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RE: **Multi-Site Field Sampling Plan – Revision 3**
Former Manufactured Gas Plant Sites, Illinois and Wisconsin

Dear Ms. Logan and Mr. Prendiville:

This letter summarizes revisions to the Multi-Site Field Sampling Plan (FSP) – Revision 2, dated September 4, 2007. The revisions were incorporated in the Multi-Site FSP – Revision 3, dated February 20, 2008.

The revisions were made to address United States Environmental Protection Agency (USEPA) written comments received December 20, 2007. For ease of review, Agency Comments are summarized with the response to comment.

General Comments

1. *State Guidance -Because the MGPs covered under this program include sites both in Wisconsin and Illinois, the document has been generic on certain approaches. To assist with the preparation of documents for the Wisconsin MGPs, the WDNR recommends consideration of a number of guidance documents that the Agency has produced.*

We acknowledge these guidance documents are available. These documents have been reviewed during the development of the Multi-site program.

2. *Documentation - While use of specific forms, formats, or other administrative matters is not mandatory under Superfund, at times it is easier to document activities conducted at a Superfund site in a manner familiar to the technical support programs. If appropriate at the Wisconsin sites, please consider documentation for the following activities on State of Wisconsin forms:*
Soil Boring - Form 4400-122
Well Construction - Form 4400-113A
Well Development - Form 4400-113B

Groundwater Monitoring Well Information - Form 3300-67
Soil Boring/Monitoring Well Abandonment - Form 3300-305

We acknowledge these forms are available. It is desirable to maintain consistency in the program and as such, the field forms included in the FSP will be used. These forms address the elements of the referenced forms.

3. *Coordination with State Agencies - Although the Multi-Site FSP does not always reflect it, each of the settlement agreements has requirements to share documents with the State for review and approval in accordance with the agreements. Similarly, there may be other obligations to coordinate with the State. Please note that a lack of discussion in the FSP about coordination with the relevant State Agency in no way erases the coordination obligations as set forth in the relevant settlement agreements.*

We acknowledge obligations to coordinate with the State. Documents will continue to be provided to the State agencies for review to support USEPA as required. Coordination with the State agencies will continue, as appropriate.

Technical Comments

4. *Section 1.2, 3rd line of first paragraph: This should be revised to read "... characterize the nature and extent of impacts and risks at each of the sites..." The last sentence of this paragraph also should be revised to include characterization of the nature and extent of contamination associated with the sites as one of the rationale for/objectives of the data collection.*

The text has been revised as suggested.

5. *Section 1.2 Sampling Objectives:*

of a proposed remedial action at each site. The Company sites encompassed within this FSP exhibit two areas affected by MGP residuals to varying degrees: 1) the former MGP properties where manufactured gas operations occurred, and 2) adjacent surface water bodies. Previously obtained site investigation (SI) data will be supplemented, as appropriate, with additional investigations necessary to evaluate potential exposure pathways, if any, and to evaluate potential remedial alternatives protective of human health and the environment.

It is conceivable that groundwater or even soil outside the MGP properties could potentially be impacted. This statement implies that only former MGP property and adjacent surface water will be evaluated. In section 3.2 permission for off-property access (if required) is discussed so it appears that this contingency has been considered.

The text has been clarified to reflect affected groundwater and soil may extend outside the former property boundary.

6. *Section 3.1 Technical Approach:*
It is understood that project specific CSMs will be developed. However a review of the revision 0, dated August 5, 2007 seems to focus on pathway receptor networks. Although these networks are critical for development of a CSM they are not the exclusive component of the CSM. In a Triad context the CSM includes: critical geologic and hydrogeologic information, historical information, facility operation information, previous sampling, and more to conceptualize what we know about the site. This preliminary model serves as the basis for developing sampling design, managing uncertainty, and

sequencing activities. The preliminary CSM is evolved in real time, guiding site activities until it is sufficiently mature to develop effective and efficient remedies. We recommend the development of more robust CSMs on a site specific basis that includes site maps, cross sections, models and visualizations that can be used to effectively communicate among project team members.

The Generalized CSM will be used as a starting point and refined as site specific data is generated. More robust CSMs (e.g., cross sections, visualizations, etc.) will be presented in SSWPs, if sufficient data exists, or in Remedial Investigation Reports.

7. *Section 2: The site-specific completion reports should include some analysis of the validity of the previously-collected data. Also, waste materials and stream biota should be added to the sample media.*

The usability of previously collected data is described in Section 4 of the Generalized CSM Revision 0 (August 5, 2007). SSWPs and RI Reports will further assess the adequacy of the previously collected data.

Waste characterization sampling is included in the text.

The sample media provided in the FSP is based on the media identified in Section 4 of the Generalized CSM Revision 0 (August 5, 2007). As described in Section 5.4 of the CSM, a biological habitat assessment will be performed to refine ecological receptors in site-specific CSMs. At this time, sampling biota (i.e., fish or aquatic vegetation) is not anticipated because focusing on the benthic community will be protective of other receptors. Although fish and aquatic vegetation may be exposed, the benthic community will be more sensitive. If biota sampling is determined to be necessary on a site-specific basis, it will be included in SSWPs.

8. *Section 4.2.1 Data Uses: The definition of surface soil depth should be based on site-specific DQOs. The definition can vary depending on whether the data will be used for risk assessment or other purposes and therefore should be specified in the SSWPs.*

   In some cases WDNR would prefer surface soil data to be collected from 0 to 4 feet bgs. The depth of the surface soil samples can be specified in the SSWPs, to reflect the use of the data and DQOs.

The SSWP will define the appropriate sample depth for characterizing surface soil, considering the DQOs.

9. *Section 4.2.1, Data Uses, Page 12 Another use of the soil data would be to support evaluating the soil to groundwater pathway?*

The text has been revised to include the potential for soil to affect groundwater.

10. *Section 4.2.2: The use of discrete samples rather than composite samples should be determined on a site-specific basis and specified in the SSWPs, to reflect the use of the data and DQOs. The specificity provided here does not allow for expanding the area beyond 1 meter or the number of increments beyond 5. Determining the best scheme for a sampling approach like this usually requires some initial evaluation of site/media specific heterogeneity to determine the best composite or multi-increment sampling scheme. This statement seems to limit the approach before any such evaluation can take place. The refinement of such an approach is best done using a real-time analytical technique to facilitate this evaluation.*

The difference between composites and multi-increment (Ml) samples should be decision unit driven. You have specified a decision unit (in this case 1 meter) to which the sample can apply. This may be semantics but Ml samples should represent increments within a specified decisions unit, while composites can extend to multiple decision units.

The SSWPs will define the appropriate sample type (i.e., discrete versus composite) and the appropriate number of sub-samples, increments, and area over which a sample is collected, considering the DQOs.

11. Section 4.2.2 Surface Soil Samples
Field photoionization detector (PID) screening for VOCs may be conducted on soil samples in accordance with the SS\\'P and field SOPs. Samples may be screened with a hand held PID equipped with a 10.6 or 10.7 eV lamp. The field analysis data may be used to select soil samples for field or fix-laboratory analysis.

Past experience at MGPs indicates that other "screening techniques" should be considered and a consistent NAPL description framework employed. As with many older and weathered MGP wastes, particularly in surface soil, volatile components may not be present while PAHs and other heavy components may be present in significant quantities. Visual inspection can often identify these impacts however this can be complicated in darker material or with inconsistent visual descriptions. Although a PID can aid in identifying areas of concern, the project team might consider a collaborative approach employing: PID, visual inspection, shake tests, dye tests, and UV exposure as a more comprehensive "quick screening" evaluation of MGP related organics for some surface and subsurface material. An example of NAPL field screening from a previous project EPA TIIB was involved with is provided below...

