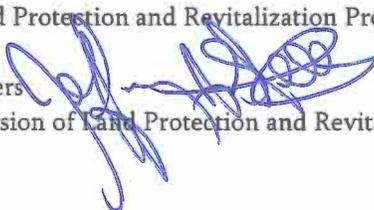


COMMONWEALTH OF VIRGINIA  
Department of Environmental Quality

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**Subject:** Division of Land Protection and Revitalization Guidance Memo  
LPR-SW-SI-26  
SUBMISSION INSTRUCTIONS FOR GROUNDWATER  
PUMP & TREAT BASED CORRECTIVE ACTION SITE EVALUATION (CASE) REPORTS  
AT SOLID WASTE LANDFILLS

**To:** Regional Land Protection and Revitalization Program Managers

**From:** Jeffery A. Steers   
Director, Division of Land Protection and Revitalization

**Date:** July 13, 2012

**Copies:** Regional Directors

**Summary**

This guidance provides owner/operators of regulated solid waste management facilities with an overview of the information applicable to the submission of Corrective Action Site Evaluation (CASE) reports at solid waste sites undergoing *Groundwater Pump and Treat* (P&T) based groundwater remediation in accordance with 9 VAC 20-81-260 of the Virginia Solid Waste Management Regulations (VSWMR). CASE reports form the basis for quantifying a remedy's ability to meet the remedial goals, and if applicable, the triggering of the need for an Alternate Remedy to be applied to address the groundwater plume.

**Electronic Copy**

An electronic copy of this guidance applicable to solid waste sites is available on DEQ's website at <http://www.deq.virginia.gov/waste/guidance.html>.

**Contact Information**

Please contact the groundwater program coordinator, Mr. Geoff Christe at (804) 698-4283 or via email [geoff.christe@deq.virginia.gov](mailto:geoff.christe@deq.virginia.gov) with any questions regarding the development or application of this guidance. Owner/operators who have questions specific to their remedy's performance on site should contact their respective Regional Office for groundwater assistance.

**Disclaimer**

*This document is provided as guidance and, as such, sets forth standard operating procedures for the agency. However, it does not mandate any particular method nor does it prohibit any alternative method. If alternative proposals are made, such proposals should be reviewed and accepted or denied based on their technical adequacy and compliance with appropriate laws and regulations.*



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# Submission Instruction

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## Groundwater P&T- based Corrective Action Site Evaluation Reports at Solid Waste Landfills

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Division of Land Protection &  
Revitalization  
629 East Main Street 5<sup>th</sup> Floor  
Richmond, VA 23219

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## **I - APPLICABILITY**

This Submission Instruction (SI) is applicable to all solid waste management facilities conducting groundwater monitoring under the requirements of the Virginia Solid Waste Management Regulations (VSWMR), originally promulgated by the Virginia Waste Management Board December 21st, 1988; as amended and has been designed in a manner consistent with the regulatory language in Amendment 7 of the VSWMR, effective March 16<sup>th</sup>, 2011.

## **II - DEVELOPMENT**

This SI has been developed to assist an owner/operator in the preparation of Corrective Action Site Evaluation (CASE) reports which document the relative performance (or rate) of groundwater cleanup since implementation of a Pump & Treat based groundwater remedy. This SI references or refers to technical information contained in several EPA documents. The reader is referred to the following for information specific to Pump and Treat use as a groundwater cleanup method:

- Methods for Monitoring Pump-and-Treat Performance. 1994. [EPA/600/R94/123]
- Pump-and-Treat Groundwater Remediation. A Guide for Decision Makers and Practitioners. 1996. [EPA/625/R95/005]
- Basics of Pump-and-Treat Groundwater Remediation Technology. 1990 [EPA/600/990/003]
- Groundwater Issue - Design Guidelines for Conventional Pump-and-Treat Systems. 1997 [EPA/540/S97/504]
- Cost Effective Design of Pump-and-Treat Systems. 2005. [EPA/542/R05/008]

These SI provide an outline of the suggested minimum technical content that should be included within CASE reports submitted to the Department for review. It is ultimately the responsibility of the owner/operator to include all the data or information necessary to sufficiently support each of the conclusions presented in the CASE. The Department recognizes that these SI may need to be altered to fit facility-specific geologic or hydrologic conditions that cannot be adequately accounted for in a SI. It is expected that the final content of any CASE submitted to the Department will include some site-specific content.

