DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION

Interim Final 2/5/99

RCRA Corrective Action
Environmental Indicator (EI) RCRIS code (CA750)

Migration of Contaminated Groundwater Under Control

Facility Name: former Cramer Company
Facility Address: 139 Mill Rock Road East, Old Saybrook, CT 06475
Facility EPA ID #: CTD001162114

1. Has all available relevant/significant information on known and reasonably suspected releases to the groundwater media, subject to RCRA Corrective Action (e.g., from Solid Waste Management Units (SWMU), Regulated Units (RU), and Areas of Concern (AOC)), been **considered** in this EI determination?

   __X__ If yes - check here and continue with #2 below.

   _____ If no - re-evaluate existing data, or

   _____ if data are not available, skip to #8 and enter "IN" (more information needed) status code.

BACKGROUND

Definition of Environmental Indicators (for the RCRA Corrective Action)

Environmental Indicators (EI) are measures being used by the RCRA Corrective Action program to go beyond programmatic activity measures (e.g., reports received and approved, etc.) to track changes in the quality of the environment. The two EI developed to-date indicate the quality of the environment in relation to current human exposures to contamination and the migration of contaminated groundwater. An EI for non-human (ecological) receptors is intended to be developed in the future.

Definition of "Migration of Contaminated Groundwater Under Control" EI

A positive "Migration of Contaminated Groundwater Under Control" EI determination ("YE" status code) indicates that the migration of "contaminated" groundwater has stabilized, and that monitoring will be conducted to confirm that contaminated groundwater remains within the original "area of contaminated groundwater" (for all groundwater "contamination" subject to RCRA corrective action at or from the identified facility (i.e., site-wide)).

Relationship of EI to Final Remedies

While Final remedies remain the long-term objective of the RCRA Corrective Action program the EI are near-term objectives which are currently being used as Program measures for the Government Performance and Results Act of 1993, GPRA). The "Migration of Contaminated Groundwater Under Control" EI pertains ONLY to the physical migration (i.e., further spread) of contaminated ground water and contaminants within groundwater (e.g., non-aqueous phase liquids or NAPLs). Achieving this EI does not substitute for achieving other stabilization or final remedy requirements and expectations associated with sources of contamination and the need to restore, wherever practicable, contaminated groundwater to be suitable for its designated current and future uses.

Duration / Applicability of EI Determinations

EI Determinations status codes should remain in RCRIS national database ONLY as long as they remain true (i.e., RCRIS status codes must be changed when the regulatory authorities become aware of contrary information).

2. **Is groundwater known or reasonably suspected to be "contaminated"[1] above appropriately protective "levels" (i.e., applicable promulgated standards, as well as other appropriate standards, guidelines, guidance, or criteria) from releases subject to RCRA Corrective Action, anywhere at, or from, the facility?**

__X__ If yes - continue after identifying key contaminants, citing appropriate "levels," and referencing supporting documentation.

_____ If no - skip to #8 and enter "YE" status code, after citing appropriate "levels," and referencing supporting documentation to demonstrate that groundwater is not "contaminated."

_____ If unknown - skip to #8 and enter "IN" status code.

Rationale and Reference(s): Results of quarterly ground water sampling from monitoring wells across the site for the period of September 1997 through July 1999 confirm contamination of ground water by trichloroethene (TCE), tetrachloroethene (PCE), 1,1,1-trichloroethane (TCA) and a few degradation products. The contaminant plume is centered at monitoring well MW98-7, and extends southerly to near MW97-1 and westerly past MW99-1. The available data suggest that contaminant concentrations decrease to the west of MW99-1 and that any discharge of contaminants to the wetland overlying this area is not significant, as discussed in (5) and (6), below. A table summarizing the quarterly ground water monitoring data from September 1997 through July 1999 is included as Attachment 6.

The Connecticut Ground Water Protection Criteria for TCE and PCE is 5 micrograms per liter (ug/l) and for TCA is 200 ug/l. TCE has been measured at concentrations up to 370 ug/l (MW98-7); PCE has been measured at concentrations up to 13 ug/l (MW E-2D) and TCA has been measured at concentrations up to 20 ug/l (MW97-3).

Footnotes:

[1]"Contamination" and "contaminated" describes media containing contaminants (in any form, NAPL and/or dissolved, vapors, or solids, that are subject to RCRA) in concentrations in excess of appropriate "levels" (appropriate for the protection of the groundwater resource and its beneficial uses).

3. **Has the migration of contaminated groundwater stabilized (such that contaminated groundwater is expected to remain within "existing area of contaminated groundwater"[2] as defined by the monitoring locations designated at the time of this determination)?**

_X_ **If yes - continue, after presenting or referencing the physical evidence (e.g., groundwater sampling/measurement/migration barrier data) and rationale why contaminated groundwater is expected to remain within the (horizontal or vertical) dimensions of the "existing area of groundwater contamination"[2]).**

____ **If no (contaminated groundwater is observed or expected to migrate beyond the designated locations defining the "existing area of groundwater contamination"[2]) - skip to #8 and enter "NO" status code, after providing an explanation.**

_X_ **If unknown - skip to #8 and enter "IN" status code.**

Rationale and Reference(s): See Attachment 3

Further information is needed to define the extent of TCE contamination in groundwater to the west.

Also, MW-97-1 is screened from 8 to 18 feet. Therefore it does not provide information concerning the extent of the contaminant plume in deeper sections of the aquifer. Construction details on MW97-3 are not provided. Therefore, it is not possible to determine whether the extent of the deeper plume has been defined to the south.

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[2] "existing area of contaminated groundwater" is an area (with horizontal and vertical dimensions) that has been verifiably demonstrated to contain all relevant groundwater contamination for this determination, and is defined by designated (monitoring) locations proximate to the outer perimeter of "contamination" that can and will be sampled/tested in the future to physically verify that all "contaminated" groundwater remains within this area, and that the further migration of "contaminated" groundwater is not occurring. Reasonable allowances in the proximity of the monitoring locations are permissible to incorporate formal remedy decisions (i.e., including public participation) allowing a limited area for natural attenuation.

Attachment 3

Results of quarterly ground water sampling from September 1997 through July 1999 are consistent and indicate stabilized contaminant concentrations within the ground water plume. All industrial activity at the subject property has permanently stopped and soil contamination in two source areas has been remediated (the southeast corner of the building in 1984 and 1999 and the oil room in 1999). Therefore, no continuing source of ground water contamination that would tend to enlarge the area of impacted ground water exists on site. Additional deep monitoring wells drilled and sampled in 1999 confirm that contaminated ground water does not extend south of MW 99-3 or north of MW G, and the trend in contaminant concentrations appears to decrease to the west of MW99-1 and east of MW E-3D.

The principal ground water contaminant is TCE. Results of ground water monitoring (see attached summary table) document the presence of substantial concentrations of a related suite of degradation products, such as cis 1,2- dichloroethene and 1,1-dichloroethene, which result from the natural anaerobic transformation of TCE. The presence of this suite of degradation products is direct evidence that an active in-situ process of naturally occurring bioremediation is ongoing at the site. The available data indicate that a viable population of indigenous soil bacteria capable of metabolizing the contaminants of concern is present. The process of bioremediation tends to restrict the enlargement of the contaminant plume by reducing the total mass of contaminants flowing in the ground water system.

Owosso Corporation is currently evaluating the feasibility of enhancing the naturally occurring in-situ bioremediation that is ongoing at the site by injecting the aquifer with a hydrogen releasing compound (HRC) that is a food-quality polylactate ester. Bioremediation with HRC is a multi-step process. Upon hydration with ground water, the polylactate ester slowly releases lactic acid. Indigenous anaerobic microbes in the soil metabolize the lactic acid released by the HRC and produce hydrogen. The resulting hydrogen can be used by reductive dehalogenators (other indigenous microbes) which are capable of dechlorinating TCE and other contaminants of concern. The addition of HRC provides a source of food which promotes growth in the population of indigenous microbes that are capable of degrading the chlorinated aliphatic hydrocarbons at the site (TCE, etc.), through a series of transformations, into the end products of carbon dioxide and water. The purpose of such an active approach of biostimulation would be to substantially increase the rate at which contaminants are degraded and, thereby, significantly decrease the time required to reach an acceptable end point, compared to the length of time that would be required if natural attenuation alone were relied upon to achieve site clean up.

