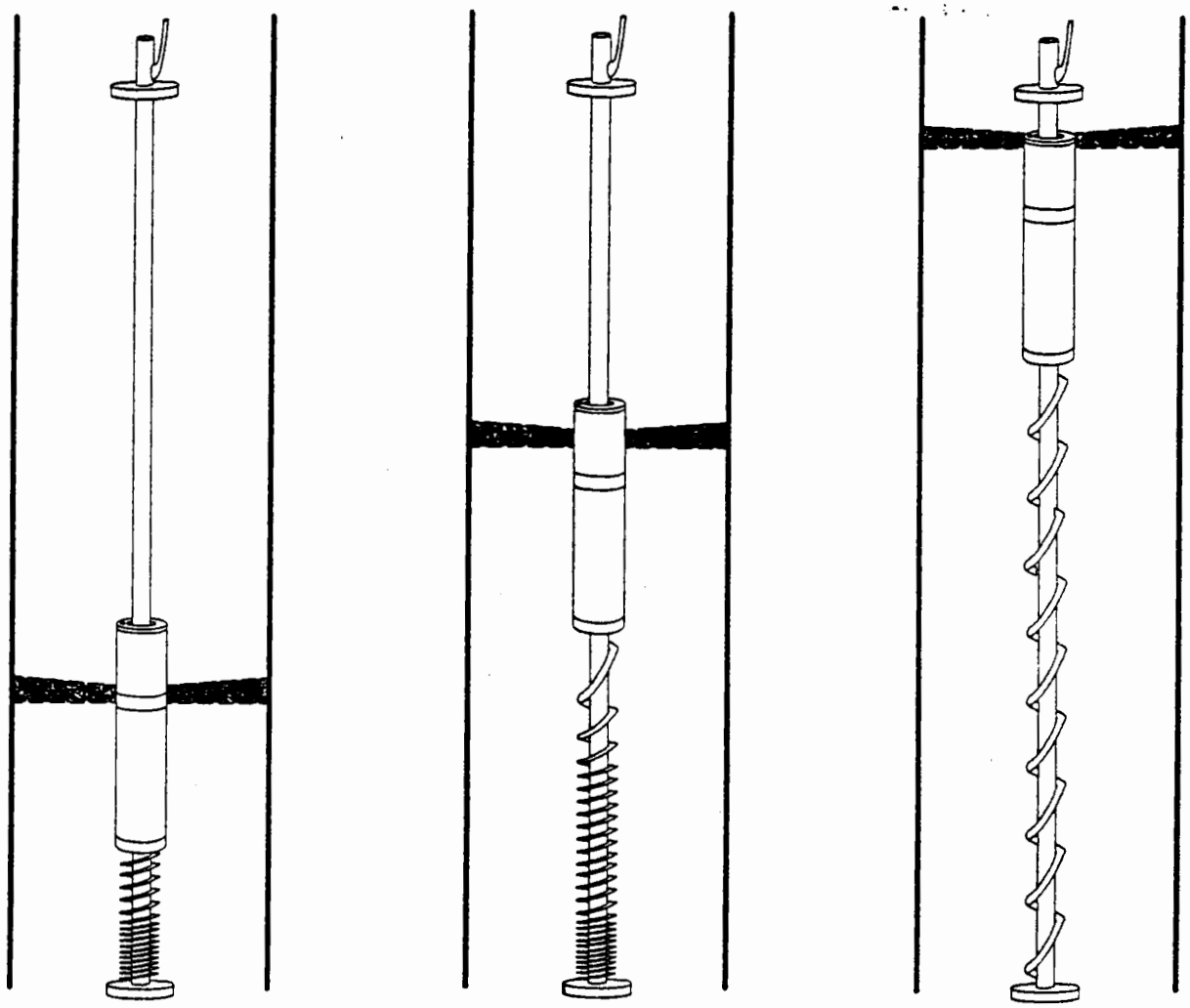
6. When properly installed, the **SkimRite™** buoy will be floating at the product-water interface. Common problems and their causes are shown in the figures on page 6.

4. Lower the **SkimRite™** into the well until the well cap rests on the top of the well casing.

5. Secure the well cap to the casing by tightening the set screws located on the inner ring of the well cap.

6. When properly installed, the **SkimRite™** buoy will be floating at the product-water interface. Common problems and their causes are shown in the figures on page 6.

SkimRite™ BUOY FLOTATION



A B C

Recommended installation of the **SkimRite™** is shown in Figure B.

When a large quantity of product is recovered, the water table will rise and the buoy will float higher as shown in Figure C. In this position, water will be in full contact with the filter and the buoy may be **fully submerged** in water. This submersion will allow water to enter the buoy through the orifice on the top of the filter. Also, the filter material **will be damaged** if submerged in water for any length of time.

Reposition the **SkimRite™** in the well by raising the **SkimRite™** by one foot so that the buoy is floating as shown in Figure A. Check the performance. It may be necessary to reposition the **SkimRite™** more than once before optimum performance is realized.

Discharge Hose and Air Lines

NOTE: *The discharge hose and air lines should be protected from damage by using conduit and/or underground installation.*

1. The discharge hose must be connected to your product holding tank. It will be the discharge line for recovered hydrocarbon fuels.

2. The 5/16" air line is used to supply air to the pump. This line must be run from the **SkimRite**™ to the air dryer.

3. The 3/8" air line is the air exhaust line for the pump and controller. This line should be run back from the **SkimRite**™ to the air dryer along with the 5/16" line. Protect the end of this line from moisture and blockage.

IMPORTANT: *If the 3/8" line is blocked or moisture is allowed into it, the control* ***will malfunction.***

Air Dryer

1. Mount the dryer panel in an upright position.

2. Connect the 10 ft. length of 5/16" air line to the SUPPLY port of the dryer panel using the supplied compression fittings. Connect the other end to the compressor.

3. Connect the 5/16" pump air line to the PUMP port. Connect the other end of this line to your **SkimRite™** pump.

4. Connect the 3/8" air return line to your **SkimRite™** pump and allow this line to vent in a non-hazardous environment, free from moisture. Blockage of this line will impair performance of the system.

5. Connect the tank full sensor to the terminals marked "1" and "2". Plug the panel into 120V AC using the supplied plug. Lift the float. Only the green indicator on the tank over fill protection module should be lit. When the float is down, both the green and yellow indicators should be lit.

6. Prepare the compressor for operation.

NOTE: The air dryer panel must be mounted in a location that will prevent exposure to freezing temperatures.

Tank Overfill Protection

Before the system will operate, the tank over fill sensor must be installed and tested.

1. The tank overfill protection circuitry is located inside of the air dryer control panel. A float switch is provided for the monitored tank, and must be installed. The float switch will fit in a 2" bung opening on the tank and must be installed on the top for the proper operation.

2. Run the 50' control cable from the float switch to the air dryer. Protect this cable from damage.

NOTE: *When the float is in the down position, the float switch is closed and will allow the system to operate.*

If the cable to the float switch is severed, the control circuitry will shut down the system.

3. Strip the ends of this cable (at the air dryer) and connect to terminals "1" and "2" inside the air dryer panel.

The control cable connections to the air dryer will have a sensing voltage on them which has no polarity and is at a low level. This voltage has been filtered through an intrinsic barrier located inside the air dryer.

Replacement of the Bladder

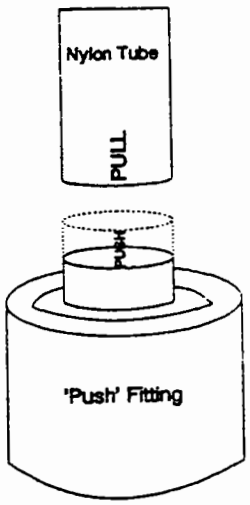
If the bladder in the pump becomes damaged or worn, replacement is required.

Removing the Bladder

(Refer to the diagrams on pages 21 and 22.)

1. Remove the screened portion of the pump/skimmer assembly by unscrewing three slotted screws at the top of the screen. Then, slide the screen off of the pump/skimmer.

2. At the top of the pump, remove the formed loop of 5/32" nylon tubing from its fittings. These fittings are "push fittings". The tube can be removed by pushing on the small brass ring where the tube enters the fitting, while pulling the tube in the opposite direction (out of the fitting).



3. Hold the upper check valve with a wrench. Unscrew the control canister from the pump by removing the coupling from the upper check valve.

   Remove the buoy's coiled hose from the nylon barbed elbow and 1/8 brass barbed elbow fitting at the bottom of the pump.

4. Remove the retaining rings at the top and bottom of the pump body. Pull the upper bladder barb fitting out of the pump to expose the bladder. Cut the bladder off from this fitting.

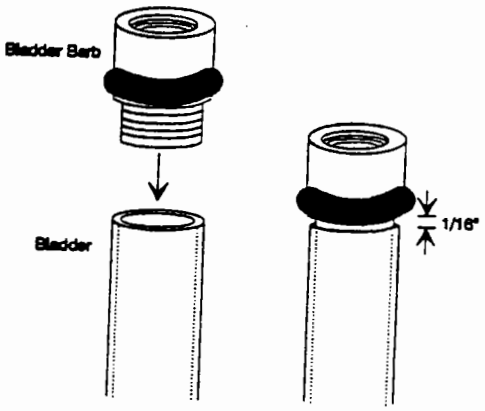
5. Pull the bottom bladder barb fitting (with bladder attached) out of the pump body. Remove the bladder from this fitting.

Installing the Bladder

(Refer to the diagrams on pages 21 and 22.)

1. Inspect the O-rings on each barbed fitting and replace if necessary. Lubricate the barbed fitting with light oil. Push the bladder onto the bottom barbed fitting. Leave 1/16" clearance between the end of the bladder and the 'stop' on the barbed fitting.

2. Insert the bladder into the pump body. Push the fitting into the body until there is room for the retaining ring to seat in the groove of the body. Install the retaining ring.



IMPORTANT: The recommended method for installing the bladder fittings into the body is by pressing them in. If you need to use a hammer for this operation, use one with a soft face (dead blow-type), and tap gently. Otherwise, damage to the check valve and fittings may result.

3. Using pliers, pull the bladder out of the top side of the pump body and hold. Install the barbed fitting on the bladder and insert into the top of the body. Push the fitting into the body until there is room for the retaining ring to seat in the groove of the body. Install the retaining ring. Gently pull on the fittings at either end of the pump body to seat the bladder.

4. Hold the check valve with a wrench to avoid twisting the bladder inside the pump housing. Attach the control canister to the pump and connect the nylon air tube to the 'push' fittings. Be careful not to kink this tube.

5. Attach the buoy's coiled hose to the barbed fittings at the bottom of the pump. Slide the screened outer housing onto the pump/skimmer and attach with three slotted screws.

Replacement of the Check Valves

If a check valve requires replacement, use the following procedure.

IMPORTANT: The check valves must be handled with care. **Damage will result** if they are dropped or subjected to rough handling.

Removing the Lower Check Valve

(Refer to the diagram on page 22.)

1. Remove the screen portion of the pump/skimmer assembly by unscrewing three slotted screws at the top of the screen. Then, slide the screen off of the pump/skimmer.

2. Remove the coiled hose from the nylon barbed fitting and brass barbed fitting by first pulling the nylon hose sleeve off the fitting. Then, pull the hose from the fitting.

3. Hold the lower check valve with a wrench. Loosen the strainer and attached fittings from the check valve by using a wrench on the upper hex of the strainer.

4. Remove the retaining ring from the pump. This will allow the bladder barb fitting to be pulled out. Carefully pull out on the check valve to expose the bladder barb fitting.

5. Firmly grip the exposed portion of the bladder barb fitting with locking pliers.

IMPORTANT: Do not grip the O-ring or bladder. Damage will result.

6. Use a wrench on the check valve to loosen it from the bladder barb fitting.

Installing the Lower Check Valve

(Refer to the diagram on page 22.)

1. Fit a replacement check valve into the bladder barb fitting. The direction arrow on the check valve must be pointing toward the bladder barb fitting.

2. Hold the bladder barb fitting as stated in the removal procedure. Tighten the check valve onto this fitting.

3. Push the bladder barb fitting into the pump housing until there is room for the retaining ring to seat in the groove of the body. Install the retaining ring.

IMPORTANT: The recommended method for installing the bladder fittings into the pump housing is by pressing them. If you need to use a hammer for this operation, use one with a soft face (dead blow-type), and tap gently.

4. Hold the check valve with a wrench to prevent the bladder barb from turning. Tighten the strainer and attached fittings onto the check valve by using a wrench on the upper hex of the strainer.

   Orient these fittings so that the brass barb elbow is aligned with the through-hole in the bottom centralizer and filter centralizer.