All SI are considered 'living' documents which will be updated or revised as needed. Comments or suggestions for future SI revisions can be submitted at any time to the attention of the Solid Waste *Groundwater Program Coordinator* at the address listed on the cover of this SI.

## **III - LIMITATIONS**

These SI have not been developed as Department rule or policy. They have

not gone through public comment. They do not supersede any regulatory requirement found in the VSWMR and their use is not mandated under the VSWMR. These SI may contain references to EPA's commentary in its preamble to the Subtitle D regulations and its 1993 Subtitle D regulation guidance. EPA's preamble contains its expanded interpretation of the technical content in the 40 CFR 258 statute and addresses the response to public comment received during the draft regulation process. Although EPA's preamble language is referenced within the SI, preamble language is not a binding part of a law/statute and it can neither enlarge the scope of a statute's applicability nor confer powers to the regulatory authority not already expressly contained within the language of the statute. At the same time, if there is a question of the intent or meaning behind any portion of the Subtitle D statute text and the preamble addresses the question, the content of the preamble cannot be ignored if it addresses the ambiguity raised. The Subtitle D regulatory guidance developed by EPA expands further upon the content of the preamble, but has the same limitations in that guidance cannot be used to infer requirements that are not expressly part of the Subtitle D statute.

Groundwater protection standards (GPS) are the cornerstone of the solid waste remedial program but are not the only remedial endpoints an owner/operator may have to meet. EPA continues to use drinking water standards [i.e., maximum contaminate level (MCL)] as the cleanup baseline in its RCRA corrective action programs (outlined in its 2004 Corrective Action guidance; pg. 5.4 as follows):

*"For groundwater that is currently used or designated as a current or reasonably expected source of drinking water, EPA recommends that regulators identify cleanup levels based on residential drinking water exposure scenario. Even if no one is currently drinking the groundwater, the cleanup level should generally be based on drinking water use if the aquifer is considered by EPA or the state to be reasonably expected future source of drinking water."*

#### **IV - SUBMISSION TIMELINES**

Facilities implementing a P&T based remedy must evaluate the groundwater quality trends post remedy implementation consistent with the timeframes defined in Permit Module XIV. Most commonly, the CASE submissions will be due on a yearly basis until such time as the P&T design has been proven to be effective. Once this has been demonstrated, the submission timeframes can likely be relaxed.

In some cases, the Permittee may petition the Director to extend the CASE submittal deadline if good cause is demonstrated, but such extensions are rarely approved if more than 180 days is requested. Any revisions to the submitted CASE needed to address Department technical review comments shall be submitted in a manner consistent with the time-frames defined in the Department's review letter.

## **V - REPORT FORMAT**

The requirement to submit a CASE report is found within 9 VAC 20-81-260.G.1 and the requirement pertains to all sites which have exceeded their GPS and initiated remediation. CASE reports are technical summaries that require conclusions supported by site-specific data obtained during the evaluation period. To reduce the volume (total pages) of the CASE report, the Department suggests that analytical data reports, QA/QC data, and field logs be included in the document on a CDROM. To further minimize the content of the submission, there is no need to include a detailed description of a site's operational history, geology or hydrology as this information is included each year in the Annual Report required under 9 VAC 20-81-250.E. Inclusion of a simplified summary of these topics is all that is required in the CASE.