The text in Sections 4.2.2 and 4.2.3 will be revised to clarify that the PID readings and other visual observations of affected soil may be used to select soil samples for analysis. The suggested standardized descriptions for the visual observation of NAPL will be adopted and included in SOP SAS-05-02, Field Logging and Classification of Soil and Rocks.

The use of a UV light box and water sheen test will be evaluated on a site-specific basis.

The text regarding characterizing vertical extent of contamination where pooled coal tar NAPL was encountered seems inconsistent with Comment #21. If NAPL is encountered in borings, precautions will be taken to minimize drag down while determining the vertical extent of NAPL.

12. Section 4.2.4: This section is a bit unclear. The collection of analytical samples from the test pits should be determined on a site-specific basis and specified in the SSWPs, to reflect the use of the data and DQOs. The first sentence of the third paragraph seems to preclude a test pit from serving multiple purposes, one of which might require analytical sampling.

The text has been revised to clarify that test pits may be excavated for several purposes. The SSWP and the DQOs will determine the need to collect samples from test pits for laboratory analysis.

13. Section 4.2.4, paragraph 4: VOC samples should not be collected from the excavator bucket.

There may be instances where the test pits are excavated beyond a depth that is safe to enter without stabilizing side walls, a confined space entry permit, or shoring system. Collecting soil samples directly from backhoe buckets is not preferred however, may be necessary depending on site-specific conditions and DQOs.

If required, soil samples will be collected from the center of the bucket as soon as the bucket has been brought to the surface to minimize potential volatilization.

14. *Section 4.2.5, Soil Borings, Page 14 and Section 4.4.5.5.1, Well Boreholes, Page 26 Mud rotary is the least desirable of the "HAS, SSA, sonic, and mud rotary" drilling methods. Site specific rationale should be provided to justify use of this drilling method at any former MPG site. Air rotary drilling methods should be considered also (and are preferred over mud rotary).*

Mud rotary may be necessary in some instances, based on site-specific conditions (e.g., the state has prohibited air rotary in shallow bedrock, saturated sands at depth blowing in, etc.), and is included as a drilling technique to be considered. Air rotary has been added to the text of Sections 4.2.5 and 4.4.5.5.1. Site-specific rationale for drilling options discussed in these sections will be provided in SSWPs.

15. *Section 4.2.6.2, Cone Penetrometer, Page 15, Second Paragraph While it is true that CPT is not typically used to obtain discrete soil cores, CPT is often used to collect ground water samples.*

The sentence has been modified to clarify water samples may be collected using CPT.

16. *Section 4.2.6.3 Laser Induced Fluorescence: It should be noted that recent LIF improvements have resulted in the development of tools with different lasers and emission wavelengths such as the TarGOST http://www.dakotatechnologies.com/? content=templates/news detail.tpl&id=44 that target heavier coal tars, creosotes, and crude oils and may help overcome the weaker probe response issue. Some vendors are also beginning to stack tools like MIP, LIF, and GeoVIS in a single push platform although our experience with these stacked tools is limited. Consultation with prospective vendors should help identify potential applications. The key piece to effectively using tools like MIP and LIF particularly for dynamic work strategies is the data management, interpolation methods, and visualization tools employed by the vendor.*

Sections 4.2.6.3 and 4.2.6.4 have been expanded to recognize the LIF technologies are evolving and prospective vendors may be consulted to evaluate potential applications.

17. *Section 4.2.6.5, First Paragraph, First Sentence - Total VOCs are a good indicator for the presence of contamination but there also may be a need to see individual results for each compound.*

Section 4.2.6.5 has been clarified to recognize specific contaminant concentrations.

18. *Section 4.3 Geophysical Methods: In the same way tools like MIP, LIF, and GeoVIS can benefit a project so can geophysical methods with regard to maturing the CSM and accomplishing tasks listed in Tables 4 and 5. Again previous experience with these types of services has shown that performance based contracting, clearly defining objectives and requirements in relation to performance or requiring a demonstration of method applicability (DMA) can save a lot of headaches. EPA's Triad tries to structure procured services at our technical support sites such that the burden of proof is on the vendor. In other words come out for a day and show me that your GPR can see to 15 feet at my site then conduct the whole survey. Previous lessons learned include allowing geophysics vendors to conduct entire surveys only to provide inadequate or extremely poor data that adds no value to your project yet you are left to pay the invoice for the entire service.*

Section 4.3.1 has been expanded to consider the site-specific objectives and requirements when selecting geophysical methods and geophysics contractors may be requested to demonstrate applicability of these methods prior to final selection.

19. *Section 4.2.7: All boreholes should be abandoned, not just the deeper ones. In addition, Borehole/well abandonment in Illinois is to be completed per 77 Illinois Administrative Code Part 920.120.*

Section 4.2.7 has been revised to recognize all boreholes will be abandoned, regardless of depth, in accordance with State specifications.

20. *Section 4.2.7: Boreholes that penetrate through, or a substantial distance into, a confining unit should have grout injected into the bottom using a tremie pipe; not just in those where NAPL is encountered.*

Section 4.2.7 has been revised to recognize all boreholes will be abandoned, regardless of depth, in accordance with State specifications.

21. *If NAPL is encountered in a borehole a sample of the NAPL/soil should be taken at the interval it is encountered. If the Work Plan calls for drilling the hole deeper, the hole should be abandoned and the boring location moved some distance over to collect deeper samples from a new hole. This will minimize the potential for creating a conduit for NAPL migration to deeper units.*

This comment seems inconsistent with Comment #11. If NAPL is encountered in borings, precautions will be taken to minimize drag down while determining the vertical extent of NAPL. Site-specific DQOs will be considered when evaluating the need to relocate a soil boring to avoid NAPL at depth.

22. *Section 4.3.2: "Upland" should be defined.*

"Upland" refers to the areas other than the water body. Section 4.3.2 has been clarified.

23. *Section 4.4.3: Bailers should not be used for sampling except under very restricted circumstances, and therefore, they should not need to be stored in wells.*

It may be necessary to use bailers for select wells. For example low yielding wells or wells known to contain product may be sampled with bailers to protect non-dedicated pumps. In these instances, bailers may be stored in the wells, above the water levels, to avoid sediment accumulating in the bailer. Thus, removal of the bailer would not affect water levels.

24. *Section 4.4.3: Dedicated equipment could be stored within the water column of the well, rather than above, making water-level measurements possible without having to first remove the equipment.*

Section 4.4.3 has been revised to clarify that the preferred approach is to store permanent (dedicated) equipment below the water level, if the water level allows. The exception is bailers which will be stored above the water column to avoid sediment accumulation.

If sufficient water level is not present, permanent (dedicated) equipment may be stored above the water level. It may be necessary to remove permanent equipment prior to collecting water level measurements. However, this would not affect the water level measurement.

25. *Section 4.4.3: This section should include a discussion of LNAPL and DNAPL thickness measurement. These should be measured whenever encountered. There are probes available designed for that specific purpose.*

Section 4.4.3 has been revised to reference SOP SAS-08-01, Groundwater and Non-Aqueous Phase Liquid Measurements, to address monitoring wells with LNAPL and/or DNAPL present.

26. *Section 4.4.3: The last sentence of this section implies that there will be no on-site monitoring wells/piezometers to use in developing groundwater flow interpretations. Generally on-site wells would be required to accurately interpret the groundwater flow regime. However, this would depend on several factors, including the size of the site and locations of the monitoring points. It begs the question at to why the general condition would be that there would only be off-site wells.*

Section 4.4.3 has been revised to clarify that wells up-, side-, and downgradient from wells containing tar and in addition to all other site wells (on-site or off-site) may be used for groundwater flow interpretation if a groundwater level was not collected from a well containing tar.

27. *Section 4.4.5.1: A bullet should be added stating characterization of the nature, extent, and thickness of LNAPL as a rationale for well placement.*

Section 4.4.5.1 has been modified to include characterizing the nature and extent of NAPL (DNAPL and LNAPL) as a rationale for well placement.

28. *Section 4.4.5.2: Sufficient rationale should be provided when proposing to nest monitoring wells in the same borehole. Concerns exist on the ability to ensure the integrity of the wells with this setup.*

Section 4.4.5.2 has been revised to reference the SSWP for site-specific conditions/rationale used in proposing nested wells within the same borehole.

29. *Section 4.4.5.2, Well Screen Placement, Page 25 Specific rationale for deciding monitoring well screen length should be provided. What factors would determine if the screen length is 5, 10 or 15 feet?*

Text has been inserted that provides site-specific conditions that may determine the use of different well screens. Site-specific criteria will be provided in SSWP, to the extent practical, but may be adjusted based on field encountered conditions.

30. *Section 4.4.5.5.2: The surface seal for the non-flush mount wells should include 2 ft of concrete to secure the well seal. Casing secured into bentonite is too easy to move/remove.*

Our experience has indicated a properly installed well with at least 5-feet of surface seal sufficiently secures the well casing. Locations where 5-feet of surface seals are not possible should include the 2 feet of concrete. This is discussed in Section 5.1 of SOP SAS-05-03.

31. *Section 4.4.5.5.2: Flush mount wells should have a slightly raised concrete pad that slopes away from the well to improve drainage.*

Section 5.1 of SOP SAS-05-03 discusses sloped concrete pads and aprons. Section 4.4.5.5.2 has been clarified.

32. *Section 4.4.5.5.2: Integrys should consider adding a bleed hole or sand bottom on the inside of the protective casing on flush-mount wells to improve drainage out of the protective cover. Wells should also have locks.*

Section 5.1 of SOP SAS-05-03 includes the use of well locks and discusses weep holes in the protective cover. The option to include sand has been added to SOP SAS-05-03. Section 4.4.5.5.2 has been revised to include these options and clarify that locks will be used.

33. *Section 4.4.6 and 4.4.7 Monitoring Well Development, Page 27: The Ground-Water Sampling Guidelines mentioned in the first sentence say nothing about monitoring well development. The appropriate relevant reference is USEPA, 1992. Monitoring Well Development Guidelines for Superfund Project Managers, www.epa.gov/tio/tsp/download/welldevelp.pdf.. All aspects relating to well development in this field sampling plan should be made consistent with this guidance including parameter stabilization and purge volumes.*

The text and SOP SAS-05-04 have been revised to reference the 1992 USEPA guidance.

34. *Section 4.4.6, Monitoring Well Development, Page 28 If the drilling method introduces water to the aquifer, three times the volume lost during drilling should be purged from the well prior to well development.*

Section 4.4.6 and SOP SAS-05-04 has been revised to include removal of three times the volume of drilling fluid lost during drilling activities.

35. *Section 4.4.7.2, Sample Collection, Page 31 Despite the last sentence, procedures for field filtration are not described in SOP SAS-08-01 nor in SAS-08-02 (nor in SAS-08-03).*

Section 4.4.7.2 has been clarified to refer to SOP SAS-08002 and SOP SAS-08-02 has been revised to include field filtration.

36. *Section 4.4.7.2 Sample Collection: The first sentence should be rewritten, "Groundwater samples will be placed in appropriate laboratory supplied containers and preserved in accordance with the analytical requirements for methods listed in Table 1." Table 1 provides method and container requirements.*

The text has been revised as suggested.

37. *Section 4.4.7.2.2: Peristaltic pumps may bias sample results and should not be used if depth to water exceeds 5-10 feet. Also, if the geology at the well screen is heterogeneous the intake on the sample tube should be lowered to the depth of the most permeable saturated interval encountered by the screen.*

The use of peristaltic pumps is allowed for in *Ground-Water Sampling Guidelines for Superfund and RCRA Project Managers* (USEPA 2002) for slow recovery rates and minimal well volume, which is the majority of the wells in which peristaltic pumps are used. Bladder pumps are used for sampling deep wells, for depth to water greater than 15 to 20 feet bgs as referenced in the USEPA 2002 guidance. Peristaltic pumps have been

successfully used at several of the sites within the program for low flow sampling as demonstrated through increased VOCs (due to less agitation within the water column) and lower PAHs (due to less turbidity and less agitation within the water column) as compared to the former sampling methods using bailers.

The tubing will be placed at an elevation near the center of the screen and a minimum of one foot above the well sump to the extent practical. In general, the screened interval is the most permeable saturated interval.

Section 4.4.7.2.2 and SOP SAS-08-02 have been clarified with regard to sample tubing depth.

38. *Section 4.4.7.2.2, Low Flow Sampling, Page 33 Total drawdown during purging and low-flow sampling should not exceed 0.1 meter. The procedure outlined here sets no maximum.*

Section 5.5 of SOP SAS-08-02 indicates the pump rate will be adjusted to avoid a drawdown of more than 0.3 feet. Section 4.4.7.2.2 has been revised to indicate the maximum acceptable drawdown of 0.1 meters or 0.3 feet.

39. *Section 4.4.9 Aquifer Characterization: Along with field methods for evaluating hydraulic conductivity (k) you might also consider including high density samplers and direct sensing tools than can provide k data in high density like the modified waterloo profiler http://www.stone-env.comlprofiling/index.html#Watpro and the high resolution piezocone http://www .estcp.orglTechnology/ER -0421- FS .cfm. The waterloo profiler has already been discussed as a potential ground water collection device but modified versions can also provide k, hydraulic head, and other information. Likewise, recent advances in high resolution piezocones have resulted in highly accurate 3D models for seepage velocity and contaminant flux based on in-situ measurements of k, hydraulic head, and effective porosity.*

Section 4.4.9 has been revised to recognize these tools are available and may be evaluated on a site-specific basis, as appropriate, and included in SSWPs.

40. *Section 4.4.9.1, Single Well Tests, Page 36 Rather than literally adding water to or removing water from a well during the single well tests, consideration should be given to the use of an actual long cylindrical "slug" of inert solid material to displace water in the tests. This avoids the problem of adding water to a monitoring well discussed in the second paragraph. If water is added to monitoring wells during a slug test, three times the volume of water added to the well should be purged upon completion of the test, not one.*

Section 4.4.9.1 and Section 4.2 of SOP SAS-08-04 have been revised to include the use of an inert solid material "slug" to displace water. These sections have also been revised to specify three times the volume of water introduced during slug testing, if water is used, will be removed upon completion.

41. *Section 4.4.9.1, Single Well Tests, Page 36, Last Paragraph Data from the single well tests should be analyzed using the Bouwer and Rice (1976) method or other appropriate methods. Data from the single well tests should be analyzed using the Bouwer and Rice (1976) method only if that is the appropriate method. For example, an oscillatory response should not be analyzed using the Bouwer and Rice (1976) method.*

Section 4.4.9.1 has been revised to clarify the appropriate method of calculation will be selected based on the responses observed.

42. Section 4.4.10: Bentonite chips or concrete should be used to bring the hole from 30 inches up to grade.

The placement of bentonite chips or concrete (when surrounding material is not concrete) from 30 inches bgs to ground surface does not allow for future site development (e.g., farm field, green space). The placement of native material or asphalt/concrete (adjacent material) is sufficient to meet the purpose of well abandonment SOP, which is to prevent the borehole / well from acting as a conduit for migration of contaminants from the ground surface to the water table or between transmissive zones. The annular space shall be filled with bentonite chips, grout, or granules to at least 30 inches bgs. Native material (gravel, soil, etc.) or material in adjacent areas (asphalt, concrete, etc.) may be used to bring the former well location to grade.

43. Section 4.5: We agree that specifics regarding the sampling and evaluation of the GSI should be addressed in the SSWPs. However, it should be noted that surface water is capable of contaminating or being contaminated by groundwater and not only sediments.

Section 4.5 has been revised to include these potential pathways.

44. Section 4.6.1: To adequately evaluate site impacts, samples should be collected at the site, not just upstream and downstream. Also pH and ORP should be added to the field measurements.

Section 4.6.1 has been revised to clarify surface water samples will be collected at the site, upstream, and downstream of the site. The requested field measurements have also been included.

45. Section 4.6.1.1, Ecological Risk Assessment Samples, Page 41 Omitted is a reference to a SOP for filtering the surface water samples.

A reference to the groundwater filtering procedures, SOP SAS-08-02, has been included.

46. Section 4.6.1.1, first sentence: This sentence should be changed to read, ".. . from the shoreline to beyond the area of impacted sediment."

Section 4.6.1.1 has been revised to allow a transect to extend to the opposite shoreline or beyond the area of impacted sediment.

47. Section 4.6.1.1: Samples should be collected under base flow conditions. This also applies to section 4.6.1.2.

Section 4.6.1.1 and Section 4.6.1.2 have been revised to specify surface water sampling will be performed under base flow conditions, to the extent practical.

48. Section 4.6.2: As appropriate it might be useful to get discharge readings at the site rather than exclusively from USGS/State gages, which could be located miles away.

SOP SAS-09-02 includes procedures for measuring streamflow. Additional text has been added to clarify.

49. Section 4.6.2: Integrys may also consider evaluating other information from non-site specific sources such as biota sampling, surface-water quality, sediment quality, ambient soil quality, etc, as a means of assessing site impacts.

It is unclear how this comment applies to Section 4.6.2, River Hydrology. However, off-site sampling of media will be performed to assist with defining/assessing site impacts. The off-site sampling will be detailed in the SSWPs.

50. Section 4.7.6, Second Paragraph, First Sentence: Further discussion is needed regarding the collecting and combing the entire core from 3 different locations in the project area.

Section 4.7.6 has been revised to clarify the composite samples will be used to evaluate disposal options in the FS and manage the investigative waste. The number of cores/locations may be adjusted based on site specific field encountered conditions. Compositing of the cores will be in accordance with the approach described in SOP SAS 06-01.

51. Section 4.7 Sediment Sampling: Although the initial text indicates a desire to use dynamic work strategies (which require real-time measurement systems) for sediment sampling the remaining text in the section does not indicate where these strategies might apply. Sections for delineation sampling (4.7.2), various risk assessments (4.7.3), and toxicity testing (4.7.4) all reference established fixed laboratory methods that require lengthy extraction, cleanup, analyses, and reporting or would require expensive surcharges to get data "in time" to drive dynamic work strategies. Table 3 does provide field analytical and mobile laboratory options but it is unclear when or how potentially applicable tools would be evaluated and used. Delineation efforts and classification of disposal material are activities that quickly come to mind that can benefit from a dynamic work strategy. It will be important for SSWPs to identify how field analytics and "screening" tools will be used collaboratively with mobile or fixed laboratory analyses.

It is intended to use field laboratories for delineations, identifying samples for toxicity testing for use in risk assessments to the extent possible. Services for select analysis (e.g., soot carbon) may not be available in a field laboratory and toxicity testing will always require a fixed-based laboratory. SSWPs will identify the laboratories intended to be used and how the data will be used to support the DQOs.

Text has been included to clarify analysis may be performed in a field or fixed-based laboratory.

52. Section 4.7.7.1: Field personnel should not remove wood chips and other materials that could be considered "unrepresentative" from sample intended for chemical analyses. These materials were used in, and contaminated by, MGP processes. Such treatment of samples should be a decision made by the lab-technician and based on the ability of the lab to analyze the sample. Removal from samples that are intended for geotechnical testing is acceptable.

The text has been revised as suggested.

53. Section 4.7.7.1: VOC samples should not be homogenized.

Sediment samples collected for VOC analysis will not be homogenized. Section 4.7.7.1 has been revised to discuss VOC samples and references to SOPs SAS-07-02 and SAS-07-03 have been included. SAS-07-03 reiterates VOC samples will not be homogenized.

54. Sections 4.7.7.2 and 4.7.7.3: The text describes coring devices proposed for sampling sediment and proposes to use a hand corer for short cores and a Vibracore for longer cores. However, the SOP attachment on sediment sampling equipment (SAS-07-03) describes soil sampling equipment. The attachment to the sediment SOP is the same as the soil SOP. These samplers are intended for use in soil and are not appropriate for sediment sampling. The sediment SOP should provide examples of equipment and procedures proposed in the report text (eg. Vibracore and Ogeechee).

Section 6 of SOP SAS-07-03 has been expanded to discuss the examples of sediment equipment and procedures discussed in Sections 4.7.7.2 and 4.7.7.3.

55. Section 4.8.1: Ambient air (vapor and particulates) also should be analyzed for the site contaminants appropriate to the sample phase.

As part of the HASP, ambient air is monitored for VOCs and action levels are established in the SSWP and/or HASP. Due to the relatively small areas of the site that will be disturbed at any given time during RI activities, this monitoring is considered sufficient.

Pilot scale treatability studies or other similar studies may expose larger areas of affected material. If pilot scale treatability studies are performed the work plan will include SOPs for monitoring ambient air and the appropriate analysis. The measures described in the SOPs will ensure the field activities do not exceed risk based concentrations developed to protect the community from human health effects.

56. Section 4.8.3, First Paragraph: If needed, sub-slab sampling may be preferred over soil gas sampling.

Section 4.8.3 has been revised to include the potential for shallower samples. Site-specific DQOs, presented in the SSWP, will be considered when evaluating the appropriate sample depth.

57. Section 6.1.1, paragraph 2: If dedicated bailers remain in any of the existing wells they should be removed. Additional sampling should not be performed using bailers except under very restricted circumstances.

There are circumstances where bailers are used (e.g., low yielding wells, presence of NAPL, etc.) and these bailers will remain in the wells as described above. Section 6.1.1 has been revised to clarify bailers will be removed from monitoring wells in which low-flow sampling techniques are being used.

58. Section 6.1.3 Field Based Analytical Method Selection Criteria: Beyond sensitivity, selectivity, and dynamic range evaluations, selection of FAMs should include a look at how the technology or strategy performs in the context of project decisions. In most cases FAMs can be used to make dirty or clean determinations at the specified level of confidence and identify samples "too close to call" near an action level that would benefit from more a rigorous analytical method. These tools will likely provide high density information that can actively identify and manage uncertainty related to small scale heterogeneity, sample support issues, spatial auto correlation of contaminants etc. that many discrete sampling/fixed based laboratory analysis programs miss.

Section 6.1.3 has been revised to include consideration of how the technology or strategy performs for selected field methods in support of project decisions.

59. Section 7.1.3, Data Acquisition, Page 60 and Appendix A, SAS-03-03, Section 4.0, Surveyed Locations, Page 3: There is a contradiction between the text here and SOP SAS-03-03. The SOP states that ground surface elevations should be established within ±0.1 foot rather than the ±0.01 feet cited in Section 7.1.3. The contradiction should be eliminated.

SOP SAS-03-03 text has been modified to include a ground surface elevation established within ±0.01 feet.

60. Section 9.2: Waste should be disposed of in compliance with U.S. EPA's Off-Site Rule (40 CFR 300.440). The text also has no mention of the procedures for the management of sediment investigative waste. The report should provide a description of the characterization and management of these wastes.

Sections 9.1 and 9.2 have been revised to include sediment investigative waste with soil investigative waste and the Off-Site Rule has been included.

61. Section 9.2, paragraph 2: The phrase, "... approved by the Company", should be amended to "... approved by the Company and U.S. EPA."

Section 9.2 has been revised to include approval by the USEPA in accordance with the Off-Site Rule.

62. Table 1: This table states PVOCs will be analyzed but the text discusses VOCs. Please clarify what the intent is here.

Table 1 is provided as an example Sampling and Analysis table and will be modified in SSWPs. The Generalized CSM Revision 0, dated August 5, 2007 includes PVOCs as a COPC. On a site-specific basis, the larger suite of VOCs may be analyzed, as detailed in SSWPs.

63. Figure 1: This figure seems to only address soil and groundwater. If decision trees are to be used, other media (e.g. sediment, air, etc) should also be addressed.

Figure 1 was referenced from USEPA guidance and is intended to illustrate a generic decision tree flow and not to include site-specific detail related to sediment, air, etc. Decision trees will be presented in the SSWP, as appropriate.

64. Figure 1 Generic RI/EE Field Decision Tree: If contamination is encountered in groundwater and the need to calculate minimum travel times for contaminants is observed what additional data would be collected? A review of the parameters in Table 1 does not indicate the collection of soil to evaluate hydraulic conductivity. Grain size distribution samples are listed under the soil and sediment for remedial alternatives/waste characterization. It is important to have those decision points that require additional sample collection specified.

Figure 1 was referenced from USEPA guidance and is intended to illustrate a generic decision tree flow and, as discussed in the response for Agency Comment #63, this Figure was not intended to include site-specific information, such as grain size distribution. Table 1 was also provided as an example Sampling and Analysis Summary and will be modified on a site-specific basis, as discussed in the response for Agency Comment #62.

65. *Figure 1: This tree assumes that if there is no soil contamination then there is no need to evaluate groundwater. This is not true. Groundwater contamination may exist at sites where soil has been previously remediated. With that said, we believe that it is appropriate to address these decision tree issues in the SSWPs rather than at this time.*

Figure 1 was referenced from USEPA guidance and is intended to illustrate a generic decision tree flow and, as discussed in the response for Agency Comments #63 and #64, this Figure was not intended to include site-specific information, or evaluate all affected media.

66. *Table 2 Field Sampling Option: Passive diffusion bag samplers (PDBs) should be added to the list of potential collection tools or collection methods.*

PDBs are included in Table 2 under "Passive Multilayer Samplers"; reference http://www.frtr.gov/site/ (included on Table 2).

SOPS

67. *Appendix A, SAS-03-01, Sample ID, Part 7, bullet: Please clarify the goal of the additional tape between the cooler and the cooler lid. The way this is worded it seems like you'd be separating the lid from the cooler.*

Text has been clarified to indicate the tape is intended to secure the top and body of the cooler together.

68. *Appendix A, SAS-03-03, Section 4.0: Presumably lateral coordinates for sample (and other) locations will not only be determined relative to appropriate coordinate system, but recorded and presented in published site documents.*

Text has been added to clarify the field data will be included in site data reports, map, tables, etc.

69. *Appendix A, SAS-04-03, Section 4.3: Trip blanks are not collected to detect contamination that may be introduced from sampling equipment. Equipment blanks are collected for that purpose.*

SAS-04-03 has been revised to remove reference to contamination introduced in the field due to sampling equipment.

70. *Appendix A, SAS-04-03, Section 4.4: Equipment blanks are collected to ensure that any sampling equipment (not just disposable) is free of measurable concentrations of COPCs. This is related to checking for the effectiveness of decontamination procedures, but goes somewhat above that. Additionally, ultrapure/DI water may be a better water to check equipment blanks for some COPCs like metals and SVOCs. Also, the timing of the collection of equipment blanks should be specified and not just the number. Typically, you want to collect an equipment blank before you take your first sample and after collection of an especially contaminated sample.*

SAS-04-03, Section 4.4, has been revised to clarify non-disposable equipment will be decontaminated and appropriate times that equipment blanks may be collected.

71. *Appendix A, SAS-04-04, section 4.3.2: Specify that the rig mast needs to be cleaned.*

The text has been modified as suggested.

72. *Appendix A, SAS-04-04, section 4.4.2: Depending on the pump being used, disassembly for decon is excessive. We suggest that pumping 2 gallons of detergent water, followed by pumping 2 gallons of tap water, then 2 gallons of distilled water should be sufficient for most pumps and most levels of decontamination. Pumps that have been in heavily contaminated wells would likely require much more effort. In those cases consideration should be given to dedicated pumps.*

Acknowledged, the text has been modified as suggested.

73. *Appendix A, SAS-05-02, Section 6.0: Depending on the type of drilling being done and the rock being drilled, consider adding description of drilling rates at depth (continuous by 1 ft intervals). At a minimum, not depths where drilling rates are especially high or low.*

Acknowledged, the text has been modified in Section 5.0 and 6.0.

74. *Appendix A, SOP SAS-05-03, Section 4.2: Down-hole well casing and screen materials typically are shipped chemically clean and wrapped in plastic to keep them clean. It may be these materials are more susceptible to contamination if they are cleaned at the site than they would be if they were just taken out of the wrapper and put down the hole.*

The discussion regarding decontamination of well materials before installation has been deleted, as suggested.

75. *Appendix A, SOP SAS-05-03, Section 4.3.1-The screen on a water-table well should straddle the water table. The term, "at the level of the water table", implies the water table should be either at the top or bottom of the screen.*

Acknowledged, the text has been clarified.

76. *Appendix A, SOP SAS-05-03, Section 4.3.1: The proposed minimum diameter for the drill casing does not correlate with the requirements of chapter NR 141.1 0(1)(c), WAC.*

Concur; text has been expanded to include the intended content of minimum drill casing diameters for air/mud rotary, hollow stem auger, sonic, etc.

77. *Appendix A, SOP SAS-05-03, Section 5.2-The volume of water added to the well during construction must be recorded.*

Acknowledged, the text has been modified as suggested.

78. *Appendix A, SOP SAS-05-03, Section 5.2, page 9, paragraph 2: A concrete pad 3.5 ft thick over its entirety is excessive. Do the authors mean 3.5 inches thick?*

Yes, the text has been revised.

79. Appendix A, SAS-05-03, Section 4.4.2, Page 4, Use of any drilling fluid other than water is unlikely to be approved.

Noted.

80. Appendix A, SAS-05-03, Section 4.4.2, Page 5 Clarify the basis for deciding on the filter pack size, whether sand or pea gravel.

Text has been expanded in Section 5.1 to discuss the rationale for filter pack sizes.

81. Appendix A, SAS-05-03, Section 4.4.2, Page 5 and Section 5.2, Page 8 Omitted is mention of the "fine sand filter-pack seal" above the regular filter pack mentioned on page 27, Section 4.4.5.5.2 of FSP.

Text has been expanded in Section 5.1to discuss the use of fine sand filter-pack seal.

82. Appendix A, SAS-05-03, Section 4.4.2, Page 8 The SOP should state how thick the bentonite seal will be. For water table wells, bentonite slurry should be used, not bentonite pellets.

Text has been expanded in Section 5.1 to clarify a 3 foot bentonite filter-pack seal thickness. The comment is not clear on the water table wells. Bentonite pellets or chips are utilized as a bentonite filter-pack seal when grout is used for the annular space seal. The top of the screen for a water table well would be above the water table and therefore the bentonite filter-pack seal would also be above the water table, resulting in bentonite pellets as the preferred material for the bentonite filter-pack seal.

83. Appendix A, SAS-05-04, Section 4.3, Page 3 Add overpumping (pumping at rates greater than would ever be used during purging and sampling) and back flushing when pumping.

Overpumping and back flushing when has been added, as suggested.

84. Appendix A, SAS-05-04, Section 5.0, Page 4 Include in the SOP removal of a volume of water three times the volume lost during drilling prior to well development. Include as a criteria for termination of well development achievement of visual clarity.

The text has been modified as suggested.

85. Appendix A, SAS-05-04, Section 6.0, Page 5 Since there is a "WELL DEVELOPMENT AND GROUNDWATER SAMPLING FIELD FORM" provided in Appendix B, include reference to this form here or preferably, include a copy of the form as an attachment to the SOP.

Reference to Appendix B of the FSP has been included.

86. Appendix A, SAS-05-04, Section 7.0, Page 5 Add to the list of references, USEPA, 1992, Monitoring Well Development Guidelines for Superfund Project Managers, www.epa.gov/tio/tsp/download/welldevelp.pdf.

The reference has been included.

87. *Appendix A, SOP SAS-05-05, Section 5: If casing isn't removed it should be cut off 2-3 ft below ground surface (not even with ground surface) and backfilled with bentonite grout or cement.*

Concur; text has been modified.

88. *Appendix A, SOP SAS-06-01, Section 6.1: Random sampling does not involve "the subjective collection of samples based on personal judgment". This is biased sampling. Random sampling requires that the probability that a sample will be collected from any given site be equal to that of any other site.*

The text has been revised.

89. *Appendix A, SAS-06-041, Encore™ Soil Sampling Procedure It is not clear from the SOP that the Encore™ soil samples will be preserved by the laboratory within 48 hours of sample collection (or analyzed within 48 hours if not preserved). This should be explicit.*

Text has been added to discuss preservation or analysis within 48 hours of sample collection in SAS-06-01 and SAS-07-03.

90. *Appendix A, SOP SAS-07 -01: This technology has substantial limitations for accurately defining the true depth of sediment, particularly in gravelly streams. This is not to say the technique shouldn't be used, but that results should be considered minimum values, and the entire data set should be evaluated to determine sediment thickness. Poling appears to be the only method proposed to determine sediment depth. SOPs for other techniques, especially geophysical techniques should be developed. The proposed sounding pole for determining water depth and sediment thickness should have a standardized diameter to insure precision between measurements. The WDNR typically uses a 2-inch diameter aluminum pole to provide sensitivity to the sediment/water interface, sufficient rigidity to avoid bending, and sufficient resistance to penetration of the sediment to measure the boundary of the soft sediment with the native sediment.*

The diameter and material of the sediment pole has been added to SOP SAS-07-01 and Section 4.7.9 of the FSP.

Geophysical surveys may be performed to assess the thickness of sediment, as described in Section 4.3.3 of the FSP. The SOPs for geophysical surveys will be provided by the geophysics contractor as part of the SSWP or prior to the work being performed.

The poling data will be used to confirm the bathymetric results and/or expand areas in which bathymetry could not be performed due to site conditions.

91. *SAS-07-03: This SOP should include more details on the types of data collected at each sediment sampling site. Specifically, all sampling locations should be located with respect to x, y and z coordinates and water depth. Where a core sampler is used, the penetration depth, recovery depth, and recovery ration should be determined.*

This SOP was expanded and reference to field forms, in which the mentioned data will be recorded, has been provided.

92. *Appendix A, SAS-08-02, Section 5.2 Measuring total well depth immediately prior to sampling should be avoided. If total well depth needs to be recorded at the time of sampling, it should be measured after completion of the well sampling.*
The optimal approach to getting well depths is to send someone out to take measurements a week or two prior to the sampling effort. If there is indication of sediment infilling in a well, efforts should be made to re-develop the well to remove the sediment, and that these efforts should be completed 48 to 72 hours prior to sampling. These activities are covered in SOP SAS-08-05, but it would be better if 08-05 was referenced here and the timing of the relation between maintenance and sampling were defined.

Requirement for total depth measurement prior to sampling has been removed and qualified that it should be avoided. Total depths may be measured following sample collection.

93. *Appendix A, SAS-08-02, Section 5.3, Page 3 and 4 It is unclear why the SOP includes casing volume calculations, since these volumes are not used during low-flow groundwater sampling. The requirement to calculate casing volume increases the possibility that total well depth will be measured immediately prior to the low-flow groundwater sampling (an undesirable practice).*

References to well volume calculations have been removed from SAS-08-02.

94. *Appendix A, SOP SAS-08-02, Section 5.4: Even if there are NAPLs in a well you don't necessarily want to sample near the NAPL as a means of characterizing groundwater quality. You would want to sample the NAPL to characterize the chemical composition of the NAPL itself (SOP SAS-08-07), but this should be a separate sampling effort focusing on the NAPL itself, not a mixture of NAPL and water, which is likely what you'd get with the proposed techniques.*
You almost always want to put the pump intake within the well screen about 2 ft off the well bottom or at the depth of the most permeable geologic unit within the screened interval, when sampling ground water. This location allows you to sample ground-water quality in the aquifer and not stir up a bunch of sediment.

The pump intake will be a minimum of one foot above the well sump to the extent practical to minimize sediment disturbance. Section 4.0 states that SOP SAS-08-02 is not applicable to collection of samples from wells with NAPL. Reference to SOP SAS-08-07 has been added to the text of SOP SAS-08-02 and SAS-08-03.

95. *Appendix A, SAS-08-02, Section 5.6, Page 5: As this SOP is written it appears that considerable drawdown would be acceptable as long as "the groundwater level does not fall below the intake level" Add an additional constraint that if the static water level prior to purging is above the well screen, then one should avoid lowering the water level into the screen.*

The text has been modified as suggested.

96. *Appendix A, SOP SAS-08-02, Section 5.7, table: Conductance measurements typically are in micro siemens per centimeter, not Siemens. Stabilization should be +/- 3% on microsiemens. Field parameters should be read every 5 minutes, not every 3 to 5.*

Concur on µS/cm; SOP and FSP text has been revised. Measurement periods are dependent on pumping rates, text has been modified to reflect a 5 minutes period as typical, but to allow measurements that are more frequent at higher pumping rates, consistent with USEPA groundwater sampling guidance (USEPA 2002).

97. *Appendix A, SAS-08-02, Section 6.0, Page 7: Since there is a "WELL DEVELOPMENT AND GROUNDWATER SAMPLING FIELD FORM" provided in Appendix B, include reference to this form here or preferably, include a copy of the form as an attachment to the SOP.*

Reference to the forms in Appendix B has been added to the Section 6.0 of SAS-08-02.

98. *Appendix A, SOP SAS-08-02, Attachment A: Please delete this chart. It might encourage the collection of inappropriate samples or the use of inappropriate sampling methods.*

Attachment A has been removed as suggested.

99. *Appendix A, SAS-08-03, Section 4.0, Page 2 & 3: While it is never desirable to purge a well dry, it may be unavoidable for a water table well. But, well screens of wells screened below the water table should not be dewatered. Only enough purging to remove water to just above the top of the screened interval is acceptable. This constraint on purging should be explicit.*

The text has been modified as suggested.

100. *Appendix A, SAS-08-03, Section 5.5.1: Use of bailers for sampling should always be justified and the generic workplan should indicate that the site specific workplans will provide appropriate rationale if there are site specific conditions that require using bailers. Bailers should ONLY be used if pumps cannot provide a sample because of low recharge in a well and a small water column or to sample NAPL. An SOP should be developed for NAPL sampling with a bailer if that is proposed Samples collected from bailers should use a bottom valve attachment that allows for better control of the water during bottle filling.*

Bailers will only be used as appropriate, at low yielding wells and wells with NAPL, as discussed in previous responses to comments. The bailers, if used, will have a bottom valve attachment to minimize aeration. Justification for the use of bailers will be included in SSWPs. The text has been modified.

Procedure(s) for sampling NAPL is provided in SOP SAS-08-07.

101. *Appendix A, SOP SAS-08-03, Section 5.5.1: The depth of the pump intake should be based on the well construction and water level. In a non-water table well the pump should be placed about 1 ft above the top of the sand pack unless the water column is a couple feet or less above the top of the sand pack.*

Requested pump intake placement contradicts Comment #94, which states "*You almost always want to put the pump intake within the well screen about 2 ft off the well bottom or at the depth of the most permeable geologic unit within the screened interval, when sampling ground water.*"

SAS-08-03, Section 5.5.1 states the pump intake will be placed a minimum of 1 foot above the base of the well screen to minimize the disturbance of accumulated sediment and the text has been modified to state the preferred pump intake level is within the length of the well screen.

102. Appendix A, SAS-08-03, Section 5.6, Page 6 and 7: Turbidity should also be monitored during purging with a stabilization criteria for turbidity of ±10% added to the table on page 7. Add dissolved oxygen and ORP to the list of field parameters. Contrary to the text, they typically are used and are superior to conductivity, pH, and temperature for indicating when formation water is present. Take a turbidity reading after the other parameters have stabilized.

Turbidity, DO, and ORP have been added to the stabilization criteria. However, based on USEPA sampling guidance (USEPA 2002) and ASTM guidance, turbidity, DO, and ORP are parameters that may not stabilize in certain aquifers. Three of these parameters are required to be stable prior to sampling.

103. Appendix A, SOP SAS-08-03, Section 5.6.1: Field parameters should be recorded using a flow through cell. Rather than base volume purged on flow rates (which can be variable) and time of pumping, just record the volume purged (to the gallon) and take field parameter readings when the appropriate volume has been purged. The text is ambiguous as to which technique will be used.

A flow through cell is the preferred method for recording field parameters. The text has been clarified to indicate the purge water volume and time will be recorded when field parameters are collected. Flow rates will also be periodically recorded during sampling.

104. Appendix A, SAS-08-03, Section 6.0, Page 10; Since there is a "WELL DEVELOPMENT AND GROUNDWATER SAMPLING FIELD FORM" provided in Appendix B, include reference to this form here or preferably, include a copy of the form as an attachment to the SOP.

Reference to the field form in Appendix B has been added to SAS-08-03, Section 6.0.

105. Appendix A, SAS-08-04, Section 4.2, Page 4: Rather than literally adding water to or removing water from a well during the single well tests, consideration should be given to the use of an actual long cylindrical "slug" of inert solid material which will displace water in the single well aquifer tests. This avoids the undesirable routine of adding water to a monitoring well. Expand this SOP by adding the procedures for conducting single well aquifer tests with the level of detail comparable to the procedures outlined for multiple well pump tests in Sections 5 and 6.

Section 4.2 is now Section 5.0 in SAS-08-04. The procedures for single well aquifer tests have been expanded.

106. Appendix A, SAS-08-04, Section 5.4, Page 8: A barometer should be present on site and used to measure barometric pressure during the pre-test stage and throughout the length of the test. These measurements should routinely be made a part of the testing procedure and not be dependent upon whether "barometric records are available".

Section 5.4 is now Section 8.4 in SAS-08-04. This section has been revised to include barometric pressure measurements during the pump tests.

107. Appendix A, SOP SAS-08-03, Section 5.7.1: Unless you've got a depth to water in a well of less than about 10 ft, peristaltic pumps should not be used for sample collection. They have to potential to bias sample results low, especially VOCs.

USEPA guidance (*Ground-Water Sampling Guidelines for Superfund and RCRA Project Manager, 2002*), does not reference the stated restriction of depth to water of less than 10 feet. The guidance states that depths greater than 15 to 20 feet should be avoided, which is at or near the practical use of a peristaltic pump. Our experience with transitioning from traditional bailer sampling to low-flow sampling has resulted in data showing slight increases in VOC concentrations and decreases in PAH concentrations (reduction of sediment and colloidal particles). We believe this application of low-flow sampling yields aquifer characteristic data.

Also see response to Agency Comment #37.

108. Appendix A, SOP SAS-08-03, Section 5.7.2: Bailers should ONLY be used if pumps cannot provide a sample because of low recharge in a well and a small water column or to sample NAPL. An SOP should be developed for NAPL sampling with a bailer. If bailers are used, samples should be collected using a bottom valve attachment that allows for better control of the water during bottle filling.

Bailers will only be used as appropriate, at low yielding wells and wells with NAPL, as discussed in previous responses to comments. The bailers, if used, will have a bottom valve attachment to minimize aeration. Justification for the use of bailers will be included in SSWPs. The text has been modified.

Procedure(s) for sampling NAPL is provided in SOP SAS-08-07.

109. Appendix A, SOP SAS-08-04, Section 4.2: This section is very short on detail. The text should specify the need for instantaneous change in water level to start tests and the need for recording water levels through time on log scale. It should specify checking transducer accuracy by raising and lowering the transducer and comparing the change in water level from the transducer reading to the distance the transducer is raised or lowered. The transducer psi range should be made appropriate to the test (generally 0-5 or 0-10 psi will do), suggest that at least two tests be done per well for QA/QC,etc.

Section 4.2 is now Section 5.0 in SAS-08-04. The procedures for single well aquifer tests have been expanded and address the above comments.
Text detailing an accuracy check on the transducer has been added to Section 5.1 and 8.5.
Text referencing the transducer psi has been added to Section 5.2 and 8.7.
Duplication of slug tests has been added to Sections 5.0 and 5.3.

110. Appendix A, SOP SAS-08-04, Section 5.2: If it's necessary for a neighboring well to pump during the aquifer test, the pumping from the neighboring well should begin as soon as it is feasible before the aquifer test starts to minimize interference.

Section 5.2 is now Section 8.2 in SAS-08-04 and has been revised as suggested.

111. Appendix A, SOP SAS-08-04, Section 5.4: Pre-test water-level trends typically should not be projected for the duration of the test. The magnitude of water-level fluctuations due to changes barometric pressure will change through time and should be adjusted during the test based on the changes in the barometric pressure recorded during the test. Ideally, water levels should be measured in an appropriate well outside of the cone of depression before, during, and after pumping to determine background changes in water levels during the test and to establish correction factors for the wells within the cone of depression.

Section 5.4 is now Section 8.4 in SAS-08-04.

112. Appendix A, SOP SAS-08-04, Section 5.5: Step tests alone do not necessarily predict whether or not there will be drawdown in the near observation wells, let alone the far ones. The greater the amount of stress you can put on the aquifer, without overutilizing it, the more information you will usually get from the aquifer test. The function of the step test (in addition to recording well loss) is to determine the approximate MAXIMUM sustainable pumping rate for the well. This rate, rather than the minimum, typically should be at or slightly greater than the target pumping rate for the aquifer test.

Section 5.5 is now Section 8.5 in SAS-08-04 and has been revised to evaluate the maximum sustainable pumping rate.

113. Appendix A, SOP SAS-08-04, Section 6.1: Time intervals for manually measuring drawdown in ALL wells where a transducer is not available for measurement (due to malfunction, otherwise transducers should always be used for the measurements) should be AT LEAST every 6 seconds for the first 2 minutes, every 30 seconds from 2 to 10 minutes, every minute from 10 to 20 minutes, every 5 minutes from 20 to 100 minutes, every 10 minutes from 100 to 200 minutes, every 50 minutes to 1,000 minutes, and every 100 minutes thereafter. If you have a "background" well outside the cone of depression, consider getting water levels during the test on the same frequency as the observation wells (for ease of comparison and correction) or every 15 minutes.

Section 6.1 is now Section 8.6 in SAS-08-04 and has been revised as suggested for the earlier readings with increased frequency. Later reading frequency has been maintained at the same frequency as the monitoring wells and pumping well to maintain level collection consistency for the test.

114. Appendix A, SAS-08-04, Section 6.1, Page 9: Transducers should be placed into a few of the observation wells and used to collect pre-test water levels.

Section 6.1 is now Section 8.6 in SAS-08-04 and has been modified as suggested.

115. Appendix A, SAS-08-04, Section 10, Page 12 Data from the single well tests should be analyzed using the Bouwer and Rice (1976) method only if that is the appropriate method. An oscillatory (under damped) response should not be analyzed using the Bouwer and Rice (1976) method.

Section 10 is now Section 12.0 in SAS-08-04 and has been revised. As discussed in the response to Agency Comment #41 the appropriate method of calculation will be selected based on the responses observed.

116. Appendix A, SAS-08-05, Section 4.3.1, Page 3 Consider adding single well aquifer testing at regular intervals (every 5 years?) as part of the inspection plan to detect significant changes in hydraulic conductivity that would justify well maintenance or rehabilitation.

Single well aquifer testing has been added to text as an option for evaluating well integrity in Section 4.3.1 and 4.3.2.

117. Appendix A, SAS-08-05, Section 4.3.2, Page 3 Add the criterion that if well yield of sampled wells decreases significantly, well maintenance or rehabilitation is required.

Acknowledged; text has been modified.

118. Appendix A, SOP SAS-08-06, Section 4.2-We strongly advise against putting an etape down a water-supply well, the chances of getting it caught up in the wiring or pitless adaptor are fairly high. We'd recommend you use an unweighted steel tape with the little loop at the bottom taken off. You may lose a bit of accuracy on your water levels (probably less than 0.10 ft) but you'll save some headaches with trying to get your probes out of the well. In addition to deconning the tape, you'll need to put some chlorine pellets down the well when you're done with the measurement to sanitize the well.

The text has been modified to allow the use of an un-weighted steel tape to measure water levels. The use of chlorine pellets to sanitize the well after measurements are collected will be evaluated on a site-specific basis.

119. Appendix A, SOP SAS-08-06, Sections 4.3, 5.1, and 5.2: Most of the residential wells we've heard of USEPA sampling were purged for 15-30 minutes (not 10), had field parameters recorded every 5-10 minutes (not 2-3) to look for stabilization, and then had the sample collected. It's not essential to estimate purge volume, and we'd recommend pumping for at least 15 minutes prior to sample collection.

Acknowledged; text has been modified. Purge volume estimation is required when samples are not collected prior to in-line systems (e.g., pressure tank, water softener, iron filter).

120. Appendix A, SOP SAS-09-01, Section 5.1: In the third sentence of the first paragraph of this section, does the text mean to imply that vertical profiling of field parameters will be performed in impoundments? If so, this text should be written more clearly. Also, SOP should specify that vertical profiling will be performed during the summer.

The text has been modified.

121. Appendix A, SAS-09-01, Section 5.3.2 and Section 5.3.3, Pages 4 and 5 If preservation is required when sampling with an intermediate vessel or pump and tubing, use a pre-preserved sample container (or add the preservative before adding the sample).

The text has been modified.

122. Appendix A, SOP SAS-09-01, Section 5.4: Depth samples typically should be collected from within 6 inches of the streambed. Collecting deep samples". . .from below the top 12 inches of the water column. . ." is too vague.

Text has been modified.

123. Appendix A, SOP SAS-09-02: Many, if not all, of the Chicago sites are associated with large, deep rivers-at least too large and too deep to measure by wading. An SOP should be developed for flow measurements from bridges or using boats.

The SOP has been modified to allow measurements from water vessels (boats), or bridges.

124. Appendix B: No example is provided of a sediment sampling field form.

Example sediment sampling field forms have been included in Appendix B.

Comments on Minor Editing

125. Section 4.4.3, Water Level Elevation Readings, Page 21 There is a minor grammatical error in the second sentence. The sentence includes the conjunction "either" but lacks the coordinating "or."

Text has been revised.

126. Section 4.4.4.4, Groundwater Profiler, Page 22 There is a minor editing error in the second sentence. The phrase "completed prior to use to lithology" makes little sense. Perhaps some words have been omitted?

Yes, text has been revised.

127. Section 4.4.7.1, Purging, Page 30, First Bullet There are two minor editing errors in the second sentence-"manner" instead of "manor" and "of' instead if "if."

Text has been revised.

128. Section 4.4.7.2.2, Low Flow Sampling, Page 32, First Paragraph There is a minor editing error in the third sentence, "equilibrated" rather than "equilibrates."

Text has been revised.

129. Section 4.4.8, Potable Wells, Page 34 There is a minor editing error in the first sentence "exists" not "exits."

Text has been revised.

130. Section 4.5.2, Indirect Pore Water Samplers, Page 40 There is a minor editing error in the first line, "of' is omitted from "focus ongoing."

Text has been revised.

131. Section 4.6.1.1, Ecological Risk Assessment Samples, Page 41 There is a spelling error in the last sentence, "split" not "spilt."

Text has been revised.

132. Appendix A, SAS-Ol-01, Section 4.1, Page 2 There is a minor editing error in the last line, "the" instead of "will be."

Text has been revised.

133. Appendix A, SAS-05-05, Purpose: Replace "need" with "needed."

Text has been revised.

134. Appendix A, SAS-05-06, Section 6.0, Page 4 There is a minor editing error in the third bullet; text should read "Unified" not "Unifies."

Text has been revised.

135. Appendix A, SAS-05-07, Section 4.0, Page 2 There is a minor editing error in the second sentence; text should read "presence of' not "presence or.".

Text has been revised.

136. Appendix A, SAS-08-05, Section 4.3.1, Page 3 The first paragraph includes a reference to Section 4.3. This appears to be an error; was Section 4.4 intended?

Yes, text has been revised.

137. Appendix A, SAS-08-06, Section 5.1, Page 3 There is a minor editing error in the second sentence of the second paragraph; text should read "away" not "at way."

Text has been revised.

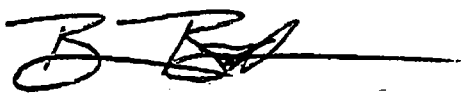
138. Appendix A, SAS-09-01, Section 5.3.2 and Section 5.3.3, Pages 4 and 5 Step 5 of both sections includes a reference to Section 3.3.1. This appears to be an error; was Section 5.3.1 intended?

Yes; text has been revised.

Please do not hesitate to contact Naren Prasad, the Project Coordinator for the Illinois Sites, at (312)240-4569 or myself if you have any questions regarding these documents.

Sincerely,

INTEGRYS BUSINESS SUPPORT, LLC.



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