5. Attach the straight 1/8" tubing to the barb elbow using the nylon hose sleeve. The sleeve will press down onto the fitting and secure the hose. Take care not to cut the tubing when installing the sleeve. Connect this tube to the coiled hose using the 1/8" nylon barbed elbow and nylon hose sleeve.

6. Replace the screened portion of the pump/skimmer assembly using the slotted screws.

Removing the Upper Check Valve

(Refer to the diagram on page 21.)

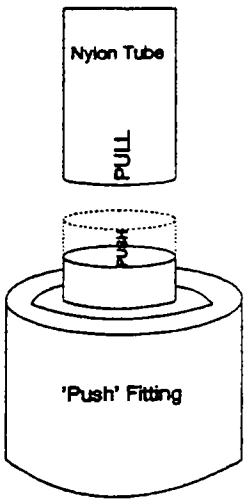
1. Remove the screened portion of the pump/skimmer assembly by unscrewing three slotted screws at the top of the screen. Then, slide the screen off of the pump/ skimmer.

2. Remove the formed loop of 5/32" nylon tubing from its fittings. These fittings are "push fittings". The tube can be removed by pushing on the small brass ring where the tube enters the fitting, while pulling the tube in the opposite direction (out of the fitting).

3. Hold the upper check valve with a wrench. Loosen the entire control canister assembly by using a wrench to loosen the brass coupling and attached fittings from the check valve.

4. Remove the retaining ring from the pump. This will allow the bladder barb fitting to be pulled out. Carefully pull out on the check valve to expose the bladder barb fitting.

5. Firmly grip the exposed portion of the bladder barb fitting with locking pliers.



IMPORTANT: Do not grip the O-ring or bladder. Damage will result.

6. Use a wrench on the check valve to loosen it from the bladder barb fitting.

Installing the Upper Check Valve

(Refer to the diagram on page 21.)

1. Fit a replacement check valve into the bladder barb fitting. The direction arrow on the check valve must be pointing away from the bladder barb fitting.

2. Hold the bladder barb fitting as stated in the removal procedure. Tighten the check valve onto this fitting.

3. Push the bladder barb fitting into the pump housing until there is room for the retaining ring to seat in the groove of the body. Install the retaining ring.

IMPORTANT: The recommended method for installing the bladder fittings into the pump housing is by pressing them. If you need to use a hammer for this operation, use one with a soft face (dead blow - type), and tap gently.

4. Hold the check valve with a wrench to prevent the bladder barb from turning. Tighten the coupling with attached fittings and control canister onto the check valve by using a wrench on the coupling.

5. Attach the formed loop of 5/32" tubing to the push fitting by pushing it into the fittings. Check for a secure connection by pulling outward on the tube.

   Take care not to kink the tube as leaks may develop.

6. Replace the screened portion of the pump/skimmer assembly using the three slotted screws.

Replacement of the SkimRite™ Filter Assembly

(Refer to the diagrams on pages 22 and 23.)

If the filter becomes damaged, use the following procedure for replacement.

Removing the Filter Assembly

1. Remove the screened portion of the pump/skimmer assembly by unscrewing three slotted screws at the top of the screen. Then, slide the screen off of the pump/skimmer.

2. Remove the coiled hose from the nylon barbed elbow by first pulling the nylon hose sleeve off of the fitting. Then, pull the hose from the fitting. Remove the nylon barbed elbow from the 1/8" straight tubing.

3. Hold the lower check valve with a wrench. Loosen the strainer and attached fittings from the check valve by using a wrench on the upper hex of the strainer.

4. Remove the bottom centralizer from the pump housing by loosening screws. The buoy/filter assembly can now be removed from the SkimRite™.

5. Remove the two screws which hold the buoy together. The buoy weight, lower buoy assembly, and upper buoy assembly can now be moved downward to expose the 1/8" barb fitting on the filter assembly. Cut the coiled hose from the barb fitting.

6. The filter assembly can now be removed.

Cleaning the Filter Material

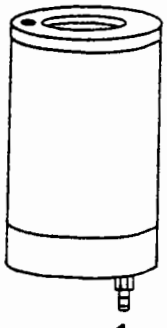
If the filter material appears to be clogged with foreign particles, follow this procedure.

1. Clean the porous polyethylene filter material with a mild detergent.

2. Rinse the material with clean water and thoroughly dry the buoy before using.

If organic growth appears to be the cause of the blockage, soak buoy in the 50% muriatic acid/water mixture for 24 hours. Then, rinse with clean water and dry thoroughly before using.

If cleaning the buoy does not rectify the problem, the buoy requires replacement.



Apply 4-5psi of air pressure + back to expedite drying time.

Installing the Filter Assembly

1. Connect the coiled hose, extending from the upper buoy assembly, to the 1/8" barb fitting on the filter assembly.

2. Connect the buoy weight, lower buoy assembly, and upper buoy assembly to the filter assembly using the long screws.

3. Slide the assembled buoy onto the pump housing. Replace the bottom centralizer 1/4" from the bottom of the pump housing.

4. Hold the lower check valve with a wrench. Tighten the strainer and attached fittings to the check valve by using a wrench on the upper hex of the strainer. Align the barb elbow with the hole in the bottom centralizer and filter centralizer.

5. Attach the coiled hose to the nylon barbed elbow using the nylon hose sleeve. Take care not to cut the coiled hose when tightening the sleeve onto the fitting. Connect the nylon barbed elbow to the 1/8" straight tubing.

6. Replace the screen portion of the pump/skimmer assembly using the slotted screws.

Cleaning the 100 Mesh Strainer

If the strainer requires cleaning, follow this procedure.

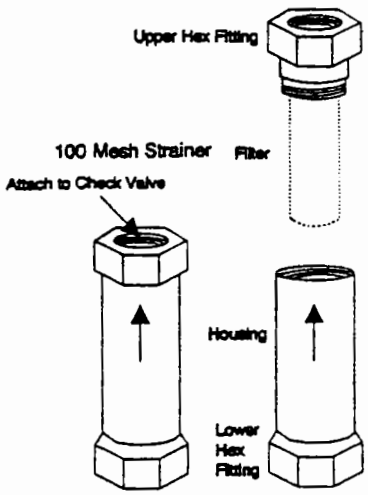
1. Remove the screened portion of the pump/skimmer assembly by unscrewing three slotted screws at the top of the screen. Then, slide the screen off of the pump/ skimmer.

2. Remove the straight 1/8" tubing from the nylon barbed elbow.

3. Hold the lower check valve with a wrench. Loosen the strainer and attached fittings from the check valve by using a wrench on the upper hex of the strainer.

4. Now, remove the inner assembly of the strainer by loosening the lower hex fitting from the housing. The filter (attached to the upper fitting) can now be cleaned.

5. Rinse particulates and debris from the filter using clean water.



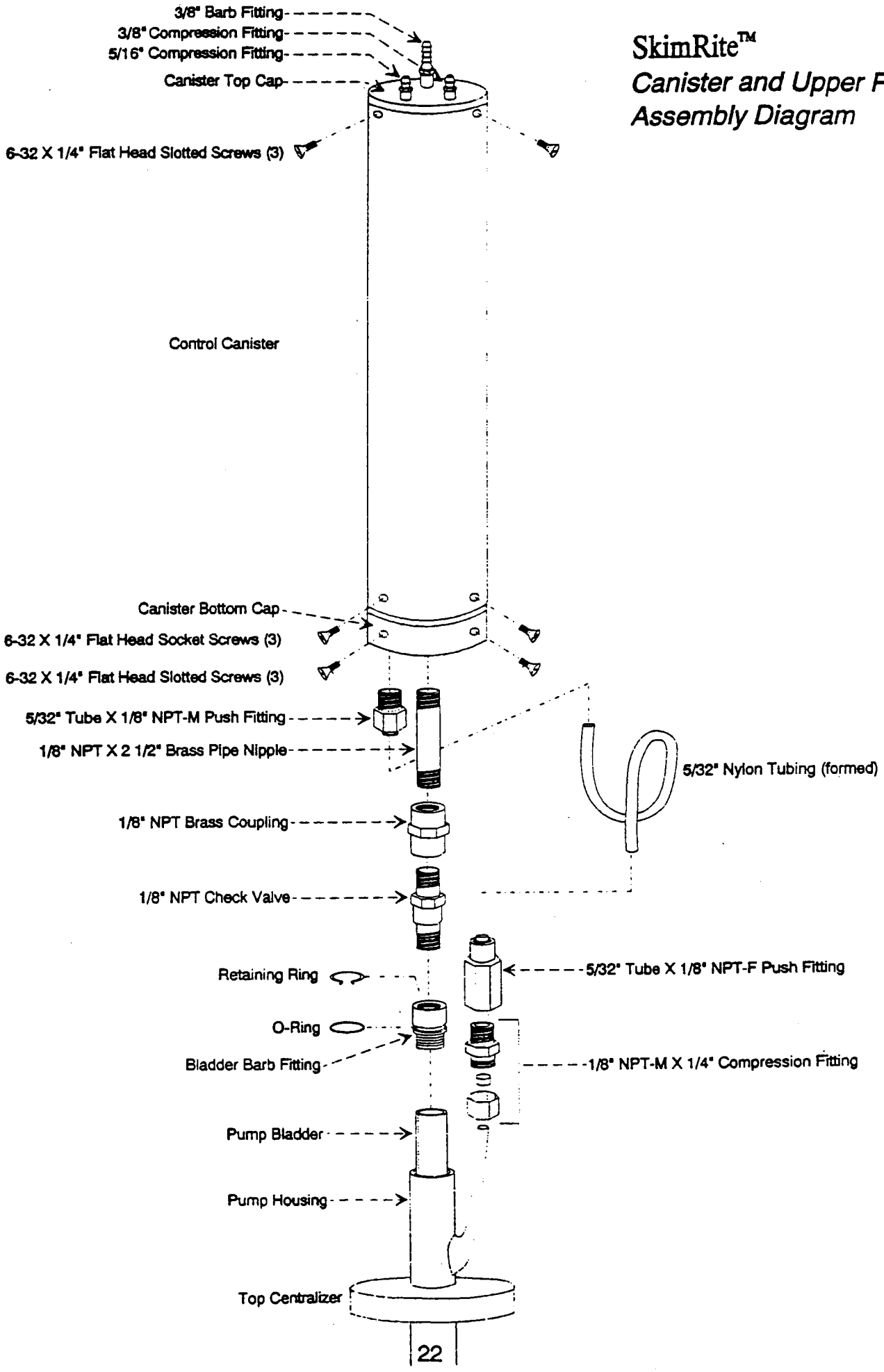
6. Reassemble the strainer. Tighten the strainer with attached fittings onto the lower check valve. Note the direction arrow on the strainer. This must point toward the pump when reassembling. Hold the check valve with a wrench to avoid rotating the bladder in the pump.

   Orient these fittings so that the straight 1/8" tubing is aligned with the nylon barbed elbow and through-hole in the bottom centralizer.

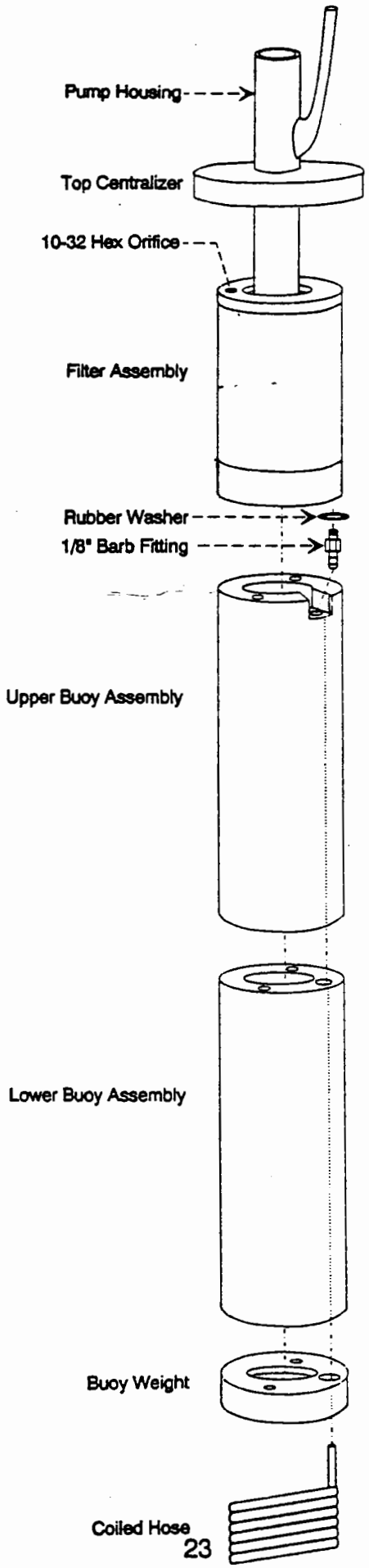
7. Attach the 1/8" straight tubing to the nylon barb elbow.