For the sake of consistency and to ensure an expeditious review, the information (technical content) of the CASE report should be arranged in the order presented in sections below. The sections discussed herein shall be considered standard technical content. Report submissions that do not provide the standard technical content outlined herein are more likely to be found to be incomplete and requiring revision during the Department's technical review process. The Department also notes that there may be some site-specific instances where a facility's technical data may require additional or different information beyond that listed in these SI as a means of more fully characterizing the technical data available and conclusions derived thereof. These instructions set no limit on the number or content of additional report sections, as long as the information included directly pertains to that required of a CASE report.

Any owner/operator whom chooses to implement a P&T based remedy must be fully cognizant that the results of the CASE period monitoring must prove plume containment has been achieved, contaminant mass effectively destroyed, and post-treatment discharge has met all applicable Permit standards.

## **VI - TECHNICAL CONTENT**

Form-1 to this SI consists of a blank, boilerplate formatted P&T based CASE report to be filled out by the owner/operator. Electronic versions may be obtained from your DEQ Regional Office groundwater contact. It is the sole responsibility of the owner/operator to include the information required to prove the remedy applied on site is working toward achieving all GPS in the manner anticipated in the Corrective Action Plan (CAP). Nothing prevents the Department from reaching a conclusion of submittal deficiency if the submission fails to adequately prove a site specific remedy is performing as anticipated, even though the submission may include all the baseline requirements defined in the VSWMR what apply to all sites, regardless of the remedy implemented.

The standardized information items to be address for P&T sites are discussed individually below. Many items are formatted in a 'Yes' or 'No' manner.

The Department is aware that such answers will often have to be supported by additional, more detailed information. Therefore, this SI allows a more detailed discussion of the relevant issue to be presented in the associated Appendix. In this way, the 'fill in the blanks' design of the CASE report serves as an executive summary for quick review of the results of the CASE period, while still allowing the owner/operator the chance to further describe complicated issues in appropriate detail relevant to technical review/comment. This type of report design increases the readability for the lay person while still including the level of detail expected when discussing complicated issues which often affect remediation progress on a site.

Each of the CASE topic questions that require further explanation is individually discussed below. If a line number is not listed, it is a question topic the Department felt needed no further explanation within this SI.

## FORM 1 LINE INSTRUCTIONS

### **General Information**

- Line 1 List DEQ Regional Office to which you submit your groundwater reports. Please utilize the following abbreviations: NRO (Northern), PRO (Piedmont), VRO (Valley), TRO (Tidewater), BRRO/R (Blue Ridge - Roanoke), BRRO/L (Blue Ridge - Lynchburg) and SWRO (Southwest).
- Line 5 Identify the landfill type, using the following abbreviations: Unlined sanitary [ul/S], CDD [ul/CDD], or industrial [ul/IND] or Lined sanitary [ln/S], CDD [ln/CDD], or industrial [ln/IND]).
- Line 6 Note the date the CAP related Permit amendment/modification was issued. If remedy implementation took place under a mechanism other than amendment/modification, list the date of the Department's approval letter.
- Line 7 List the date the CASE was due to the Department based on Permit Module XIV.
- Line 8 List the period covered by the CASE period (i.e., March 2009 – March 2012).
- Line 9 Acknowledge whether or not a copy of the CASE was forwarded to the public data repository as listed in the facility Permit, Module XIV.

### **Section A – Remedy/Plume Behavior**

- Line 13 Based on current groundwater quality data, list the currently anticipated CAP completion date. If the completion date has been pushed back significantly, then the separate issue of corrective action financial assurance may need to be addressed in more detail.
- Lines 17/18 Within solid waste corrective action, wells are judged to have achieved all applicable GPS if they have had no GPS exceedances for three consecutive years of sampling. If any of the site wells have met that requirement during the CASE period, subtract these wells from the list of those wells sampled per Module XIV requirements. List

the number of wells that continue to exceed GPS on the appropriate line (17 or 18).

