NATURE SAVER™ FAX MEMO 01616

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| To David Lim | Date 8/2/01 # of pages ▶ 28 |
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...NTAL INDICATOR DETERMINATION

Interim Final 2/5/99

...rective Action

Environmental Indicator (EI) RCRIS code (CA750)

Migration of Contaminated Groundwater Under Control

Facility Name: Putnam Municipal Landfill

Facility Address: 344 River Road, Putnam Ct.

Facility EPA ID #: CTD 991288622

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).

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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): See CA750, Item 2 Addendum

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).

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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.

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

Rationale and Reference(s): See CA 750, Item 3 Addendum.

[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.

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): See CA 750, Item 4 Addendum.

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): See CA 750, Item 5 Addendum.

[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.

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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."

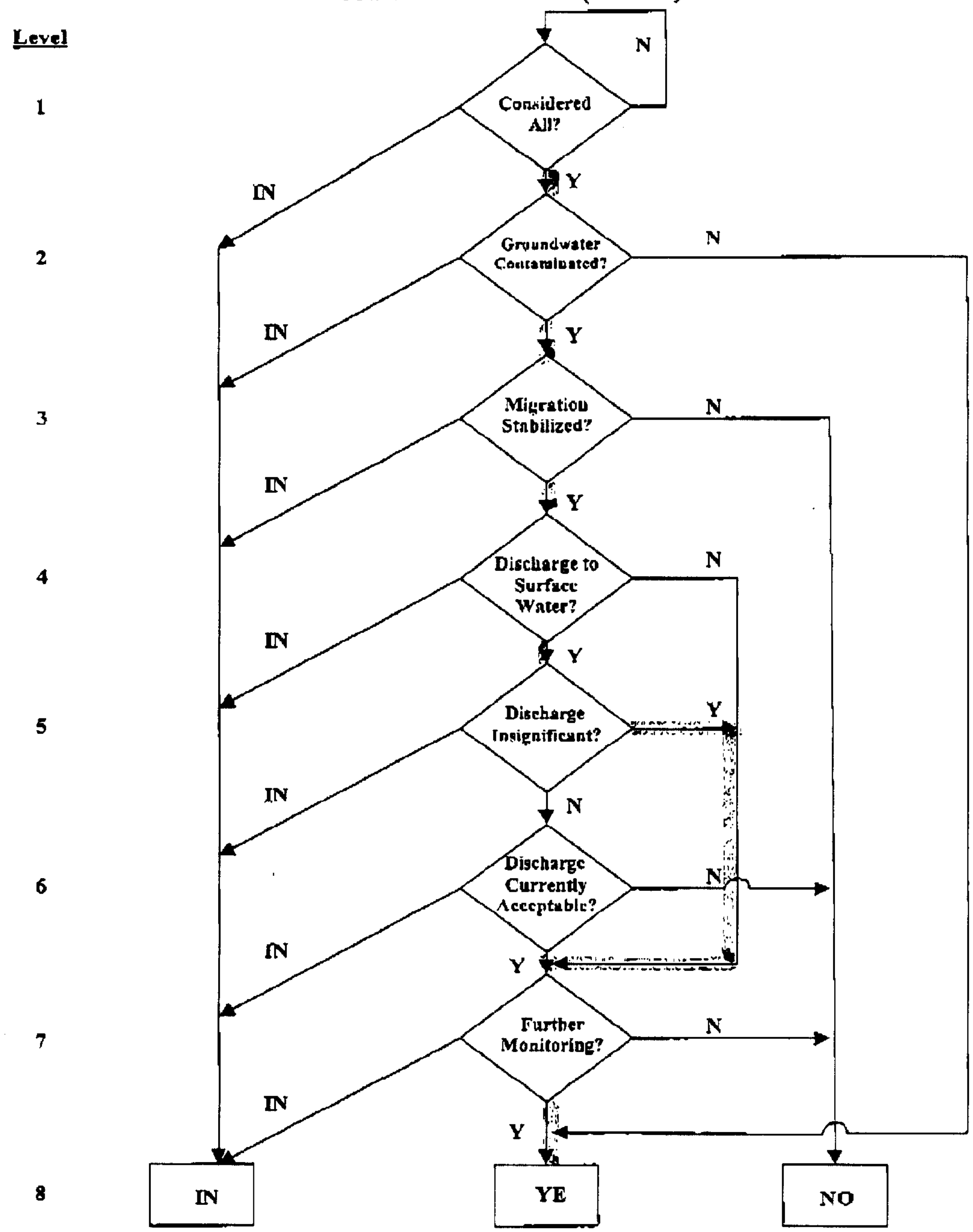
____ If no - enter "NO" status code in #8.