8. Replace the screen portion of the pump/skimmer assembly using the slotted screws.

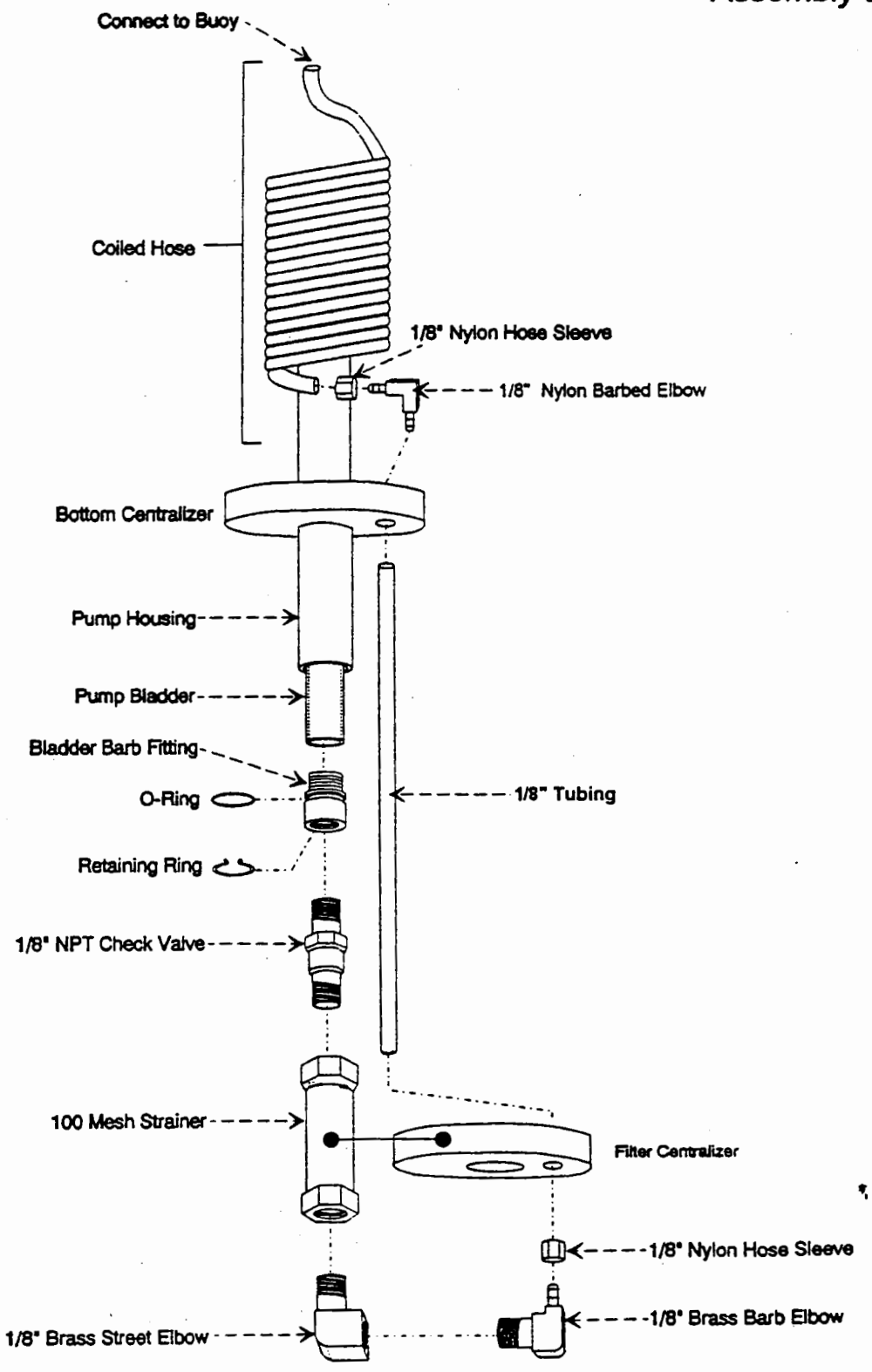
SkimRite™
Canister and Upper Pump Assembly Diagram



SkimRite™
Filter Buoy Assembly Diagram

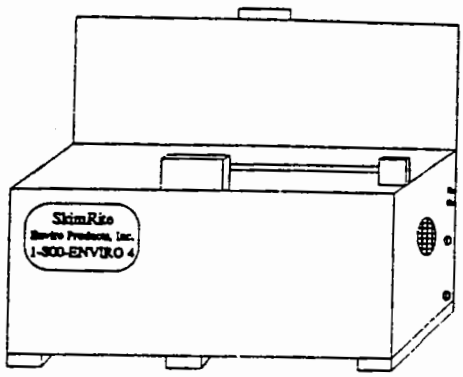


SkimRite™
Lower Pump Assembly Diagram



Outdoor Enclosure Option

The outdoor enclosure option is recommended for situations which require the **SkimRite**™ system to be portable and fully protected from the environment.



The system is configured and operated the same as a standard **SkimRite**™ system. Follow the procedure in the manual for installation and operation.

The compressor and air dryer are housed in a lockable, painted, steel enclosure. Connections for power, air supply and air return lines, and tank over fill protection are provided on the right side of the enclosure.

The **SkimRite**™ is stored in a 2" steel tube extending from the right side of the enclosure. Loosen the cap using a pipe wrench and remove the **SkimRite**™ from the tube.

The enclosure is vented and cooled by a small fan located on the right side of the enclosure. Louvers located on the left side of the enclosure must be kept open and free of obstructions. To aid in ventilation, do not position the enclosure so that the left or right sides are obstructed.

The power cord must be pulled through the lower cord fitting on the enclosure and the plug must be attached to it. Pull the tank overfill sensor line *completely through* the upper cord fitting. This line must be kept away from the power line to maintain intrinsic safety on the line. Additionally, no other lines should be connected to the conduit on the inside rear of the enclosure.

A small, black cup is provided to aid in changing in the oil in the compressor. To contain spillage, an oil absorbent pad has been provided. Compressor oil changes should be performed in accordance with the manual.

A lever valve on the inside front of the enclosure is used to drain moisture from the compressor air tanks. Depress the lever to drain. Moisture is discharged through a small hole in the bottom of the enclosure. The tanks should be drained weekly (minimum).

Heated Enclosure Option

The heated enclosure option is recommended whenever the **SkimRite™** will be used in temperatures below 40°F.

The enclosure is configured the same as the Outdoor Enclosure Option except for the following modifications:

A heating unit is attached to the inside of the enclosure to provide heat for the system. This heater is controlled by a thermostat located on the inside of the enclosure. The thermostat for this heater should be set at 50°F.

A thermostat for the fan is mounted near the heater thermostat and will activate the fan when the internal temperature exceeds 85°F.

Parts and Accessories

Description	Qty.	LIST PRICE	Part Number
SkimRite™ Pump/Skimmer/Controller	1	2,100.00	SR SKIMRITE PSC
1.5 H.P. Compressor (120V AC)	1	525.00	SR COMPRESSOR
Air Dryer with Tank Over Fill Protection	1	1,545.25	P EPI SR MEM AIRDRYER
3/8" O.D. Air Line Per 100 Foot	1	65.00	SR AIRVENT HOSE 3/8"
5/16" O.D. Air Line Per 100 Foot	1	45.00	SR AIRSUP HOSE 5/16"
3/8" I.D. Discharge Hose Per 100 Foot	1	117.00	SR DSCHG HOSE 3/8"
2" Locking Well Cap	1	37.00	SR WELL CAP 2"
4" Locking Well Cap	1	55.00	SR WELL CAP 4"
6" Locking Well Cap	1	63.00	SR WELL CAP 6"
8" Locking Well Cap	1	71.00	SR WELL CAP 8"
10" Locking Well Cap	1	79.00	SR WELL CAP 10"
12" Locking Well Cap	1	87.00	SR WELLCAP 12"
Check Valve	1	19.50	VLV502101
Bladder Replacement Kit	1	38.50	SR BLADDER REP KIT
100 Mesh Strainer	1	20.22	FLT50201250125
Coiled Hose	1	23.75	SR COILED HOSE
Formed Nylon Tube, Pump - Control	1	3.00	SRS 370 FRMED TUBE
Filter Assembly Replacement Kit	1	97.00	SR FILTER KIT
Manual	1	50.00	SR MANUAL STD SYS
RiteTank™	1	5,595.00	
Outdoor Enclosure for Compressor & Air Dryer	1	980.00	SR ENCLOSURE OPTN
Heat Option for Outdoor Enclosure	1	525.00	SR HEAT OPTION
Operational Timer	1	443.75	SR TIMER INTERMIT
Manifold Block	1	145.00	SR MANIFOLD ASY
Auto Drain	1	245.00	SR AUTO DRAIN OPT

Troubleshooting Guide (continued on page 29)

Problem	Cause	Corrective Action
No product being pumped. Air is discharged through the product hose.	1. Product has been removed from well.	1. None.
	2. Product level is below the skimmer buoy.	2. Change placement of the **SkimRite™** in the well. See the 'Installation' section of the manual.
	3. The air pressure is low.	3. Set the regulators as given in the 'Installation' section.
	4. The **SkimRite™** has been used in a well that is too deep.	4. At 60 PSI, the **SkimRite™** will pump from 120 feet.
	5. The product viscosity is too low.	5. Product will not flow through the filter.
Pump discharges water	1. The skimmer buoy is below the water level.	1. Adjust the placement of the **SkimRite™** in the well. See the 'Installation' section of the manual.
	2. Filter material surface tension has been reduced due to age or type of product.	2. Replace the filter assembly as given on pages 17 - 19.
No product or air being discharged through the product hose.	1. The product tank is full.	1. Empty the product tank. Check the operation/installation of the tank overfill float switch and control cable.
	2. The filter material in the buoy has been fouled by particulates in the product.	2. Clean or replace the filter as given on pages 17-19.
	3. The 100 mesh strainer has fouled.	3. Disassemble and clean the 100 mesh strainer as given on page 20.
	4. The air supply is very low or has been shut off.	4. Check the air supply pressure and set as given in the 'Installation' section. Check all shut off valves and air lines
	5. The controller is malfunctioning.	5. Check for blockage of 3/8" air return line.

Troubleshooting Guide Cont.

The air compressor is not operating	1. Power loss to the compressor.	1. Check the fuse/breaker box for the compressor. The fuse/breaker may be under rated for the compressor.
The air compressor runs continuously.	1. There is an air leak in the air supply lines. 2. There are too many pumps connected to the system. 3. The SkimRite™ controller is malfunctioning.	1. Check all lines for leaks. 2. A maximum of 4 SkimRite™ pumps can be used with the standard compressor supplied with the system. 3. Check for pulses of air at the 3/8" air return line. If there is a steady flow of air, the controller requires service.

Product Service

For product questions, problems, or application assistance, please contact **Enviro Products, Inc.** 9AM to 5PM EST, Monday through Friday.

Enviro Products, Inc.
1431 Rensen Street, Suite A
Lansing, MI 48910
(517) 887-1222
1-800 ENVIRO 4
FAX (517) 887-8374

Enviro Products, Inc.
One Year Warranty

The products manufactured by **Enviro Products, Inc.** are warranted, under normal or intended use, to be free of defects in material and workmanship for a period of 1 year from the date of purchase under the following conditions and restrictions.

Warranty is limited to the repair or replacement of a part or parts which are determined to be defective by inspection, or test at **Enviro Products, Inc.** Repair or replacement of said part(s) will be made by a qualified **Enviro Products, Inc.** technician or properly trained representative.

Round trip freight (and associated charges) of the warranted equipment will be at the expense of the purchaser. Travel expenses for service visits by **Enviro Products, Inc.** personnel will be billed to the buyer. Unauthorized repair or alteration of equipment will void this warranty in its entirety.

Equipment must be contamination-free when returned to **Enviro Products, Inc.** If it is determined that the buyer's equipment is contaminated, it will be returned to the buyer at the buyer's expense. Contaminated equipment will not be repaired, replaced, or covered under any warranty until such time that the said equipment is decontaminated by the buyer.

Equipment not manufactured by **Enviro Products, Inc.** will be covered by the warranty of its manufacturer and not under the warranty of **Enviro Products, Inc.** .

In no event or circumstance will **Enviro Products, Inc.** or its representatives be liable for any injury, damage, or loss, direct or consequential, incidental, indirect, punitive, or special, arising out of the use or inability to use the equipment sold to the purchaser by **Enviro Products, Inc.**

All liability and risk is assumed by the purchaser from the time of delivery. Purchaser will be solely responsible for use and suitability of equipment for intended use.