Lines 20/21 Plumes on site may be large and complex. The intent of the question is to allow the owner/operator to list a 'yes' if groundwater quality has improved in some (but maybe not all) of the Performance and Compliance wells onsite. It is acknowledged that it is unlikely groundwater improvements will be seen on a uniform basis on site due to hydrologic constraints and proximity to the waste mass.

Line 22 Evidence of plume expansion includes any increasing trends in groundwater constituents in plume margin wells, or the recognition of detects in sentinel wells formerly devoid of any detected landfill constituents. Additional information including the calculated groundwater flow rate and plume migration direction can be included in the Appendices.

Line 26 Protection of HH&E refers to whether or not the remedy was successful in preventing direct exposure to the impacted media.

Line 27 This references the fact that there is a significant component of vertical plume migration that is driven by topographic differences between areas of recharge and discharge and the density of the landfill constituent now found in groundwater. Unless extraction wells are screened at appropriate depths, it may not be possible to capture the deep zones of plume migration. Are site extraction wells designed to address all possibilities of vertical flow?

Line 31 P&T Performance wells should be located hydrologically downgradient of the extraction well(s) but on same GW flow path (pre P&T operation) from the corresponding GPS exceeding compliance well. Performance wells downgradient of the extraction well document the ability of the extraction well to capture the entire migrating plume as it enters the cone of depression/zone of capture.

Line 33 Plumes which discharge to surface water at concentrations above the applicable GPS should be undergoing remediation needed to cease such discharge at GPS exceeding levels. Please note that under EPA's Subtitle D defined groundwater monitoring and corrective action programs, surface water quality standards were not a substitute for determining when groundwater remediation should be occurring. If surface water results exceed a GPS, continued use of P&T may no longer be applicable in the associated portion of the plume directly discharging to surface water.

## **Section B – Groundwater Sampling**

Line 41 Copies of the VELAP certificate(s) should be included in the CASE Appendices.

Line 42 One of the most important lines of P&T performance is calculation of the contaminant mass removal rate during the CASE period compared to the system design. In other words: (influent concentration in micrograms per liter) x (daily flow rate in gallons per minute) x (applicable conversion factors) = (pounds of contaminant destroyed per day).

Line 43 One of the most important lines of P&T capture is the documented reduction in contaminant concentrations downgradient of the line of extraction wells. This should be measured in Performance wells formerly screened within the plume prior to extraction

system start-up. Use of the term 'yes' should be restricted only in those cases where performance well CoC concentrations have dramatically been reduced or eliminated entirely.

### Section C – Risk Exposure Factors

- Line 48 Approval for use of P&T will have been based on an acceptable review of potential risk topics. If land use changes take place on adjacent properties since the remedy has been implemented, then the baseline risk review results may no longer be applicable or supportive of continued P&T use.
- Line 49 Most commonly this will refer to the construction of final impermeable cover. Unless the entire source area is covered by final impermeable cover, the use of 'yes' should not take place. In those cases where the source includes both impermeable capped and pre-88 soil capped waste areas, the answer should be listed as 'no' and further explanation can be provided in the Appendices.
- Line 51 This issue must be addressed if there are any structures on site or off site which sit above the groundwater plume.
- Line 53 Use of the answer 'no' will only be appropriate for those landfills which are located in urban areas surrounded on all sides by properties currently hooked to a municipal-supplied water source and there is a local mechanism, restriction, or ordinance which prohibits any well installation (including wells for non-potable use).

