IMMEDIATE RESPONSE ACTION PLAN MODIFICATION

Prepared for:
Eagle Gas, Inc., 131 Main Street, Carver, MA
DEP RTN 4-17582

Prepared by:
Decoulos & Company

Date: July 8, 2005

DECOULOS & COMPANY
ENVIRONMENTAL ENGINEERING & LAND PLANNING

VIA eDEP AND 1ST CLASS MAIL

Friday, July 8, 2005

Jonathan E. Hobill, Regional Engineer
Bureau of Waste Site Cleanup
20 Riverside Drive
Lakeville, MA 02347

RE: IRA Plan Modification; 131 Main Street, Carver; RTN 4-17582

Dear Mr. Hobill:

On behalf of Eagle Gas, Inc., Decoulos & Company is pleased to submit this Immediate Response Action (IRA) Plan Modification for the above referenced property. The IRA Plan Modification has been filed electronically using the eDEP filing system. The DEP Transaction ID was 41792.

The report includes an Imminent Hazard/Substantial Release Migration Evaluation. Additionally, the proposed response action is based upon an IRA Plan Modification denial dated November 26, 2004 and various discussions with Department representatives earlier this year.

A hard copy of the report is being made available for inspection at Eagle Gas. Various town officials and stakeholders are being notified by email of the availability of the report online. The report is available for download in Adobe Acrobat™ format at http://www.decoulos.com/Eagle.htm.

Please feel free to call or email if you have any questions or concerns. Thank you.

Very truly yours,

Joel M. Cohen
joel@decoulos.com

James J. Decoulos, PE, LSP
jamesj@decoulos.com

cc: Francis J. Casey, Carver Board of Selectmen *via email*
Robert C. Tinkham, Jr., Carver Board of Health *via email*
Sarah G. Hewins, Carver Conservation Commission *via email*
William A. Halunen, Carver Department of Public Works *via email*
David C. Bennett, Bennett & O'Reilly, Inc. *via email*
Najib Badaoui, Eagle Gas, Inc.

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1.0 PURPOSE AND SCOPE

This Immediate Response Action (IRA) Plan Modification has been prepared to address a release of petroleum on property located at 131 Main Street in Carver, Massachusetts (the Site). The release poses a potential liability to Potentially Responsible Party (PRP) Eagle Gas, Inc. (Eagle) under the Massachusetts Oil and Hazardous Material Release Prevention and Response Act, General Laws, Chapter 21E.

The Massachusetts Department of Environmental Protection (DEP or the Department) issued Release Tracking Number (RTN) 4-17582 on January 21, 2003 based upon the identification of Light Non-Aqueous Phase Liquid (LNAPL) in groundwater monitoring well BP-5RR. The well is located in front of the Site within the Main Street right-of-way held in fee by the Town of Carver (the Town).

The IRA Plan Modification follows the requirements of 310 CMR 40.0411 through 40.0429 of the Massachusetts Contingency Plan (MCP). The MCP is the body of regulations promulgated under G.L. c. 21E.

The most recent proposal to remediate the LNAPL related to RTN 4-17582 was the submission of an IRA Plan Modification on January 7, 2005. The Plan estimated soil permeability for the recharge of groundwater into an interceptor trench within Main Street. Following review of the January Plan, the Department requested detailed empirical data to justify the hydraulic conductivity estimates together with additional details relating to the collection of LNAPL and the treatment of petroleum contaminated groundwater.

2.0 HISTORY OF IMMEDIATE RESPONSE ACTIONS

2.1 Immediate Response Action Plan dated March 17, 2003 (RTN 4-17582)

In the IRA Plan submitted to DEP on March 17, 2003 Eagle proposed the evacuation of LNAPL at BP-5RR by a drum vacuum system operated by a pneumatic compressor. The purpose of the evacuation was to determine how quickly LNAPL would enter the well point. Additionally, sampling of existing monitoring wells and private drinking water supply wells was to be conducted. Utility manholes were also proposed for airspace monitoring for volatile organic vapors.

On March 19, 2004, DEP issued Eagle a Notice of Noncomliance concerning RTN 4-17582 for the following reasons: (1) Failure to conduct an IRA at a site where a condition of Substantial Release Migration had been identified, and failure to conduct an IRA to eliminate and/or mitigate Critical Exposure Pathways; (2) Failure to submit either an IRA Plan, and IRA Completion Report, or a Response Action Outcome (RAO) Statement within sixty (60) days of providing oral notification to the Department of a ‘2 Hour’ or ’72 Hour’ Release and/or knowledge of a condition of Substantial Release Migration; (3) Failure to submit an IRA Status Report six months after submission of the first IRA Status Report; (4) Failure to submit an RAO Statement, Tier Classification Submittal or Downgradient Property Status Submittal.

2.2 Immediate Response Action Plan dated January 21, 2004 (RTN 4-17852)

An inspection of South Meadow Brook on May 16, 2003 revealed the presence of a sheen on the surface of the brook. The sheen was observed from Main Street on both the easterly (upgradient) and westerly (downgradient) portions of the brook. Although the drainage structures in front of the Site did not show any visual signs or elevated headspace readings indicating petroleum impact, DEP issued a Notice of Responsibility (NOR) on May 16th to Eagle due to the likelihood that the source of the outfall contamination originated from the Site, and assigned RTN 4-17825.

On November 26, 2003, DEP issued Eagle a Notice of Noncompliance concerning RTN 4-17825 for the following reasons: (1) Failure to submit a Release Notification Form (RNF) within sixty (60) days of notifying the Department of the release condition; (2) Failure to submit either an IRA Plan, an IRA Completion Report, or a RAO Statement within sixty (60) days of providing oral notification to the Department of a '2 Hour' or '72 Hour' Release.

Based upon subsurface investigations (performed in response to the November of 2003 Notice of Noncompliance), and stormwater flow patterns observed since March of 2003, it was apparent that the outfall area had been impacted with oil that was generated from stormwater surface flows at Eagle Gas (RTN 4-17825). To address the situation, standard Best Management Practices (BMPs) for stormwater quality control were proposed for implementation.

An IRA Plan Modification was submitted on January 21, 2004. In this IRA Plan, Eagle proposed corrective actions to reduce the impact of petroleum discharges during stormwater runoff events. The corrective actions included the reconstruction of the concrete pad over the underground storage tanks (USTs); the installation of an overhead canopy; and, the installation of an oil/water separator.

On April 5, 2004 DEP issued a Request for IRA Plan Modification. Following review of the IRA Plan submitted in January 2004, the Department determined: (1) the actions outlined therein were not sufficient to prevent additional impact to South Meadow Brook; (2) the IRA Plan did not adequately address the condition of Substantial Release Migration; and, (3) the IRA Plan did not provide sufficient information to support the assertion that the impact to the surface water body was caused solely by surface water runoff from the gasoline station and not contributed to by an ongoing subsurface release at the Site.

Based upon these determinations, the Department thereby requested additional immediate or accelerated response actions. The Department required the submittal of an IRA Plan Modification including a plan and schedule to perform an Imminent Hazard Evaluation, an evaluation of Critical Exposure Pathways, and a plan and schedule to mitigate the condition of Substantial Release Migration. Lastly, the Department required a plan and schedule to conduct sufficient assessment to determine all sources of oil contamination impacting the catch basins and storm water drainage system, and a plan and schedule for assessment and conceptual remediation for the entire storm water drainage system.

On April 21, 2004, an IRA Modification Plan was submitted to DEP addressing the requirement for a schedule of action at the stormwater outfall location (RTN 4-17852). Various tasks and a schedule for implementation of each task were developed.

The tasks proposed: the continuous inspection and replacement of absorbent booms and pads at the stormwater outfall discharge area to South Meadow Brook; the sampling of surface water and sediment at the outfall basin; the sampling of groundwater monitoring wells; the stabilization of contaminated sediment; the pursuit of public funds to remediate the outfall basin; and, the development of remedial action plans to be submitted to the Carver Conservation Commission.

2.3 Immediate Response Action Submissions Following the Linking of RTN 4-17582 to RTN 4-17852

On April 30, 2004, a Phase I Initial Site Investigation Report and Tier Classification was completed pursuant to the requirements of 310 CMR 40.0480 of the MCP. The score from the Numerical Ranking System scoresheet was 742 and the site was therefore classified as Tier IA. As part of the Phase I Report submission, Eagle requested that RTN 4-17825 be linked to RTN 4-17582.

2.3.1 IRA Status and Modification dated June 15, 2004

Due to the continuing emanation of LNAPL from BP-5RR and newly discovered LNAPL at DCW-1, further remedial actions were required. An IRA Status and Modification Plan was submitted on June 15, 2004. The purpose of the submittal was to accelerate the recovery of LNAPL in a rapid, safe and comprehensive manner.

Eagle proposed the excavation of a fifty (50) foot long trench, three (3) feet wide, within the Main Street right-of-way. Excavation within the Main Street right-of-way required approval from the Town before commencing the work. Eagle's proposal involved the characterization and disposal of contaminated soil from the 50 foot long trench; the installation of panel piping within the trench; a 12 inch HDPE recovery well in the middle of the LNAPL interceptor trench; and, provisions for the potential active recovery of LNAPL. The proposal called for LNAPL to be collected initially with a passive skimmer collection system. In the event that this passive system was unable to keep up with the rate of LNAPL recovery, Eagle proposed a transition to an active recovery system.

On July 7, 2004 DEP submitted an IRA Plan Modification Denial and Request for IRA Plan Modification with an Interim Deadline. The IRA Modification Plan was denied for the following reasons: (1) the Plan did not contain sufficient supporting documentation to demonstrate the efficacy of the proposed passive recovery system; (2) the extent of LNAPL was not fully delineated, and the Plan failed to demonstrate the proposed passive collection system provided sufficient recovery or storage capacity for the LNAPL present at the site; (3) the proposed gravel trench had the potential to create a preferential migration pathway for contaminant flow off site; (4) historical LNAPL recovery by hand was not performed on a routine basis and did not control the mitigation of LNAPL; (5) the proposed operator of the

passive recovery system did not have the appropriate health and safety training; (6) the Plan did not include a monitoring plan to monitor and verify the effectiveness of the LNAPL recovery system in controlling the off-site migration of LNAPL; (7) the Plan did not address the condition of Substantial Release Migration posed by dissolved groundwater contamination at the Site; and, (8) an active recovery system was necessary to provide hydraulic control to mitigate the condition of Substantial Release Migration.

2.3.2 IRA Status and Modification Plan dated November 4, 2004

Following DEP's July 2004 denial, an IRA Status and Modification Plan was submitted on November 4, 2004. This Plan included a groundwater treatment system to withdraw groundwater from wells ERW-1 and ERW-4 at a rate sufficient to draw LNAPL and dissolved diesel constituents. Under this scenario, the groundwater would be pumped to a treatment trailer, treated and be discharged into the ground via infiltration chambers. The plan called for either ERW-1 or ERW-4 to be an active groundwater withdrawal source, with the remaining well to be fitted with a Keck Passive Recovery Canister (PRC) skimmer. Additionally, well ERW-2 would continue to be fitted with a Keck PRC skimmer. It was proposed that the skimmers would be manually emptied 3 times a week if necessary.

On November 26, 2004, DEP denied the IRA Plan Modification due to concerns that the LNAPL collection system may not have been properly located and that it failed to demonstrate adequate capacity to remove LNAPL at the Site. Furthermore, the Department believed that Eagle had failed to demonstrate sufficient hydraulic control to mitigate a possible condition of Substantial Release Migration. Additionally, concerns were raised that insufficient controls were proposed for the evaluation of Critical Exposure Pathways; that management of remediation waste was not sufficiently detailed; an evaluation of Imminent Hazard was not conducted; and, that mitigation of impacts to surface waters and sediments at South Meadow Brook was not addressed.

2.3.3 IRA Modification Plan proposals and actions in December of 2004

After a meeting with Department representatives on December 2, 2004, Licensed Site Professional (LSP) James J. Decoulos (Decoulos) proposed significant changes to the LNAPL response action. The changes were discussed and reviewed by the Department through a series of design proposals submitted by email between December 11th and 15th.

Prior to the additional design, a subsurface investigation was conducted on December 10th with a GeoProbe™ direct push probe machine to delineate the extent of LNAPL. With the downgradient limit of LNAPL identified, a fifty (50) foot groundwater interceptor trench was proposed within the Main Street right-of-way, verbally approved by the Department and constructed on December 16th and 17th.

The interceptor trench was excavated to a total depth of 11 feet below grade and set with two – two inch perforated schedule 40 PVC pipes laying along the full length of the trench bottom. The two inch piping was connected to risers on the northern end of the trench. Two - six inch observation wells were set at each end of the trench (EOW-1 set in the south and EOW-2 set in the north) and two - one inch electrical conduits then connected the observation wells. All of the horizontally laid piping was then connected beneath the paved surface to the northern end of the Site, off the Main Street right-of-way.

2.3.4 IRA Modification Plan dated January 7, 2005

The IRA Modification Plan submitted on January 7, 2005 addressed the need for a calculated hydraulic conductivity value in order to determine an appropriate flow rate for the proposed active recovery system. At the time the interceptor trench was constructed, Cyn Environmental performed a pump test drawing 203 gallons in approximately two hours—an observed initial recharge rate of approximately 102 gallons per hour or 1.7 gallons per minute. Additionally, flow rate was calculated based on typical permeability rates for sandy silt and the calculated area of the saturated trench sidewall. These calculations yielded an approximate flow rate of 0.78 gallons per minute.

The Plan admitted that the pump test did not provide enough critical data to utilize an acceptable analytical method (such as Bouwer-Rice) to establish permeability for the interceptor trench. However, observations and assumptions on groundwater flow entry into the trench were deemed sufficient to arrive at an expected treatment system flow rate. Following review of the January Plan, the Department requested accurate empirical data to justify the hydraulic conductivity estimates.

2.3.5 IRA Modification Plan dated January 18, 2005

To better characterize the physical parameters in the sandy silt strata between 5 and 11 feet below grade, rising head slug tests were proposed at observation wells EOW-1 and EOW-2. The IRA Modification Plan submitted on January 18, 2005 described inserting Mini-Troll© pressure transducers in each well, and securing the connecting cable for each transducer to the inside casing of each well. The connections would allow water level data collections to be made with the well covers secured and the southbound lane of traffic to remain open. The interceptor trench would then be completely pumped of stored groundwater from the end of the existing two inch line located on the Eagle property (near utility pole #147). Approximately 24 hours later the Mini-Troll© transducers would be withdrawn, and the groundwater observation data would be retrieved.

2.3.6 IRA Status Report dated May 6, 2005

All actions completed between November 5, 2004 and May 6, 2005 were summarized in an IRA Status Report submitted on May 6, 2005. These actions included groundwater sampling, GeoProbe soil investigations, construction of the interceptor trench hydraulic conductivity assessments.

3.0 IMMINENT HAZARD / SUBSTANTIAL RELEASE MIGRATION EVALUATION

Pursuant to 310 CMR 40.0006, an Imminent Hazard (IH) is defined as "a hazard which would pose a significant risk of harm to health, safety, public welfare or the environment if it were present for even a short period of time…" The definitive IH conditions identified in 310 CMR 40.0321(1) and the potential IH conditions identified in 310 CMR 40.0321(2) which may be applicable to the release are presented below in italics followed by the Site specific evaluation of whether the condition exists at the Site. Consistent with the DEP's Guidance for Disposal Site Risk Characterization and 310 CMR 40.0950, the quantitative IH evaluation shall consider only current uses at the Site.

A release to the environment which results in the presence of oil and/or hazardous material vapors within buildings, structures, or underground utility conduits at a concentration equal to or greater than 10% of the Lower Explosive Limit (LEL).

LEL levels have not been measured inside these structures. Photo-ionization detector (PID) screens and Air Phase Hydrocarbon (APH) analysis has detected low levels of volatile organic compound (VOC) constituents.

A release to the environment of reactive or explosive hazardous material, as described in 310 CMR 40.0347, which threatens human health or safety.

The existing non-aqueous phase liquid (NAPL) consists of diesel fuel. It does not present the ability of a reactive or explosive threat.

A release to the environment of OHM which poses a significant risk to human health when present for even a short period of time, as specified in 310 CMR 40.0950.

The risk to human health, associated with current exposures to impacted soil and groundwater detected at the Site is evaluated in Section 3.1 below.

A release to the environment of OHM, which produces immediate or acute adverse impacts to freshwater or saltwater fish populations.

An inspection of South Meadow Brook on May 16, 2003 revealed the presence of a sheen on the surface of the brook. The sheen was observed from Main Street on both the easterly (upgradient) and westerly (downgradient) portions of the brook.

Upon observation of the sheen and the apparent lack of connection with Eagle Gas, James J. Decoulos reported the condition to the Carver Board of Health and the Carver Conservation Commission at Town Hall. Further inquiry resulted in contact with the Carver Fire Department (CFD).

With the assistance of Chief Harriman and Deputy Chief Weston of the CFD, the source of the sheen was identified as a stormwater outfall located approximately 300 feet north of the intersection of

Main Street and South Meadow Street. Water emanating from the outfall appeared to be impacted from diesel fuel, home heating oil or waste oil.

Although the drainage structures in front of the Site did not show any signs of petroleum impact, DEP issued a Notice of Responsibility (NOR) on May 16th to Eagle due to the likelihood that the source of the outfall contamination originated from the Site.

Absorbent booms were placed by the Department at the outfall and the surrounding surface water pool. Within two days, additional absorbent pads and booms were placed in the impacted outfall area. Pads and booms have been continuously monitored and replaced by Eagle since the discovery.

The migration of petroleum residuals from the surface appears to be an on-going threat. Precipitation events directly carry small amounts of petroleum and waste oil off the Site into the first downgradient catch basin, in front of the residence of Paul Malley. From this location, stormwater carries the constituents directly into South Meadow Brook. Although this situation may be exempt from the notification requirements set forth in 310 CMR 40.0300 (see 310 CMR 40.0317(7)), the potential of chronic harm to ecological receptors within the South Meadow watershed is an on-going threat and requires a long-term solution.

A release to the environment, which produces readily apparent effects to human health, including respiratory distress or dermal irritation.

Impacted soil and groundwater at the Site exists primarily beneath pavement. Decoulos has not observed or received reports of any readily apparent effects to human health in connection with the diesel release at the Site.

A release to the environment indicated by the measurement of OHM in a private drinking water supply well at a concentration equal to or greater than ten times the Category RCGW-1 Reportable Concentration.

During a site inspection on May 16, 2003, Decoulos inspected potential surrounding receptors to the LNAPL impacted well BP-5RR. Due to the close proximity of the well to the stormwater drainage system on Main Street, an immediate concern of the LNAPL discovery was that the product may travel underground along the exterior of the stormwater drainage piping. Monitoring wells DCW-1, DCW-2 and DCW-3 were advanced directly next to the stormwater piping on June 2, 2003. A sheen of petroleum was observed at DCW-1 on October 7, 2004. It is not known whether the sheen was associated with the diesel release or the historical dissolved gasoline release.

All drinking water samples collected from the Site and surrounding area have not shown any petroleum constituents equal to or greater than ten times the Category RCGW-1 Reportable Concentration.

A release to the environment for which estimated long-term risk levels associated with current exposures are greater than ten times the Cumulative Receptor Risk Limits in 310 CMR

40.993(6). Past exposures may be included in such evaluations to the extent that it is reasonable to quantify those exposures.

The estimated long-term risk levels associated with current exposures to impacted soil and groundwater detected at the Site are evaluated in Section 3.1 below.

3.1 Risk to Human Health

Potential receptors to OHM at the Site include gas station workers, patrons, utility workers, and trespassers . Exposures for these potential receptors are unknown at this time, and could potentially classify the Site as an Imminent Hazard. The migration of elevated concentrations of VOC vapors within the surrounding buildings cannot be eliminated as a potential pathway. Additional APH sampling of petroleum hydrocarbons at the residential apartment on Site and at the surrounding properties is required to eliminate this potential threat.