This warranty is effective 2/1/93 and is subject to change without notice.

Enviro Products, Inc.

Notice of Warranty Amendment for SkimRite™ Systems

The **SkimRite™** pump/skimmer/controller is **not subject to warranty repair or replacement** due to air supply-related causes when the air drying system used does not provide dew point reduction to 40 F, and particulate filtration of 5 microns minimum. Additionally, if the air drying system marketed and/or approved by **Enviro Products, Inc.** is misused or proper maintenance is not performed in accordance with manufacturer specifications, warranty on the system is voided.

Enviro Products, Inc. is **not liable for any damages** caused by improper use, improper installation, or lack of utilization of the tank over fill system marketed by **Enviro Products, Inc.** Secondary containment is recommended in all installations.

This warranty amendment supersedes the current warranty offered by **Enviro Products, Inc.** and replaces that warranty in part or full.

This warranty is agreed upon by the purchaser by the act of purchase and is effective upon receipt of the product by the purchaser.

Effective 10/1/92

MEMBRANE AIR DRYER SPECIFICATIONS

The following is general specifications for the Membrane Air Dryer module that is supplied by **Enviro Products, Inc.** This air dryer package is manufactured by **Enviro Products, Inc.** for use with pneumatic equipment requiring dry air with a dew point to -22° F.

1. The Membrane Air Dryer module is designed for dehumidification of compressed air. With the use of hollow fibre polymer membranes, the module facilitates dehumidification and enhances efficiency.

2. Air inlet and outlet of the Membrane Air Dryer is ½" NPT.
   Dimensions are 15" long X 4" diameter, Weight is .93 lbs
   Pressure range; 0 - 120 PSIG
   Operating ambient temperature; 32 - 104 F
   Compressed air flow rate; 3.53 - 35.3 SCFM
   Compressed air temperature; 70 F
   Dry air dew point (properly sized & used); -22 F

3. The module is designed for indoor use (protected from elements and freezing temperatures). The outer surfaces are made of Aluminum and plastics.

4. Supply air should be clean and the operating environment should be free from such chemicals as corrosive chemicals (hydrochloric acid, sulfuric acid, nitric acid, hydrogen sulfide, etc.) and organic solvents (carbon tetrachloride, chloroform, thinner, alcohol, trichloroethylene, acetone, ketone and aniline).

5. It is recommended that an automatic drain separator with a filter (5 micron or smaller) be installed just before the air supply inlet to eliminate drain and dust. The mixing of condensate into the air supply will lower dehumidification efficiency.

6. Purge flow orifice selects the maximum air flow rate that can be used. The typical output of dry air for maximum efficiency is 4 times that of the bleed air volume. i.e. 3 SCFM bleed air X 4 = 12 SCFM of usable dry air. This would give maximum efficience given proper air filtration and air cooling prior to the dryer.

7. The module starts to function when air pressure is applied to the unit. However, it takes 10 - 15 minutes for initial drying until normal dehumidifying level is obtained.

8. The unit can be mounted in any position.

Air-Mate by Emglo

Parts List #AM3978-391F
(Revised 2/93

MODELS AM39 and AM78

Operating Instructions & Parts Manual

AM39 - 3/4 Horsepower 115 Volt Single Phase 3.9 CFM Disp, 2.4 CFM Free Air @125 PSI.
AM78 - 1 1/2 Horsepower 115 Volt Single Phase 7.7 CFM Disp, 3.6 CFM Free Air @125 PSI

BEFORE YOU START THE COMPRESSOR ADD OIL!

The compressor is shipped without oil in the crankcase.

1. Remove plastic plug from oil fill port and fill crankcase with 4 oz. of Emglo N-100 Compressor Oil or SAE 30* non-detergent oil and install dipstick (Fig. 1).

***COLD WEATHER OPERATION (30°-50° F) use Emglo N-68 Compressor Oil or SAE 5W30 oil, if below 30° it may be necessary to warm the unit to 30° before starting.**

Figure 1

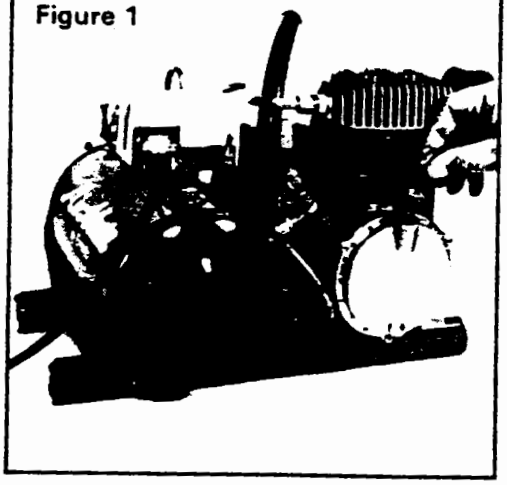
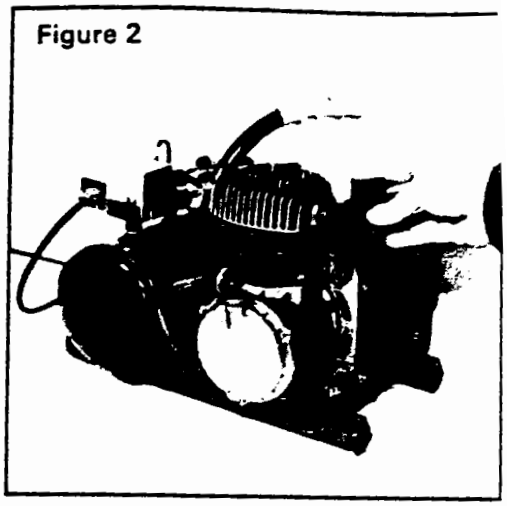


Figure 2



2. Remove plastic plug from air intake port and install inlet air filter (Fig 2).

OPERATION

1. The on/off lever is located in the side of the pressure switch and should always be used to turn off power to the motor, as this automatically relieves high pressure air from the discharge line.

2. The pressure switch is factory set to start the compressor at a pressure below 100 PSI and stop the compressor at 125 PSI. (max pressure 125 PSI)

3. The recommended operating position of the compressor is, of course, on a level surface. For temporary use, the compressor may be tileted 15° to left or right as viewed from the end of the tank.

4. The electric motor is provided with overload protection. Should the unit stop unexpectedly; (1) check supply voltage, (2) check oil level, (3) check tank air pressure (not to exceed 125 psi). Turn the unit off using the lever on the pressure switch, then reset the motor protector.

MAINTENANCE

DAILY - check crankcase oil level and drain condensate from air tank(s).
WEEKLY - examine the intake filter element, clean or replace as necessary .
MONTHLY - drain crankcase oil and refill with 4 ounces of new oil.

WARRANTY

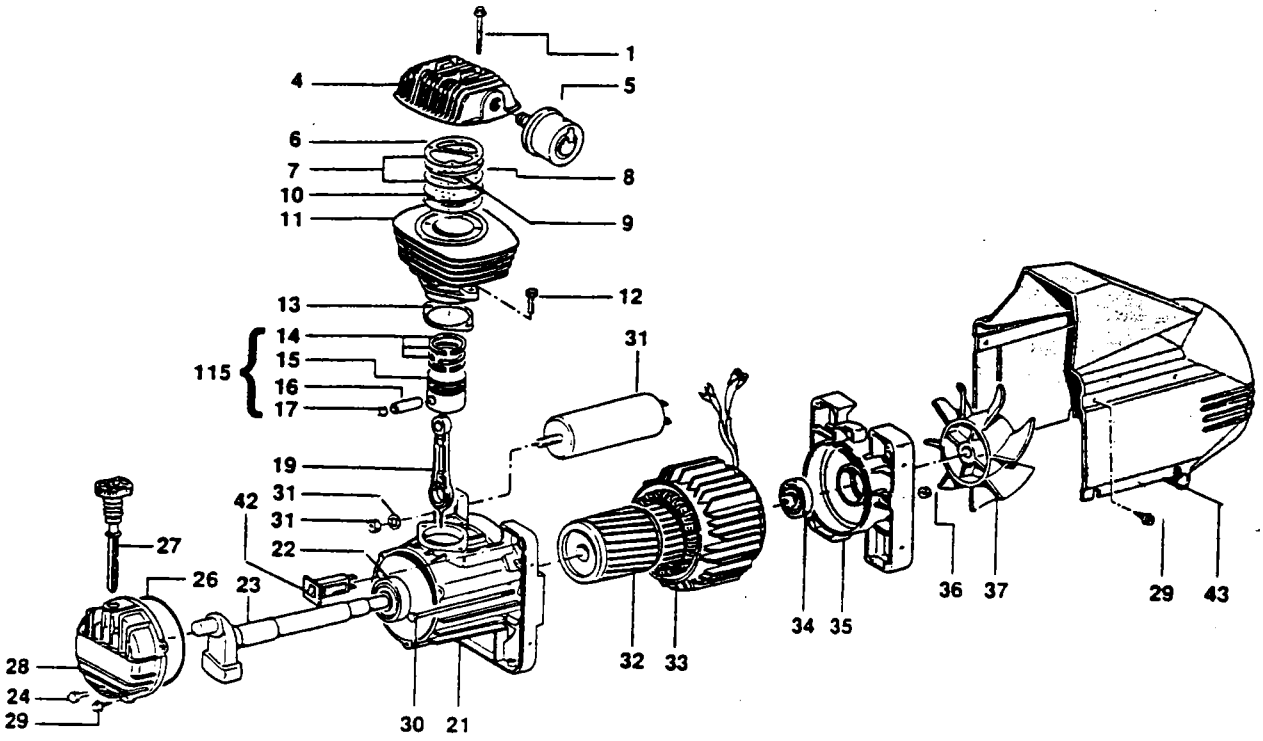
AIR-MATE COMPRESSORS ARE WARRANTED TO BE FREE FROM DEFECTS IN MATERIAL AND WORKMANSHIP UNDER NORMAL USE FOR A PERIOD OF 12 MONTHS FROM DATE OF INSTALLATION OR 15 MONTHS FROM DATE OF SHIPMENT, WHICHEVER COMES FIRST.
Liability is limited to repair or replacement of material found defective, free of charge F.O.B. plant. Unauthorized repairs or replacement will not be subject to factory warranty.

Emglo Products Corporation

MODEL AM39 - 3/4 HORSEPOWER

AM39

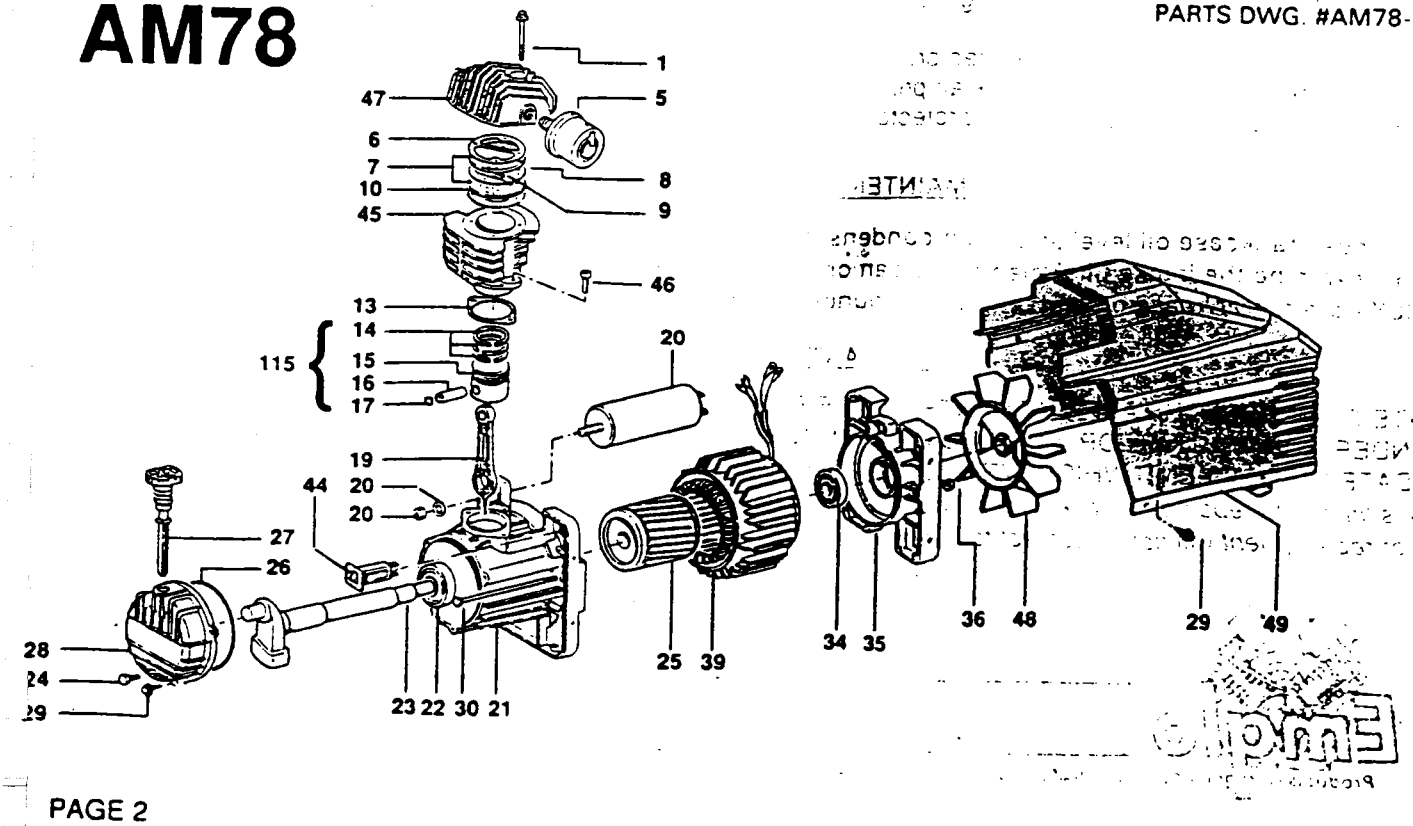
PARTS DWG. #AM39-391



MODEL AM78 - 1-1/2 HORSEPOWER

AM78

PARTS DWG. #AM78-391



reference numbers when ordering parts. Quantity* indicates the total number of that part required for a complete pump repair. Parts and current pricing may be obtained by contacting your local EMGLO distributor or by calling the factory. Minimum order $10.00