### Section D – Interpretation of Analytical Results

- Line 57 Trend analysis requires a minimum of 10 independent data points be available for use. This will likely require use of older sampling data from previous CASE periods by adding that information to the dataset acquired during this CASE period. Any trend analysis done as part of a CASE submission should include all data acquired since remedy implementation as in general, the more data included in the trend analysis, the better the trend analysis will be.
- Line 59 Time Series data plots, showing trend analysis/regression line, should be included for all GPS exceeding constituents, in each well they are recognized at GPS exceeding values. For graphic clarity, plots should be constructed for single constituents.
- Line 63 Those GPS CoCs which display highly hydrophobic behavior may prove difficult to address using P&T. Do any of the site's CoCs display this behavior?
- Line 65 Every P&T system is designed with an anticipated pumping (extraction) rate. Based on data acquired during the CASE Period, was the actual pumping rate equivalent too, higher, or lower than the original system design. Explain the reason for any difference in the appropriate Appendix.
- Line 66 Were any of the extraction wells offline during the CASE Period. If so, provide the reason in the appropriate Appendix.

- Line 67 Did any of the extraction wells suffer a declining yield during the CASE Period? Explain the reason (if known) in the appropriate Appendix.
- Line 68 Every P&T system is designed to achieve a vertical and horizontal zone of capture. The facility has the responsibility of proving the existence of such zone, most commonly by recording the GW elevations in the associated Performance wells. Based on the data obtained during the CASE Period, was a GW capture zone achieved by the current extraction system? Explain the reason for any capture zone failure in the appropriate Appendix.
- Line 69 Every P&T system is designed to achieve removal of contaminants of concern, or reduce them to below remedial or discharge allowable levels. Did sampling of effluent document such remedial levels were achieved by the system as designed?

### Section E – Future Actions

- Line 70 Regarding the issue of performance, use of ‘yes’ should only be presented if the trend analysis supports groundwater quality improvement at rates which would achieve GPS within a reasonable timeframe. The Department will allow some leeway during the initial CASE period to allow sufficient data to be collected from newly installed Performance wells. However, once 10 independent data points are collected, the performance of P&T and its ability to achieve GPS should be quantifiable using the data collected.
- Line 71 The rebound period, with respect to P&T, is that period of sampling following the discontinuation of pumping/extraction, where the owner/operator will look to see if contaminant levels increase in Performance wells due to the effect of residual contaminants in the aquifer matrix. This period is often entered after the trends of contaminants have begun to stabilize at low levels meaning the efficiency of the system has reached its maximum.
- Line 72 The rebound period proposed must be long enough to demonstrate no rebound in CoC levels to those which would exceed GPS. In order to satisfy site-wide Corrective Action, GPS cannot be exceeded anywhere within the plume for three consecutive years of sampling. This minimum, regulatorily defined time frame may be lengthened if the aquifer specifics suggest a longer period will be needed to demonstrate plume stability and lack of rebound.
- Line 73 If there is doubt that P&T alone can meet site-wide GPS, perhaps because of “tailing”, the VSWMR allow an owner/operator the option of implementing an additional remedy component via the Interim Measures allowance (which typically does not entail Permit modification). If the answer to this question is ‘yes’, further detail should be presented in the Appendices.
- Line 74 If there is doubt that P&T and Interim Measures can meet all GPS, the VSWMR require an Alternate Remedy be applied. If the answer to this question is ‘yes’, further detail should be presented in the Appendices.

Line 76 If there is doubt that P&T, Interim Measures, and Alternate Remedy can meet GPS, the VSWMR allow the owner/operator the option to submit a technical infeasibility demonstration showing that GPS cannot be practically met on site regardless of the remedy implemented. If the answer to this question is 'yes', further detail should be presented in the Appendices.