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

Rationale and Reference(s): See CA 750, Item 7 Addendum.

Facility Name: Putnam Municipal Landfill
EPA ID#: CTD No. 991288622
City/State: Putnam, CT

**MIGRATION OF CONTAMINATED GROUNDWATER UNDER CONTROL (CA 750)**



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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 Putnam Municipal Landfill facility, EPA ID # CTD991288622 located at 344 River Road, Putnam, 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.

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

Completed by (signature) Marina Crawford Date 8/1/01
(print) Marina Crawford
(title) Sanitary Engineer 3

Supervisor (signature) John England Date 8/1/01
(print) John England
(title) Supervising Environmental Analyst
(EPA Region or State) CT

Reviewed by:
David Lim
David Lim 8/30

Approved by:
Matthew R. Hoagland
Matthew R. Hoagland
Section Chief,
EPA RCRA
Corrective Action
Section
9/4/01

Locations where References may be found:

State of CT DEP, 79 Elm Street, Hartford, CT

Griffin Engineering Group
100 Cummings Center, Suite 333 G, Beverly, MA

Contact telephone and e-mail numbers

(name) Marina Crawford
(phone #) (860) 424-3574
(e-mail)

**PUTNAM MUNICIPAL LANDFILL, EPA ID #: CTD991288622**
FORM CA750 – Migration of Contaminated Groundwater Under Control

**ITEM 2 ADDENDUM**

Yes. The most recent assessment (*Putnam Landfill Closure and Post-Closure Plan*, Putnam, Connecticut, prepared by Metcalf & Eddy, 1998), and quarterly groundwater monitoring reports (*Groundwater Monitoring Results, Putnam Municipal Landfill*, prepared by Geotoxi Associates, Inc.), document that groundwater at the site is contaminated at concentrations exceeding Federal and State Primary Drinking Water Standards.

The following table indicates the maximum concentration detected for each primary pollutant contaminant that has been detected in the groundwater at a concentration exceeding an applicable drinking water standard during the period of 1999 - 2000. To date, only dissolved constituents have been detected in the groundwater. Despite the landfill being classified as a hazardous waste disposal facility for accepting lead carbonate contaminated button dust, to date, lead has not been detected in the groundwater at concentrations exceeding the applicable drinking water standard.

| Contaminant | Conc. of Concern | Max. Conc. Detected | Factor above Standard | Location | Date |
|---|---|---|---|---|---|
| Arsenic | 50 ug/l (1,2) | 560 ug/l (3) | 11.2 | OW-16S | 7/20/99 |
| Selenium | 50 ug/l (1,2) | 91 ug/l | 1.8 | OW-2E | 7/27/00 |
| Thallium | 5 ug/l (2) | 17 ug/l | 3.4 | OW-2E | 10/26/00 |
| Silver | 36 ug/l (2) | 45 ug/l | 1.2 | OW-1 | 4/18/00 |
| Benzene | 1 ug/l (2) | 17 ug/l | 17 | OW-2E | 1/19/00 |
| Vinyl Chloride | 2 ug/l (1,2) | 19 ug/l | 9.5 | OW-2E | 1/19/00 |
| cis-1,2-DCE | 70 ug/l (1,2) | 75 ug/l | 1.1 | OW-2E | 7/19/99 |
| 3-&4-Methylphenol | 35 ug/l (2) | 60 ug/l | 1.7 | OW-2E | 1/19/00 |

(1) 40 CFR Part 141, Federal Clean Water Act Maximum Concentration Limit (MCL).
(2) Connecticut Department of Environmental Protection, Significant Environmental Hazard Condition Notification Threshold Concentrations, Drinking Water Well/Groundwater Protection Criteria
(3) ug/l = micrograms per liter

**PUTNAM MUNICIPAL LANDFILL, EPA ID #: CTD991288622**
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**ITEM 3 ADDENDUM**

Based on groundwater monitoring data collected during the period 1990 – 2000, the groundwater migration plume appears to be stabilized both in horizontal and vertical dimensions. In 1999, the landfill was capped with a composite low permeability layer, approved by the CT DEP, to prevent the percolation of water into the landfill, and thus minimizing the creation of additional landfill leachate.

Site Stratigraphy: Metcalf & Eddy (1998) indicates that the landfill area is underlain by three major unconsolidated stratigraphic units. The Upper Sand and Gravel Unit (Unit 1), a Sandy Silt Unit (Unit 2), and a Lower Sand and Gravel Unit (Unit 3). In general, most of Unit 1 lies above groundwater with Unit 2 and 3 being the major saturated units. The estimated average linear groundwater velocities for Units 2 and 3 are 0.63 and 4.0 feet/day, respectively.

Groundwater Flow: Based on the information presented in M&E (1998) and in subsequent monitoring reports, groundwater flow has been identified to be to the south and southeast towards the Quinebaug River. The river has been identified as a hydrogeological barrier for the groundwater migration plume to the east. This conclusion is supported by the lack of detection of elevated concentrations of municipal solid waste (MSW) leachate indicator parameters (i.e. alkalinity, chloride, iron, manganese, sodium, COD, and TDS), as well as the lack of detection of the identified contaminants of concern, in both the shallow and deep compliance characterization wells (OW-15S/15D) located on the east side of the river. This data is presented in quarterly groundwater monitoring reports prepared by Geotoxi Associates.

Contamination Plume: The southern extent of the groundwater contamination plume is monitored by compliance characterization wells OW-13S/13D and MW-17S/17M/17D. To date, VOCs have not been detected in the downgradient compliance characterization wells. However, elevated concentrations of MSW leachate parameters (including alkalinity, ammonia, iron, manganese, arsenic, and TDS) have been detected in MW-17D These concentrations have not exceeded any primary drinking water standards, and the maximum concentration of arsenic detected has been 27 ug/l, approximately ½ the current drinking water standard. These concentrations appear to be indicative of an MSW leachate plume, and not the result of a release of a "RCRA regulated" hazardous waste.

Given, the distance to these compliance characterization wells, the age of the landfill, and the estimated groundwater flow rates, there would have been sufficient time for the plume to have reached the characterization wells, as is seen with MW-17D. The presence of reduced concentrations of leachate parameters, and the lack of detection of VOCs at the compliance characterization wells, indicates that the contaminated plume is either discharging to the river or attenuating with distance from the landfill.

**PUTNAM MUNICIPAL LANDFILL, EPA ID #: CTD991288622**
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**ITEM 4 ADDENDUM**

Yes. Based on the information presented in M&E (1998), groundwater at the site flows to the east and southeast, through the underlying poorly graded sands and gravels, and discharges into the adjacent Quinebaug River. This conclusion is supported by:

(1) the observed presence of "reddish oxidized sediments along the side of the Quinebaug River channel during periods of low water level. This appears to be a discharge area for leachate contaminated groundwater; and

(2) the lack of detection of elevated concentrations of leachate indicator parameters (i.e. alkalinity, chloride, iron, manganese, sodium, COD, and TDS), as well as the lack of detection of the identified contaminants of concern, in both the shallow and deep compliance characterization wells (OW-15S/15D) located on the east side of the river..

**PUTNAM MUNICIPAL LANDFILL, EPA ID #: CTD991288622**
FORM CA750 – Migration of Contaminated Groundwater Under Control

**ITEM 5 ADDENDUM**

Yes. The maximum known concentrations for RCRA metals and VOCs, detected in the groundwater discharging to the Quinebaug River during 1999-2000, are all less than 10 times their respective groundwater standard, except for benzene and arsenic.

Benzene: The maximum concentration of benzene detected in any groundwater monitoring well ranged from 11 to 17 ug/l during 1999- 2000, 11 – 17 times the CT drinking water standard of 1 ug/l. However, the maximum concentration of benzene detected was lower than the EPA Region 4 Freshwater Surface Water Chronic Screening Value for benzene of 53 ug/l [1].

Arsenic: The maximum concentration of ~~benzene~~ As detected in any groundwater monitoring well was 560 ug/l during 1999 - 2000, 11.2 times the CT drinking water standard of 50 ug/l. Since the detection of arsenic at a concentration of 560 ug/l in monitoring well OW-16S on 7/20/99, the maximum detected concentration, during the last five sampling events, has been 390 ug/l, 7.8 times the CT drinking water standard. In addition, the EPA Region 4 Freshwater Surface Water Chronic Screening Value for arsenic is 190 ug/l [1]. The concentrations detected in the groundwater are less than 10x the standard that is protective of freshwater aquatic life.

Also, the surface water monitoring data, presented in the USGS's *Water Resources Data - Connecticut, Water Year 1999*, prepared by the USGS, does not indicate an increase in arsenic in the surface water downstream of the landfill. The maximum concentration of arsenic detected in the river surface water was 2 ppm, both upstream and downstream of the landfill. Therefore, the discharge of the contaminated groundwater from the landfill into the Quinebaug River does not appear to degrade the river water quality.

[1] *EPA Region 4 Ecological Risk Assessment Bulletin*, Table 1 Region 4 Waste Management Division Freshwater Surface Water Screening Values for Hazardous Waste Sites, updated August 11, 1999.

## PUTNAM MUNICIPAL LANDFILL, EPA ID #: CTD991288622
FORM CA750 – Migration of Contaminated Groundwater Under Control

### ITEM 7 ADDENDUM

Yes. Groundwater, surface water, and sediment sampling for the Putnam Municipal Landfill is currently being conducted on a quarterly basis in accordance with Appendix I of the 1998 *Putnam Landfill Closure and Post Closure Plan*, prepared by Metcalf & Eddy, and approved by the CTDEP. Sampling is currently conducted on January, April, July, and October. At the end of a two-year period, a summary report will be prepared evaluating the existing data, and sampling frequency, locations, and parameters will be re-evaluated. In summary, the plan calls for the following:

Groundwater: Groundwater sampling is currently conducted at 15 groundwater monitoring wells around the landfill site. The current sampling locations, include: two upgradient wells (MW-21S/21D); six plume characterization wells (OW-1, OW-2E/2B/2D, and OW-16S/16D); and seven compliance wells (OW-13S/13D, OW-15S/15D, MW-17S/17M/17D). Refer to Figure P-1 for sampling locations.

Surface Water: Surface water sampling of the Quinebaug River is conducted at two former USGS stream sampling stations. The upstream sampling station is located approximately 3 miles upstream of the landfill (01125500 Quinebaug River at Putnam, CT), and the downstream location is located approximately 3 miles downstream of the landfill (01125520 Quinebaug River at Cotton Road Bridge near Pomfret Landing, CT). The monitoring program for the adjacent ash monofill also includes quarterly sampling at these locations with the net result of eight samplings per year.

Sediments: Sediment samples are collected quarterly at the two Quinebaug River surface water sampling locations.

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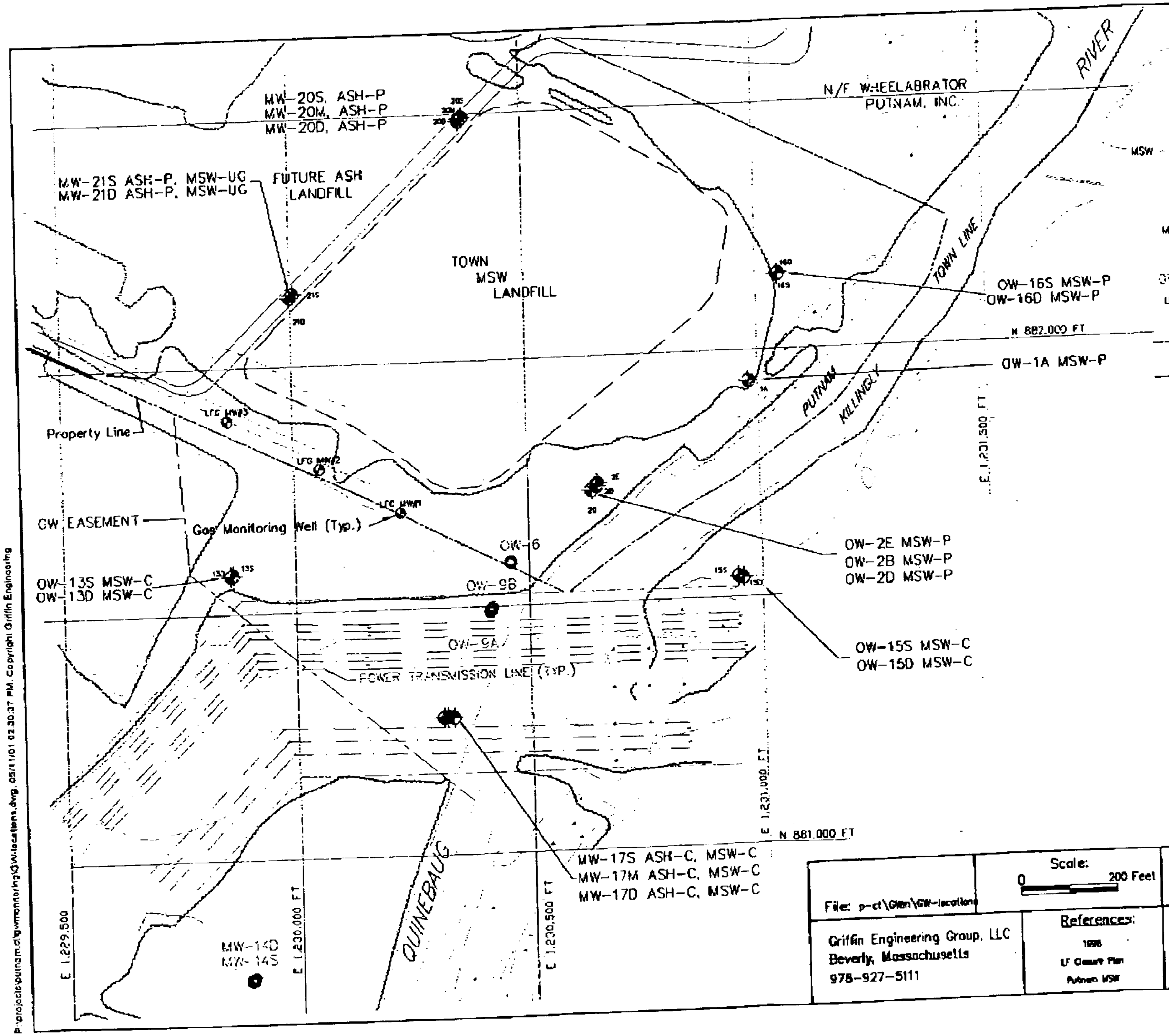


LEGEND

MSW – P

ASH = Wheelabrator As
MSW = Town Landfill M
P = Plume Characteriz
C = Compliance Charac
UG = Upgradient Backg

MW-12S Existing Monitoring

OW-5A Existing Monitoring in Monitoring Pro

LFG MW# Existing Gas Monito

Property Line

Boundary of Gr

WEED

| Well | Elevation Top of Cas (ft |
|---|---|
| OW-1A | 216. |
| OW-2B | 219 |
| OW-2D | 219. |
| OW-2E | 220. |
| OW-6 | 220. |
| OW-9A | 216. |
| OW-9B | 216. |
| OW-13D | 275. |
| OW-13S | 275. |
| MW-14D | 223 |
| MW-14S | 223 |
| OW-15S | 216. |
| OW-15D | 215. |
| OW-16D | 222. |
| OW-16S | 222. |
| MW-17D | 218. |
| MW-17M | 218. |
| MW-17S | 216. |
| MW-20D | 244. |
| MW-20M | 245 |
| MW-20S | 244 |
| MW-21D | 265. |
| MW-21S | 266. |

* Not verified by Griff

File: p-ct\Glen\GW-locations

Scale: 0 200 Feet

Town of Putnam, MSW Landfill Closu

Griffin Engineering Group, LLC
Beverly, Massachusetts
978-927-5111

References:
1996
LF Closure Plan
Putnam MSW

Ground Water and Landfill Gas Monit Well Network

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