REFERENCE No.	PART NUMBER	QUANTITY*	DESCRIPTION
1	3952	4	HEAD BOLT M6, 6-7. lb.-ft.
4	3950	1	HEAD, AM39
5	39154	1	INTAKE FILTER ASSY
6	3951	1	HEAD GASKET
7	3940	2	VALVE PLATE
8	3941	1	VALVE PLATE GASKET
9	3947	2	VALVE REED
10	3912	1	CYLINDER GASKET, TOP
11	3930	1	CYLINDER, AM39
12	398	2	CYLINDER BOLT, AM 39, M8, 8-10 lb.-ft.
13	3931	1	CYLINDER GASKET, BOTTOM
14	39133	1	PISTON RING SET
15	3932	1	PISTON
16	3935	1	PISTON PIN
17	3936	2	PIN RETAINER
19	3921	1	CONNECTING ROD
20	7819	1	CAPACITOR, AM78
21	391	1	CRANKCASE
22	399	1	BEARING, COMPR. END
23	3920	1	CRANKSHAFT
24	3913	1	OIL DRAIN PLUG
25	N/A	1	ROTOR, MOTOR, AM78
26	3924	1	O RING, END COVER
27	3914	1	DIPSTICK
28	392	1	END COVER
29	396	7	SCREW (only 5 used on AM78)
30	3926	2	BOLT, MOTOR, M6, 40-45 lb.-in.
31	3919	1	CAPACITOR, AM39
32	N/A	1	ROTOR, MOTOR, AM39
33	N/A	1	STATOR, MOTOR, AM39
34	999	1	BEARING, MOTOR END
35	3928	1	END COVER, MOTOR
36	3929	2	NUT, M6, 40-45 lb.-in.
37	3939	1	FAN & RETAINER, AM39
	N/A	1	STATOR, MOTOR AM78
42	3942	1	OVERLOAD SWITCH, AM39
43	3948	1	FAN HOUSING, AM39
44	7842	1	OVERLOAD SWITCH, AM78
45	7830	1	CYLINDER, AM78
46	788	2	CYLINDER BOLT, AM78
47	7850	1	HEAD, AM78
48	7839	1	FAN, AM78
49	7848	1	FAN HOUSING, AM78
	ASSEMBLIES		
100	39100	1	GASKET SET includes #'s 6, 8, 10, 13, 26
115	39132	1	PISTON, PIN & RINGS includes #'s 14, 15, 16, 17
	39101	1	BASIC REPAIR KIT - AM39 or AM78 Includes: Gaskets, Rings, Valves, & Filter
	39154P	1	FILTER ASSY (Pkg. of 6)

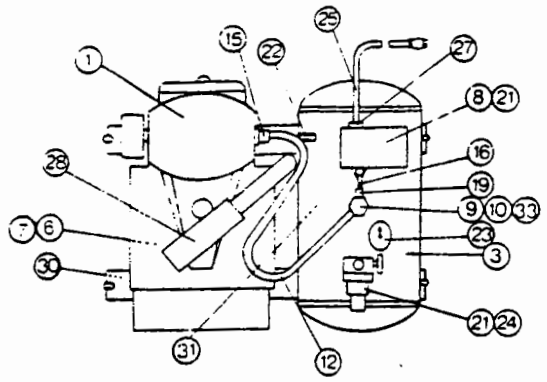
HAND SAMPLE ASSEMBLY PARTS

ASSEMBLY BREAKDOWN

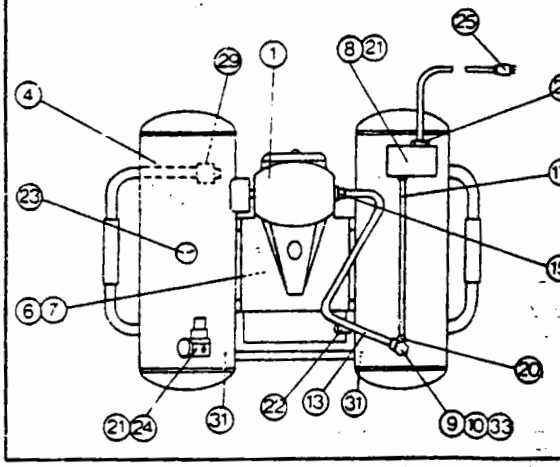
Select your model from choices below:

Parts designated by an asterisk (*) require your specific model number (either **AM39** or **AM78**) to identify the correct part number. **MINIMUM BILLING $10.00.**

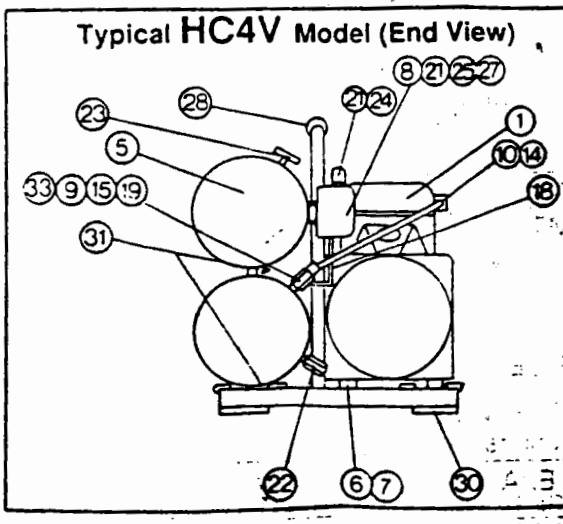
Typical **HC2** Model (Top View)



Typical **HC4** Model (Top View)



Typical **HC4V** Model (End View)



REF.	PART NUMBER	DESCRIPTION
* 1		Pump/Motor Assembly
	AM39	3/4 Horsepower, **AM39**
	AM78	1 1/2 Horsepower, **AM78**
3	**HC2**	Tank Assembly, **HC2**
4	**HC4**	Tank Assembly, **HC4**
5	**HC4V**	Tank Assembly, **HC4V**
6	**210-1039**	Saddle w/bolts & nuts
7	**120-1177**	#12 x 3/4 Screw (4 required)
8	**PBVL**	Pressure Switch
* 9		Check Valve
†	**1238TAM2**	Check Valve, **AM78**
	1238T	Check Valve, **AM39**
†10	**121-1035**	3/8 Compression EL
12	**610-1069**	3/8 Aftercooler, **HC2**
13	**610-1071**	3/8 Aftercooler, **HC4**
14	**610-1073**	3/8 Aftercooler, **HC4V**
15	**121-1030**	3/8 x 3/8 Compression Connector
16	**610-1070**	1/4" Unloader Tube, **HC2**
17	**610-1072**	1/4" Unloader Tube, **HC4**
18	**610-1074**	1/4" Unloader Tube, **HC4V**
19	**121-1032**	1/4 x 1/8 Compression EL
20	**121-1025**	1/4 x 1/8 Compression Connector
21	**122-1137**	1/4 x Close Nipple
22	**SV165-18**	Safety Valve, 1/8 NPT 165PSI
23	**PG18**	Pressure Gauge, 1/8 NPT
24	**R14**	Regulator, 1/4 NPT
*25		Cord Set
	123-1027	16 - 3 x 6, **AM39**
	123-1026	14 - 3 x 6, **AM78**
27	**123-1029**	Romex Connector
28	**104-1072**	Hand Grip, **HC2, HC4V**
29	**PAD-50**	Foot Pad, **HC4**
†30	**PAD-40A**	Foot Pad, **HC2, HC4V**
31	**DC18**	Drain Cock, 1/8 NPT
*33	**141-1065**	Aftercooler Exhaust Valve AM78 only, 1/8 NPT
		For units built before 7/91 order conversion kit #9979-KIT

* Part number varies for AM39 or AM78, please select item for your model

† Part number may differ if unit manufactured prior to 7/91, consult factory

AirMate by Emglo

Emglo Products Corporation

Distributed by:

ENVIRO PRODUCTS

1431 Ranger Street • Suite A • Lansing, Michigan 48911

(517) 887-1222 • 1-800 ENVIRO 4 • Fax (517) 887-6274

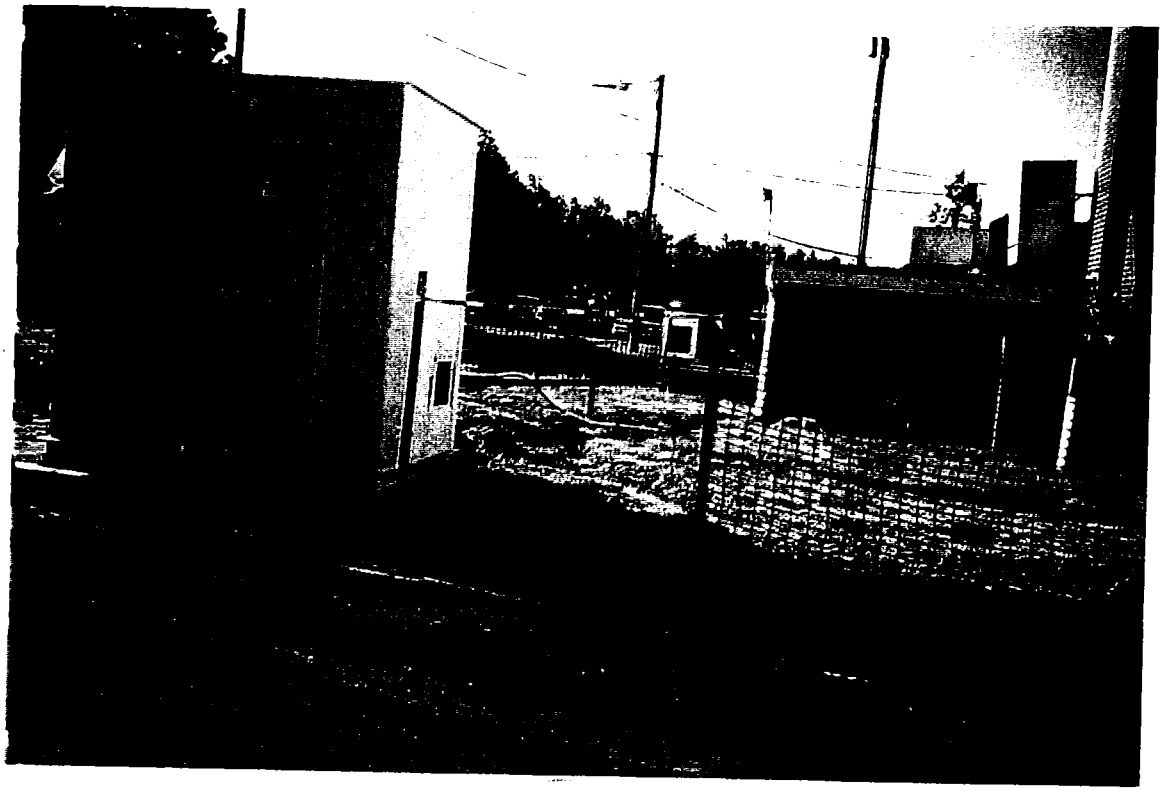


Photo 01: **The flammable storage shed and product skimming system located behind Building R-12.**

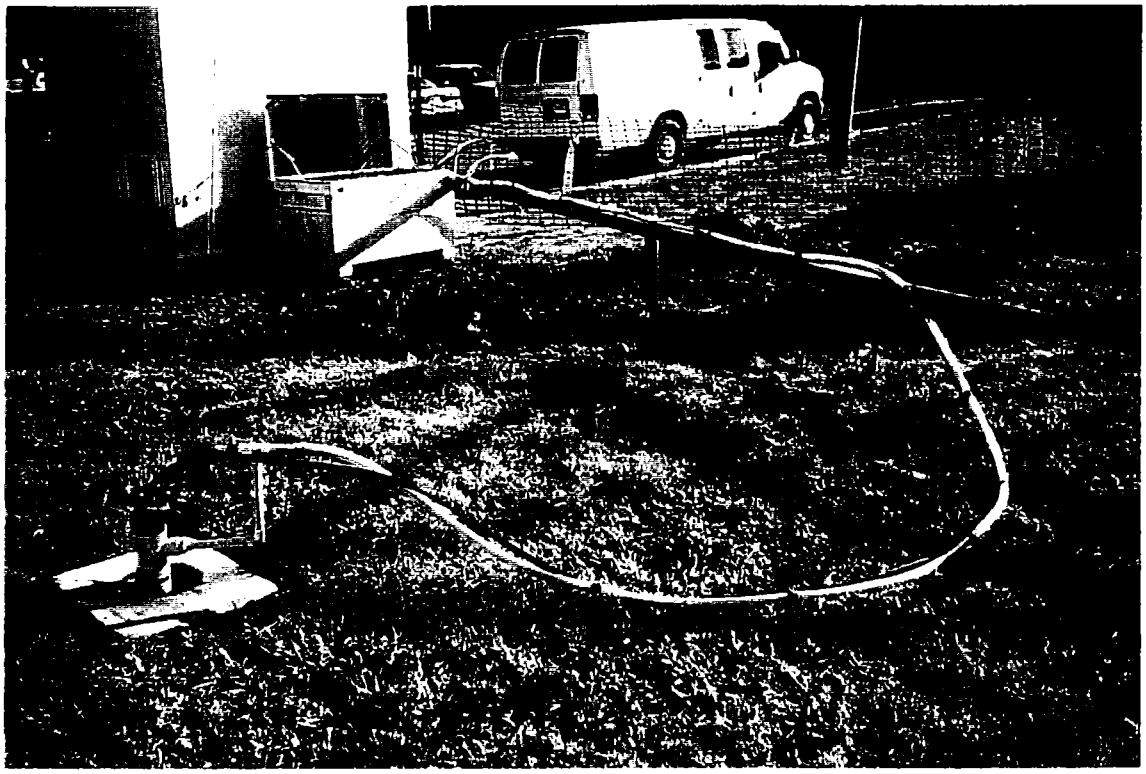


Photo 02: **Photo of skimmer pump box and air line and product discharge line to the recovery well.**

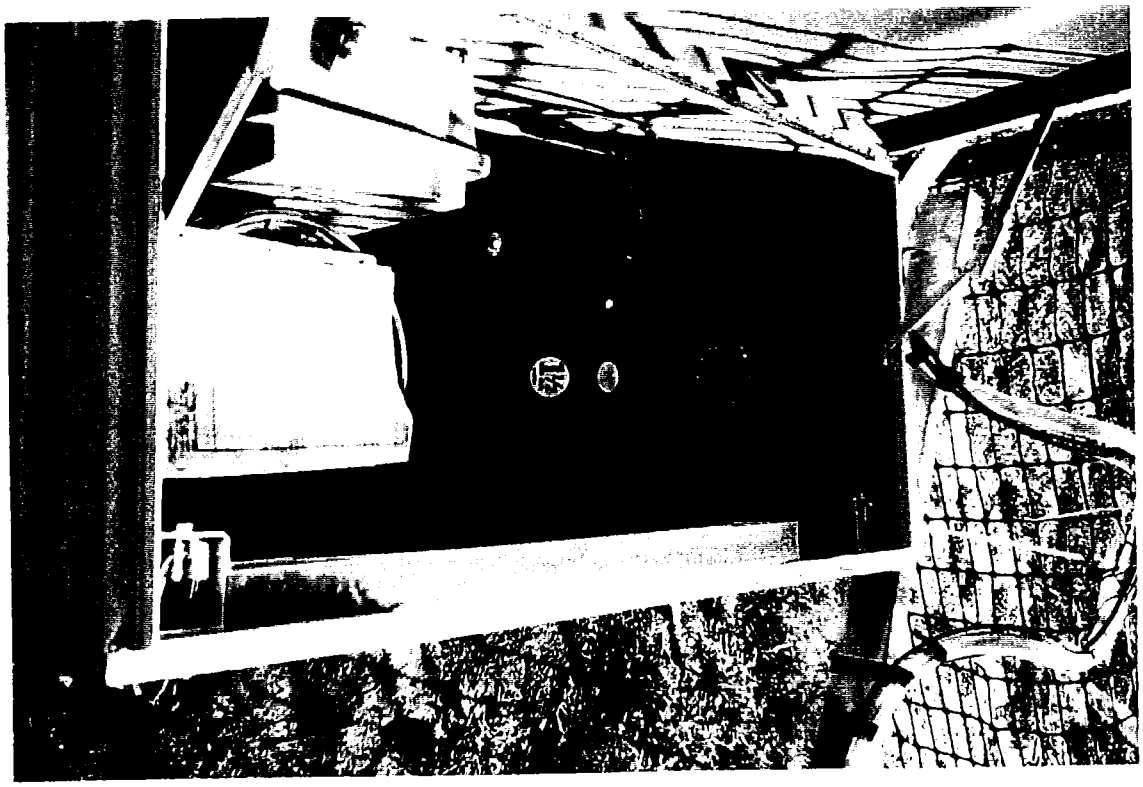


Photo 03: **Close-up of the air compressor skid associated with the product skimmer system.**

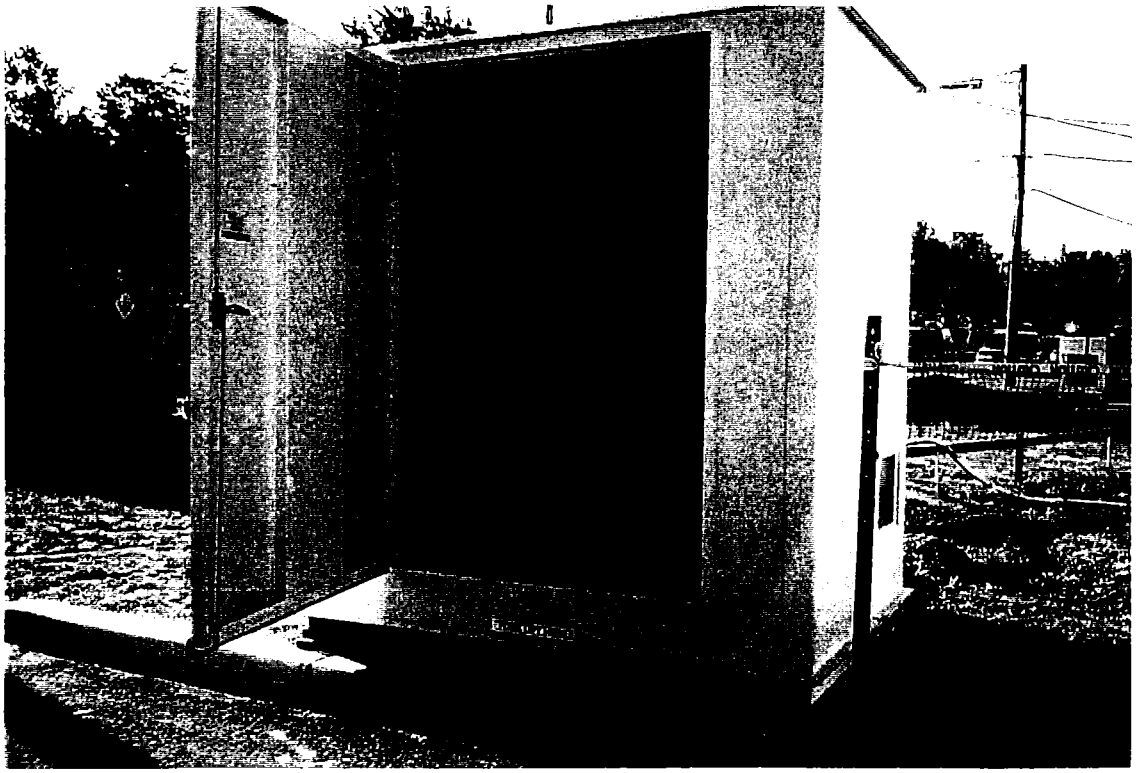


Photo 04: **Photo of inside (secondary containment) flammable storage locker.**

Photo 05: **Photo of line from skid unit and storage shed to the extraction well.**