#### REQUIRED ATTACHMENTS

- I Include applicable portion of a USGS, 1:24,000-scale, topographic map with site location and facility boundaries clearly identified.
- II Provide a property boundary map delineating the landfill property and the boundaries of all adjacent properties which share a boundary with the landfill or are separated from the landfill by a road, railway, or surface water. The information should be sourced from county or municipal property records, tax maps, etc.
- III Provide an aerial photograph covering the landfill and surrounding properties clearly displaying current land use. The date, scale and source of the imagery should be included on the photography.
- IV Provide a potentiometric surface map, scaled to fit a folded page no larger than 11" x 17" based on the most recent groundwater data obtained during the CASE period.
- V Provide a table which lists each monitoring well on site and shows each of the groundwater constituents found to exceed GPS at any point during the CASE period. Any constituents found to exceed for the initial time should be presented in italics.
- VI Provide vertical and horizontal plume maps individually for each groundwater constituent exceeding its GPS. The maps may be scaled to fit a folded page no larger than 11" x 17". Maps should be created for each sampling event during the CASE period. In addition, the owner/operator must include one total VOC isoconcentration map based on the most recent groundwater data obtained during the CASE period.
- VII Copies of all laboratory reports issued during the CASE period, including the cover and signature pages, as well as the VELAP accreditation certification form. This information is preferred submitted on CDROM.
- VIII Attach a copy of the 'chain of custody' and field book documentation. This information may be presented on a CDROM.
- IX Provide copies of any computer generated statistical analysis. This information may be presented on CDROM if desired, however, it is preferred that any time series plots included, be presented in hard copy form.

REPORT APPENDICES

- A Detailed Information on Remedy/Plume Behavior
- B Detailed Information on Groundwater Sampling Actions
- C Detailed Information on Risk Exposure Factors
- D Detailed Information on Analytical Result/Measurement Interpretation
- E Detailed Information on Future Actions

FORM 1 (see following pages)

### Pump and Treat (P&T) Corrective Action Site Evaluation (CASE) Report Summary Document



	1] DEQ Region:	2] Date:
	3] Solid Waste Permit Number:	
4] Facility Name:	5] Landfill Type:	
6] Date of Groundwater Remedy Implementation (Permit Amendment Issuance):		
7] Case Report Due Date:	8] CASE Report Period:	
9] Was Public Repository copied on CASE submittal:		
10] Name and location (City/Town) of Public Repository:	11] Which groundwater CASE report submittal (circle one) is this? 1 <sup>st</sup> 2 <sup>nd</sup> 3 <sup>rd</sup> 4 <sup>th</sup> 5 <sup>th</sup> 6 <sup>th</sup> 7 <sup>th</sup> Other	
<b>Section A - Remedy/Plume behavior: Please use 'Y', 'N', 'NA' – not applicable, or 'P' – possibly, where needed. Any response of Y or P should be fully explained in the associated Appendix.</b>		
12] List the anticipated P&T completion date presented in the original CAP Submission?		
13] Based on CASE period data, what is the current anticipated P&T completion date?		
14] Were there any performance problems or Operations and Maintenance issues associated with P&T components during CASE period?		
15] What type of technology is used on site to clean the contaminated groundwater?		
16] Were GPS achieved in <u>all</u> portions of the plume during CASE period?		
17] How many P&T extraction wells continue to exceed GPS during CASE Period?		
18] How many Compliance wells continue to exceed GPS during CASE Period?		
19] Did any formerly 'clean' Compliance wells exceed GPS during this CASE period?		
20] Compared to previous data, did gw quality improve in at least some of the Performance wells during CASE Period?		
21] Compared to previous data, did the gw quality improve in at least some of the Compliance wells during CASE Period?		
22] Was there any evidence of lateral or vertical plume expansion during CASE Period?		
23] (if yes to 22) Were any new wells installed to address expansion during CASE Period?		
24] Are any Performance wells screened below the base of GPS exceeding areas of the plume?		
25] Are there Sentinel wells showing no GPS exceedances located at the edge of the plume?		
26] Was remedy protective of human health and environment during entire CASE Period?		
27] Are extraction wells screened at differing depths to intercept all vertical groundwater flow?		
28] Did any Performance wells exceed MCL-based GPS during the CASE Period?		
29] Did any Performance wells exceed BKG-based GPS during the CASE Period?		
30] Did any Performance wells exceed ACL-based GPS during the CASE Period?		
31] Are Performance wells located downgradient from each exceeding Compliance well?		
32] How many extraction wells were in use during the CASE Period?		
33] (if applicable) Did surface water sampling yield concentrations in excess of GPS?		