4. Does "contaminated" groundwater **discharge** into **surface water** bodies?

__X__ If yes - continue after identifying potentially affected surface water bodies.

_____ If no - skip to #7 (and enter a "YE" status code in #8, if #7 = yes) after providing an explanation and/or referencing documentation supporting that groundwater "contamination" does not enter surface water bodies.

_____ If unknown - skip to #8 and enter "IN" status code.

Rationale and Reference(s): Mill Meadows Wetland _____

5. **Is the discharge of "contaminated" groundwater into surface water likely to be "insignificant" (i.e., the maximum concentration[3] of each contaminant discharging into surface water is less than 10 times their appropriate groundwater "level," and there are no other conditions (e.g., the nature, and number, of discharging contaminants, or environmental setting), which significantly increase the potential for unacceptable impacts to surface water, sediments, or eco-systems at these concentrations)?**

__X__ If yes - skip to #7 (and enter "YE" status code in #8 if #7 = yes), after documenting: 1) the maximum known or reasonably suspected concentration[3] of key contaminants discharged above their groundwater "level," the value of the appropriate "level(s)," and if there is evidence that the concentrations are increasing; and 2) provide a statement of professional judgement/explanation (or reference documentation) supporting that the discharge of groundwater contaminants into the surface water is not anticipated to have unacceptable impacts to the receiving surface water, sediments, or eco-system.

_____ If no - (the discharge of "contaminated" groundwater into surface water is potentially significant) - continue after documenting: 1) the maximum known or reasonably suspected concentration[3] of each contaminant discharged above its groundwater "level," the value of the appropriate "level(s)," and if there is evidence that the concentrations are increasing; and 2) for any contaminants discharging into surface water in concentrations[3] greater than 100 times their appropriate groundwater "levels," the estimated total amount (mass in kg/yr) of each of these contaminants that are being discharged (loaded) into the surface water body (at the time of the determination), and identify if there is evidence that the amount of discharging contaminants is increasing.

_____ If unknown - enter "IN" status code in #8.

Rationale and Reference(s): While elevated concentrations of TCE and PCE have been measured in ground water from deep monitoring wells screened at the bottom of the overburden aquifer near the wetland (MW 98-7, MW-E1D, MW-E2D and MW 99-1), ground water from shallow monitoring wells screened near the top of the overburden aquifer that are nearest the wetland (MW-G, MW-E1, MW-E2 and MW 97-1) have much lower concentrations of contaminants which are generally not detected or are no more than two times the appropriate ground water "level" (the Connecticut Ground Water Protection Criteria). It is the shallow, rather than the deep ground water, whose quality is most representative of the concentrations of contaminants that will discharge to an overlying surface water body.

The maximum reasonably suspected concentration of TCE (the principal contaminant) discharging to the wetland is about 10 ug/l (shallow well MW-E2), compared to the Connecticut Ground Water Protection Criteria for TCE of 5 ug/l and the Surface Water Protection Criteria for TCE of 2,340 ug/l. The quarterly ground water monitoring data (Attachment 5) indicate that the contaminant concentrations are consistent and not increasing. Page 6 of Table 5 in the August 1998 Supplemental Subsurface Investigation report lists results of two rounds of sampling surface water in and near the wetland. These data indicate very low levels of a few volatile organic compounds most likely related to petroleum products in road and parking lot runoff, but no TCE or PCE.

Based upon these facts, we believe that the concentrations of contaminants in ground water discharging through the hyporheic zone to the overlying wetland are not likely to have unacceptable impacts to the receiving surface water, sediments or ecosystem.

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[3] As measured in groundwater prior to entry to the groundwater-surface water/sediment interaction (e.g., hyporheic) zone.

6. **Can the discharge of "contaminated" groundwater into surface water be shown to be "currently acceptable" (i.e., not cause impacts to surface water, sediments or eco-systems that should not be allowed to continue until a final remedy decision can be made and implemented[4])?**

____ If yes - continue after either: 1) identifying the Final Remedy decision incorporating these conditions, or other site-specific criteria (developed for the protection of the site's surface water, sediments, and eco-systems), and referencing supporting documentation demonstrating that these criteria are not exceeded by the discharging groundwater; OR 2) providing or referencing an interim-assessment,[5] appropriate to the potential for impact, that shows the discharge of groundwater contaminants into the surface water is (in the opinion of a trained specialists, including ecologist) adequately protective of receiving surface water, sediments, and eco-systems, until such time when a full assessment and final remedy decision can be made. Factors which should be considered in the interim-assessment (where appropriate to help identify the impact associated with discharging groundwater) include: surface water body size, flow, use/classification/habitats and contaminant loading limits, other sources of surface water/sediment contamination, surface water and sediment sample results and comparisons to available and appropriate surface water and sediment "levels," as well as any other factors, such as effects on ecological receptors (e.g., via bio-assays/benthic surveys or site-specific ecological Risk Assessments), that the overseeing regulatory agency would deem appropriate for making the EI determination.

_____ If no - (the discharge of "contaminated" groundwater can not be shown to be "**currently acceptable**") - skip to #8 and enter "NO" status code, after documenting the currently unacceptable impacts to the surface water body, sediments, and/or eco-systems.

_____ If unknown - skip to 8 and enter "IN" status code.

Rationale and Reference(s): _____Not Applicable

[4] Note, because areas of inflowing groundwater can be critical habitats (e.g., nurseries or thermal refugia) for many species, appropriate specialist (e.g., ecologist) should be included in management decisions that could eliminate these areas by significantly altering or reversing groundwater flow pathways near surface water bodies.

[5] The understanding of the impacts of contaminated groundwater discharges into surface water bodies is a rapidly developing field and reviewers are encouraged to look to the latest guidance for the appropriate methods and scale of demonstration to be reasonably certain that discharges are not causing currently unacceptable impacts to the surface waters, sediments or eco-systems.

7. **Will groundwater monitoring / measurement data (and surface water/sediment/ecological data, as necessary) be collected in the future to verify that contaminated groundwater has remained within the horizontal (or vertical, as necessary) dimensions of the "existing area of contaminated groundwater?"**

X **If yes - continue after providing or citing documentation for planned activities or future sampling/measurement events. Specifically identify the well/measurement locations which will be tested in the future to verify the expectation (identified in #3) that groundwater contamination will not be migrating horizontally (or vertically, as necessary) beyond the "existing area of groundwater contamination."**

____ **If no - enter "NO" status code in #8.**

X **If unknown - enter "IN" status code in #8.**

Rationale and Reference(s): Ground water will continue to be sampled and analyzed quarterly, as detailed in the Quarterly Ground Water Monitoring Plan submitted to the Connecticut Department of Environmental Protection, January 1999.

While shallow groundwater discharges to groundwater, there has not been enough evaluation of groundwater/surface water interaction to confirm that deeper contam. of the aquifer (i.e. [illegible] contain higher levels of TCE) do not pass under the wetland. Therefore more information is needed to confirm that this indicator has been achieved. Therefore, additional investigation is necessary. Monitoring existing wells is not sufficient.

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8. Check the appropriate RCRIS status codes for the Migration of Contaminated Groundwater Under Control EI (event code CA750), and obtain Supervisor (or appropriate Manager) signature and date on the EI determination below (attach appropriate supporting documentation as well as a map of the facility).

X YE - Yes, "Migration of Contaminated Groundwater Under Control" has been verified. Based on a review of the information contained in this EI determination, it has been determined that the "Migration of Contaminated Groundwater" is "Under Control" at the former Cramer Company _____ _____facility , EPA ID # CTD001162114_____ , located at 139 Mill Rock Rd East, Old Saybrook, CT. Specifically, this determination indicates that the migration of "contaminated" groundwater is under control, and that monitoring will be conducted to confirm that contaminated groundwater remains within the "existing area of contaminated groundwater" This determination will be re-evaluated when the Agency becomes aware of significant changes at the facility.

____ NO - Unacceptable migration of contaminated groundwater is observed or expected.

X IN - More information is needed to make a determination.

Completed by (signature) Stephanie Carr Date 9/29/99
(print) Stephanie Carr
(title) RCRA Facility Manager

Supervisor (signature)_____ Date _____
(print)_____
(title)_____
(EPA Region or State)_____

Locations where References may be found:

Connecticut Department of Environmental Protection, Hartford, CT
US Environmental Protection Agency, Region I, Boston, MA
Environmental Products & Services, Inc., Milford, CT
Pepper Hamilton, LLP, Philadelphia, PA

Contact telephone and e-mail numbers

(name) David Scott_____
(phone #) (203) 301-0808_____
(e-mail) epsct@freewwweb.com_____

Attachment 4

State of Connecticut
WATER RESOURCES COMMISSION
223 State Office Building
Hartford, Connecticut

WELL COMPLETION REPORT

This report must be completed and submitted to State Water Resources Commission no later than 30 days after completion of well.

DO NOT FILL IN
State Well No. 0517
Other No. _____

WELL OWNER: Arthur and Nellie Hunt (Name) Elm Street (Street Address) Old Saybrook (City and Town)

WELL DRILLER: Aronson Well Drilling Co. (Name) Robin Lane (Street Address) Hollingsworth (City and Town)

PROPOSED USE OR USES (Check):
☒ Domestic ☐ Farm ☐ Irrigation ☐ Business Establishment ☐ Municipal ☐ Industrial ☐ Test Well

CASING DETAILS	YIELD TEST		WATER LEVEL (measure from land surface)	SCREEN DETAILS
Length: 50 Feet	☒ Bailed or ☐ Pumped or ☐ Compressed Air	1/2 Hours	Static: 6 Feet	Make:
Diameter: 6 Inches		20 G.P.M.	During Yield Test: 20 Feet	Length Ft. Slot Size
Kind: Black steel	Yield: 20 G.P.M		DRILLING EQUIPMENT ☒ Cable Tool ☐ Rotary ☐ Other (Specify)	Diameter: In.

TOTAL DEPTH OF WELL 59 FEET

WELL LOG

Depth From Ground Surface	Give description of formations penetrated, such as: peat, silt, sand, gravel, clay, hardpan, shale, sandstone, granite, etc. Include size of gravel (diameter) and sand (fine, medium, coarse), color of material, structure (loose, packed, cemented, soft, hard). For example: 0 ft. to 27 ft. fine, packed, yellow sand; 27 ft. to 134 ft. gray granite.
0 FT. to 1 FT.	Loam
1 FT. to 7 FT.	Coarse loose sand & 1/2" gravel
7 FT. to 38 FT.	fine loose brown sand.
38 FT. to 48 FT.	~~fine~~ coarse sand and 1" gravel
48 FT. to 59 FT.	grey granite
FT. to FT.	
FT. to FT.	
FT. to FT.	
	YIELD TEST DATA IN G.P.M. If Yield Was Tested At Different Depths During Drilling, List Below
FT.	G.P.M.
FT.	G.P.M.
FT.	G.P.M.
FT.	G.P.M.

Date Well Was Completed: 1/5/68

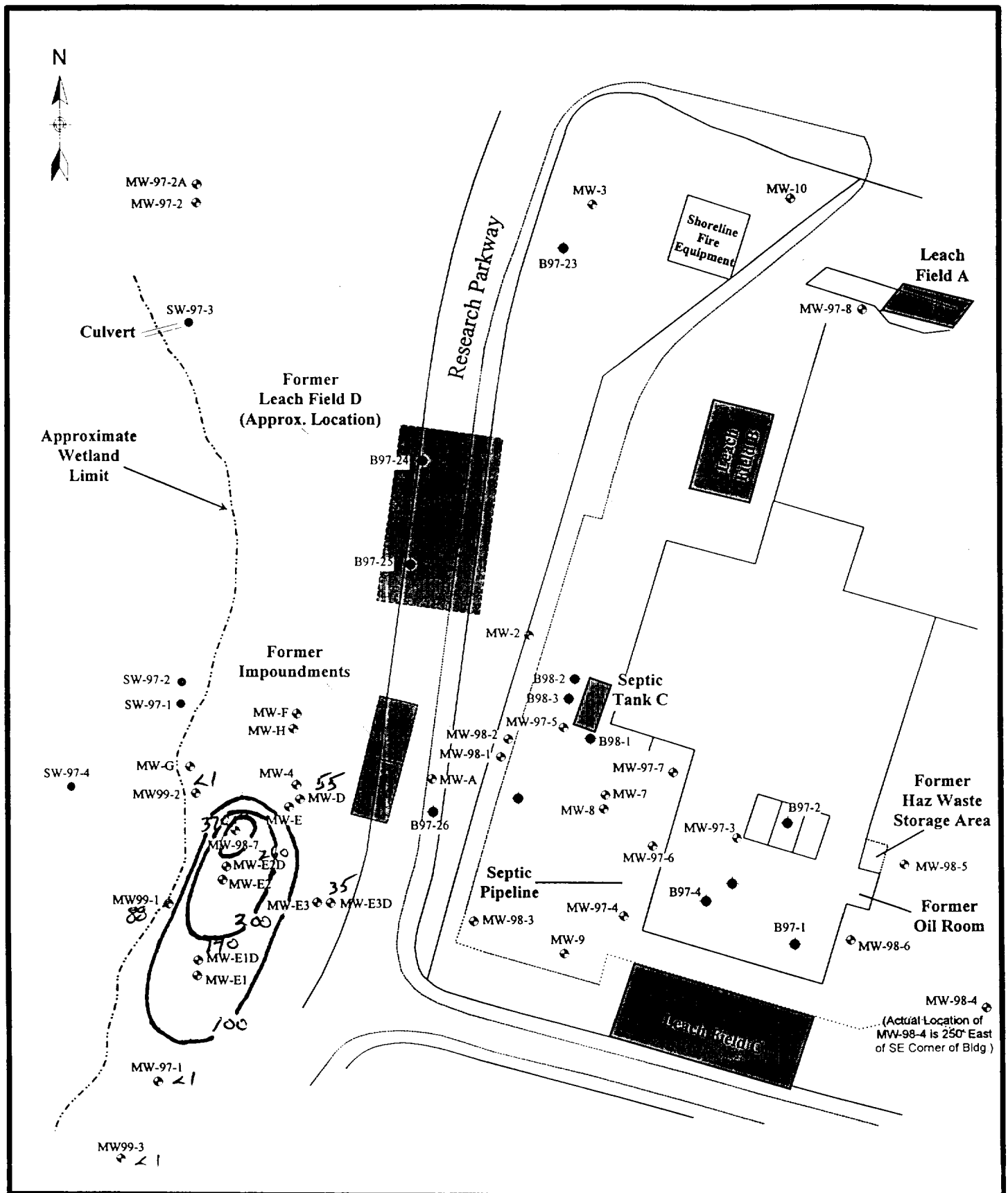
Date of Report 1/12/68

Town Permit Number: 70

Well Driller William J. Aronson (Signature)

Certificate No. 2617

Attachment 5



Environmental Products & Services, Inc.	Date: July 1999	Project No.: C1432
Former Cramer Company TCE Concentrations in Deep Monitoring Wells	Scale: 1" = 120'	Figure No.: 1
	Drawn By: Geoscience	Location: Old Saybrook, CT