3.2 Risk to Safety

The characterization of risk to safety was evaluated at the Site based upon the criteria listed in 310 CMR 40.0960. The release-related conditions identified as posing a risk to safety in 310 CMR 40.0960(3) are listed below in italics followed by the Site specific evaluation of whether or not the condition exists at the Site.

The presence of rusted or corroded drums or containers, open pits, lagoons or other dangerous structures.

Based upon observations during response actions, there are no rusted or corroded drums or containers, open pits, lagoons or other dangerous structures at the Site.

Any threat of fire or explosion, including the presence of explosive vapors resulting from a release of OHM.

The diesel release does not pose a threat of fire or explosion. It does appear however that the historical dissolved gasoline release has intermixed with the diesel release in the vicinity of wells DCW-1 and ERW-3. If the historic gasoline concentrations are confined and unable to vent, the possibility exists that explosive vapors could develop within the stormwater collection system in front of the Site.

Any uncontained materials which exhibit the characteristics of corrosivity, reactivity or flammability described in 310 CMR 40.0347.

Residual impacted soil and groundwater does not exhibit the characteristics of corrosivity, reactivity or flammability described in 310 CMR 40.0347.

3.3 Risk to Environment

The characterization of risk to the environment was evaluated based upon the criteria contained in 310 CMR 40.0955(3). The release-related conditions identified as posing a risk to the environment in 310 CMR 40.0955(3) are listed below in italics followed by the Site specific evaluation of whether or not the condition exists at the Site.

Evidence of stressed biota attributable to the release at the disposal site, including, without limitation, fish kills or abiotic conditions.

A release to the environment of OHM, which produces immediate or acute adverse impacts to freshwater or saltwater fish populations.

In response to both of these criteria, groundwater migration of petroleum hydrocarbons could be intercepted by the stormwater collection system along Main Street. This interception would open a direct pathway to South Meadow Brook.

On April 20, 2005, Decoulos and Michael Connors of GeoLabs, Inc. removed the stormwater drain manhole cover that lays approximately 15 feet east of the USTs on Site, within the Main Street right-of-way. With the cover removed, a sheen of petroleum was observed on the standing water within the drainage structure. Samples were collected from the standing water with a peristaltic pump. After the samples were collected, a fresh boom was placed inside the manhole. See Figure 5, page 21, of IRA Status Report dated May 6, 2005.

The results from the storm drain sampling on April 20th showed traces of methyl tert-butyl ether (MTBE) (at 23.1 ug/l) and the C_9–C_{18} Aliphatic Hydrocarbon range (at 193 ug/l) infiltrating into the drainage system. These constituents are known indicators of gasoline and diesel fuel, respectively. Although the concentrations are well below GW-1 and GW-3 standards in the MCP, the elevated MTBE levels are of particular concern as they act as leading indicators for the migration of gasoline. Gasoline has greater mobility and risk to human health and ecological resources than diesel fuel.

In response to concerns that the gasoline and diesel fuel from the gas station could be infiltrating to the storm drain system underground, data from the National Climatic Data Center (www.ncdc.noaa.gov/oa/ncdc.html) was collected to established historic precipitation data for the region. The data showed that dry weather conditions existed for the twelve days preceding the April 20th sampling event. Therefore, the dry flow conditions at the time of sampling event are a likely indicator that underground petroleum contamination is migrating into the storm drain system.

Decoulos conducted a follow up visit to inspect the storm drain system on April 26, 2005. The sheen was gone from the manhole, and the boom appeared slightly spent with oil. Standing water at the outfall into South Meadow Brook appeared significantly cleaner than on the April 20th visit.

Although the levels of MTBE and EPH fractions identified in the storm drain system in front of the Site are below Method 1 standards in the MCP, these numbers may not be indicative of a

worst-case scenario. The contaminant levels are affected by dilution from upgradient stormwater flows within the drain system. Additionally, the contaminant levels within the drain pipe may be affected by groundwater elevation.

The cross-section plan submitted in the January 7, 2005 IRA Mod Plan (Figure 2) shows groundwater levels below the storm drain pipe based upon elevation measurements recorded on June 12, 2003. A mere nine inch rise in groundwater elevation from that period would likely threaten the migration of petroleum constituents into the storm drain system.

Data from the nearest United States Geological Survey (USGS) monitoring well (located in Lakeville, MA) indicates groundwater levels fluctuating significantly during April 2005. See Figure 1 and http://nwis.waterdata.usgs.gov/ma/nwis/current/?type=gw .

By assessing groundwater elevations from the USGS network between the springs of 2003 and 2005 – and comparing those levels with elevation measurements and visual observations in the spring of 2005 – it is estimated that the storm drain system is impacted by groundwater petroleum contamination when groundwater at the USGS Lakeville well is approximately 10.6 feet below land surface or above. See graph in Figure 1.

This observation was substantiated by Site visits in June of 2005. The storm drain manhole immediately in front of the Site was opened on June 8th and there appeared to be a visible sheen. According to the USGS monitoring well data, the groundwater elevation for that date was 10.3 feet below land surface—above the estimated cutoff point of 10.6 feet. See graph in Figure 2.

On June 17, 2005, both the storm drain manhole in front of the Site and the storm drain manhole 170 feet north of the Site were opened. There was no sheen visible at either stormwater structure on this visit. See photographs in Figure 3. According to USGS monitoring well data, the groundwater elevation for this date was 10.75 feet below land surface.

Between January 1, 2005 and July 1, 2005, groundwater reached its highest elevation at the USGS well in Lakeville on April 4, 2005, at 8.63 ft below land-surface. See Figure 2. This reading is within inches of the highest elevation ever recorded at the well, 8.56 ft below land-surface on May 13, 1998. Figure 2 also presents an approximately six week period in which the storm drain system in the Main Street right-of-way may have acted as a migration pathway for groundwater petroleum contamination emanating from the Site.

The migration of petroleum residuals from the surface appears to be an on-going threat. Precipitation events directly carry small amounts of petroleum and waste oil off the Site into the first downgradient catch basin, in front of the residence of Paul Malley. From this location, stormwater carries the constituents directly into South Meadow Brook. The potential of chronic harm to ecological receptors within South Meadow Brook is an ongoing non-point source pollution threat that requires a long-term stormwater management solution.

FIGURE 1
Comparison of Eagle Gas Storm Drain Observations with the USGS Monitoring Well at Lakeville

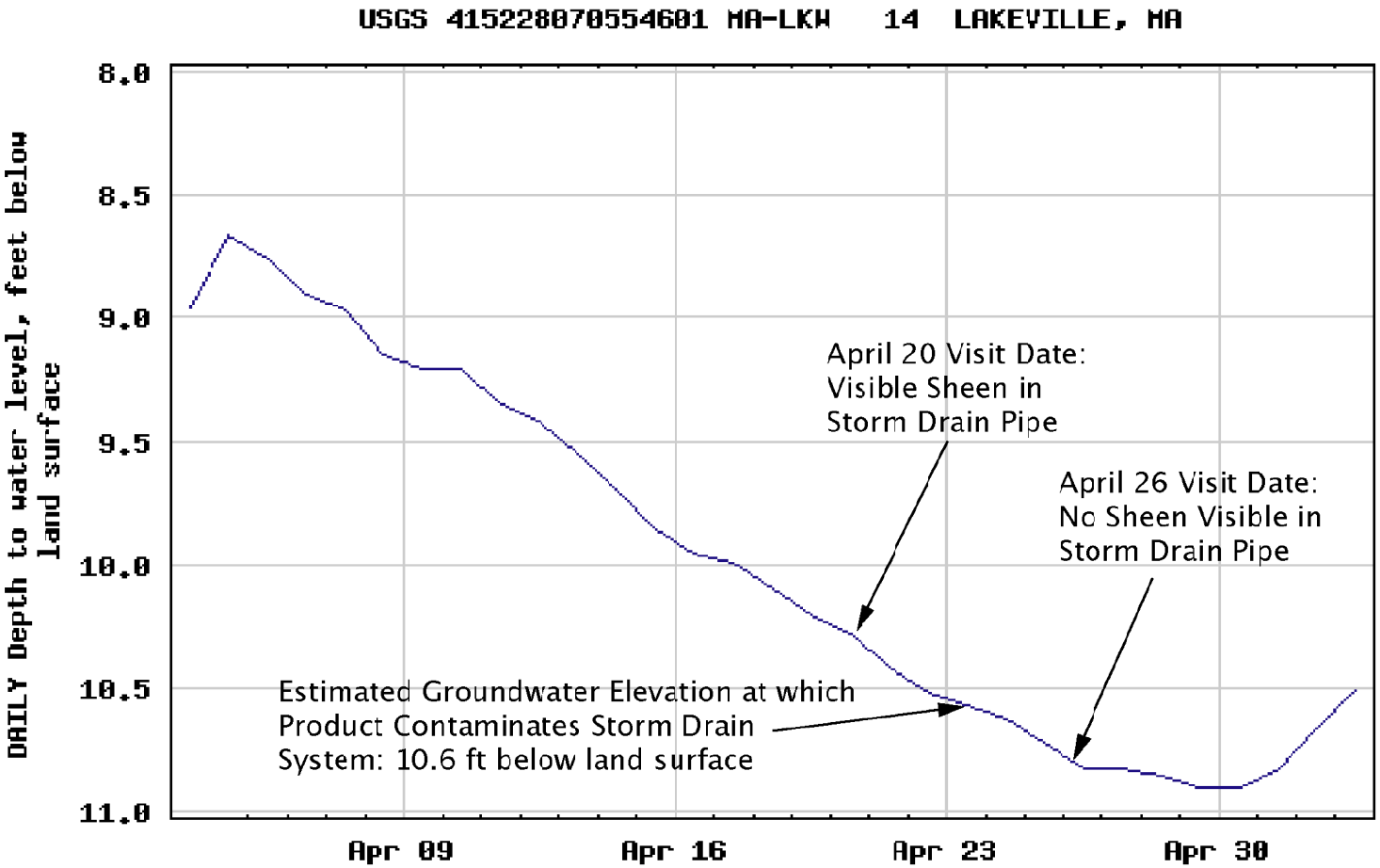
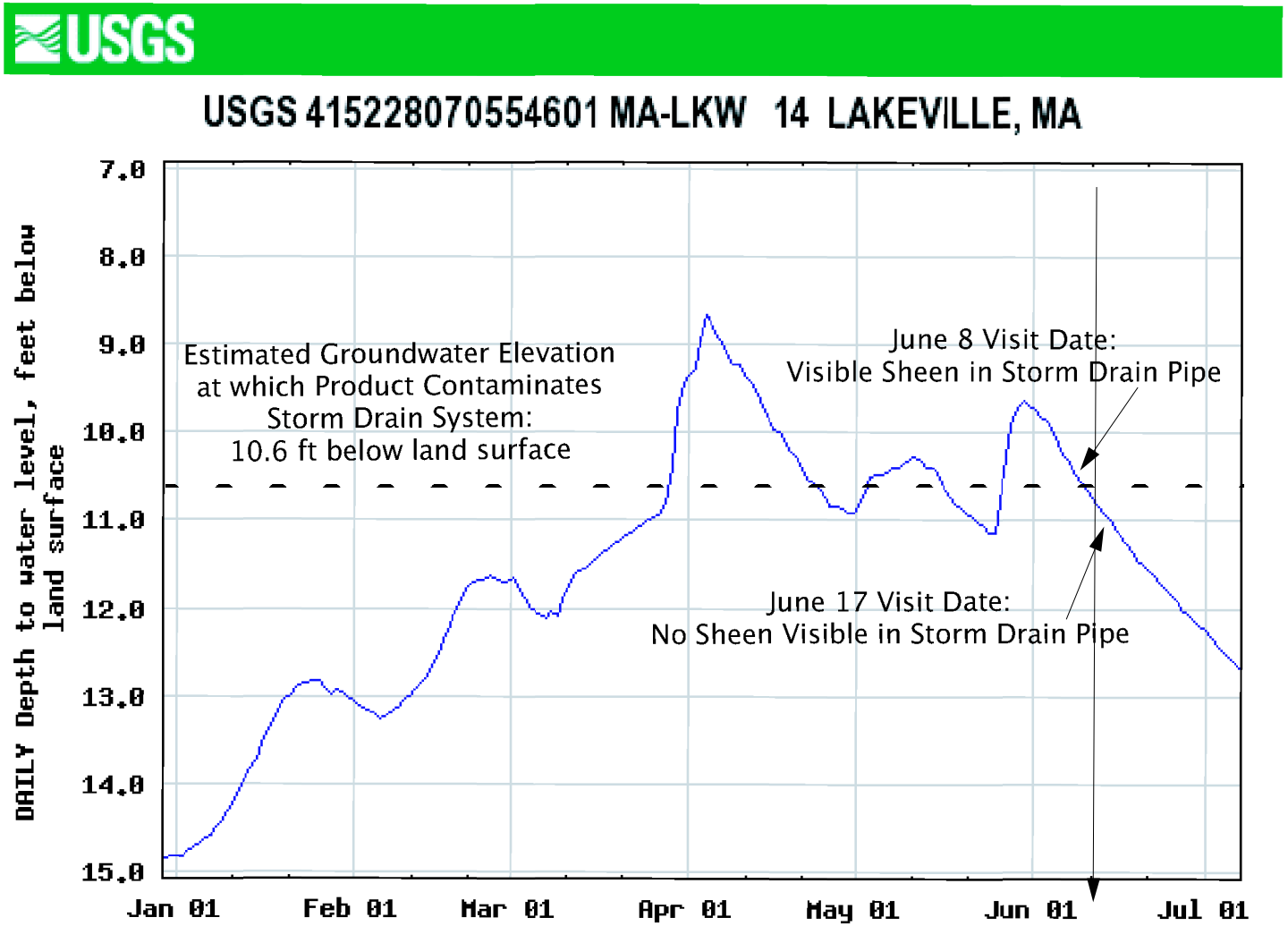


FIGURE 2
Six Month View of USGS Lakeville Monitoring Well Data



Storm Drain Manhole
Sampling

Storm Drain Manhole North of Site

Storm Drain Manhole
Sampling

Storm Drain Manhole
Immediately In Front of Site

REFERENCE:

DIGITAL PHOTOGRAPHS
SHOT JUNE 17, 2005

SITE PHOTOGRAPHS

FIGURE 3

3.4 Imminent Hazard Evaluation Conclusions

It is unknown whether an Imminent Hazard existed during the approximately six week period in the spring of 2005 when the storm drain system was probably impacted from groundwater petroleum contamination.

The risk of harm to public health and safety from the diesel release is low. All available data and information collected to date demonstrates no possibility of human soil exposure from the release; no threat to drinking water sources; and, no threat to indoor air space from the diesel fuel.

Although no evidence of stressed biota, fish kills or abiotic conditions has been observed that can be attributed to the recent diesel release, further response actions will be necessary to address aggravating conditions that could pose an Imminent Hazard to the environment.

3.5 Critical Exposure Pathway and Substantial Release Migration Evaluation

Pursuant to 310 CMR 40.0006, a Critical Exposure Pathway (CEP) is defined as those routes by which OHM released at a Site is transported, or is likely to be transported to human receptors via:

(a) vapor-phase emissions of measurable concentrations of OHM into the living or working space of a pre-school, daycare, school or occupied residential dwelling; or
(b) ingestion, dermal absorption or inhalation of measurable concentrations of OHM from drinking water supply wells located at and servicing a pre-school, daycare, school or occupied residential dwelling.

Pre-school, daycare, or other schools are not located within 500 feet of the release. A private residence owned by Paul Malley is located south of the Site at 133 Main Street. Currently, impacts to residential living or working spaces are not known to exist.

Pursuant to 310 CMR 40.0956, a condition of Substantial Release Migration means a condition at a Site that includes any of the following:

(a) Releases that have resulted in the discharge of separate-phase OHM to surface waters, subsurface structures, or underground utilities or conduits; or
(b) Releases to the ground surface or to the vadose zone that, if not promptly removed or contained are likely to significantly impact the underlying groundwater, or significantly exacerbate an existing condition of groundwater pollution; or
(c) Releases to the groundwater that have migrated or are expected to migrate more than 200 feet per year; or
(d) Releases to the groundwater that have been or are within one year likely to be detected in a public or private water supply well; or
(e) Releases to the groundwater that have been or are within one year likely to be detected in a surface water body, wetland, or public water supply reservoir; or
(f) Releases to the groundwater that have or are within one year likely to result in the discharge of vapors into school buildings or occupied residential dwellings.

According to the criteria of 310 CMR 40.0956, Site conditions could present a Substantial Release Migration for the following reasons:

> Based upon assessment activities conducted to date, it has been determined that low concentrations of underground petroleum hydrocarbons are intercepted by the storm drain system which migrate directly into South Meadow Brook – only during the spring season when groundwater levels are elevated. These discharges result in direct impacts to wetland resources and South Meadow Brook. Additionally, there is the threat of gasoline constituents from RTN 4-13333 contaminating the private well located east of the Site, currently owned by William Holmes. Therefore, a condition of SRM is appropriate for this Site.

4.0 GROUNDWATER AND LNAPL RECOVERY SYSTEM DESIGN

In order to evaluate the most appropriate groundwater treatment and LNAPL recovery design, field tests have been conducted at the Site to determine the response to groundwater pumping and LNAPL recovery.

4.1 Pilot Pump Test

On December 22, 2004, a 3500 gallon press vacuum tank truck arrived on Site to pump the groundwater from the recovery trench in the Main Street right-of-way. The truck was operated by Alan Pierce of Lighthouse Environmental, Inc. of Reading, MA (Lighthouse Environmental).

Static water measurements were recorded at observation wells EOW-1 and EOW-2 throughout the pumping process. A police detail was required for these direct readings with a water level interface probe. The results are presented in the attached Table 1.

The water level in EOW-1 reacted immediately to the pumping. Within eight minutes of pumping, the water level dropped over one foot. With a flashlight shining in the six inch well, the groundwater surface could be seen shimmering while pumping.

At a depth of 8.25 feet below the rim of well EOW-1, the groundwater level could no longer be read as debris had accumulated within the casing from the trench excavation. The nearly three feet of debris will be vacuumed from the well within the next month with a portable drum vacuum system.

The water level in EOW-2 was much less responsive to the pumping action. It took approximately 30 minutes to drop one static foot.

Pumping ceased after exactly one hour. For the next hour, static water level measurements continued to drop at EOW-2. Due to limited access to the right-of-way and the need for a police detail, it was not possible to measure the lowest static groundwater elevation at the well before it began to recover.

Table 1
VACUUM PUMP TEST
Eagle Gas, Inc.
131 Main St, Carver
DEP RTN 4-17582
December 22, 2004

Time	EOW-1 Static Water Level (ft)	EOW-2 Static Water Level (ft)	Vacuum Pressure at Tanker (in)	Cumulative Volume of Groundwater Pumped (gals)
1400	6.58	6.74		
1404	(started pumping)			
1406			22	
1408				100
1409	7.22			
1411	7.50			
1413	7.78			
1416		7.10		
1417			23	
1418		7.20		250
1419	8.25	(debris in well revealed)		
1423		7.38		
1425		7.46		
1429		7.64		
1430				650
1438			(started sucking air)	
1439		7.90		
1440			20	
1444		8.02		
1452		8.15		
1500		8.32	(stop pumping)	1100
1509		8.44		
1511		8.48		
1514		8.54		
1519		8.68		
1525		8.80		
1529	*Groundwater*	8.84		
1532	*Level*	8.92		
1537	*Below*	9.04		
1548	*Debris*	9.20		
1552	*in Well*	9.26		
1557		9.32		

4.2 Percolation Test

While the pump test was running on December 22, 2004, a percolation test was conducted at a location to the northwest of the building, as shown on Figure 4.

The procedure for the percolation test followed the guidelines established under Title 5 at 310 CMR 15.105. A hole was dug to a depth of approximately 30 inches into the fine to medium sand layer that exists below the top and subsoils. At 3:21 pm, a fifteen minute pre-soak of the hole begun. For the following 30 minutes, the water level dropped approximately 2 ½ inches. As a conservative measure, a loading rate of 25 minutes per inch in a Class II soil shall be selected for design under the guidelines at 310 CMR 15.242.

4.3 Evaluation of LNAPL Recovery

Approximately one week after four inch wells ERW-1, ERW-2, ERW-3 and ERW-4 were constructed in August of 2004, LNAPL measurements were recorded at each well. The LNAPL measurements recorded on August 26, 2004 with a Solinst oil-water interface probe Model 122 were non-detectable at ERW-1; 0.29 feet at ERW-2; non-detectable at ERW-3; and, 1.88 feet at ERW-4.

On October 7, 2004, the LNAPL measurements from the four inch wells were 0.60 feet at ERW-1; 3.28 feet at ERW-2; non-detectable at ERW-3; and, 0.05 feet at ERW-4. The comparative measurements of LNAPL are noted in Figure 4 next to each well.

The apparent increase in LNAPL thickness – without any justifiable loss of diesel fuel - is consistent with findings of various regulatory agencies and others. See various sources in Section 9.0. Between August 26, 2004 and October 7, 2004, no LNAPL removal occurred from the four wells. There was no possibility of diesel fuel loss during this period as the remote diesel fill line was taken out of service in May of 2003 and all diesel inventory records have been accurately checked.

As described in the IRA Status Report and Modification Plan dated November 5, 2004, a four-inch diameter Keck passive recovery canister (PRC) skimmer, with a four (4) liter capacity, was placed in well ERW-2 on October 28, 2004 to measure the rate of LNAPL recovery. Product information and schematic diagrams of the unit are provided in Appendix B. After an initial recovery of over 3 liters the first day, LNAPL recovery to well ERW-2 subsequently diminished to less than 1 liter per day. Table 2 presents the LNAPL recovery data between October 7, 2004 and December 22, 2004.

On November 13, 2004, evaluation of LNAPL recovery began at wells ERW-1 and ERW-4. A second Keck PRC skimmer was alternated between these wells to establish the rate of LNAPL recovery.

At the request of the Department, collection and recording of the LNAPL withdrawal from the PRC skimmers by Najib Badoui ended on December 8, 2004. All LNAPL recordings since that time have been conducted by personnel who have completed OSHA certified health and safety training.

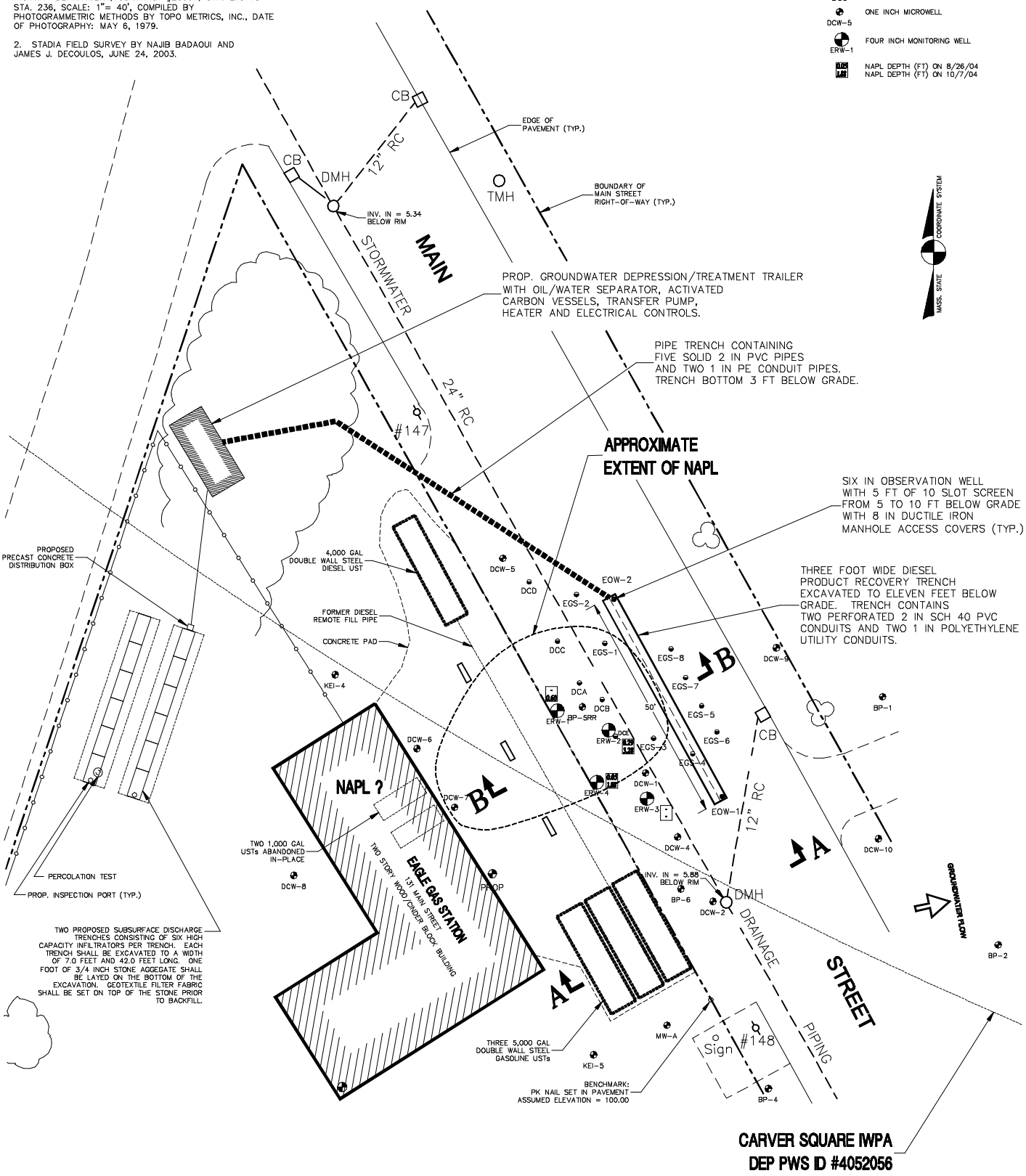
REFERENCES

1. LAYOUT OF ROUTE 58, WAREHAM – CARVER, MA HIGHWAY DEPARTMENT, CONTRACT #20907, STA. 213 TO STA. 236, SCALE: 1"= 40', COMPILED BY PHOTOGRAMMETRIC METHODS BY TOPO METRICS, INC., DATE OF PHOTOGRAPHY: MAY 6, 1979.

2. STADIA FIELD SURVEY BY NAJIB BADAOUI AND JAMES J. DECOULOS, JUNE 24, 2003.

LEGEND

- DCC — ONE INCH SOIL BORING
- DCW-5 — ONE INCH MICROWELL
- ERW-1 — FOUR INCH MONITORING WELL
- 0.05 / 1.2 — NAPL DEPTH (FT) ON 8/26/04 / NAPL DEPTH (FT) ON 10/7/04

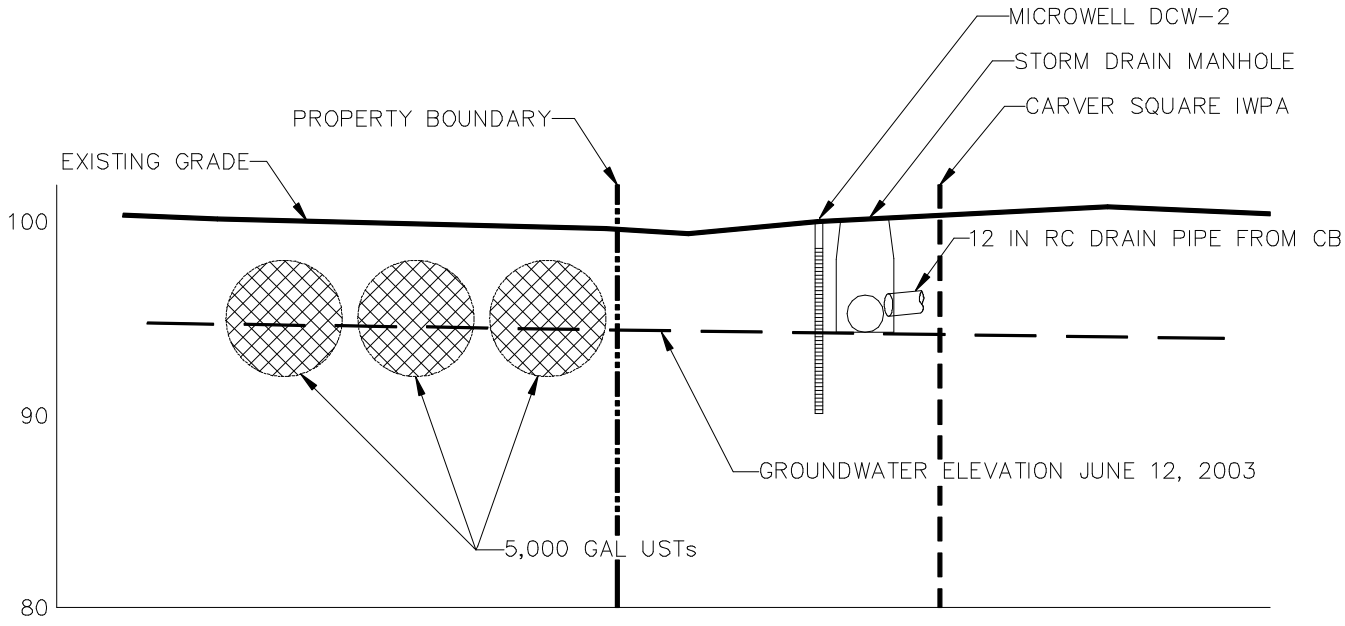


CARVER SQUARE IWPA
DEP PWS ID #4052056

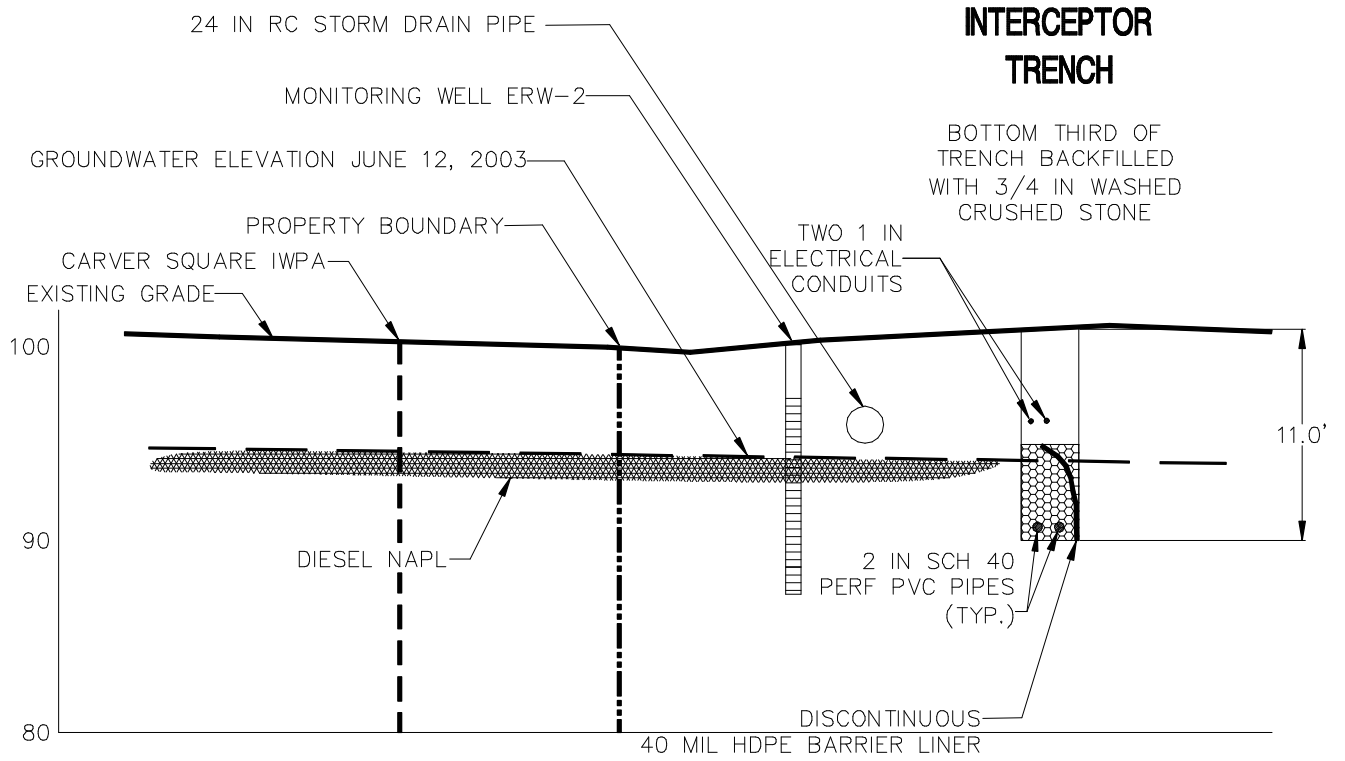
DECOULOS & COMPANY
185 ALEWIFE BROOK PKWY, CAMBRIDGE, MA 02138
WWW.DECOULOS.COM
617.489.7795

PROPOSED PRODUCT RECOVERY EAGLE GAS STATION CARVER, MASSACHUSETTS

DATE
JUL 2005
SCALE
1"= 30'
FIGURE NO.
4



SECTION A-A



SECTION B-B

DECOULOS & COMPANY 185 ALEWIFE BROOK PKWY, CAMBRIDGE, MA 02138 WWW.DECOULOS.COM 617.489.7795	**CROSS SECTIONS** **EAGLE GAS STATION** **CARVER, MASSACHUSETTS**	DATE JUL 2005 SCALE 1" = 10' FIGURE NO. 5

Table 2
Light Non Aqueous Phase Liquid (LNAPL) Recovery
between October 7, 2004 and December 22, 2004
131 Main Street, Carver, MA

Date	Time	ERW-1 DEPTH OF NAPL (IN)	ERW-1 EST. VOLUME OF NAPL (LITER)	ERW-2 DEPTH OF NAPL (IN)	ERW-2 EST. VOLUME OF NAPL (LITER)	ERW-4 DEPTH OF NAPL (IN)	ERW-4 EST. VOLUME OF NAPL (LITER)
10/7/2004	1400			40	3.8	22	2.6
10/13/2004	2100			38	3.8		
10/14/2004	1030			4	1.9		
10/14/2004	1830			1.5			
10/18/2004	2100			3	1.9	15	2.6
10/19/2004	2100			2	1.9	4	3.8
10/20/2004	2100			2	0.4	1	0.0
10/22/2004	1300			1	0.4	0.5	0.2
10/25/2004	2100			2	0.8	1	0.4
10/27/2004	2100			2	1.9	0.5	0.2
10/28/2004	1600	4	0.2		1.5		
10/28/2004	2200				1.8		
10/29/2004	1000				0.4		
10/29/2004	2100				0.5		
10/30/2004	1300				0.5		
10/31/2004	2100				0.0		
11/1/2004	1600	5	0.5		1.0		
11/2/2004	2100				1.0		
11/4/2004	1100				1.0		
11/5/2004	2100				0.5		
11/8/2004	2100		1.0		2.0		
11/10/2004	2100				1.5		
11/11/2004	1600				0.5		
11/13/2004	1500				1.0		4.0
11/14/2004	2000						1.0
11/15/2004	2100				2.0		0.5
11/16/2004	2100		4.0		0.5		0.5
11/18/2004	2100				1.0		0.5
11/21/2004	2100				2.0		1.0
11/22/2004	2100		4.0				
11/23/2004	2100		3.0				
11/26/2004	2100		2.0		3.0		
11/29/2004	2100				2.0		3.0
11/30/2004	2100						1.5
12/2/2004	1400		1.5		2.0		1.0
12/6/2004	2100		4.0		3.0		
12/8/2004	2100		1.0		1.0		
12/10/2004	1700				2.0		3.0
12/13/2004	1500				1.0		2.0
12/17/2004	1300				3.5		3.0
12/22/2004	1630				4.0		4.0
TOTALS			**21.2**		**57.0**		**34.8**

NOTES:
1. Underlined volumes represent estimates of NAPL recovered based upon water/diesel fuel mixture.
2. Recovery of NAPL from ERW-2 began with a 4 inch Keck PRC skimmer on October 28, 2004.
3. Recovery of NAPL from ERW-2 began with a 4 inch Keck PRC skimmer on November 13, 2004.
4. LNAPL recovery made by James J. Decoulos after 12/8/2004.

The primary purpose of the PRC skimmer units has been to evaluate the rate of LNAPL recovery from the four inch wells set in August of 2004 (ERW-1 through ERW-4). Regardless of whether an active or passive LNAPL recovery is engaged, the LNAPL cannot enter these wells points any faster under normal atmospheric pressures. Both active and passive recovery systems utilize the same type of hydrophobic screen for the selective recovery of free phase LNAPL product.

The PRC units bring the LNAPL in the wells down to a sheen. Checks on this function are randomly performed during LNAPL recovery measurements by lowering a clear bailer into the well after the PRC unit is discharged.

A review of the data from prior reports show that LNAPL recovery at wells ERW-1, ERW-2 and ERW-3 have been averaging between 0.5 and 1.0 liters per day at each well. The LNAPL recovery from each of these well points is likely limited to the six inch borehole size of the individual wells.

4.4 Hydraulic Conductivity Assessment

Rising head slug tests were conducted at each observation well within the interceptor trench on February 2 and 3, 2005. The original data collected by the miniTROLLs© from In Situ, Inc. was presented in Appendix E of the IRA Status Report submitted on May 6, 2005.

Both miniTROLLs© were pre-programmed to begin collecting data at 12:30 pm on Wednesday February 2nd. Prior to inserting the first miniTROLL© in EOW-2, the well was pumped by a 3,500 gallon press vacuum tank truck operated by Alan Pierce of Lighthouse Environmental. A police detail was on hand to close the southbound lane of traffic. Between 12:31 pm and 12:46 pm, approximately 225 gallons of groundwater was pumped from EOW-2. At 12:50 pm, the miniTROLL© was set in EOW-2.

Observation well EOW-1 was pumped at 12:51 pm. At 1:00 pm it was observed that the collecting tubing was clogged. Various efforts were made to free the clogged debris from the tubing up to 1:20 pm. The well contains debris from the interceptor trench construction that could not be fully removed by the vacuum truck. At the time of initial pumping, approximately 295 gallons of groundwater had been evacuated from EOW-1. At 1:21 pm, the second miniTROLL© was set in EOW-1.

Light Non-Aqueous Phase Liquid (LNAPL) was then removed from wells ERW-1, BP-5RR, ERW-2, ERW-4 and DCW-7 with the vacuum truck. Four-inch diameter Keck passive recovery canisters (PRCs) were located within wells ERW-1 and ERW-2. The PRC from ERW-1 contained mostly water and the unit was raised 12 inches to adjust for elevated groundwater levels. The PRC at ERW-2 contained mostly LNAPL and the unit was raised 6 inches to adjust for seasonal groundwater changes. Manifests from the vacuum truck are provided in Appendix B. Approximately 75 gallons of groundwater and LNAPL was pumped from the five wells.

At 2:16 pm, the interceptor trench was pumped from the end of the pipe trench on the Eagle property. At 2:36 pm, the vacuum truck began collecting air and at 2:40 pm the pumping ceased. Altogether,

approximately 1100 gallons of LNAPL and groundwater was pumped from the observation wells, monitoring wells and interceptor trench on February 2, 2005.

The data collected from the miniTROLLs© shows the initial drawdown at each observation well, followed by a groundwater recovery and a final pump of the interceptor trench at the trench end.

After conducting the rising head slug tests on February 2nd, the interceptor trench and LNAPL were vacuumed on February 9th and 16th. The interceptor trench was pumped from the two inch PVC conduit on the Eagle property and the LNAPL was recovered from ERW-1, BP-5RR, ERW-2, ERW-4 and DCW-7. Manifests were provided in Appendix C of the IRA Status Report dated May 6, 2005.

Hydraulic conductivity was determined using the program AquiferWin32© from Environmental Simulations, Inc. This program ran the data through two test scenarios, providing two different but similar values from each miniTROLL©. Using the Bouwer & Rice[1] equation, the hydraulic conductivity at EOW-1 was determined to be 1.66×10^{-5} cm/sec, while using the Black[2] equation it was determined to be 1.67×10^{-5} cm/sec. Using the Bouwer & Rice equation, the hydraulic conductivity at EOW-2 was determined to be 1.81×10^{-5} cm/sec, while using the Black equation it was determined to be 1.85×10^{-5} cm/sec. Output and graphs from the analysis were provided in Appendix C of the IRA Status Report of May 6, 2005.

A flow rate was established based upon the calculated permeability of the sandy silt layer between 5 and 11 feet below grade and the actual sidewall area of the 50 foot long by 3 foot wide trench. Using the saturated surface area of the trench, a flow rate for the pumping and treating was calculated:

Saturated Trench Sidewall Area (ft2)	**530**
Conversion (cm2/ft2)	**929**
Saturated Trench Sidewall Area (cm2)	**492,370**
Most Conservative Permeability (cm/sec)	**1.85E-05**
Area (cm2)	**492,370**
Flow rate (cm3/sec)	**9.11**
Conversion (cm3/mL)	**1**
Flow Rate (ml/sec)	**9.11**
Conversion (L/ml)	**0.00**
Flow Rate (L/sec)	**0.01**
Conversion (gallons/L)	**0.26**
Flow Rate (gal/sec)	**0.00**
Conversion (sec/min)	**60**
Flow Rate (gal/min)	**0.14**
Conversion (min/day)	**1440**
Anticipated Flow Rate (gal/day)	**207.77**

[1] Bouwer, H., and R.C. Rice. 1976. A slug test for determining hydraulic conductivity of unconfined aquifers with completely or partially penetrating wells. *Water Resour. Res.* 12, no. 3: 423-428.
[2] Black, J.H. 1978. The use of the slug test in groundwater investigations. *Water Services*, Vol. 29, pp. 174-178.

4.5 Proposed LNAPL Recovery and Groundwater Treatment Operation

A free product recovery and groundwater treatment system is proposed for implementation using the constructed well and trench network.

Although the Department has argued vigorously for active recovery of LNAPL on Site, recent standards and practices for LNAPL recovery with similar site characteristics do not support this need.

The U.S. Environmental Protection Agency (EPA) has promulgated guidelines for LNAPL recovery at leaking UST sites. See http://www.epa.gov/OUST/pubs/fprg.htm In their Free Product Recovery Plan Checklist, EPA suggests that soils exhibiting hydraulic conductivity less than 1.0×10^{-4} cm/s do not typically require active free product recovery. See Checklist: Free Product Recovery Plan, Section 3, page 2. The best conductivity measured to date has been 1.85×10^{-5} cm/sec.

The American Petroleum Institute (API) has developed a downloadable program entitled the "API Interactive LNAPL Guide, Version 2.0, August, 2004". See API's LNAPL resource center web page at: http://api-ep.api.org/environment/index.cfm?objectid=19B69DAD-EFD0-4BC3-8C217099F8F205F1&method=display_body&er=1&bitmask=002008008000000000 A copy of the Table of Contents and the Recoverability Screening Charts are provided in Appendix C.

Even with an apparent LNAPL thickness of 5.0 feet in a monitoring well, the Recoverability Screening Charts from API show that LNAPL is "Not Likely to be Recoverable" for diesel fuel which exhibits hydraulic conductivity of 1.85×10^{-5} cm/sec.

Using the Interactive Selection Tool from the Remedial Selection Tools in the API Interactive LNAPL Guide, the recommended remedial solution is either Monitored Natural Attenuation and Passive Skimming (if LNAPL is not migrating or there are not any Business/Regulatory Drivers) or Excavation and the installation of a Trench with HDPE & Skimming (if LNAPL is migrating or there are Business/Regulatory Drivers). See output results at end of Appendix C.

The LSP Association Technical Practices Committee has recently adopted a technical practice paper on LNAPL management in the context of MCP compliance. The Committee argues that:

> The current conceptual model used for characterizing the nature and extent of LNAPL contamination in the MCP is no longer considered. This model is sometimes referred to as the "Tank and Pancake" model (Ballestero et al., 1994). In the Tank and Pancake model, LNAPL in the environment is assumed to behave like oil added to a soil-filled tank that is partially full of water. Near-surface LNAPL releases are assumed to migrate vertically in unsaturated soils under gravitational force until the groundwater table is reached, at which time the LNAPL spreads horizontally as a continuous single-phase fluid (Figure 2). The LNAPL is assumed to "float" as a separate layer on the water table (or capillary fringe) in the shape of a "pancake" and remain in one connected mass.

> … This model is no longer considered by technical associations in the oil industry and national technical consensus standard setting associations to be the best or even an appropriate conceptual model to describe and understand the presence and movement of LNAPL released to the environment (API, 2003; DNREC, 2004).
>
> LSPA Technical Practices Committee, *LNAPL and the Massachusetts Contingency Plan, Part I*, April, 2005, page 7.

Based upon observed field product recovery rates and recent revelations in LNAPL science, Eagle proposes the diesel product recovery from wells ERW-1, ERW-2 and ERW-4 through the use of the PRC skimmers. The passive skimmers shall be retrofitted with 3/16 inch polyethylene tubing at the top of the units to allow withdrawal of product from the units with a peristaltic pump (and avoid the need to lift the units out of the ground). It is believed that the collection of LNAPL close to the source of the release will help reduce the smearing of free product along the drawdown surface, between the pad of the gas station and the interceptor trench.

It is expected that LNAPL will be collected from each unit twice per week. The collection will occur through the use of a peristaltic pump located at the ground surface with the 3/16 inch tubing from each cannister. This proposed passive skimming arrangement is considered acceptable for the low permeability of the material in which the LNAPL resides.

A single pump recovery system is proposed for withdrawal of LNAPL and groundwater from the interceptor trench. Vacuum pumping of the trench will occur through the fully perforated 2 inch PVC pipe at the bottom of the trench (one of the 2 inch pipes is perforated around the full circumference of the piping and the other is perforated only on the upper half).

A ½ horsepower Gorman Rupp centrifugal pump is proposed for withdrawal to the treatment trailer as shown in Figure 4. At the point of entry into the trailer, a check valve will be placed within the inlet line. The pump will discharge to a 1,000 gallon separation tank inside the trailer.

A floating skimmer shall be located within the 1,000 gallon separation tank to collect LNAPL. The skimmer unit will collect product and be emptied by gravity to a 55 gallon drum in the trailer dedicated for product collection. See Geotech Environmental product literature for the skimmer unit in Appendix D.

The 1,000 gallon tank shall then be pumped to the activated carbon drums via a submersible pump that shall reside on the bottom of the tank.

From the separation tank outlet, the water shall flow through two 55 gallon activated carbon canisters. Sample collection valves shall be provided prior to the first drum, between the drums and at the discharge line from the second drum. The discharge from the trailer shall empty into a groundwater infiltration system as shown in Figure 4.

The basic instrument for evaluating activated carbon use is the adsorption isotherm. The isotherm represents an empirical relationship between the amount of contaminant adsorbed per unit weight of carbon and its equilibrium water concentration.

This relationship can be expressed in the form:

$$X/M = KC^{1/n}$$

where:

X/M = Amount of contaminant adsorbed per unit weight of carbon
C = Concentration of contaminant in the water stream
K,n - Empirical constants particular to the contaminant

On February 16, 2005 during the course of vacuuming the interceptor trench, a groundwater sample was collected from the two inch PVC supply line to the trench. The sample was analyzed for Total Petroleum Hydrocarbons (TPH) and the reported concentration from GeoLabs, Inc. of Braintree, MA was 16.6 mg/l.

Using the reported TPH concentration and a conservative pumping rate of 3.0 gallons per minute[3], representative Ken Kikta of the Carbtrol Corporation prepared an activated carbon usage estimate. Assuming 55 gallon drums of activated carbon, which contain 200 pounds of carbon per drum, it is estimated that breakthrough of the first activated carbon drum in series would occur at 128 days. See Appendix E.

The Department has recently requested a carbon usage estimate based upon elevated MTBE levels recently measured at DCW-4. The latest groundwater sampling round conducted on April 6, 2005 showed an average MTBE value of 1455 ug/l.

With the latest MTBE value and the conservative pumping rate of 3.0 gallons per minute, Carbtrol has estimated that breakthrough of the first activated carbon drum in series would occur after approximately 30 days of operation.[4] This estimate is based upon approximately five (5) pounds of MTBE being collected per day of operation.

At an adjusted flow rate of 0.14 gallons per minute, breakthrough of the first drum will occur well beyond one month of operation. As a conservative measure, changeout and replacement of the carbon drums shall occur every forty-five (45) days. Monthly MTBE and TPH analysis of the treatment system inlet shall be conducted to ensure that the concentrations do not significantly degrade and impact the changeout period.

Monitoring of the groundwater depression zone at the interceptor trench is proposed through the use of water level loggers at each of the observation wells. See Appendix F. The loggers shall be connected to a dedicated computer located inside the trailer to continuously monitor the water levels at each well. The data will be accessible over the web through a remote internet connection of the computer.

[3] This rate was assumed prior to the hydraulic conductivity analysis.
[4] Telephone conversation with Carbtrol representative Ken Kitka on May 10, 2005.

The depression of the groundwater table at the interceptor trench shall significantly reduce the threat of petroleum constituents being intercepted by the preferential pathway of the storm drain system. Although this depression does not appear necessary through the end of 2005, continued operation of the system into 2006 may require a third water level logger on the westerly side of the storm drain system.

Subsequent IRA Status Reports shall estimate groundwater elevations in the vicinity of the storm drain system, between wells DCW-4 and DCW-5. The design objective for groundwater control shall be to maintain the groundwater elevations at least twelve (12) inches below the storm drain inverts in the vicinity of the LNAPL area.

The discharge of treated groundwater shall occur in a subsurface leaching facility as shown in Figure 4. Based upon the revised pumping rate and adjusted discharge factors, the size of the proposed leaching facility has been significantly reduced.

Earlier loading rates for groundwater infiltration design were obtained directly from Title 5, 310 CMR 15.242. In addition to a significant reduction in flow, the Title 5 loading rate is overly conservative for the proposed treated groundwater infiltration design. The Title 5 effluent loading rate is based upon septic effluent that is highly elevated in suspended solids and other constituents. A more appropriate design flow would be a greywater discharge as provided in 310 CMR 15.289(3)(a)(2).

Adjusted infiltration calculations based upon the revised flow rate and greywater discharge rate reveal that 12 high capacity Infiltrators© are suitable to handle the proposed subsurface discharge. The units shall be placed in two separate trenches that are 7.0 feet wide by 42.0 feet long. See calculations in Appendix G.

5.0 WETLAND RESOURCE MITIGATION AT SOUTH MEADOW BROOK

Historical petroleum impacts to South Meadow Brook appear to have been caused by surface water runoff from Main Street. The primary cause of impact appears to have been the runoff into the downgradient catch basin located in front of 133 Main Street.

To mitigate the impact of runoff, a stormwater catch basin insert is proposed at the 133 Main Street catch basin. The Town of Carver has recently been offered one fiberglass hooded stormwater outlet device that is designed to be retrofitted into existing catch basins. See Appendix H. The offer comes from the manufacturer, LeBaron Foundry, Inc., in the hopes of selling additional units to the Town. Carver Department of Public Works (DPW) Director William A. Halunen has notified Eagle that the free unit offered to the Town can be retrofitted into the catch basin in front of 133 Main Street.

In addition to providing stormwater management protection at the catch basin, a ten foot long trench filter is proposed at the stormwater outlet pipe. See Appendix I.

Management of stormwater contaminated sediment at the outlet shall be controlled through the construction of a sand bag dike at the banks of South Meadow Brook. An eighteen inch outlet pipe, with a deep tee that will draw from the bottom of the created basin, will control runoff into the Brook.

Details on the design will be forwarded to the Carver Conservation Commission in a Notice of Intent submitted under the Massachusetts Wetlands Protection Act, G.L. c. 131, § 40. Coordination and authorization for these recommended controls will also be required from DPW.

The Carver DPW acts as the lead town agency responsible for compliance with the Stormwater Phase II Final Rule from EPA. The Rule requires operators of regulated small municipal separate storm sewer systems (MS4s) to obtain a National Pollutant Discharge Elimination System (NPDES) permit and develop a stormwater management program designed to prevent harmful pollutants from being washed by stormwater runoff into the MS4 (or from being dumped directly into the MS4) and then discharged from the MS4 into local waterbodies.

Eagle proposes to continue working closely with the Carver DPW to assist the Town in achieving a more cost effective solution for meeting the requirements of the Phase II Final Rule as it relates to the stormwater collection system that runs from the Site to the South Meadow Brook. Furthermore, regional, state and federal stormwater grant programs will be pursued with the Town to share in the costs related to stormwater quality improvements.

6.0 MANAGEMENT OF REMEDIATION WASTE

As previously described, all LNAPL recoveries from the proposed PRCs at ERW-1, ERW-2 and ERW-4 shall be made by OSHA certified personnel. Eagle also proposes to collect LNAPL from microwells BP-5RR and DCW-7 through 3/8 inch polyethylene tubing dedicated to each well. The product shall be collected with a peristaltic pump and emptied into a five gallon bucket which shall sit on disposable absorbent pads. The LNAPL shall then be emptied to a 55 gallon drum under the shed roof on the southeasterly side of the building on Site. The drum shall be clearly labeled “LNAPL Product Area A, Drum No. X” (where X is the sequential numbering of drums). At all times, an empty 55 gallon drum shall reside next to the active collection drum.

The operation of the treatment trailer system shall be managed by a certified wastewater plant operator. The LNAPL separated within the 1,000 gallon tank shall be emptied to a 55 gallon drum in the trailer. The drum shall be clearly labeled “LNAPL Product Area B, Drum No. Y” (where Y is the sequential numbering of drums).

The first activated carbon drum in series shall be replaced after thirty (30) days of operation. Spent carbon drums left in the trailer until pickup shall be clearly labeled “Spent Drum To Be Properly Disposed”. Two new activated carbon drum units shall be present in the trailer at all times.

Flow rate information of the treatment system shall be collected into the on-Site computer located in the trailer. Monitoring of system information can then be made over the internet by the operator or the Department.

Collection of absorbent booms, pads and stormwater hydrocarbon recovery units shall be made on a monthly basis from the stormwater outfall area at the junction with South Meadow Brook. The spent material shall be deposited in a 55 gallon drum in the vicinity of the outfall. The drum shall be clearly labeled "Spent Absorbent Material Area A, Drum No. Z" (where Z is the sequential numbering of drums). The replacement of the absorbent material shall be made by OSHA certified personnel only and two empty 55 gallon drums shall reside at the outfall area.

7.0 ENVIRONMENTAL MONITORING PLAN

Quarterly sampling of existing groundwater monitoring wells is proposed in the area surrounding the LNAPL plume. The quarterly sampling shall be conducted at the following wells for Extractable Petroleum Hydrocarbon (EPH) and Volatile Petroleum Hydrocarbon (VPH) analysis: DCW-1, DCW-2, DCW-3 and DCW-4 (LNAPL has been identified in DCW-1 and the sample shall be collected from below the LNAPL column and duly noted).

The following wells shall be sampled for EPH analysis only: DCW-5, DCW-6, DCW-8, DCW-9, DCW-10, BP-1 and BP-2 (with the understanding that PRP Richard Nantais, Trustee of Nantais Realty Trust shall be responsible for collecting VPH samples from BP-1 and BP-2). The next round of sampling is scheduled for the end of July, 2005.

An LNAPL investigation shall be scheduled to evaluate the extent of product to the south and southwest. As previously described, this effort was halted on December 10, 2004 due to a hydraulic line failure in the GeoProbe unit.

The groundwater treatment system shall be monitored for EPH and VPH analysis with the schedule described below.

8.0 IMPLEMENTATION SCHEDULE

A. Groundwater Treatment System Construction, Operation and Maintenance

The groundwater treatment system and discharge field shall be constructed within 21 days of approval of this IRA Plan. Treatment plant operation is expected to be fully operational within seven days thereafter.

Through the first week of operation, samples shall be collected at the inlet to the first 55 gallon activated carbon drum, at the midpoint collection valve between the drums, and at the discharge valve from the second drum. The samples shall be analyzed for EPH and VPH analysis.

Samples shall be collected on a weekly basis thereafter at the inlet to the first drum and the outlet of the second drum for both EPH and VPH analysis.

As described earlier, the first activated carbon drum in series shall be replaced after thirty (30) days of operation. The second drum shall then be moved to the first position and a fresh activated carbon drum shall be placed into the second position. <u>The thirty (30) day changeout period is subject to change based upon analytical results from the port sampling.</u>

B. LNAPL Recovery

LNAPL recovery at wells ERW-1, ERW-2, ERW-4, BP-5RR and DCW-7 shall be conducted twice a week. The frequency shall be reduced to once per week, if the rate of LNAPL withdrawal can be fully contained within the capacity of each PRC unit. The LNAPL removal action shall occur simultaneously with the inlet/outlet groundwater treatment sampling at the treatment trailer.

C. Booms, Pads, and Stormwater Catch Basin Inserts

Currently, surface water absorbent booms and pads are located at four locations at and around the Site: at each of the two catch basins along Main Street; at the drain manholes in front of 131 and 133 Main Street; and, at the stormwater outfall area.

The absorbent material shall be maintained in all stormwater drainage structures. The catch basin in front of 133 Main Street is expected to be retrofitted with the LeBaron "Snout" and absorbent pads shall continue to be maintained at this structure. The booms and pads will be inspected and replaced as necessary on a monthly basis and each monthly inspection shall be documented in writing and recorded with digital photographs.

As described earlier, the stormwater outfall pipe into South Meadow Brook shall be retrofitted with a trench filter. See Appendix I. The outfall area shall continue to be maintained with absorbent booms and pads. The trench filter, booms and pads shall be inspected and replaced as necessary on a bi-weekly basis and each inspection shall be documented in writing and recorded with digital photographs.

D. Groundwater Sampling Plan

Quarterly groundwater sampling of the monitoring wells described in Section 9.0 shall be conducted on July 30, 2005; October 15, 2005; and, December 30, 2005.

E. IRA Status Report

An IRA Status report shall be submitted in November of 2005 to summarize the treatment system startup and operation together with a detailing reporting of soil and groundwater sampling since the filing of the last status report in May of 2005.

9.0 REFERENCES

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APPENDIX A
IRA TRANSMITTAL FORM

Massachusetts Department of Environmental Protection
Bureau of Waste Site Cleanup

BWSC105

IMMEDIATE RESPONSE ACTION (IRA) TRANSMITTAL FORM

Pursuant to 310 CMR 40.0424 - 40.0427 (Subpart D)

Release Tracking Number: 4 - 17582

A. RELEASE OR THREAT OF RELEASE LOCATION:

1. Release Name/Location Aid: RTE 58 - EAGLE GAS STATION
2. Street Address: 131 MAIN ST
3. City/Town: CARVER 4. ZIP Code: 02330-0000

☑ 5. Check here if a Tier Classification Submittal has been provided to DEP for this disposal site.
☑ a. Tier IA ☐ b. Tier IB ☐ c. Tier IC ☐ d. Tier II

☐ 6. Check here if this location is Adequately Regulated, pursuant to 310 CMR 40.0110-0114. Specify Program (check one):
☐ a. CERCLA ☐ b. HSWA Corrective Action ☐ c. Solid Waste Management
☐ d. RCRA State Program (21C Facilities)

B. THIS FORM IS BEING USED TO: (check all that apply)

1. List Submittal Date of Initial IRA Written Plan (if previously submitted): 11/5/2004 (mm/dd/yyyy)
☐ 2. Submit an **Initial IRA Plan**.
☑ 3. Submit a **Modified IRA Plan** of a previously submitted written IRA Plan.
☑ 4. Submit an **Imminent Hazard Evaluation**. (check one)
☐ a. An Imminent Hazard exists in connection with this Release or Threat of Release.
☐ b. An Imminent Hazard does not exist in connection with this Release or Threat of Release.
☐ c. It is unknown whether an Imminent Hazard exists in connection with this Release or Threat of Release, and further assessment activities will be undertaken.
☑ d. It is unknown whether an Imminent Hazard exists in connection with this Release or Threat of Release. However, response actions will address those conditions that could pose an Imminent Hazard.
☐ 5. Submit a request to **Terminate an Active Remedial System or Response Action(s) Taken to Address an Imminent Hazard** .
☐ 6. Submit an **IRA Status Report** .
☐ 7. Submit an **IRA Completion Statement**.

☐ a. Check here if future response actions addressing this Release or Threat of Release notification condition will be conducted as part of the Response Actions planned or ongoing at a Site that has already been Tier Classified under a different Release Tracking Number (RTN) . When linking RTNs, rescoring via the NRS is required if there is a reasonable likelihood that the addition of the new RTN(s) would change the classification of the site.

b. Provide Release Tracking Number of Tier Classified Site (Primary RTN): ☐ - ☐

These additional response actions must occur according to the deadlines applicable to the Primary RTN. Use the Primary RTN when making all future submittals for the site unless specifically relating to this Immediate Response Action.

☐ 8. Submit a **Revised IRA Completion Statement**.

(All sections of this transmittal form must be filled out unless otherwise noted above)

Massachusetts Department of Environmental Protection
Bureau of Waste Site Cleanup

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4 - 17582

C. RELEASE OR THREAT OF RELEASE CONDITIONS THAT WARRANT IRA:

1. Identify Media Impacted and Receptors Affected: (check all that apply)

☐ a. Air ☐ b. Basement ☐ c. Critical Exposure Pathway ☑ d. Groundwater ☐ e. Residence

☑ f. Paved Surface ☐ g. Private Well ☐ h. Public Water Supply ☐ i. School ☑ j. Sediments

☑ k. Soil ☑ l. Storm Drain ☑ m. Surface Water ☐ n. Unknown ☑ o. Wetland ☑ p. Zone 2

☐ q. Others Specify: _____

2. Identify Oils and Hazardous Materials Released: (check all that apply)

☑ a. Oils ☐ b. Chlorinated Solvents ☐ c. Heavy Metals

☐ d. Others Specify: _____

_____

D. DESCRIPTION OF RESPONSE ACTIONS: (check all that apply, for volumes list cumulative amounts)

☐ 1. Assessment and/or Monitoring Only
☑ 3. Deployment of Absorbent or Containment Materials
☐ 5. Structure Venting System
☑ 7. Product or NAPL Recovery
☑ 9. Groundwater Treatment Systems
☐ 11. Bioremediation
☐ 13. Excavation of Contaminated Soils
☐ 2. Temporary Covers or Caps
☐ 4. Temporary Water Supplies
☐ 6. Temporary Evacuation or Relocation of Residents
☐ 8. Fencing and Sign Posting
☐ 10. Soil Vapor Extraction
☐ 12. Air Sparging

☐ a. Re-use, Recycling or Treatment ☐ i. On Site Estimated volume in cubic yards _____

☐ ii. Off Site Estimated volume in cubic yards _____

iia. Receiving Facility: _____ Town: _____ State: _____

iib. Receiving Facility: _____ Town: _____ State: _____

iii. Describe: _____

☐ b. Store ☐ i. On Site Estimated volume in cubic yards _____

☐ ii. Off Site Estimated volume in cubic yards _____

iia. Receiving Facility: _____ Town: _____ State: _____

iib. Receiving Facility: _____ Town: _____ State: _____

D. DESCRIPTION OF RESPONSE ACTIONS (cont.): (check all that apply, for volumes list cumulative amounts)

☐ c. Landfill

☐ i. Cover Estimated volume in cubic yards _____

Receiving Facility: _____ Town: _____ State: _____

☐ ii. Disposal Estimated volume in cubic yards _____

Receiving Facility: _____ Town: _____ State: _____

☐ 14. Removal of Drums, Tanks or Containers:

a. Describe Quantity and Amount: _____

_____

b. Receiving Facility: _____ Town: _____ State: _____

c. Receiving Facility: _____ Town: _____ State: _____

☐ 15. Removal of Other Contaminated Media:

a. Specify Type and Volume: _____

_____

b. Receiving Facility: _____ Town: _____ State: _____

c. Receiving Facility: _____ Town: _____ State: _____

☐ 16. Other Response Actions:

Describe: _____

_____

☐ 17. Use of Innovative Technologies:

Describe: _____

Massachusetts Department of Environmental Protection
Bureau of Waste Site Cleanup

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IMMEDIATE RESPONSE ACTION (IRA) TRANSMITTAL FORM Pursuant to 310 CMR 40.0424 - 40.0427 (Subpart D)

Release Tracking Number
4 - 17582

E. LSP SIGNATURE AND STAMP:

I attest under the pains and penalties of perjury that I have personally examined and am familiar with this transmittal form, including any and all documents accompanying this submittal. In my professional opinion and judgment based upon application of (i) the standard of care in 309 CMR 4.02(1), (ii) the applicable provisions of 309 CMR 4.02(2) and (3), and 309 CMR 4.03(2), and (iii) the provisions of 309 CMR 4.03(3), to the best of my knowledge, information and belief,

> *if Section B of this form indicates that an* ***Immediate Response Action Plan*** *is being submitted*, the response action(s) that is (are) the subject of this submittal (i) has (have) been developed in accordance with the applicable provisions of M.G.L. c. 21E and 310 CMR 40.0000, (ii) is (are) appropriate and reasonable to accomplish the purposes of such response action(s) as set forth in the applicable provisions of M.G.L. c. 21E and 310 CMR 40.0000 and (iii) complies(y) with the identified provisions of all orders, permits, and approvals identified in this submittal;

> *if Section B of this form indicates that an* ***Imminent Hazard Evaluation*** *is being submitted*, this Imminent Hazard Evaluation was developed in accordance with the applicable provisions of M.G.L. c. 21E and 310 CMR 40.0000, and the assessment activity(ies) undertaken to support this Imminent Hazard Evaluation comply(ies) with the applicable provisions of M.G.L. c. 21E and 310 CMR 40.0000;

> *if Section B of this form indicates that an* ***Immediate Response Status Report*** *is being submitted*, the response action(s) that is (are) the subject of this submittal (i) is (are) being implemented in accordance with the applicable provisions of M.G.L. c. 21E and 310 CMR 40.0000, (ii) is (are) appropriate and reasonable to accomplish the purposes of such response action(s) as set forth in the applicable provisions of M.G.L. c. 21E and 310 CMR 40.0000 and (iii) comply(ies) with the identified provisions of all orders, permits, and approvals identified in this submittal;

> *if Section B of this form indicates that an* ***Immediate Response Action Completion Statement*** *or a request to* ***Terminate an Active Remedial System or Response Action(s) Taken to Address an Imminent Hazard*** *is being submitted*, the response action(s) that is (are) the subject of this submittal (i) has (have) been developed and implemented in accordance with the applicable provisions of M.G.L. c. 21E and 310 CMR 40.0000, (ii) is (are) appropriate and reasonable to accomplish the purposes of such response action(s) as set forth in the applicable provisions of M.G.L. c. 21E and 310 CMR 40.0000 and (iii) comply(ies) with the identified provisions of all orders, permits, and approvals identified in this submittal.

I am aware that significant penalties may result, including, but not limited to, possible fines and imprisonment, if I submit information which I know to be false, inaccurate or materially incomplete.

1. LSP #: 9360

2. First Name: JAMES J 3. Last Name: DECOULOS

4. Telephone: (617) 489-7795 5. Ext.: 6. FAX:

7. Signature: JAMES J DECOULOS

8. Date: 07/08/2005
(mm/dd/yyyy)

9. LSP Stamp:

Massachusetts Department of Environmental Protection
Bureau of Waste Site Cleanup

BWSC105

IMMEDIATE RESPONSE ACTION (IRA) TRANSMITTAL FORM Pursuant to 310 CMR 40.0424 - 40.0427 (Subpart D)

Release Tracking Number: 4 - 17582

F. PERSON UNDERTAKING IRA:

1. Check all that apply: ☐ a. change in contact name ☐ b. change of address ☐ c. change in the person undertaking response actions

2. Name of Organization: EAGLE GAS INC

3. Contact First Name: NAJIB 4. Last Name: BADAOVI

5. Street: 131 MAIN ST 6. Title:

7. City/Town: CARVER 8. State: MA 9. ZIP Code: 02330-0000

10. Telephone: (508) 866-9098 11. Ext.: 12. FAX:

G. RELATIONSHIP TO RELEASE OR THREAT OF RELEASE OF PERSON UNDERTAKING IRA:

☑ 1. RP or PRP ☐ a. Owner ☐ b. Operator ☐ c. Generator ☐ d. Transporter

☑ e. Other RP or PRP Specify: PRP GENERIC OR NON-SPECIFIED

☐ 2. Fiduciary, Secured Lender or Municipality with Exempt Status (as defined by M.G.L. c. 21E, s. 2)

☐ 3. Agency or Public Utility on a Right of Way (as defined by M.G.L. c. 21E, s. 5(j))

☐ 4. Any Other Person Undertaking IRA Specify Relationship: _____

H. REQUIRED ATTACHMENT AND SUBMITTALS:

☐ 1. Check here if any Remediation Waste, generated as a result of this IRA, will be stored, treated, managed, recycled or reused at the site following submission of the IRA Completion Statement. If this box is checked, you must submit one of the following plans, along with the appropriate transmittal form.

☐ a. A Release Abatement Measure (RAM) Plan (BWSC106) ☐ b. Phase IV Remedy Implementation Plan (BWSC108)

☑ 2. Check here if the Response Action(s) on which this opinion is based, if any, are (were) subject to any order(s), permit(s) and/or approval(s) issued by DEP or EPA. If the box is checked, you MUST attach a statement identifying the applicable provisions thereof.

☐ 3. Check here to certify that the Chief Municipal Officer and the Local Board of Health have been notified of the implementation of an Immediate Response Action taken to control, prevent, abate or eliminate an Imminent Hazard.

☐ 4. Check here to certify that the Chief Municipal Officer and the Local Board of Health have been notified of the submittal of a Completion Statement for an Immediate Response Action taken to control, prevent, abate or eliminate an Imminent Hazard.

☐ 5. Check here if any non-updatable information provided on this form is incorrect, e.g. Release Address/Location Aid. Send corrections to the DEP Regional Office.

☑ 6. Check here to certify that the LSP Opinion containing the material facts, data, and other information is attached.

Massachusetts Department of Environmental Protection
Bureau of Waste Site Cleanup

BWSC105

IMMEDIATE RESPONSE ACTION (IRA) TRANSMITTAL FORM Pursuant to 310 CMR 40.0424 - 40.0427 (Subpart D)

Release Tracking Number
4 - 17582

I. CERTIFICATION OF PERSON UNDERTAKING IRA:

1. I, NAJIB BADAOUI, attest under the pains and penalties of perjury (i) that I have personally examined and am familiar with the information contained in this submittal, including any and all documents accompanying this transmittal form, (ii) that, based on my inquiry of those individuals immediately responsible for obtaining the information, the material information contained in this submittal is, to the best of my knowledge and belief, true, accurate and complete, and (iii) that I am fully authorized to make this attestation on behalf of the entity legally responsible for this submittal. I/the person or entity on whose behalf this submittal is made am/is aware that there are significant penalties, including, but not limited to, possible fines and imprisonment, for willfully submitting false, inaccurate, or incomplete information.

2. By: NAJIB BADAOUI (Signature) 3. Title:

4. For: EAGLE GAS INC (Name of person or entity recorded in Section F) 5. Date: 07/08/2005 (mm/dd/yyyy)

☐ 6. Check here if the address of the person providing certification is different from address recorded in Section F.

7. Street: _____

8. City/Town: _____ 9. State: _____ 10. ZIP Code: _____

11. Telephone: _____ 12. Ext.: _____ 13. FAX: _____

YOU ARE SUBJECT TO AN ANNUAL COMPLIANCE ASSURANCE FEE OF UP TO $10,000 PER BILLABLE YEAR FOR THIS DISPOSAL SITE. YOU MUST LEGIBLY COMPLETE ALL RELEVANT SECTIONS OF THIS FORM OR DEP MAY RETURN THE DOCUMENT AS INCOMPLETE. IF YOU SUBMIT AN INCOMPLETE FORM, YOU MAY BE PENALIZED FOR MISSING A REQUIRED DEADLINE.

Date Stamp (DEP USE ONLY:)

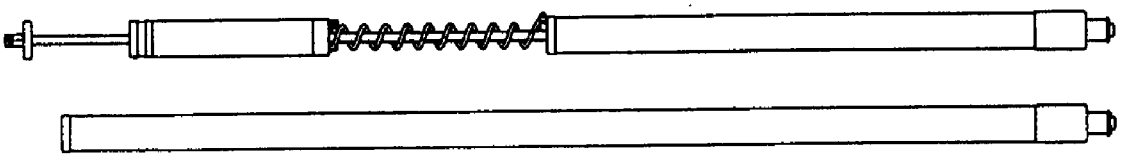
7/8/2005 4:21:21 PM

APPENDIX B
KECK PASSIVE RECOVERY CANISTER MANUAL AND SCHEMATIC

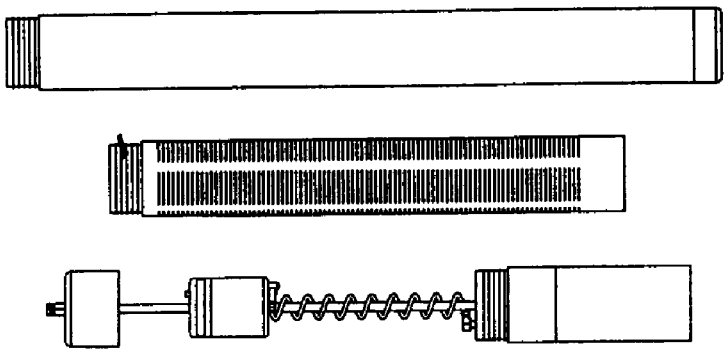
geotech

Product Recovery Canister

Installation and Operation Manual



PRC 2



PRC 4

Rev. 4 3/3/03 Part # 26650319

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System Components

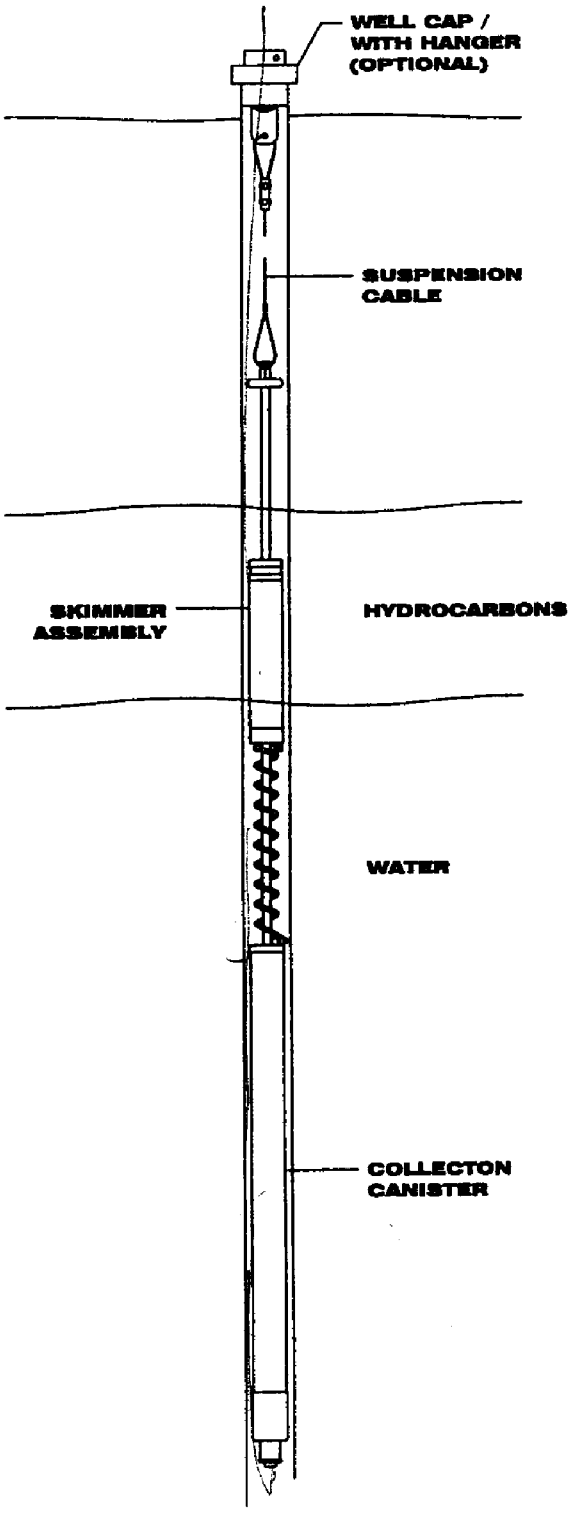
The Keck Canister consists of two (2) major components; a product skimmer assembly and a collection canister (see page 5 figures 1-3). On the 4" model, the skimmer assembly is protected by a slotted screen which pre-filters the incoming product and protects the intake assembly from damage. The skimmer assembly collects free product and passes it through a coiled hose to the collection canister. Recovered product is evacuated by removing the Keck Canister from the well and opening the drain on the bottom of the device. Increased capacity collection canisters are available and easily installed by simply unscrewing the collection canister section and replacing it with a larger collection canister and weight assembly. When going from smaller to larger collection canisters, consideration must be made for weight. Going from larger to smaller is not a problem.

Chapter 1: System Description

Function and Theory

The Keck Canister is a passive, skimmer device designed to recover light floating hydrocarbons (such as gasoline and diesel fuel) from the ground water in wells that are 2 inches and larger. Featuring a floating oleophilic/hydrophobic intake assembly, the Keck Canister will automatically collect and skim floating product down to a sheen. The skimmer assembly features over 12 inches of intake travel to accommodate water level fluctuations. The unit is suspended in the well at the desired recovery depth by the 25 feet of supplied stainless steel suspension cable.

Chapter 6: System Schematic



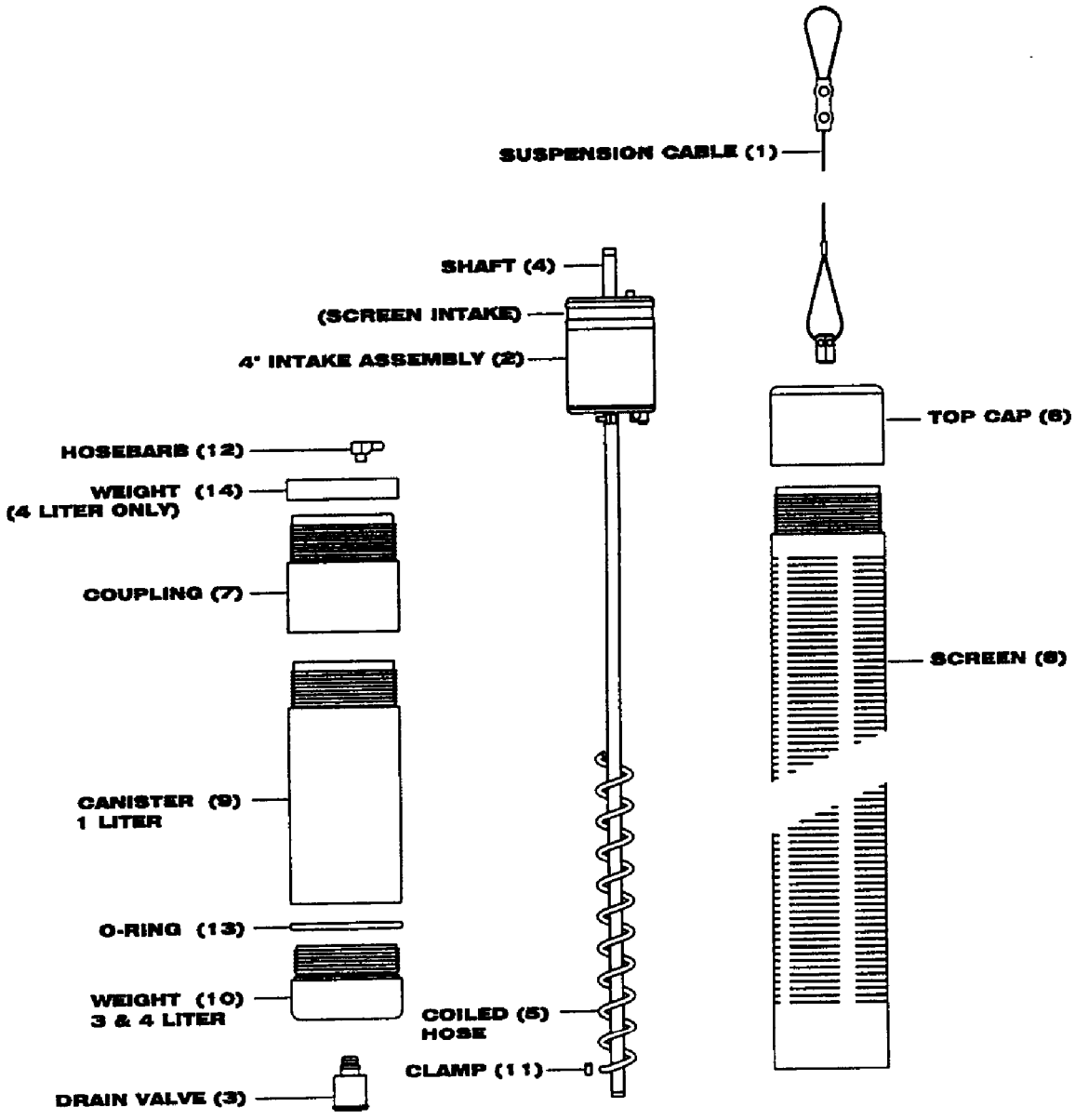


Figure 6 – Standard 4" PRC Skimmer Assembly (3&4 Liter) Parts List

APPENDIX C
API INTERACTIVE LNAPL GUIDE

American Petroleum Institute

API Interactive LNAPL Guide

Version 2.0

Prepared for:
The American Petroleum Institute's Soil and Groundwater Technical Task Force

Developed by:
Environmental Systems & Technologies
(A Division of Groundwater & Environmental Services, Inc.)
Blacksburg, Virginia

Aqui-Ver, Inc.
Park City, Utah

August 2004

ACKNOWLEDGMENTS

API STAFF CONTACT

Harley Hopkins, Regulatory Analysis and Scientific Affairs Department (RASA)

MEMBERS OF THE API SOIL AND GROUNDWATER TECHNICAL TASK FORCE

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Curtis Stanley, Shell Global Solutions (US) Inc.; (Chairman)

Mark Adamski, BP p.l.c

Tim Buscheck, ChevronTexaco Corporation

Brian Davis, ChevronTexaco Corporation

George DeVaull, Shell Global Solutions (US) Inc

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Victor Kremesec, Atlantic Richfield Company, A BP Affiliated Company

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DEVELOPERS

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Mary Ann Parcher, ES&T, a Division of GES Inc.

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Don Lundy, ES&T, a Division of GES Inc.

G.D. Beckett, Aqui-Ver, Inc.

Christine Curley, Aqui-Ver, Inc.

Jeffrey Johnson, RETEC

API Interactive LNAPL Guide **Table of Contents**

Overview

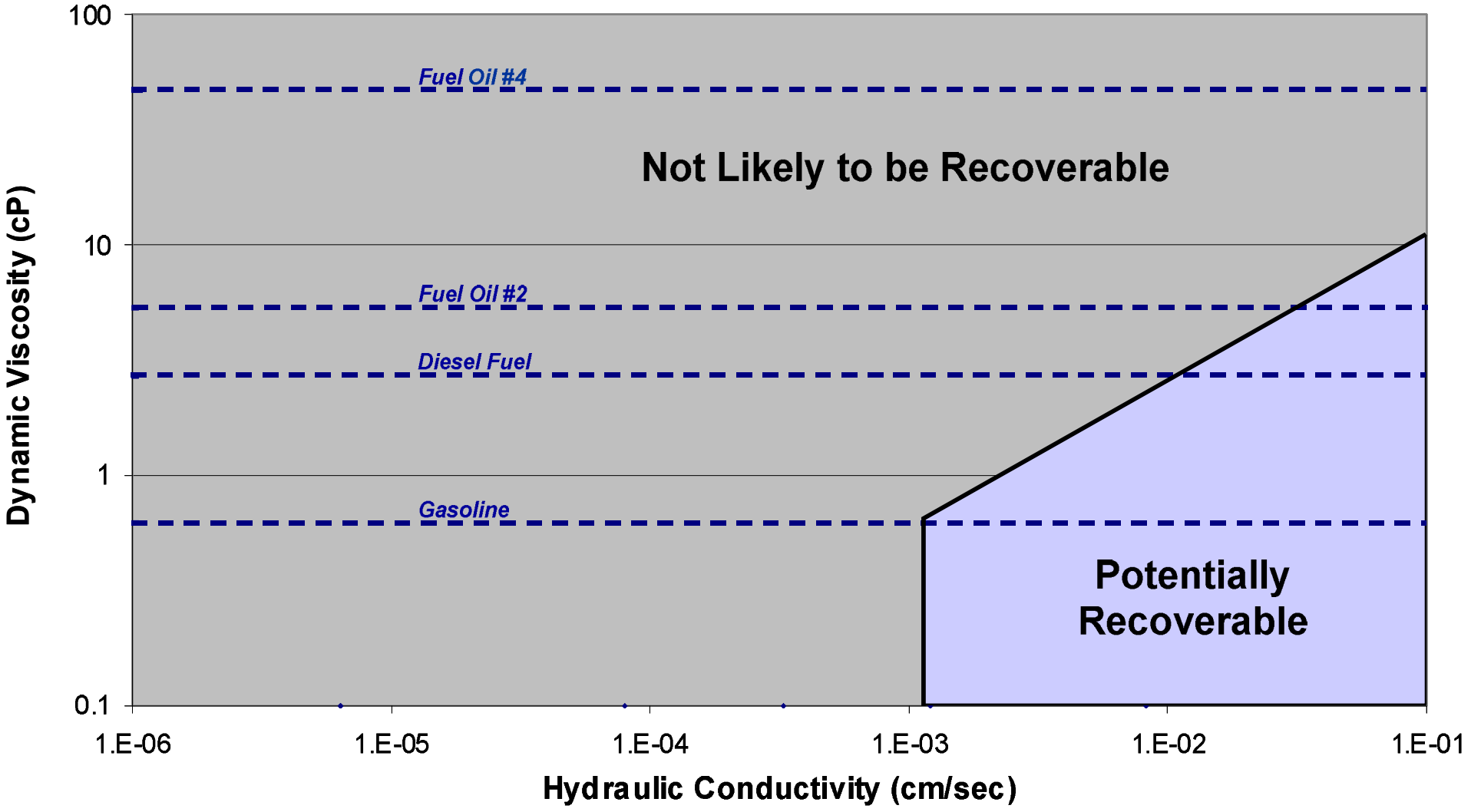
Educational Information

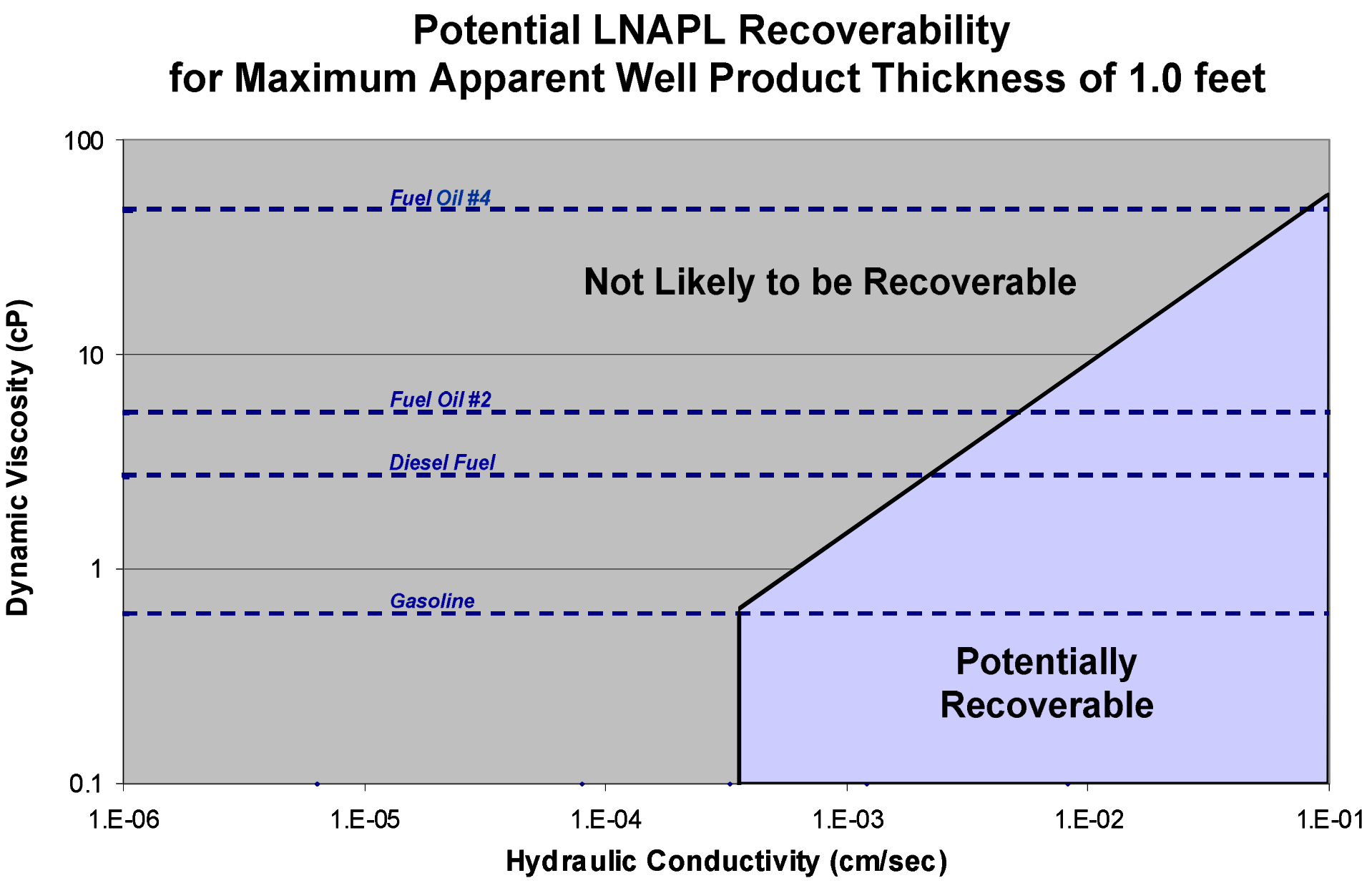
As part of the development of guidance documents associated with the Texas Risk Reduction Program, numerical modeling was conducted to evaluate recoverability for different product types under various aquifer soil conditions. The objective of the analysis was to provide a quick conservative screening tool to differentiate the general conditions where “LNAPL may not be recoverable” from those where “LNAPL may be recoverable.” Recovery was considered to be primarily by total fluid recovery from a single operating extraction well and secondarily by vacuum enhanced recovery (VER). Product recoverability was defined with respect to percent oil recovered relative to the total initial oil volume. Specifically, oil recovery was conservatively considered "Not Likely to be Recoverable" as a liquid when less than 10 percent of the total initial amount of product within the radius of influence of the extraction well was recovered.

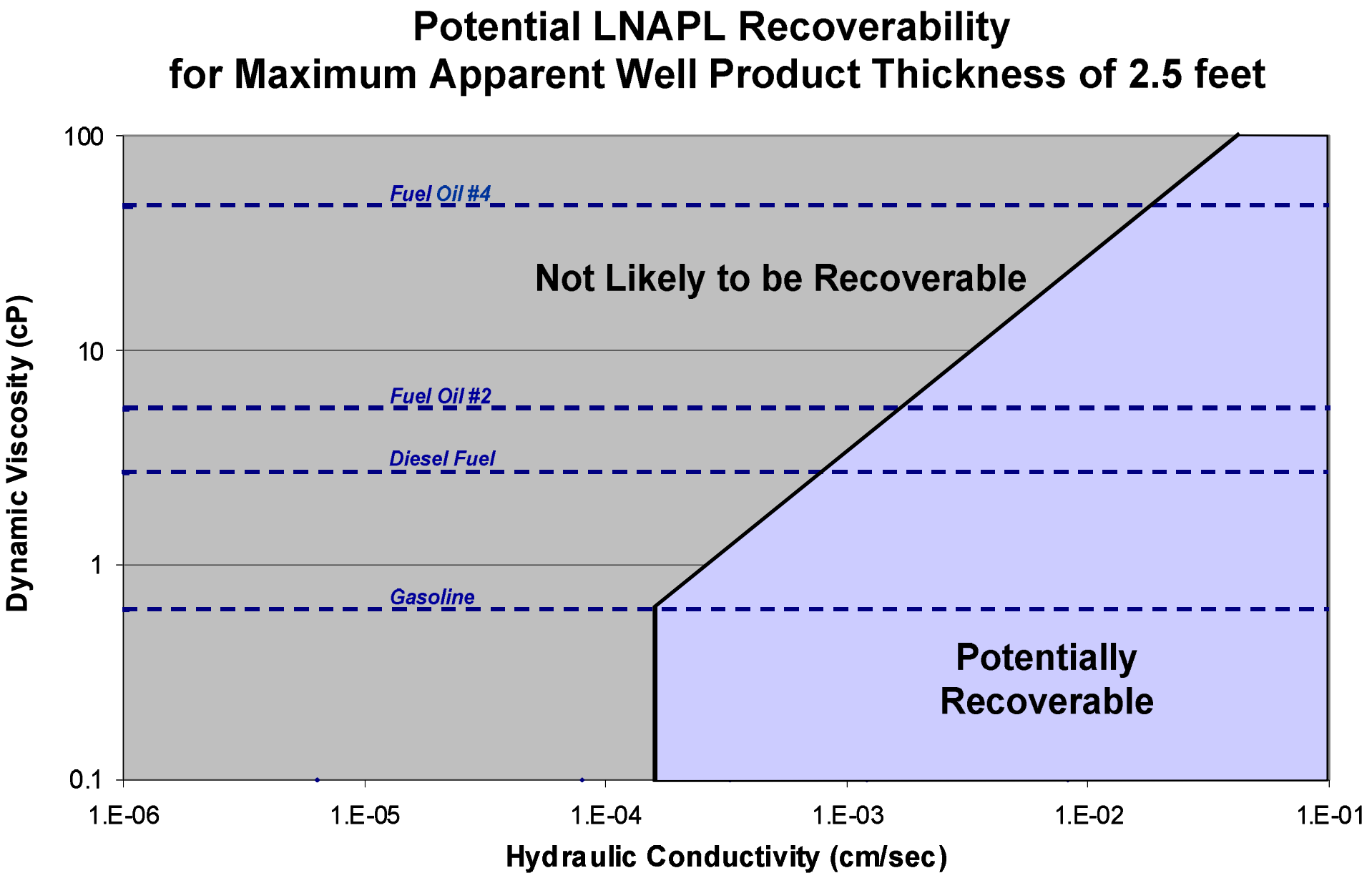
The analysis, which utilized the numerical model ARMOS, entailed simulations of over 200 different scenarios that were defined by site and remedial conditions. The variables considered in the analysis were aquifer material, product type, and the initial LNAPL plume volume as defined by apparent well product thickness. For each product and soil condition, four apparent well product thicknesses were simulated: 0.5, 1, 2.5 and 5 feet. The initial conditions were consistent for each simulation. Specifically, initial product thickness was uniform across the domain, the aquifer was homogeneous, and the initial potentiometric surface was flat. A single recovery well having a fixed pumping level (constant head) was located in the middle of the model domain (LNAPL plume). The water pump elevation was defined as being three feet below the initial water table. When air flow was considered, vacuums ranging from 5 to 15 inches Hg were applied.

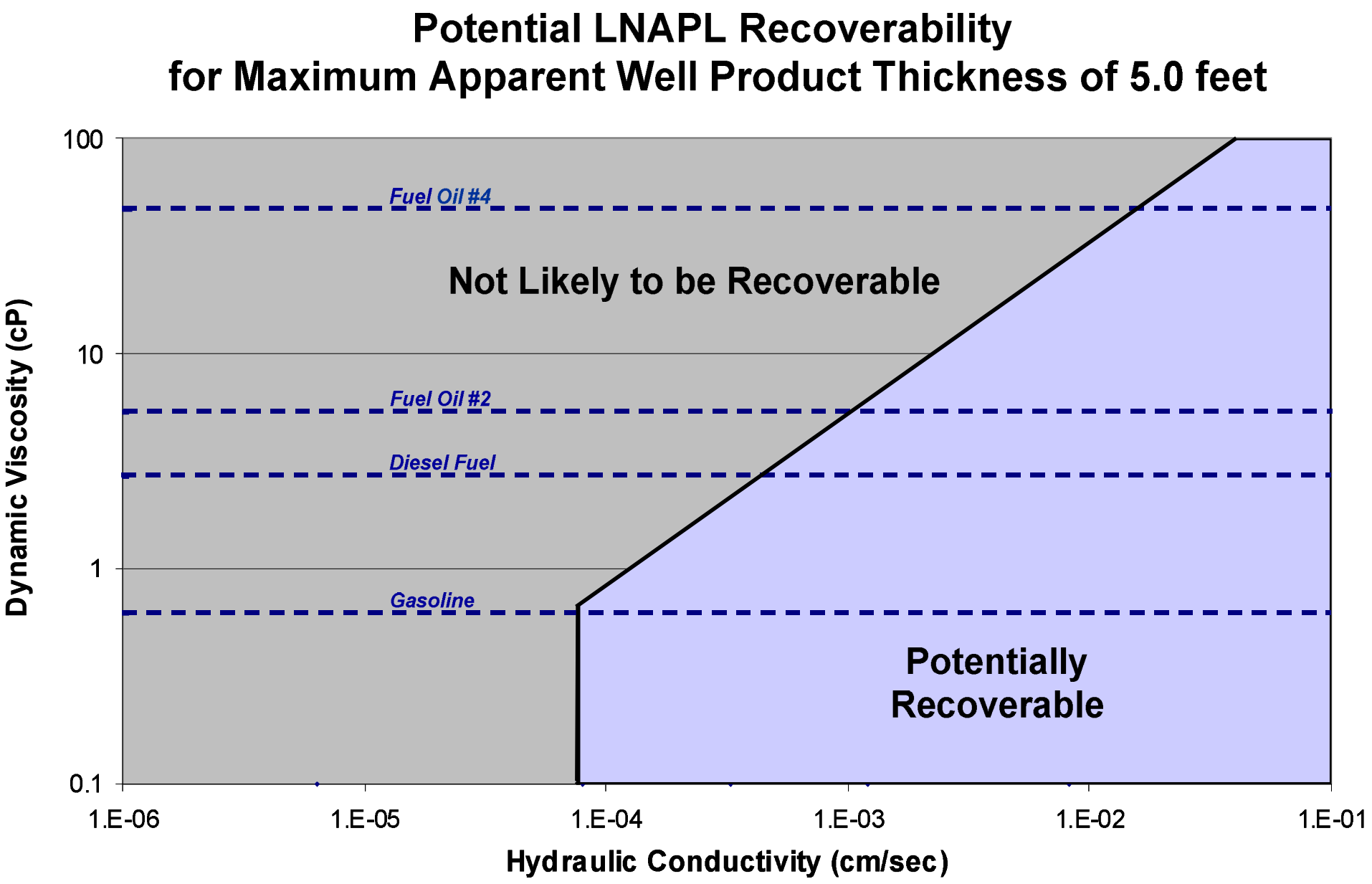
The results of the various scenarios were then plotted in a series of charts based on product thickness. Using the distribution of the plotted points, two general zones were delineated: “LNAPL Potentially Recoverable” and “LNAPL Not Likely to be Recoverable”. The results of the analysis indicate oil recoverability becomes limited with increasing oil viscosity, decreasing apparent product thickness, and decreasing hydraulic conductivity of the aquifer. Hence, site-specific soil and product conditions require consideration in defining remedial goals for LNAPL-impacted sites. In cases where LNAPL mobility and hence recoverability as a liquid is low, alternative approaches that focus on containment and monitoring should be considered. If the LNAPL is a very volatile material, vapor phase removal should also be considered.

Potential LNAPL Recoverability for Maximum Apparent Well Product Thickness of 0.5 feet

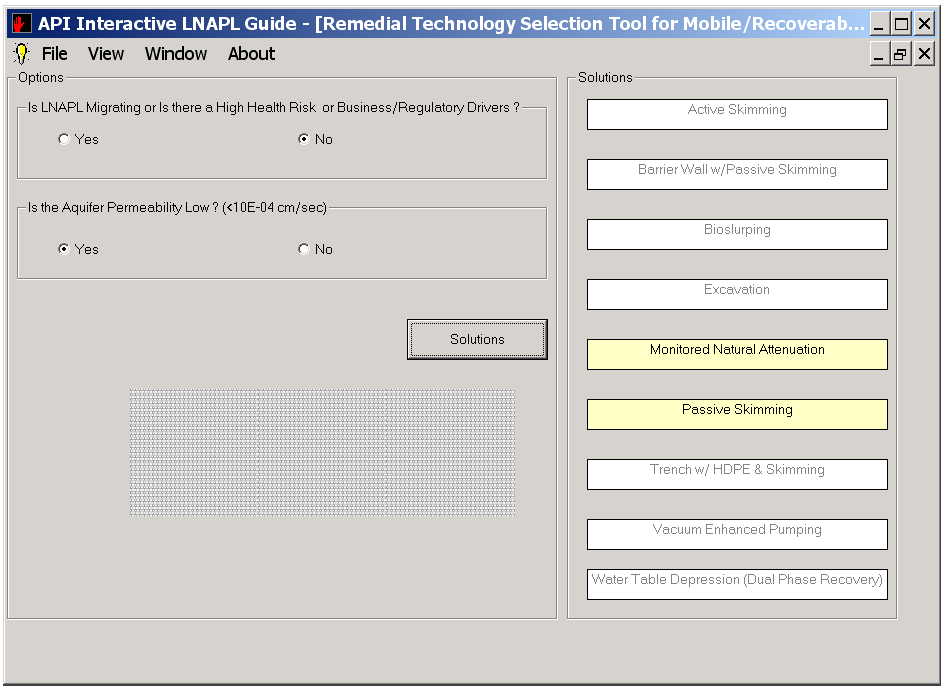


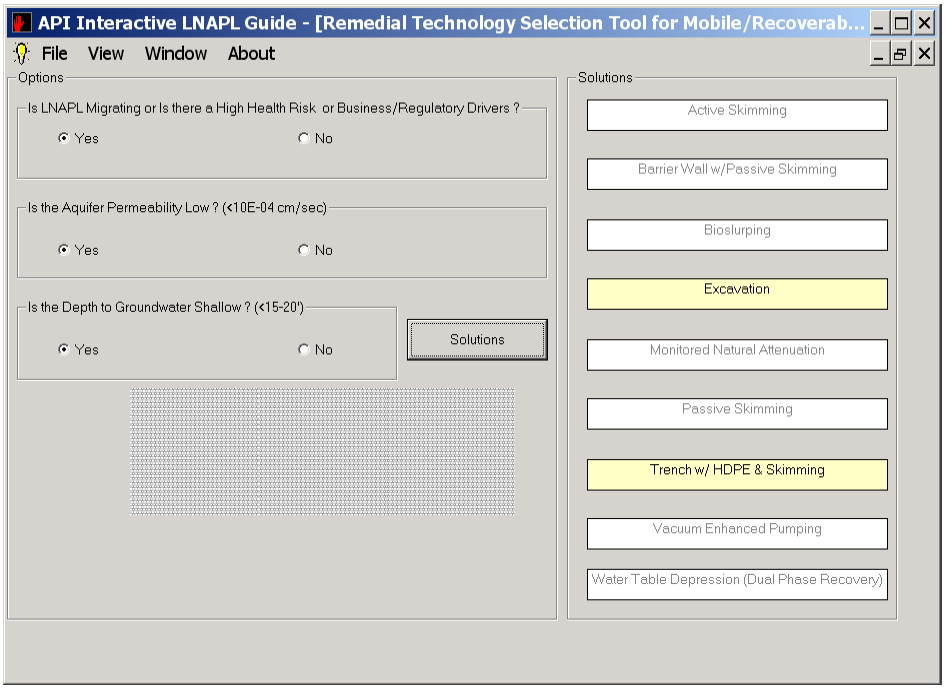

Potential LNAPL Recoverability
for Maximum Apparent Well Product Thickness of 1.0 feet
100
10
1
0.1
Dynamic Viscosity (cP)
Fuel Oil #4
Fuel Oil #2
Diesel Fuel
Gasoline
Not Likely to be Recoverable
Potentially
Recoverable
1.E-06
1.E-05
1.E-04
1.E-03
1.E-02
1.E-01
Hydraulic Conductivity (cm/sec)


Potential LNAPL Recoverability
for Maximum Apparent Well Product Thickness of 2.5 feet
Dynamic Viscosity (cP)
100
10
1
0.1
Fuel Oil #4
Fuel Oil #2
Diesel Fuel
Gasoline
Not Likely to be Recoverable
Potentially
Recoverable
1.E-06
1.E-05
1.E-04
1.E-03
1.E-02
1.E-01
Hydraulic Conductivity (cm/sec)


Potential LNAPL Recoverability
for Maximum Apparent Well Product Thickness of 5.0 feet
100
10
1
0.1
Dynamic Viscosity (cP)
Fuel Oil #4
Fuel Oil #2
Diesel Fuel
Gasoline
Not Likely to be Recoverable
Potentially
Recoverable
1.E-06
1.E-05
1.E-04
1.E-03
1.E-02
1.E-01
Hydraulic Conductivity (cm/sec)

API Remedial Technology Selection Tool Results
using the API Interactive LNAPL Guide, v.2.0
Eagle Gas, Inc. 131 Main Street, Carver, MA
by James J. Decoulos, PE, LSP
Date: July 8, 2005





API LNAPL GUIDE CALCULATIONS

Eagle Gas, Inc.
Carver, MA
MA DEP RTN 4-17582
July 8, 2005

Mobility Results

Mobility (f/day)	Plume Velocity (ft/day)
2.07E-01	3.82E-06

Saturation Results

Initial LNAPL Mass = 396.9 Lbs

Elevation (ft)	LNAPL Saturation	Water Saturation	LNAPL Relative Permeability	Water Relative Permeability
0.00E+00	0.00E+00	1.00E+00	0.00E+00	1.00E+00
1.50E-02	1.19E-06	1.00E+00	1.09E-03	9.96E-01
3.00E-02	4.77E-06	1.00E+00	2.18E-03	9.93E-01
4.50E-02	1.08E-05	1.00E+00	3.28E-03	9.89E-01
6.00E-02	1.93E-05	1.00E+00	4.39E-03	9.85E-01
7.50E-02	3.03E-05	1.00E+00	5.50E-03	9.82E-01
9.00E-02	4.37E-05	1.00E+00	6.61E-03	9.78E-01
1.05E-01	5.97E-05	1.00E+00	7.72E-03	9.74E-01
1.20E-01	7.81E-05	1.00E+00	8.84E-03	9.70E-01
1.35E-01	9.91E-05	1.00E+00	9.96E-03	9.67E-01
1.50E-01	1.23E-04	1.00E+00	1.11E-02	9.63E-01
1.65E-01	1.49E-04	1.00E+00	1.22E-02	9.59E-01
1.80E-01	1.77E-04	1.00E+00	1.33E-02	9.55E-01
1.95E-01	2.08E-04	1.00E+00	1.44E-02	9.51E-01
2.10E-01	2.42E-04	1.00E+00	1.56E-02	9.48E-01
2.25E-01	2.78E-04	1.00E+00	1.67E-02	9.44E-01
2.40E-01	3.17E-04	1.00E+00	1.78E-02	9.40E-01
2.55E-01	3.58E-04	1.00E+00	1.89E-02	9.36E-01
2.70E-01	4.02E-04	1.00E+00	2.00E-02	9.33E-01
2.85E-01	4.48E-04	1.00E+00	2.12E-02	9.29E-01
3.00E-01	4.97E-04	1.00E+00	2.23E-02	9.25E-01
3.15E-01	5.48E-04	9.99E-01	2.34E-02	9.21E-01
3.30E-01	6.02E-04	9.99E-01	2.45E-02	9.18E-01
3.45E-01	6.59E-04	9.99E-01	2.57E-02	9.14E-01

Elevation (ft)	LNAPL Saturation	Water Saturation	LNAPL Relative Permeability	Water Relative Permeability
3.60E-01	7.18E-04	9.99E-01	2.68E-02	9.10E-01
3.75E-01	7.79E-04	9.99E-01	2.79E-02	9.06E-01
3.90E-01	8.44E-04	9.99E-01	2.90E-02	9.03E-01
4.05E-01	9.10E-04	9.99E-01	3.02E-02	8.99E-01
4.20E-01	9.79E-04	9.99E-01	3.13E-02	8.95E-01
4.35E-01	1.05E-03	9.99E-01	3.24E-02	8.92E-01
4.50E-01	1.13E-03	9.99E-01	3.35E-02	8.88E-01
4.65E-01	1.20E-03	9.99E-01	3.47E-02	8.84E-01
4.80E-01	1.28E-03	9.99E-01	3.58E-02	8.80E-01
4.95E-01	1.36E-03	9.99E-01	3.69E-02	8.77E-01
5.10E-01	1.45E-03	9.99E-01	3.81E-02	8.73E-01
5.25E-01	1.54E-03	9.98E-01	3.92E-02	8.69E-01
5.40E-01	1.62E-03	9.98E-01	4.03E-02	8.66E-01
5.55E-01	1.72E-03	9.98E-01	4.14E-02	8.62E-01
5.70E-01	1.81E-03	9.98E-01	4.26E-02	8.58E-01
5.85E-01	1.91E-03	9.98E-01	4.37E-02	8.55E-01
6.00E-01	2.01E-03	9.98E-01	4.48E-02	8.51E-01
6.15E-01	2.11E-03	9.98E-01	4.59E-02	8.47E-01
6.30E-01	2.22E-03	9.98E-01	4.71E-02	8.44E-01
6.45E-01	2.32E-03	9.98E-01	4.82E-02	8.40E-01
6.60E-01	2.43E-03	9.98E-01	4.93E-02	8.36E-01
6.75E-01	2.54E-03	9.97E-01	5.04E-02	8.33E-01
6.90E-01	2.66E-03	9.97E-01	5.16E-02	8.29E-01
7.05E-01	2.78E-03	9.97E-01	5.27E-02	8.26E-01
7.20E-01	2.90E-03	9.97E-01	5.38E-02	8.22E-01
7.35E-01	3.02E-03	9.97E-01	5.49E-02	8.18E-01
7.50E-01	3.14E-03	9.97E-01	5.61E-02	8.15E-01
7.65E-01	3.27E-03	9.97E-01	5.72E-02	8.11E-01
7.80E-01	3.40E-03	9.97E-01	5.83E-02	8.08E-01
7.95E-01	3.53E-03	9.96E-01	5.94E-02	8.04E-01
8.10E-01	3.67E-03	9.96E-01	6.06E-02	8.00E-01
8.25E-01	3.81E-03	9.96E-01	6.17E-02	7.97E-01
8.40E-01	3.94E-03	9.96E-01	6.28E-02	7.93E-01
8.55E-01	4.09E-03	9.96E-01	6.39E-02	7.90E-01
8.70E-01	4.23E-03	9.96E-01	6.51E-02	7.86E-01
8.85E-01	4.38E-03	9.96E-01	6.62E-02	7.83E-01
9.00E-01	4.53E-03	9.95E-01	6.73E-02	7.79E-01
9.15E-01	4.68E-03	9.95E-01	6.84E-02	7.76E-01
9.30E-01	4.84E-03	9.95E-01	6.95E-02	7.72E-01
9.45E-01	4.99E-03	9.95E-01	7.07E-02	7.69E-01
9.60E-01	5.15E-03	9.95E-01	7.18E-02	7.65E-01

Elevation (ft)	LNAPL Saturation	Water Saturation	LNAPL Relative Permeability	Water Relative Permeability
9.75E-01	5.31E-03	9.95E-01	7.29E-02	7.62E-01
9.90E-01	5.48E-03	9.95E-01	7.40E-02	7.58E-01
1.00E+00	5.64E-03	9.94E-01	7.51E-02	7.55E-01
1.02E+00	5.81E-03	9.94E-01	7.62E-02	7.51E-01
1.03E+00	5.99E-03	9.94E-01	7.74E-02	7.48E-01
1.05E+00	6.16E-03	9.94E-01	7.85E-02	7.45E-01
1.06E+00	6.34E-03	9.94E-01	7.96E-02	7.41E-01
1.08E+00	6.51E-03	9.93E-01	8.07E-02	7.38E-01
1.09E+00	6.70E-03	9.93E-01	8.18E-02	7.34E-01
1.11E+00	6.88E-03	9.93E-01	8.29E-02	7.31E-01
1.12E+00	7.07E-03	9.93E-01	8.41E-02	7.28E-01
1.14E+00	7.25E-03	9.93E-01	8.52E-02	7.24E-01
1.15E+00	7.44E-03	9.93E-01	8.63E-02	7.21E-01
1.17E+00	7.64E-03	9.92E-01	8.74E-02	7.17E-01
1.18E+00	7.83E-03	9.92E-01	8.85E-02	7.14E-01
1.20E+00	8.03E-03	9.92E-01	8.96E-02	7.11E-01
1.21E+00	8.23E-03	9.92E-01	9.07E-02	7.07E-01
1.23E+00	8.43E-03	9.92E-01	9.18E-02	7.04E-01
1.24E+00	8.64E-03	9.91E-01	9.29E-02	7.01E-01
1.26E+00	8.85E-03	9.91E-01	9.41E-02	6.97E-01
1.27E+00	9.06E-03	9.91E-01	9.52E-02	6.94E-01
1.29E+00	9.27E-03	9.91E-01	9.63E-02	6.91E-01
1.30E+00	9.48E-03	9.91E-01	9.74E-02	6.88E-01
1.32E+00	9.70E-03	9.90E-01	9.85E-02	6.84E-01
1.33E+00	9.92E-03	9.90E-01	9.96E-02	6.81E-01
1.35E+00	1.01E-02	9.90E-01	1.01E-01	6.78E-01
1.36E+00	1.04E-02	9.90E-01	1.02E-01	6.75E-01
1.38E+00	1.06E-02	9.89E-01	1.03E-01	6.71E-01
1.39E+00	1.08E-02	9.89E-01	1.04E-01	6.68E-01
1.41E+00	1.10E-02	9.89E-01	1.05E-01	6.65E-01
1.42E+00	1.13E-02	9.89E-01	1.06E-01	6.62E-01
1.44E+00	1.15E-02	9.88E-01	1.07E-01	6.59E-01
1.45E+00	1.17E-02	9.88E-01	1.08E-01	6.55E-01
1.47E+00	1.20E-02	9.88E-01	1.09E-01	6.52E-01
1.48E+00	1.22E-02	9.88E-01	1.11E-01	6.49E-01
1.50E+00	1.25E-02	9.88E-01	1.12E-01	6.46E-01
1.51E+00	1.26E-02	9.87E-01	1.12E-01	0.00E+00
1.53E+00	1.25E-02	9.87E-01	1.12E-01	0.00E+00
1.54E+00	1.21E-02	9.87E-01	1.10E-01	0.00E+00
1.56E+00	1.16E-02	9.87E-01	1.07E-01	0.00E+00
1.57E+00	1.07E-02	9.86E-01	1.04E-01	0.00E+00

Elevation (ft)	LNAPL Saturation	Water Saturation	LNAPL Relative Permeability	Water Relative Permeability
1.59E+00	9.66E-03	9.86E-01	9.83E-02	0.00E+00
1.60E+00	8.36E-03	9.86E-01	9.15E-02	0.00E+00
1.62E+00	6.84E-03	9.86E-01	8.27E-02	0.00E+00
1.63E+00	5.09E-03	9.85E-01	7.14E-02	0.00E+00
1.65E+00	3.13E-03	9.85E-01	5.59E-02	0.00E+00
1.66E+00	9.50E-04	9.85E-01	3.08E-02	0.00E+00
1.68E+00	0.00E+00	9.84E-01	0.00E+00	0.00E+00

APPENDIX D
GRAVITY FEED FILTER SCAVENGER

Click to go to www.geotechenv.com

Hydrocarbon Recovery Systems

Gravity Feed Filter Scavenger

The Gravity Feed Filter Scavenger is a two piece housing designed to float an oil/water separator cartridge at the oil/water surface of a holding vessel. Once floated on the surface and its output hose is connected, it is ready to start recovering product.

FEATURES

- Requires no power
- Lightweight
- Low maintenance
- Screens available in three mesh sizes
- For hydrocarbons with specific gravity < 1.0
- For use with hydrocarbon viscosities 50 to 400 SSU

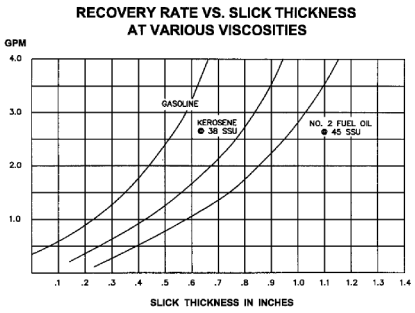
SPECIFICATIONS

Dimensions: 18.5" dia. x 10" high x 5" draft
(47.4cm x 25.6cm x 12.8 cm)

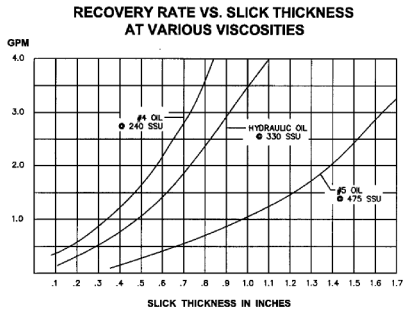
Weight: 11 lbs (5kg)

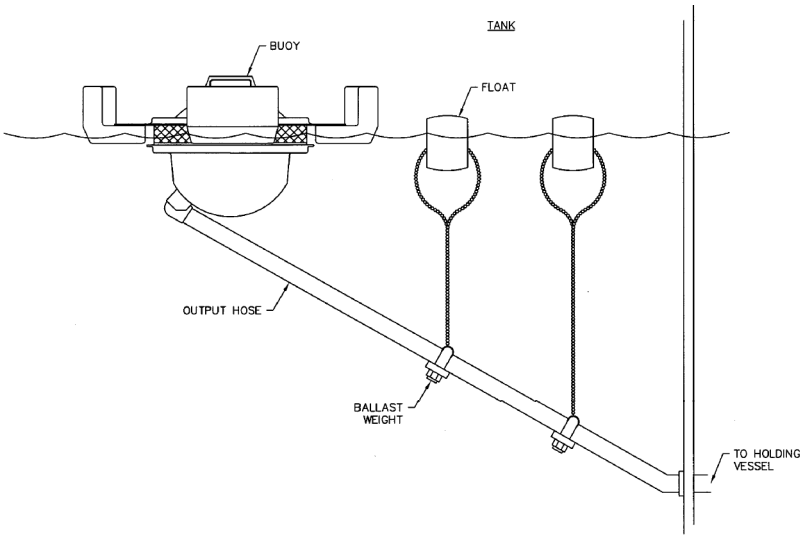
ORS Gravity Feed Filter Scavenger

Scavenger "Light Oil" Separator Cartridge



Scavenger "Heavy Oil" Separator Cartridge





CALL GEOTECH TODAY (800) 833-7958

Geotech Environmental Equipment, Inc.
8035 East 40th Avenue • Denver, Colorado 80207
(303) 320-4764 • **(800) 833-7958** • FAX (303) 322-7242
email: sales@geotechenv.com website: www.geotechenv.com

APPENDIX E
CARBTROL ACTIVATED CARBON DRUM USAGE ANALYSIS

PROJECT: Decoulos & Co. MA Eagle Gas Station

FLOW IN GPM: 3.00
FLOW IN GPD: 4320.00

PERFORMANCE:

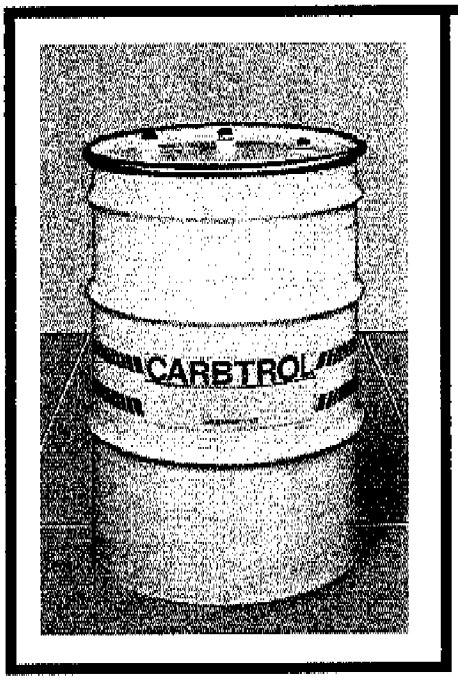
CONTAMINANT	CONC(ppb)	#CONT /DAY	# CARBON /DAY	# CONT /1000 gal	# CARBON /1000 gal
Diesel (as Naphthalene)	17000	0.61	1.56	0.14	0.36
TOTALS	17000	0.61	1.56	0.14	0.36

Calculation based on CARBTROL CSL carbon having an Iodine number of: 1100.00

CARBTROL®

WATER PURIFICATION CANISTER 200 POUND ACTIVATED CARBON

L-1



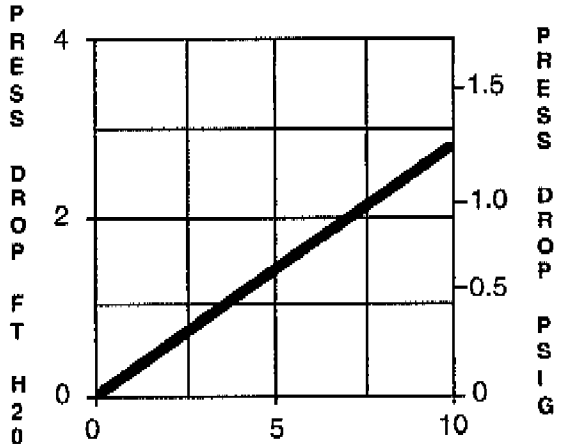
The CARBTROL L-1 (liquid) Canister handles up to 10 gpm.

FEATURES

- 200 pounds of high activity carbon.
- Large 1 1/4" internal piping. Low pressure drop allows operation of three canisters in series.
- Standard FPT couplings for easy installation - saves time and money.
- Special "no leak" lid gasket.
- Heavy duty steel drums. Acceptable for transport of hazardous spent carbon.
- Piping design eliminates channeling.

SPECIFICATIONS

DRUM:	24" Ø x 34" high, mild steel, epoxy phenolic internal coating with polyethylene liner.
CARBON:	200 lbs.
SHIPPING WEIGHT:	250 lbs.
INLET:	1 1/4" FPT, steel
OUTLET:	1 1/4" FPT, steel
INTERNAL PIPING:	1 1/4" PVC
DRAIN:	3/4" bung
PRESSURE DROP:	1.25 psi @ 10 gpm
MAX. OPERATING PRESSURE:	10 psi



AT-100/#2

CARBTROL® CORPORATION

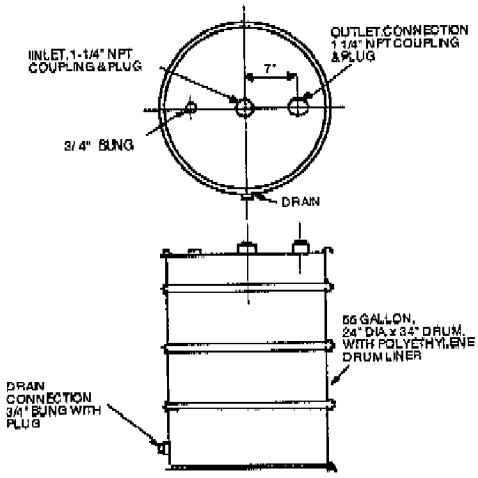
955 Connecticut Ave., Suite 5202
Bridgeport, CT 06607

800-242-1150 Fax: 203-337-4353
www.carbtrol.com info@carbtrol.com

CARBTROL®

WATER PURIFICATION CANISTER 200 POUND ACTIVATED CARBON

L-1



OPTIONS

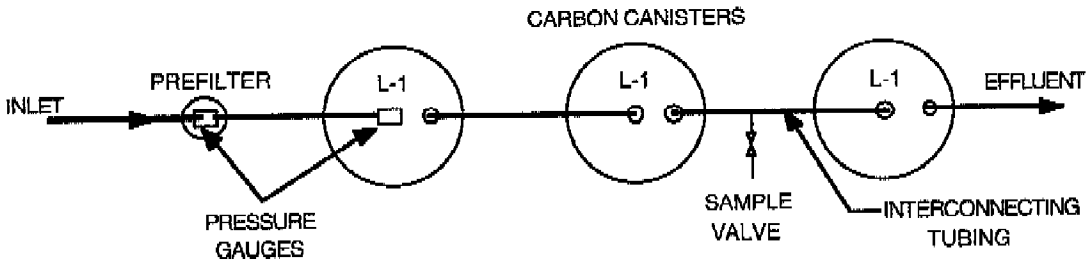
Interconnecting Piping Kit

Flexible 1 1/4" diameter PVC tubing with hose clamps. Includes inlet pressure gauge and intermediate sample valve.

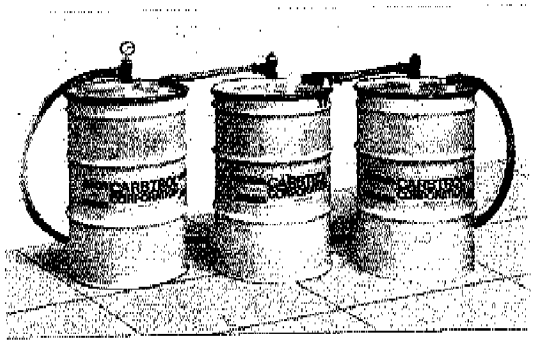
Pre-filter for Suspended Solids Removal

Pre-filter consisting of a basket filter piped and mounted on support frame. Filter is of carbon steel construction.

ARRANGEMENT (3) L-1 Canisters in series for 10 gpm flow (Contact time @ 10 gpm - 15 minutes)



TYPICAL INSTALLATION



CARBTROL® CORPORATION
955 Connecticut Ave., Suite 5202
Bridgeport, CT 06607
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www.carbtrol.com info@carbtrol.com

APPENDIX F
GLOBAL WATER LEVEL LOGGERS

Click to go to www.geotechenv.com

Water Level Loggers

Global Water Level Loggers

The Global Water Level Logger monitors and records water level data. It can record up to 24,400 readings and is programmable from one reading per second to one reading per day. Pressure ranges of 0-3', 0-15', 0-30', 0-60', 0-120', and 0-250' are available. A 25 foot cable is standard, with optional cable lengths of up to 500 feet available.

FEATURES

- **Easily adapted for well-head mounting or other installations**
- **EZ-PC software allows uploading of data into standard spreadsheet format**
- **Palm Pilot® software simplifies data collection**
- **Ideal for monitoring well or surface water applications**
- **Real-time readout of current data**
- **Reliable and accurate**
- **Automatic barometric pressure and temperature compensation**
- **Weatherproof cylindrical enclosure**
- **Fully encapsulated water level sensor with marine grade epoxy**
- **No need to remove sensor for data collection or battery change. Connection and battery replacement are accessable from surface.**

Global Water Level Logger with 1 5/8 inch Data Logger

OPERATION

Place the Water Level Logger slightly below the lowest expected water level. Select a range to cover maximum water level change, not necessarily the total depth of water. Select the smallest range possible for greater accuracy.

The weatherproof cylindrical enclosure is designed to slide into a 2 inch standard ABS or PVC pipe slip coupler.

For well head monitoring, a reducer coupling is available to couple the datalogger to the well head. For monitoring surface water, a protective stilling well can be easily constructed from PVC pipe. The pipe may be attached vertically to a post or on a slant down the bank.

User friendly software and cable are provided with each water level logger. There are 10 menu items that allow you to set the date, time, recording interval, engineering units, collect date, and observe data. Tabular files may be printed or data presented by all standard spreadsheets.

Deluxe Palm Package
Includes Palm Pilot®, field cable, and rugged carrying case.

Geotech Environmental Equipment, Inc.
8035 East 40th Avenue • Denver, Colorado 80207
(303) 320-4764 • **(800) 833-7958** • FAX (303) 322-7242
email: sales@geotechenv.com website: www.geotechenv.com

Water Level Meters

Geotech Water Level Loggers Specifications

Size:

Datalogging unit .....1 5/8" diameter, 10” high available

Probe.....5.7" length, .77" diameter

Material of cable covering .....Marine grade polyurethane jacket, polyethylene vent tube, full foil shield Outside Diameter: 3/16”

Cable wiring.....3 wire (input, output, ground)

Weight 1.6lbs

Recording interval .....Programmable Linear fixed intervals from 1/second to once every 32,000 seconds (also 0-32,000 minutes, hours and days) and Logarithimic test (for pump and slug tests).

Memory .....24,400 readings Non-volatile flash memory

Type of memory .....Data overwite: Select memory wrap or unwrap (unwrap will stop logging data once memory is full)

Battery life .....Litium 9V DC: Up to 3 years (depending on recording intervals)

Input .....Analog 0-4V DC

Resolution .....12 bit (0.003' for 14' range)

Linearity.....0.1% Full Scale

Accuracy .....0.1% Full Scale at constant temperature, 0.2% over 35º F to 70º F range
0.25% Full Scale for temperature greater than 85º F

Pressure ranges .....0-3’, 0-15’, 0-30’, 0-60’, 0-120’, and 0-250’ are available

Computer interface .....RS232C, 9 pin female connector provided

Software.....Compatible with Microsoft’s Windows 95, 98, ME, 2000, NT, and XP. Windows and Excel are trademarks of the Microsoft Corporation.

Software features .....Programmable record interval, scaling for engineering units, output in spreadsheet format, real-time monitoring.

Operating temperature.....-40° to 170° F (Datalogger)

Overpressure: .....2 x full scale range

Burst Pressure: .....10 x full scale range

CALL GEOTECH TODAY (800) 833-7958

Geotech Environmental Equipment, Inc.
8035 East 40th Avenue • Denver, Colorado 80207
(303) 320-4764 • **(800) 833-7958** • FAX (303) 322-7242
email: sales@geotechenv.com website: www.geotechenv.com

APPENDIX G
GROUNDWATER DISCHARGE INFILTRATION CALCULATIONS

GROUNDWATER INFILTRATION TRENCH DESIGN
EAGLE GAS, INC.
131 MAIN STREET, CARVER, MA

Saturated Trench Sidewall Area (ft2)	530	
Conversion (cm2/ft2)	929	
Saturated Trench Sidewall Area (cm2)	492,370	
Worst Expected Permeability (cm/sec)	1.85E-05	
Area (cm2)	492,370	
Flow rate (cm3/sec)	9.11	
Conversion (cm3/mL)	1	
Flow Rate (ml/sec)	9.11	
Conversion (L/ml)	0.00	
Flow Rate (L/sec)	0.01	
Conversion (gallons/L)	0.26	
Flow Rate (gal/sec)	0.00	
Conversion (sec/min)	60	
Flow Rate (gal/min)	0.14	
Conversion (min/day)	1440	
Anticipated Flow Rate (gal/day)	207.77	
adjusted Title 5 greywater design rate	124.66	GPD, which equals 60% of design flow (see 310 CMR 15.289(3)(a)(2))
...using a Safety Factor of 2.5	311.65	GPD (for Title 5 infiltration design)

Aggregate border around each Infiltrator	2	ft
Infiltrators per Trench	6	
Length	41.50	ft
Width	6.83	ft
Sidewall Height	2.00	ft
No. of Chamber Trenches	2	
Sidewall Area =	386.67	sf
Bottom Area =	567.17	sf
Total Area =	953.83	sf
TOTAL FLOW CAPACITY =	314.77	GPD (using Soil Class III at 25 min/in perc rate) (see 310 CMR 15.242)

APPENDIX H
CATCH BASIN INSERT CONTROL

Jim THESE MAY WORK IN THE CATCH BASINS BY BAGLA C-15.

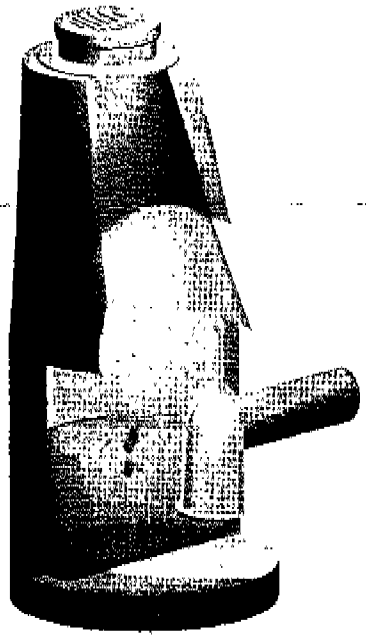
Bill

LeBARON FOUNDRY INC.

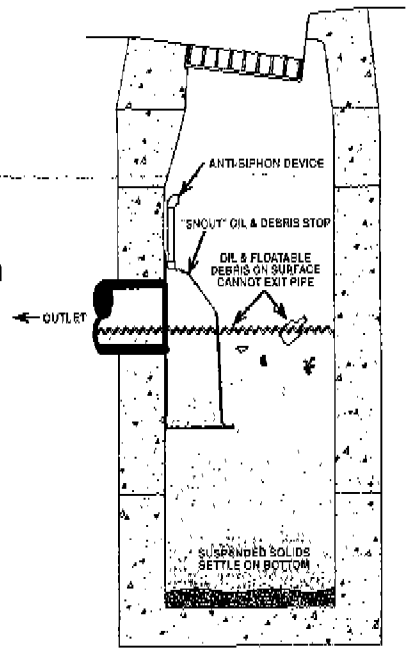
IRON CASTINGS AND CONSTRUCTION SUPPLIES

ARE YOU IN COMPLIANCE?

Avoid costly fines ADOPT-A-SNOUT!



- NPDES PHASE II DEMANDS, Best Management Practices (BMPs). Potential fines begin in 2007.
- LeBaron Foundry, Inc. and Best Management Products, Inc. have formed a strategic alliance to provide a simple and low cost storm water management solution.
- The SNOUT is a fiberglass hooded outlet cover with a removable watertight port for access to pipe and an anti-siphon flow vent to improve hydraulics.
- Best of all, this product does not require new construction. It can be easily installed in your existing catch basins.
- The SNOUT is recognized by the EPA and is listed on their website as a best management solution.
- It is THE most ECONOMICAL and EFFECTIVE device you can get to manage storm water issues in your city or town.



AND...

We are giving away one (up to 30") to any Town or City willing to try it out and provide feedback to the manufacturer.

Just fill out the " Adoption" form on the reverse side of this letter and fax it back to us at **508-580-2740**. The full benefit of this promotion is open to the first 500 Public Sector entities that apply in the continental United States only.

DON'T BE LEFT OUT!

P.O. BOX 746 14 EAST UNION STREET, BROCKTON, MA 02303 TEL (508) 586-3130 FAX (508) 580-2740

www.lebaronfoundry.com

APPENDIX I
STORMWATER OUTFALL TRENCH FILTER

Stormwater Management
Spill Response
Spill Containment
Contact Us
Home

Search
SITE MAP

STORMWATER MANAGEMENT - CATCH BASIN PROTECTION

Ultra-TrenchFilter

DrainGuard | GrateGuard | CurbGuard | BasinGuard | PassiveSkimmer | HydroKleen | Drain Marker | Lifter/Hook | TrenchFilter

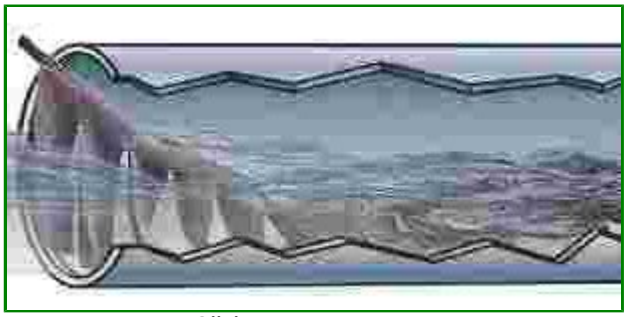
Reduce Oil and Sediment Flowing Through Trench Drains and Pipes

NEW!

Click For Larger Image

- Filter design forces water to flow around and through a series of X-Tex filter strips — sand, silt and sediment are trapped between the strips while hydrocarbons are absorbed by the X-Tex material.
- Unit has a 10 ft. x 2ft. section of filter strips — nylon cord is sewn along the entire length of the fabric for added strength.
- Loops on each end allow TrenchFilters to be connected together for long runs of trench/pipe.
- Ten-foot cord (included) can be used to tie off TrenchFilter and secure it in place.
- Helps meet new Stormwater Management Regulations — NPDES 40 CFR 122.26 (1999). Considered a Best Management Practice (BMP).

Click For Larger Image



Click For Larger Image

Ultra-TrenchFilter
Part# 9700
Dimensions: 10’ L x 2’W
Absorbs up to 0.5 gallons of oil per unit
Weight: 2 lbs.

U.S. Patent No. 6,632,501

DrainGuard | GrateGuard | CurbGuard | BasinGuard | PassiveSkimmer | HydroKleen | Drain Marker | Lifter/Hook | TrenchFilter