<b>Section B - Groundwater Sampling: Please use 'Y', 'N', 'NA' – not applicable, or 'P' – possibly, where needed. Any response of Y or P should be fully explained in the associated Appendix.</b>	
34] Were all Permit-listed Corrective Action wells sampled during CASE period?	
35] If not, list the wells which could not be sampled:	
36] List the reason for the non-sampling during CASE period:	
37] Other than issues noted above, were all Corrective Action related wells sampled at the required quarterly or semi-annual frequency outlined in Module XIV during CASE period?	
38] (if no to 37) List the reason for the non-frequency sampling.	
39] Were all CAP related wells sampled for constituents of Module XIV during CASE period?	
40] (if no to 39) List the reason for the non-sampling:	
41] Were all analysis during CASE period conducted by VELAP certified facilities?	
42] Did the facility calculate the contaminant mass removed within the influent water on an average pounds/per day basis during the CASE Period?	
43] Did results of Performance well sampling support complete plume capture by the line of extraction wells?	
44] Are copies of all sampling event analytical results obtained during the CASE Period attached as an Appendix to this report in CDROM format?	
<b>Section C - Risk Exposure Factors: Please use 'Y', 'N', 'NA' – not applicable, or 'P' – possibly, where needed. Any response of Y or P should be fully explained in the associated Appendix.</b>	
45] Does owner/operator legally own/control all areas currently underlain by landfill contaminated groundwater (i.e., those portions of the plume that exceed GPS)?	
46] (if no to #45) Provide the name of current ownership:	
47] Was there any potential for exposure of humans or environmental receptors to contaminated groundwater during the CASE Period?	
48] Was there any change in adjacent property land-use during the CASE Period which could change the potential exposure risks previously defined during remedy selection?	
49] Are containment components in place to prevent exposure and minimize future releases?	
50] Was there any remedy-related site activity which created a short term exposure risk to workers or the environment during the CASE period?	
51] Is there any potential for vapor intrusion issues above the landfill contaminant plume?	
52] Is groundwater currently used (or potentially used) on site for any reason?	
53] Is groundwater currently or potentially used as a potable water source in the landfill area?	
54] (if needed) Is there an alternate drinking water supply in the vicinity of the landfill?	
55] Is there evidence (or potential for) plume discharge (levels above LOQ) to surface water?	
<b>Section D - Interpretation of Analytical Results/Measurements: Please use 'Y', 'N', 'NA' – not applicable, or 'P' – possibly, where needed. Any response of Y or P should be fully explained in the associated Appendix.</b>	
56] What statistical method was used to assess groundwater trends during CASE Period:	
57] Was prior CASE period data pooled with current CASE data to develop the time series plots?	
58] Were any unusual statistical problems noted (i.e. outliers)?	
59] Were time-series plots provided individually for all GPS exceeding constituents in each MW they were identified in during the CASE period?	
60] When looking solely at Sentinel well data during the CASE period, did any constituents show upward trending concentration behavior in any well (if so, list on the line below)?	