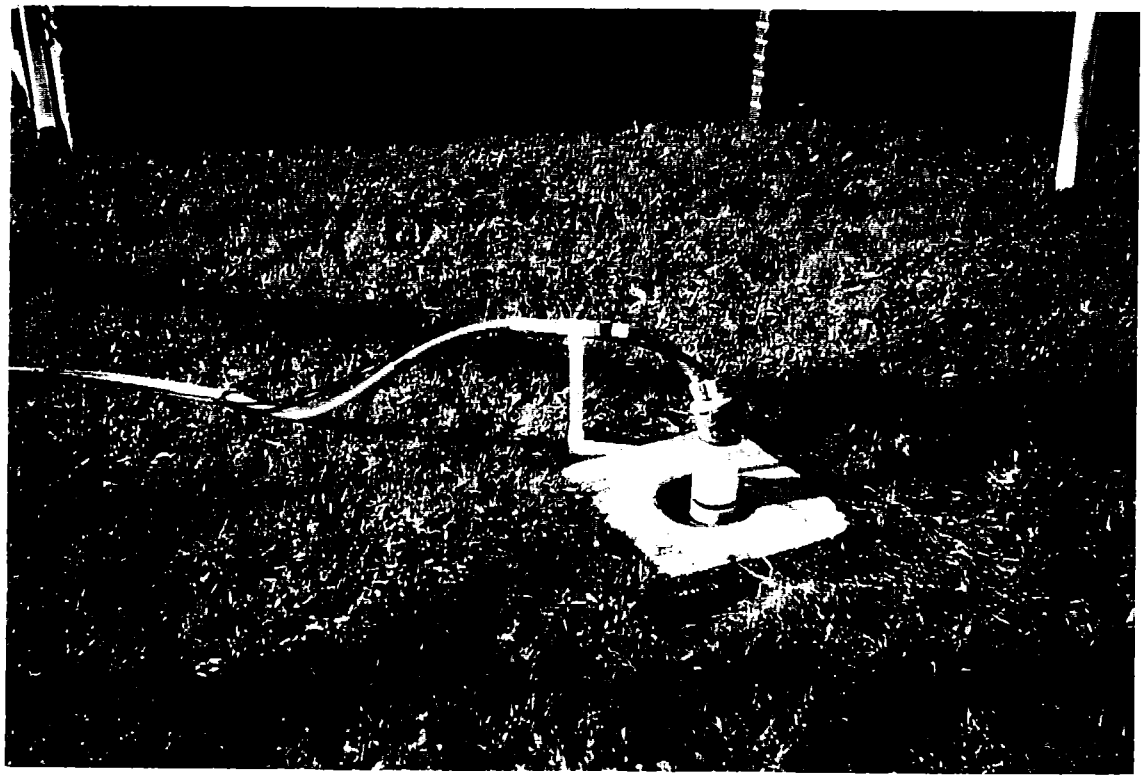
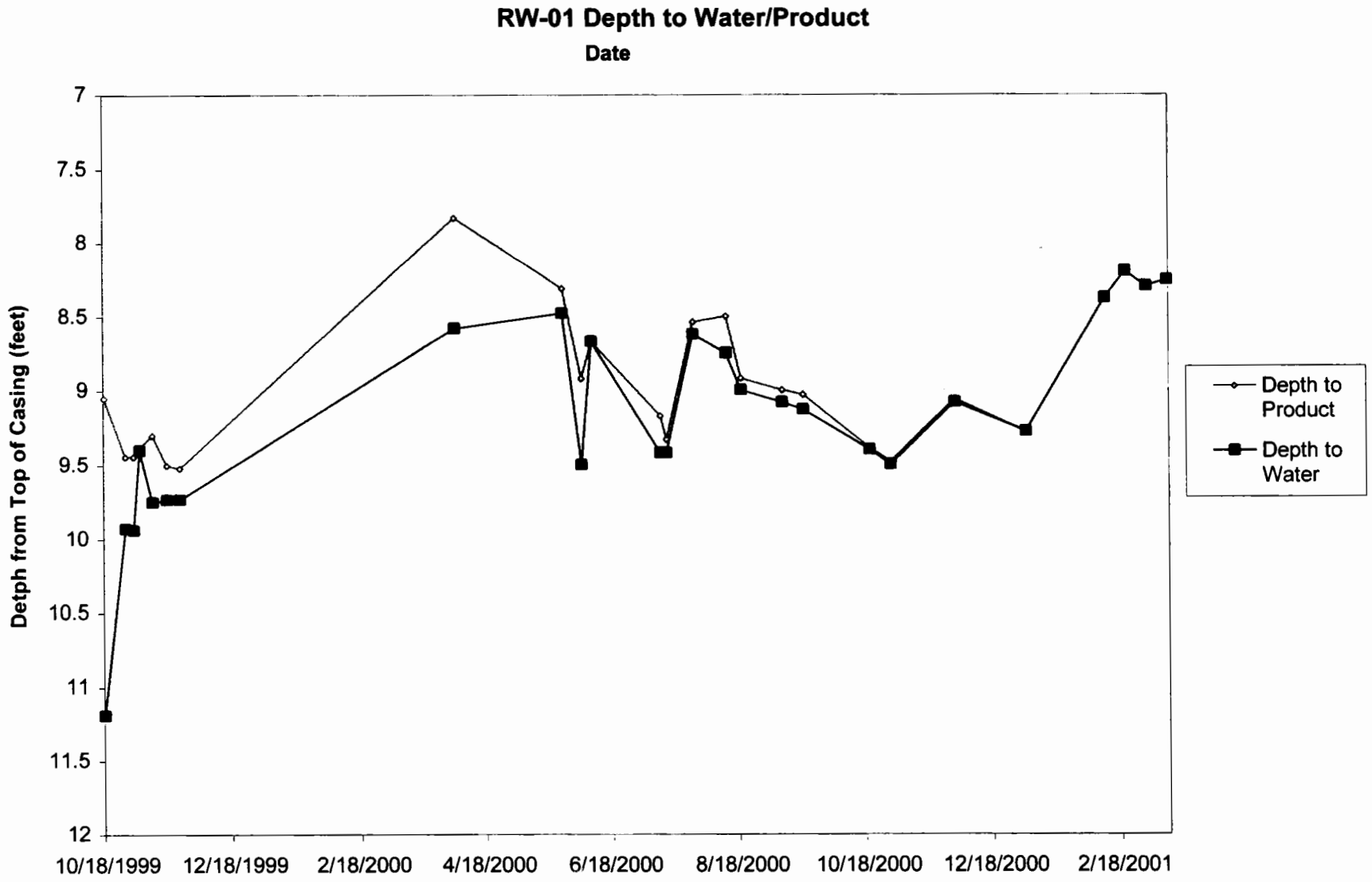
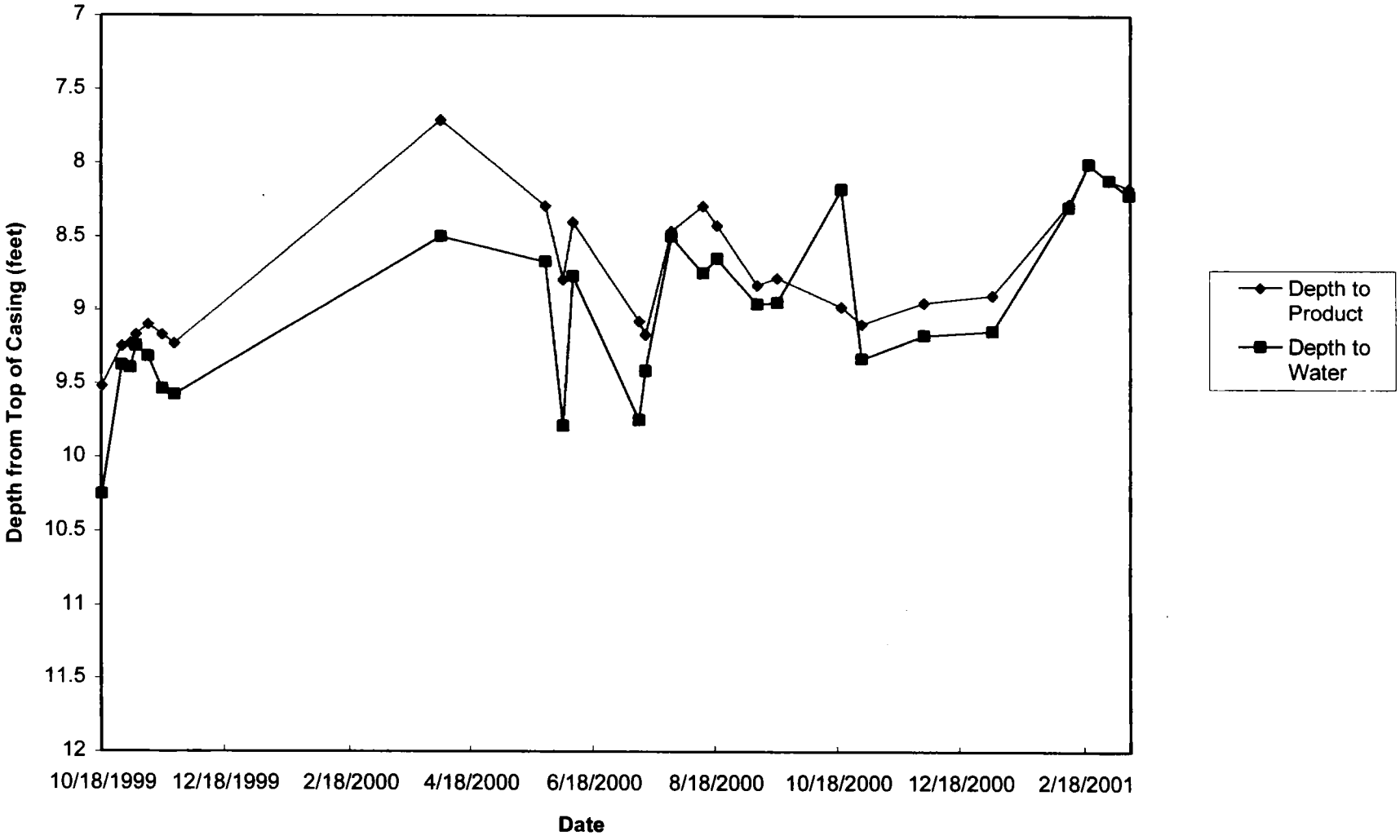


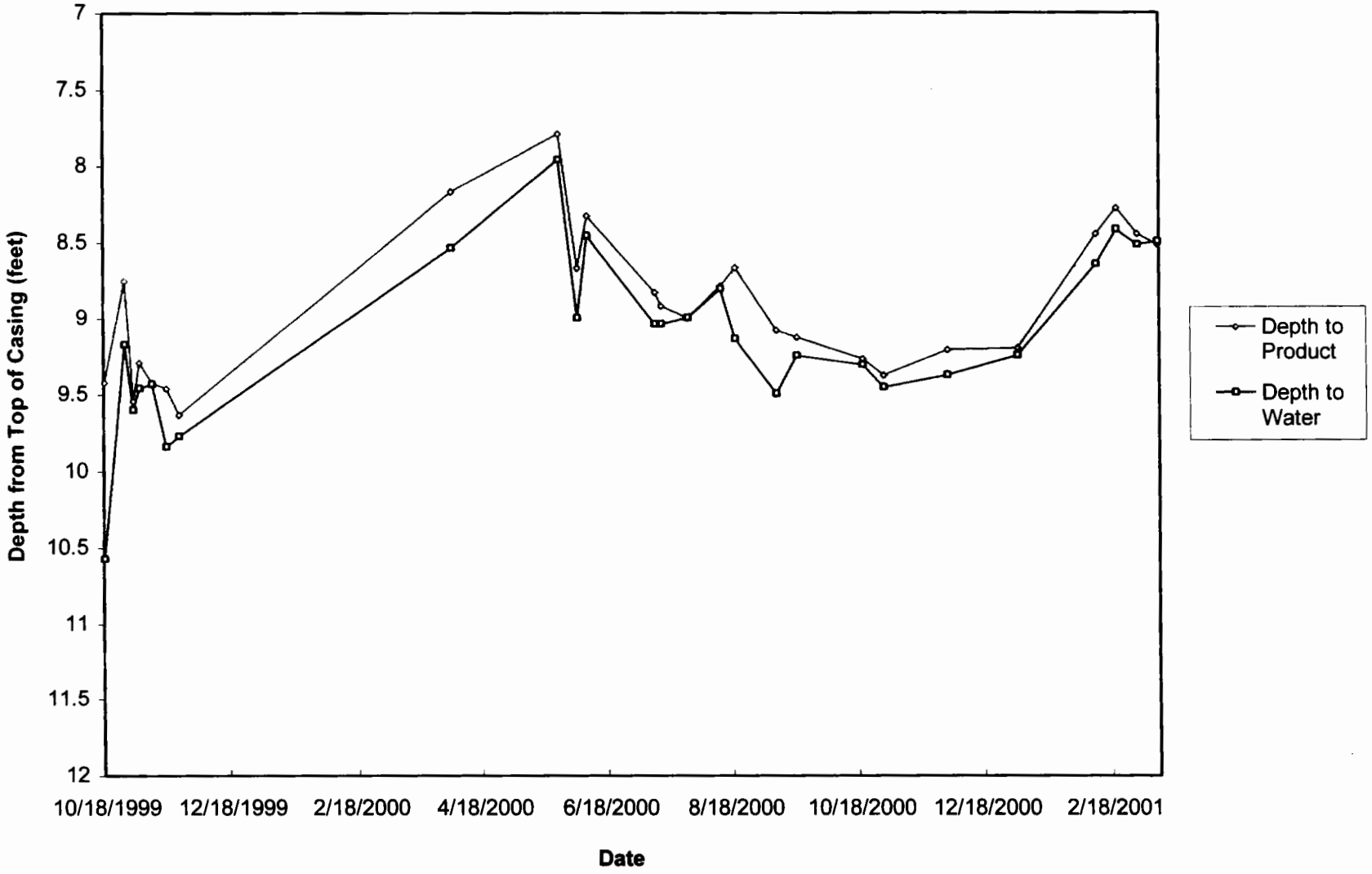
Photo 06: **Photo of lines going to and from the extraction well. Note the product line is contained inside a secondary containment line.**

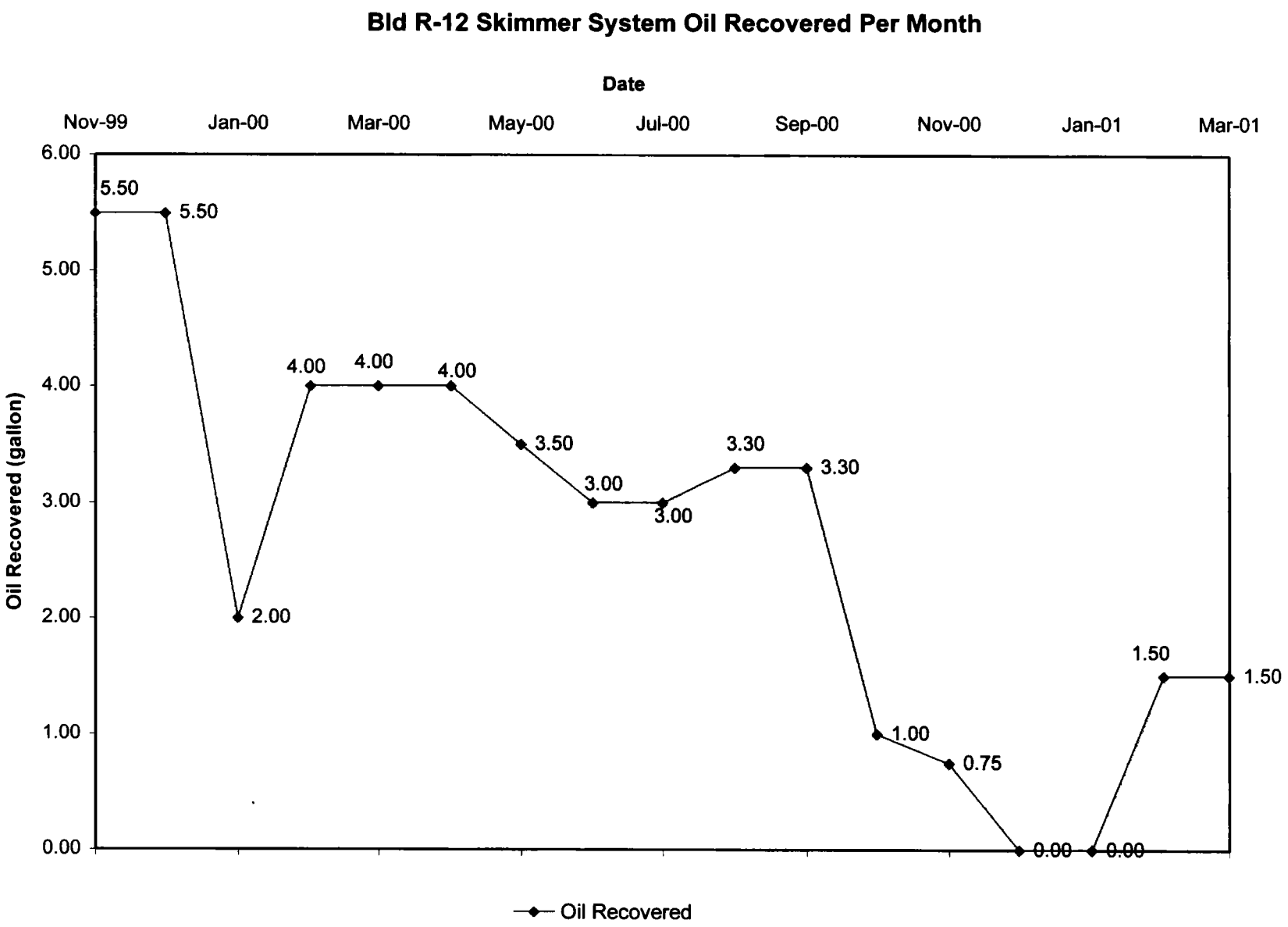

RW-01 Depth to Water/Product
Date
Detph from Top of Casing (feet)
7
7.5
8
8.5
9
9.5
10
10.5
11
11.5
12
10/18/1999
12/18/1999
2/18/2000
4/18/2000
6/18/2000
8/18/2000
10/18/2000
12/18/2000
2/18/2001
Depth to Product
Depth to Water

RW-02 Depth to Product/Water



RW-03 Depth to Product/ Water




Bld R-12 Skimmer System Oil Recovered Per Month
Date
Nov-99
Jan-00
Mar-00
May-00
Jul-00
Sep-00
Nov-00
Jan-01
Mar-01
Oil Recovered (gallon)
6.00
5.00
4.00
3.00
2.00
1.00
0.00
5.50
5.50
2.00
4.00
4.00
4.00
3.50
3.00
3.00
3.30
3.30
1.00
0.75
0.00
0.00
1.50
1.50
Oil Recovered

KLEER Remedial Support Passive Skimmers

Skimmer Models Advantages

KLEER passive skimmers come in three different models, each have different sizes and capacities. These models are:

- RSS25
- RSS50
- RSS75
- Oil Wick Capillary
- Oil Wick Cartridge

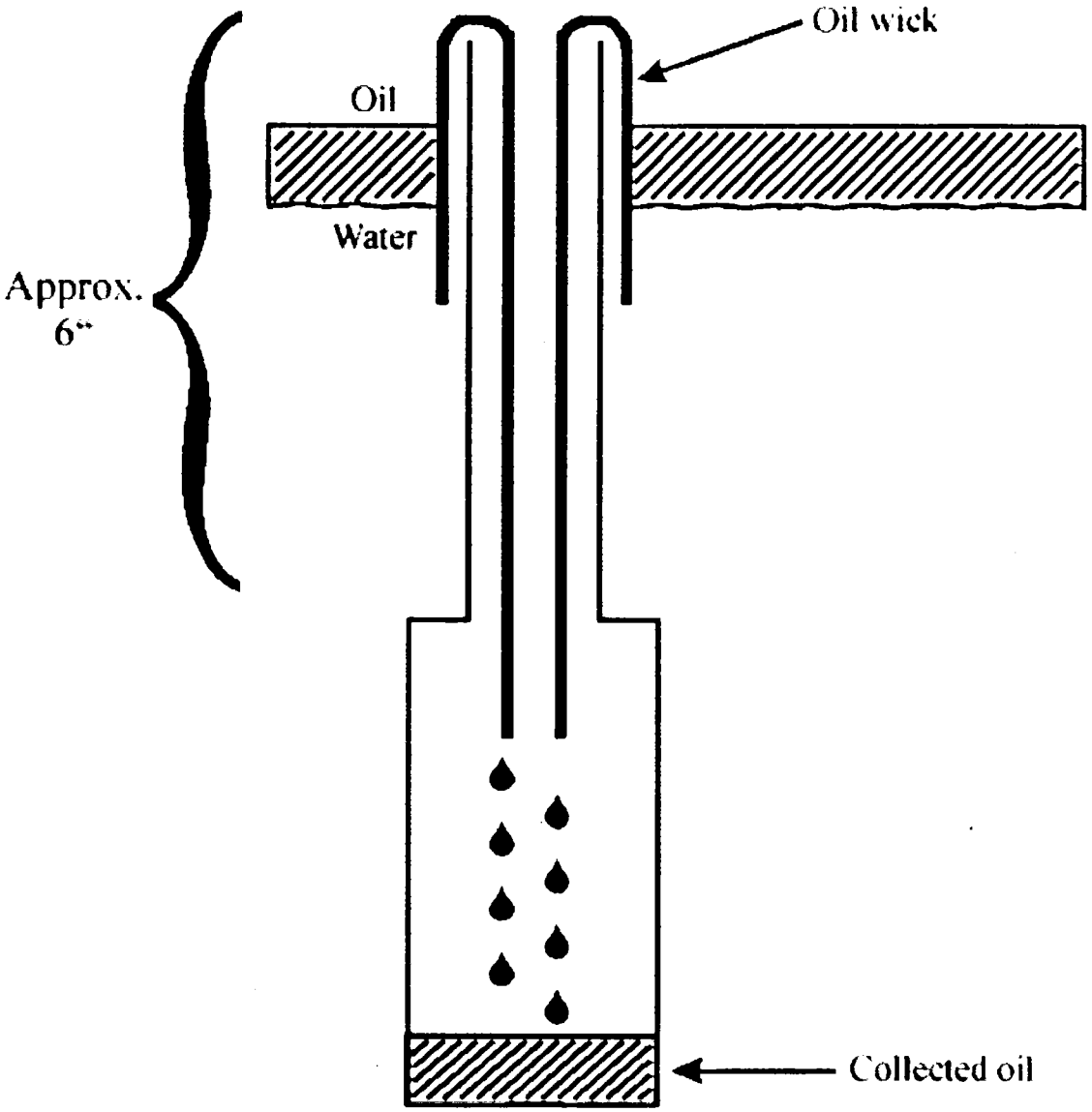
Our passive skimmers have many advantages that optimize hydrocarbon removal.

- Removal of floating hydrocarbon using advanced membrane technology.
- They require no power, no moving parts.
- Skimmer floats are ready to fill.
- Excelent for contaminant drawdown calculations; they require no maintenance.

Skimmer Specifications

Model /Specs	RSS25	RSS50	RSS75
CAPACITY	0.5 litres	2.1 litres	4.5 litres
TOTAL LENGTH	58"(1.47m)	74"(1.85m)	74"(1.85m)
OUTSIDE DIAMETER	1.7"(42mm)	2.4"(60mm)	3.6"(89mm)

OIL WICK "CAPILLARY": DETAIL



Application: thin layers (<1" oil)
Advantage: less chance of water collection than Oil Wick Cartridge
(but greater than membrane)
Disadvantage: slower fluid recovery rate than Oil Wick Cartridge
(but faster than membrane in oil)

Gasoline and Diesel Recovery

Prices

KLEER Passive Skimmer Specifications and Base Prices

WELL SIZE	MODEL	BASIC COST ($US)	CAPACITY	MINIMUM WATER/ HC COLUMN
2"(50mm)ID	RSS25	$499	0.5 Litre	31"(80mm)
3"(75mm)ID	RSS50	$639	2.1 Litre	48"(1.2m)
4"(100mm) ID	RSS75	$839	4.5 Litre	48"(1.2m)

Options are available, just ASK US!

KLEER Active Electrical Skimmer Specifications and Base Prices

WELL SIZE	MODEL	BASIC COST ($US)	
2"(50mm) ID	RSS25 PDC	$2590	Includes controller and 3 metres (10 feet) umbilical chord plus 15' power/discharge above wellhead. 6 month warranty on pump.
3"(75mm) ID	RSS50 PDC	$2780	
4"(100mm) ID	RSS75 PDC	$2980	

Options are available, just ASK US!

KLEER Active Pneumatic Skimmer Specifications and Base Prices

WELL SIZE	MODEL	BASIC COST ($US)	
2"(50mm) ID	RSS25 PA	$2290	Includes controller and 3 metres (10 feet) umbilical chord plus 15' power/discharge above wellhead. 6 month warranty on pump.
3"(75mm) ID	RSS50 PA	$2490	
4"(100mm) ID	RSS75 PA	$2690	

Options are available, just ASK US!

Oil Wick Pricing (Specify "Cartridge" or "Capillary")

2"	PVC	0.4m(16")	22"	0.3L	695
	STAINLESS	0.6m(2')	1.2m(4')	0.7L	995
	STAINLESS	0.3m(1')	1.0m (3.3')	0.35L	938
3"	PVC	20"	30"	1L	1395
	STAINLESS	0.6m(2')	34"	1.5L	1680
4"	PVC	20"	30"	2L	1580
	STAINLESS	0.6m(2')	34"	3L	1950

- All skimmers include 10' brass chain and eye bolt mounting for your well cap.
- Floating skimmers are available for 3" and 4" wells (add $600).
- Active versions add $1100 for basic 12VDC electric (3", 4" only) or pneumatic (all diameters).

KLEER

Remedial Support® Skimmers For Floating Hydrocarbons Starting at $400*

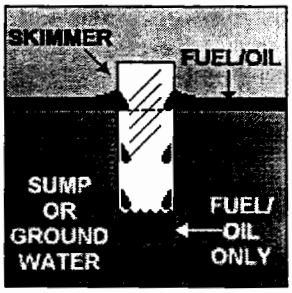
ACTIVE PASSIVE

The **KLEER** Remedial Support® Skimmer incorporates an oleophilic membrane which separates floating hydrocarbons from water, leaving the water behind. The passive version has no moving parts, responds to fluctuating water tables without manual adjustment and is maintenance free. For more demanding needs, both pneumatic and 12VDC versions are available which can pump fluids from 100' depths.

KLEER Skimmers are affordable, easily installed and simple to operate.

Hundreds of our skimmers are currently in use and are backed by knowledgeable staff who understand the variables of site remediation. For further information about the **KLEER** difference call 1-800-463-8043

Recovered Fluid can be seen through **KLEER** reservoir.



STANDARD SPECIFICATIONS

- KLEER MEMBRANE FILTERS are 300mm long, designed for oils with viscosity greater than #2 fuel oil.
- KLEER reservoirs are clear PVC with a brass base and drain valve. Skimmers for 3" diameter wells (RSS50) and 4" diameter wells (RSS75) are in two sections which can shorten the skimmer by 50% in the field.
- Passive Skimmer standard dimensions and capacities are: RSS25 (2" wells), RSS50, RSS75.
- ACTIVE SKIMMER FORMATS: electric, pneumatic, mechanical.

PERFORMANCE HIGLIGHTS

- Fits in 2" MONITORING wells, larger recovery wells, 45 gallon storage!
- Security ensured: all equipment is downhole.
- Easily transferred between wells.
- Anyone can operate KLEER Skimmers.
- Changes NOT required for various types of hydrocarbon recovery
- No external pumps or electrical infrastructure required.
- WATER-FREE operation collects non-emulsified hydrocarbons without water.
- ECONOMICAL disposal of water-free hydrocarbons.
- EASE of handling water-free product in winter conditions.
- PVC and brass construction
- INEXPENSIVE to purchase
- PRODUCT RECHARGE RATES and soil permeability can now be determined on your site using KLEER Skimmers (regardless of initial product thickness).
- Timing is flexible: unit remains down-hole until you are ready for retrieval.
- NO MOVING PARTS (passive).

Three Borehole Sizes: 2"(50mm)-Model RSS25, 4"(100mm)-Model RSS50, 6"(150mm)-Model RSS75
CUSTOM SIZES AVAILABLE

If this is the first page that you arrived at then CLICK HERE to go to the main page.