61] When looking solely at Performance well data during the CASE period, did any constituents show upward trending concentration behavior in any well (if so, list on the line below)?	
62] When looking solely at Compliance well data during the CASE period, did any constituents show upward trending concentration behavior (if so, list on the line below)?	
63] Are any of the GPS CoCs known to be hydrophobic (i.e., prefer to bind to aquifer matrix) based on their Octanol-water partition coefficient?	
64] How was the pumping rate (extraction rate) measured on site? Flowmeter on influent or discharge rate on the effluent measured via pipe, weir, or flowmeter? List in box to the right.	
65] Was the pumping rate (extraction rate) achieved on a daily basis during the CASE Period equivalent to the original design specs? If not circle whether it was (higher) or (lower)	
66] Did any of the extraction wells suffer downtime during the CASE Period?	
67] Did any of the extraction wells suffer from declining water yield (compared to prior data) during the CASE Period?	
68] Did the GW elevation measurements in Performance wells downgradient of the extraction well(s) substantiate a horizontal and vertical GW capture zone?	
69] Did the sampling results of the post-treatment effluent meet all applicable discharge permit (i.e., VPDES) requirements and solid waste GPS set for the CoCs?	
<b>Section E – Future Actions: Please use 'Y', 'N', 'NA' – not applicable, or 'P' – possibly, where needed. Any response of Y or P should be fully explained in the associated Appendix.</b>	
70] Based on the data acquired during this (and the proceeding) CASE period, does the implemented P&T remedy have the ability to achieve all GPS within a reasonable timeframe.	
71] Do the trends in GW sampling results (including evidence of tailing effect in CoC concentrations) indicate the facility is ready to discontinue pumping and sample during a 'rebound' period?	
72] (if yes to 71) How long is the anticipated rebound period (i.e., sufficient number of independent events to prove no CoC rebound to levels which exceed GPS)?	
73] (if no to 70) Is Interim Measure use justifiable on site?	
74] (if no to 70 and 73) Is Alternate Remedy application justified on site (if yes list remedy type on line below)?	
75] Is the Alternate Remedy discussed in detail in the current CAP?	
76] (if no to 70, 73 and 74) Will owner/operator be submitting a technically infeasible demonstration (as defined in the VSWMR) to the Director?	
77] Will any discharge-related Permits from other media need to be renewed during the next CASE period?	
78] Are there any other actions planned for the site during the upcoming CASE period not currently discussed in the existing CAP?	
<b>Attachments. The following attachments must be included in the CASE in the order prescribed</b>	
<b>Attachment I:</b> Site Identified on a USGS 7 1/2-minute Topographic Map	
<b>Attachment II:</b> GW elevation table summary (as determined from measurement data obtained from all wells sampled during the CASE period)	
<b>Attachment III:</b> GW flow rate calculations (based on most recent CASE period sampling event)	
<b>Attachment IV:</b>	

Potentiometric Surface Map, scaled to fit a size no larger than 11" x 17", based on the most <u>recent</u> CASE period sampling event	
<b>Attachment V:</b> Table of constituents exceeding GPS during the CASE period, listed per well.	
<b>Attachment VI:</b> Vertical and Horizontal Plume maps provided for each GPS exceeding constituent on site (wherever possible – sized to fit on an 11" x 17" sheet	
<b>Attachment VII:</b> Time Series Data Plots for each GPS exceeding constituent identified within individual wells sampled during the CASE period	
<b>Attachment VIII:</b> Complete Laboratory Reports (including Verification events) for each sampling event during the CASE period	
<b>Attachment IX:</b> Chain of Custody and Field Book documentation (including Verification events) for each sampling event during the CASE period	
<i>Note: Attachments VIII and IX may be submitted in electronic format on CDROM.</i>	
<b>Appendices. The following should be included as needed following the instructions in the SI and inserted after the Attachments. If the site does not need to use a particular Appendix, attach its place holder and use the term 'reserved'.</b>	
<b>Appendix A - Remyd/Plume behavior, Detailed Discussion</b>	
<b>Appendix B - Groundwater Sampling, Detailed Discussion</b>	
<b>Appendix C - Risk Exposure Factors</b>	
<b>Appendix D - Interpretation of Analytical Results, Detailed Discussion</b>	
<b>Appendix E – Future Actions</b>	
<b>Appendix F – Discussion of remedy specific performance demonstrations (i.e., MNA, P&amp;T, In-situ, etc.)</b>	
<b>Responsible Official Signature:</b>	
I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is to the best of my knowledge and belief true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.	
Name:	Title:
Signature:	Date: