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April 29, 2009

Mr. James M. DiLorenzo  
Remedial Project Manager  
United States Environmental Protection Agency  
Office of Site Remediation and Restoration  
1 Congress Street, Suite 1100 (HBO)  
Boston, Massachusetts, 02114-2023

Subject: April 30, 2009 Response to EPA Letter dated March 12, 2009  
*Disapproval and Notice of Deficiencies, Draft Project Operations Plan,  
Olin Chemical Superfund Site, Wilmington, Mass*

Dear Mr. DiLorenzo:

Enclosed please find Olin's response to the USEPA letter titled *Disapproval and Notice of Deficiencies, Draft Project Operations Plan, Olin Chemical Superfund Site, Wilmington, Mass*, and dated March 12, 2009. The enclosed response to comment letter has been submitted within the time specified in the March 12, 2009 EPA letter. The response to comment letter identifies the manner in which the Revised Remedial Investigation / Feasibility Study (RI/FS) Work Plan addresses how each of the six deficiencies identified in the USEPA letter have been cured. In addition responses have been provided to all comments contained in the USEPA letter, some of which Olin had not had an opportunity to respond to previously.

A copy of this cover letter and the response to comment letter has been included with each copy of the revised RI/FS Work Plan. An electronic copy of this letter and the enclosure has been mailed to you separately.

If you have any questions concerning this deliverable, please do not hesitate to contact Steve Morrow at 423-336-4511.

Sincerely,

  
Steve Morrow  
Principal Environmental Specialist

Cc File  
P. Thompson, MACTEC (1)  
Joseph Coyne, MADEP

**RESPONSE TO USEPA DEFICIENCIES AND COMMENTS ON THE  
DRAFT PROJECTS OPERATIONS PLAN  
DATED MARCH 12, 2009  
OLIN CHEMICAL SUPERFUND SITE; WILMINGTON, MA**

***DEFICIENCIES***

- 1. The POP as submitted, and as supplemented by Olin's January 30<sup>th</sup> response, is deficient in that it does not include the non-POP components as specified in Section 3.0 of the RI/FS SOW.**

In the November 17<sup>th</sup> comment letter, EPA noted the submitted document was not titled "work plan." More than semantics, EPA explained that the POP did not contain the required components of Section 3.0 of the RI/FS SOW. Although not specified as deficiencies, EPA cited several objectives of the field investigation from Section 3.0 as examples. These media specific objectives require the proposal of field and data evaluation activities beyond sample collection. In Olin's January 30<sup>th</sup> response, it is explained that Olin intends to provide the non-POP components of the RI/FS Work Plan. However, portion "c" of this response indicates that, "It is premature to identify what receptors, exposure pathways, or exposure areas would be evaluated (although some preliminary approaches could be discussed)." Section 3.0 of the RI/FS SOW clearly states the primary objective of the RI, "At its onset, the goal of the Remedial Investigation shall be to supplement the usable existing field data and studies summarized in the Focused RI Report, and collect all new field data which can reasonably be assumed to be necessary to complete a Remedial Investigation (RI), Feasibility Study (FS) and Baseline Risk Assessment for each OU, and which will be sufficient to select a remedy for each OU." To achieve this objective, the RI/FS Work Plan must identify receptors, exposure pathways, or exposure areas to ensure adequate data collection. EPA understands and expects that these receptors, pathways and areas are preliminary and may change as the RI proceeds. The cure requires that the revised RI/FS Work Plan include a description of all the data evaluation activities proposed to address the objectives contained in Section 3.0 of the RI/FS SOW.

**Proposed Cure:**

The revised RI/FS Work Plan will contain an additional volume titled Volume I Project Overview which includes preliminary identification of receptors, exposure pathways, and exposure areas to guide data collection activities (Tables 2.0-1 and 2.0-2) and discusses how the proposed RI investigations and data collection will address the objectives identified in Section 3.0 of the SOW (Table 3.1-1). Volume I will also include discussions of data gaps/data needs (Section 4.0), procedures and processes for RI/FS Work Plan implementation and modifications (Section 5.0), project deliverables (Section 6.0), the refinement of Applicable or Relevant and Appropriate Requirements (ARARs) (Section 7.0), and an expanded project schedule (Section 8.0). Olin provided the proposed outline for this volume for the conference call held on April 15, 2009. This volume will replace the supplemental information volume in the original Draft POP submittal.

- 2. The POP as submitted, and as supplemented by Olin's January 30<sup>th</sup> response, is deficient in that it does not propose a field sampling and site characterization program for soils located beneath the temporary cap as is necessary to satisfy the objectives as described in Section 3.0, Sub-Section IV.B of the RI/FS SOW.**

In the November 17<sup>th</sup> comment letter, EPA requested that soil samples be collected from beneath the temporary cap within the footprint of the slurry wall area. This is necessary since the temporary cap does not provide a permanent barrier to potential direct contact. Olin's response is that data collection is not necessary since a permanent cap is planned. EPA considers this response to be insufficient. There is no commitment in the existing AOC for the installation of a permanent cap. As such, there is no schedule or timeline for the installation of a permanent cap. It is also unclear to EPA if Olin possess' the geotechnical information necessary to install a permanent cap. This presents a real scenario where the existing tarp, already aged and weakened despite Olin's best efforts at maintenance, could quickly fall into disrepair resulting in a direct contact pathway for exposure to uncharacterized, yet presumable contaminated surface soils. Additionally, while EPA plans to consider the incorporation of the existing slurry wall and cap area into the final remedy, there is no presumptive remedy under CERCLA providing for an engineered cap. It also seems that chemical and physical soil data are needed to effectively evaluate and design various capping technologies. Therefore, EPA continues to request that surface and subsurface soils beneath the cap be sufficiently characterized to adequately evaluate potential risks and to provide the data necessary to make a final remedial determination. EPA has proposed a scope for characterization of soil within exposure area in Attachment #1. Alternatively, EPA may consider the placement of a final engineered cap as a Non-Time Critical Removal Action. Olin may propose that a permanent RCRA cap (or equivalent) be designed and installed within a reasonable time frame (this alternative approach may require amendment to the consent order.) The cure requires that the revised RI/FS Work Plan include a proposal for characterization of soils within the footprint beneath the temporary cap. Alternatively, Olin may propose the design and installation of a permanent cap for EPA's consideration.

#### **Proposed Cure:**

USEPA and Olin held a meeting (March 17, 2009) and a conference call (April 15, 2009) to discuss the scope of proposed OU1 investigation activities. Pursuant to these discussions, a scope of those activities has been established that includes the sampling of surface soils at 10 locations from beneath the Temporary Cap. The locations have been identified and reviewed with USEPA. These locations will be identified on Figure 4.1-1 in the revised FSP.

- 3. The POP as submitted, and as supplemented by Olin's January 30<sup>th</sup> response, is deficient in that it does not propose a sufficient field sampling program for surface and sub-surface soils to satisfy the objectives as described in Section 3.0, Sub-Section IV.B of the RI/FS SOW.**

In the November 17<sup>th</sup> comment letter, EPA requested that all contaminants on the target analyte list be analyzed at a representative number of soil samples. Olin responded with an approach that is focused on site features and locations where releases were most likely to have occurred. While EPA agrees that it is not necessary or appropriate to evaluate samples for all target analytes at all sample locations, EPA does not agree that an expanded list of analytes should be limited only to previously identified source areas. Spatial coverage for an expanded list of analytes, including specialty compounds, is required. Also, a majority of the existing surface soil samples were collected from 0 to 3 feet and do not represent surface soil conditions, but may be used to represent sub-surface soil. Proposed samples may be collected from 0 to 1 foot but no deeper (this is a departure from the 0 to 6 inch requirement contained in the RI/FS SOW). Subsurface soil samples are only proposed to a depth

often feet. While ten feet is adequate to evaluate potential human health risks, it is not adequate to assess the nature and extent of contamination in deeper soils. The cure requires that the revised RI/FS Work Plan include a sufficient number of samples between 1 to 10 feet, and a sufficient number of samples below 10 feet, and a sufficient number of analysis for an expanded list of analytes, to satisfy the objectives outlined in Section 3.0, Sub-Section IV.B of the RI/FS SOW.

**Proposed Cure:**

USEPA and Olin held a meeting (March 17, 2009) and a conference call (April 15, 2009) to discuss the scope of proposed OU1 investigation activities. Pursuant to these discussions, a scope of those activities has been established that includes the sampling of surface soils and subsurface soils within OU1. The revised FSP will propose the sampling and analytical program that was provided to USEPA for the April 15, 2009, call and subsequent communications in Sections 4.1 and 4.2.

**4. The POP as submitted, and as supplemented by Olin's January 30<sup>th</sup> response, is deficient in that it does not propose a sufficient field sampling program for surface water and sediment to satisfy the objectives as described in Section 3.0, Sub-Section IV.E of the RI/FS SOW.**

In the November 17<sup>th</sup> comment letter, EPA noted that the age of the existing surface water and sediment sample sets raise concern over representativeness of the data. EPA requested additional surface water and sediment samples not only to confirm previous results, but also in areas not previously sampled or proposed to be sampled. Olin proposed that a comparison of new data to existing data be allowed to determine if existing data are representative of current conditions. However, no details are provided on how such comparisons would be performed. Also, while EPA agrees that it is not necessary or appropriate to evaluate samples for all target analytes at all sample locations, EPA does not agree that an expanded list of analytes should be limited only to previously identified source areas. Spatial coverage for an expanded list of analytes, including specialty compounds, is required in a representative number of sediment and surface water samples. The cure requires that the revised RI/FS Work Plan include a sufficient number of samples, and a representative number of samples with analysis for an expanded list of analytes, to satisfy the objectives outlined in Section 3.0, Sub-Section IV.E of the RI/FS SOW. The cure should also propose a method for data comparison.

**Proposed Cure:**

USEPA and Olin held a meeting (March 17, 2009) and a conference call (April 15, 2009) to discuss the scope of the proposed surface water and sediment investigation activities. Pursuant to these discussions a scope of those activities has been established that includes the sampling of additional surface water and sediment locations within OU1 and OU2. The revised FSP will propose the sampling and analytical program that was provided to USEPA for the April 15, 2009, call in Sections 4.4, 4.5, 5.1, and 5.2. That proposed program will include the collection of four additional samples in MMB and Sawmill Brook surface water as requested in comment Number 2 for OU2 in the memorandum dated April 17, 2009.

**5. The POP as submitted, and as supplemented by Olin's January 30th response, is deficient in that it does not propose a sufficient field sampling program for the bedrock aquifer to satisfy the objectives as described in Section 3.0, Sub-Section IV.C of the RI/FS SOW.**

In the November 17<sup>th</sup> comment letter, EPA noted that a clearly articulated program for determining the nature and extent of contamination in the bedrock was not included in the POP. Olin proposes through their written response to install two additional bedrock wells in an area just south of the currently defined plume adjacent to the Cook Avenue area. Olin then proposes the geophysical logging of these wells with a suite of instruments. While EPA concurs with these activities, the bedrock program as proposed is not sufficient to address the full list of objectives identified in the RI/FS SOW. Specifically, there is no program proposed to evaluate the condition of bedrock beneath the known DAPL pools. Concerns voiced by Olin regarding possible cross contamination as a result of drilling through the known DAPL pools can be addressed using appropriate well installation techniques. Further, the work plan does not propose any activities to confirm that the extent of DAPL is accurate. Also, despite repeated requests by EPA, no wells are proposed in the area of the slurry wall to adequately monitor the bedrock/slurry wall interface for leakage. The POP should also acknowledge that the cessation of pumping from the Maple Meadow Brook aquifer and the installation of the slurry wall have impacted groundwater gradients, and that the existing data set was largely compiled based on conditions which may no longer be representative. The cure requires that the revised RI/FS Work Plan include a bedrock program that is sufficient to address the full list of objectives identified in Section 3.0, Sub-Section IYC, of the RI/FS SOW. The cure should also acknowledge that the cessation of pumping from Maple Meadow Brook and the installation of the slurry wall have impacted groundwater gradient, and propose a program to determine current groundwater gradients, including interaction between the overburden and bedrock aquifer, and interaction between groundwater and regional surface water bodies.

**Proposed Cure:**

USEPA and Olin held a meeting (March 17, 2009) and a conference call (April 15, 2009) to discuss the scope of proposed OU3 investigation activities. Pursuant to these discussions, a scope of those activities has been established that includes the installation of additional bedrock and overburden well locations and the acquisition of additional seismic refraction profiles. The revised FSP will propose these additional wells and investigation activities to the OU3 program that was provided to USEPA for the April 15, 2009 call in Section 6.0 OU3 Investigation. That proposed program will include the requested changes provided by EPA in the Nobis Engineering comments Number 1 and 2 for OU3 in the memorandum dated April 17, 2009. There are no comments pertaining to OU3 in the April 20, 2009, memorandum. Olin is proposing a new deep well (GW-65BRD) immediately down gradient of impacted deep overburden groundwater within the MMBA in lieu of wells identified in comment Number 3 under OU3 in the memorandum dated April 17, 2009. It would be Olin's intention to collect and evaluate data from this well to aid in assessing the need for additional bedrock investigations in the MMBA.

**6. The POP as submitted, and as supplemented by Olin's January 30<sup>th</sup> response, is deficient in that it does not include a plan for air monitoring during certain site activities as required in Sections 2.0 and Section 3.0, Sub-Section IV.D of the RI/FS SOW.**

In the November 17<sup>th</sup> comment letter, EPA noted that the POP did not include a Field Sampling Plan (FSP) for the air quality assessment to be implemented during the RI. Olin responded that air monitoring had been performed during drum removal and test pit excavation activities which Olin considered to represent a worst case scenario and that elevated VOCs were not detected. These tests were performed at specific locations and do not negate the requirement for Olin to monitor air quality

as required by the RI/FS SOW during intrusive activities that could potentially release VOCs or particles into the atmosphere. Olin's response to comments also acknowledged the absence of a proposal for assessment of the vapor intrusion pathway in the POP, and intends to provide such a proposal in the revised RI/FS Work Plan. The cure requires that the revised RI/FS Work Plan discuss the previous air quality assessments, and contain a proposal for screening and monitoring of air quality as part of the FSP.

### **Proposed Cure:**

The revised RI/FS Work Plan discusses previous air quality assessments in OU1 (Section 4.5 in the FSP). Screening VOCs for health and safety purposes during invasive activities (soil borings and soil sampling) will be completed under the HASP (Section 4.5.2 in the FSP).

Section 4.5 of the revised FSP describes the process for evaluating the vapor intrusion pathway which will involve collection of groundwater VOC and SVOC data from water tables wells at appropriate locations. The following technical approach, more fully described in Section 4.5 of the FSP, will be implemented to investigate the potential vapor intrusion pathway for the Site (both on-Property and off-Property) and to generate the analytical data and other information necessary to include the vapor intrusion pathway into the Baseline Human Health Risk Assessment, if the pathway is determined to be potentially significant during the investigation. The approach described below is a step-wise approach that may include one or more of the following tiers of investigation/evaluation.

- Tier 1 – Primary Screening – *determine if the pathway needs to proceed to Tier 2 (sufficiently volatile and toxic compounds are present in the subsurface and inhabited buildings are currently present, or could be expected to be present in the future, near volatiles in the subsurface).*
- Tier 2 – Secondary Screening – *for specific locations, determine if the vapor intrusion pathway is considered complete or incomplete (based on evaluation of groundwater and soil data).*
- Tier 3 – Site-Specific Pathway Assessment – *if Tier 2 concludes it is necessary, collect and evaluate indoor air samples and also characterize background/ambient air quality.*

### **COMMENTS**

#### **Draft Project Operations Plan January 30, 2009 Response**

1. Revised draft Work Plan – Olin states their plans to include requested items in their "revised draft work plan." This includes such items as reorganizing the work plan, including goals and objectives of the RI/FS, identification of data needs, plans for modifications of the work plan based on findings during field work, outline and format of the RI, and outline and format of the FS, content and format of risk assessment interim deliverables, citation of guidance's to be followed during the risk assessments, and identification of what data is suitable for use in risk assessments, etc. EPA acknowledges the pending inclusion of these omissions, the scope of which should be consistent with EPA comments as previously submitted and contained herein.

**Response:** *Olin has provided a proposed outline to USEPA on April 15, 2009, for Volume I of the revised RI/FW Work Plan that contains the requested items. Volume I has been prepared consistent with that outline.*

2. General Issues, Olin response number 4 –

- a) It is stated "the October 2008 Draft RI/FS Work Plan has built upon the October 2007 Draft Focused RI and it has carried forward the position, stated in the Draft Focused RI, that the historical data were suitable for delineation of nature and extent and for conducting risk assessments". EPA disagrees with this statement in that portions of the historical data, across all affected media, are no longer representative of current conditions as explained in the subsequent comments below.
- b) While Olin has developed a grid system for OUI, Olin has not applied the grid system in any way to determine if the historical and proposed data are sufficient for the OUI remedial investigation. Given the diverse activities that occurred on the property over several decades, and considering the amount of material that was moved around on the parcel over the years during operation and subsequent removal activities, and as observed on various historical photographs, it is reasonable to expect that contamination has spread to areas of the property not previously studied by Olin under the MCP. In lieu of sampling on a grid system, EPA has proposed 9 exposure areas within the former boundaries of the property. These areas are based on past Site activities. See Operable Units (OU) #1 comment below for further discussion of proposed exposure areas. Application of the EPA proposed exposure areas or a grid system to the Site characterization strategy will ensure site-wide coverage to identify nature and extent.
- c) Numerous figures and associated data tables were provided by Olin in response to this question. Significant time was spent by EPA to evaluate the material point by point (e.g., at specific sample and well points, what was actually sampled for (not just detected). Many of the samples were of limited use quantitatively (may be used qualitatively in the future) based on depth, location, or limited chemicals analyzed as the objective of the various sample collections were different than a site-wide nature and extent evaluation (most were for specific MCP removal actions). EPA is providing Attachments #1A and 1B which proposed additional surface and subsurface sampling (by Exposure Area), Attachment #2 for sediment and surface water samples, and provided comments under OU #3 for groundwater. The proposed exposure areas were used to review the useable historic data and Olin's proposed samples, and provide the suggested number of new Site-wide samples shown on Attachments #1A and 1B for surface and subsurface soils, and Attachment #2 for sediments and surface water.
- d) Proposed soil samples in the operational area and beneath the temporary cap should be collected from a minimum of three depth intervals as follows:
  - i. 0-1 foot for evaluating surface soils,
  - ii. 1-10 feet for evaluating risks from exposures to subsurface soil,
  - iii. Below 10 feet to the top of rock for evaluating the nature and extent of contamination. Sample interval should not be greater than two feet and should be selected based on field observations such as, PID readings, olfactory and visual staining.

While EPA generally considers soil deeper than 1 foot to not be representative of surface conditions, EPA has agreed to allow the use 0-2 foot historic soil data as representative of current conditions.

Olin has not provided historic soil data collected from below 10 feet to the top of bedrock in the POP or subsequent response to comments, therefore EPA has not reviewed any such data for adequacy for the nature and extent evaluation. Olin should amend the subsurface site

characterization program to include soils deeper than 10 feet, by exposure area, and reference usable historic sub-surface soil data within this depth interval to the extent available.

**Response:**

- a) through d). Subsequent to the March 17, 2009, during the April 15, 2009, conference call between Olin and USEPA, Olin presented a proposed sampling and analytical program for OUI that incorporated sample locations previously identified by USEPA for exposure areas A, B, C and D. Olin has incorporated this program into Section 4.0 of the FSP for OUI. Olin will collect a sample from 0-1 feet for surface soils and from 1-10 feet for subsurface soil. Samples collected greater than 10 feet will be extracted and held for later analysis based on results of the 1-10 foot sample. The 1-10 foot sample result will be screened against Region III Industrial RBCs and groundwater protection screening levels. If these values are exceeded by an analyte (e.g. hydrazine), or an analyte within an analyte group (e.g., benzene in the VOCs), the deeper sample will be analyzed for that analyte or analyte group. Additionally, if an analyte does not currently have a Region III Industrial RBC or groundwater protection screening level and is detected in the sample taken from the 1-10 ft zone, the sample taken from deeper than 10 feet will be analyzed for that analyte. A minimum of six deep soil samples will be analyzed, with a preference towards areas near the former unlined impoundments in the productions areas.

3. Historical Figure (Attachment B) – please add:

- a) the drum storage areas between the bunker buildings and
- b) the drum storage area between Plant D and the warehouses.

These drum storage areas were evident in 1967 aerial photos and are not included in the revised historical features figure.

**Response:** *Although there does appear to be materials staged in these two areas on the 1967 aerial photographs, the plant drum storage area has been identified on the photograph. The area adjacent to the bunker buildings was utilized for finished product staging and loading. Additionally, at the time of the photograph, Plant D was under construction, and the materials seen are likely related to construction activities. Therefore, the only known drum staging area for the plant has been labeled. Soil sampling is proposed for both areas to investigate possible contamination (Section 4.1 and 4.2 of the FSP).*

4. Air Monitoring– Please include air screening and monitoring during intrusive RI field activities (revise HASP and QAPP as well).

**Response:** *Air monitoring of the work environment will be undertaken during soil sampling activities to ensure that the PPE and engineering controls utilized at the Site are sufficient to ensure worker safety. At a minimum, this monitoring will include evaluations for hazardous concentrations of airborne VOCs. When drilling indoors, the level of carbon monoxide and oxygen will be monitored continuously.*

*The Field Sampling Plan includes a section for air monitoring (Section 4.5) which incorporates the Health and Safety Plan information on air monitoring (Section 4.5.2).*

5. Data Results – It is expected that data results for contaminants evaluated under multiple chemical analysis methods for the same sample will be compared and the results with the lower detection limits will be preferentially used in the RI quantitative evaluations.

**Response:** *The higher detected concentration for contaminants evaluated under multiple chemical analyses will be used in the RI quantitative evaluations. If all analytical methods yield non-detect concentrations, the lower detection limit will be preferentially used in the RI quantitative evaluations.*

6. Chromium – EPA has reviewed the discussion of hexavalent chromium versus total chromium results site-wide. EPA is concerned that Site-wide (OU 1) soil samples with high total chromium have not been analyzed for hexavalent chromium outside the Lake Poly Area. At Lake Poly, pH and oxidation-reduction conditions favor Chromium III. Further analysis of hexavalent chromium is needed in soils from other areas of the site where such conditions may not persist.

Note that in the FRI, there are samples from the north pond and MMB wetland that do compare hexavalent and total chromium. See Attachment 1A and 1B for proposed sampling locations.

**Response:** *Additional analyses for hexavalent chromium have been added to the sampling plan based on Attachments 1A and 1B, as provided by the USEPA. The proposed sampling and analytical program was presented to USEPA on April 15, 2009 (Section 4.0 in the FSP).*

7. RI Analyte List (Table 3.1-1) modifications:

- a) Table 3.1-1 lists 2,2,4-trimethyl pentenes, rather than 2,4,4-trimethyl pentenes. Please correct this typographical error.
- b) The revised Table 3.1-1 appears to exclude the following agreed RI analytes:
- hexanone,
  - methyl ethyl ketone, and
  - methyl isobutyl ketone.

Please return these contaminants to the RI Analyte list.

- c) In addition, the following chemicals need to be added to the list based on review of data provided in the Jan 2009 responses to comments and/or the FSP, these have been previously detected in Site soils or groundwater:
- Acetaldehyde – detected in groundwater,
  - benzoic acid – detected in groundwater and soil, and
  - benzyl alcohol – detected in groundwater.

- d) In addition, the following chemicals need to be added to the list as based on review of data provided in the Jan 2009 responses to comments and/or the FSP, these were reportedly used or produced on-site:
- benzonitrile,
  - hexamethylene tetraamine,
  - diphenyl oxide,
  - dinonyl phenol,
  - 2-ethyl hexoic acid, and
  - trimethylamine.

**Response:**

- a.) *The typographical error will be corrected.*
- b.) *Hexanone is included on Table 3.1-1 of the FSP as 2-hexanone (591-78-6). Methyl ethyl ketone is included on Table 3.1-1 as 2-Butanone (MEK) (78-93-3), and methyl isobutyl ketone is included on Table 3.1-1 as 4-Methyl-2-pentanone (MIBK) (108-10-1). Since these compounds are already included on the list, no addition is required.*
- c.) *Acetaldehyde, benzoic acid, and benzyl alcohol have been added to the RI Analyte List (Table 3.1-1 of the FSP).*
- d.) *Diphenyl oxide, otherwise known as diphenyl ether, and will be added and analyzed by Method 8270. Analytical methods are not available for benzonitrile, hexamethylene tetraamine, dinonyl phenol, 2-ethyl hexoic acid and trimethylamine, and those analytes will not be added to the RI Analyte List (Table 3.1-1 of the FSP). The absence of analytical methods for this analyte will be discussed as an uncertainty in the baseline risk assessment.*

8. Human Health Risk Assessment –

- a) Olin's sample human health risk assessment (HHRA) tables (Attachment A to RTCs) are not in standard RAGS D format. Beyond format, the provided samples differ from RAGS D tables in that they lack an overall presentation of media, exposure points, receptors, and exposure routes considered similar to RAGS D Table 1, screening toxicity values with their source on the COPC screening table similar to RAGS D Table 2, and a presentation of central tendency exposure (CTE) assumptions or sources of CTE assumptions, similar to RAGS D Table 4. Olin needs to follow RAGS D format for the HHRA. The revised work plan only needs to confirm that the "HHRA tables will be presented in RAGS D format" – examples are not needed. In addition to RAGS D tables, supporting information will be needed including a listing of the samples within each dataset with collection dates and input source files for ProUCL.
- b) Olin has expressed a desire to exclude background concentrations from the risk calculations. Following EPA's Guidance for Comparing Background and Chemical Concentrations in Soil for CERCLA Sites, EPA 540-R-01-003. OSWER 9285.7-41. September 2002, background cannot be used to screen out Contaminants of Potential Concern (COPCs) from risk calculations. If Olin wishes to calculate risks both with and without background contaminants for discussion purposes, this is acceptable.

Olin has provided background concentration data as an attachment to the Response to Comments. A review of the attachment indicates that background sediment and surface water data were

collected in 1996, and therefore, may no longer be representative of current background conditions (e.g., MMB area is now considerably more flooded than when the "background" samples were collected and are no longer representative of the area. This may be due to the shut-off of town wells and maybe we are seeing groundwater welling up in the wetland bringing contaminants to the area – thus MMB locations may no longer be background).

A seemingly high "background" value of 897 mg/kg is presented in the FRI and in Attachment D of the RTCs for ammonia in sediments. This value is presented in Table D-3 and is the result of sample BS012REF, collected on January 20 1997. The location or sample ID of this background sample is not shown on the figure of background sediment locations (Figure D-3). It is important to note that this is the only background sediment sample analyzed for ammonia. Similarly high soil concentrations up to 690 mg/kg also collected in January 1997 are included in the soil background samples BS021REF.

- c) A preliminary approach for receptors, exposure pathways, and exposure areas does need to be discussed in the work plan. EPA has analyzed the adequacy of sampling plans assuming future commercial/industrial Site use, including indoor air, soil, sediment, and surface water exposures in the operational area, in the cap area, and Exposure Area B. In addition, recreational user exposures to soil, sediment, and surface water were assumed in Exposure Area C (the conservation area). Other receptors, in addition to commercial/industrial and recreational receptors, such as current trespassers, future construction workers and future consumption of groundwater, are anticipated for the HHRA.
- d) Since groundwater on-site is hydraulically connected to the former town drinking water aquifer and area private drinking water wells and new wells could be installed at nearby off-site properties, both bedrock and overburden groundwater results from on-site ground water monitoring wells are expected to be evaluated quantitatively for drinking water/household water use in the OU#3 HHRA.
- e) Shallow groundwater data from on-site and off-site monitoring wells will be used to screen for potential vapor intrusion into current and future indoor air spaces following EPA's 2002 Vapor Intrusion Guidance. Such information is needed at all locations overlying the groundwater plume, with the exception of wetland areas and the conservation area. Because construction in wetland areas and the conservation area is prohibited, EPA concurs that wells within wetland areas and the conservation area need not be screened for potential vapor intrusion.
- f) Although based on residential exposures, the EPA's 2002 Vapor Intrusion Guidance Table 2c values should be used for the initial screening of potential vapor intrusion concerns throughout the Site.
- g) EPA's 2002 Vapor Intrusion Guidance Table 2c values based on MCLs are not adequate for screening certain volatiles for potential vapor intrusion concerns. Vapor intrusion risk based values have been developed and are available from EPA Region I for chemicals with Vapor Intrusion Guidance Table 2c values based on MCLs. (EPA, 2002)

**Response:**

- a.) *The HHRA tables will be presented in the RAGS D format. Supporting information including data sample lists and Pro UCL input files will be provided as a part of the BHHRA.*
- b.) *Background data sets for surface water and sediment will be recollected.*

*As indicated on Table D-3 of the January 30, 2009 Response to Comments Letter (which lists the COC Sample ID and the Location ID for the background sediment samples), BS012REF is the*

*COC Sample ID for location SDREF-12, which is shown on Figure D-3 of the Response to Comments Letter.*

- c.) The preliminary discussion of receptors and exposure pathways is included in the CSM presented as part of the RI/FS Work Plan (Table 2.0-1 of Volume I and Figure 2.2-1 of the FSP). Potential human health receptors include: a community resident, resident, worker, trespasser, industrial worker, and construction worker.*
- d.) It has not been determined that on-site groundwater, which is within the Aberjona watershed, is hydraulically connected to groundwater within the MMBA, which is within the Ipswich watershed. Olin will work with USEPA during development of the HHRA for OU3 to develop an appropriate evaluation of on-site groundwater. The on-site groundwater is within a well established, industrially zoned setting, and reasonable, foreseeable future use and exposure to that groundwater should be considered in the HHRA.*
- e.) As discussed in previous comment responses, information regarding the approach to evaluate vapor intrusion will be added to Section 4.5 of the FSP.*
- f.) The values from EPA's 2002 Vapor Intrusion Guidance Table 2c will be used as an initial screening of potential vapor intrusion concerns.*
- g.) Values in EPA's 2002 Vapor Intrusion Guidance Table 2c which are based on MCLs will not be used.*

9. Ecological Risk Assessment –

- a) EPA has raised concern regarding the age of many of the surface water and sediment data (both site-specific and background) which Olin proposes to use quantitatively in the Baseline Risk Assessments. Many of the existing surface water and sediment data points that Olin suggests are useable in the risk assessments are more than 9 years old, and there have been many environmental changes in the interim that could substantially impact the results of those analyses: storm events, off-site land use activities, flow patterns as a result of the cessation of pumping in the MMB area in 2003, the physical on-site changes in the South Ditch area associated with construction of the slurry wall in 2001 etc. While EPA is not aware of any guidance which specifies the appropriate age of media specific data that can be quantitatively used in a baseline risk assessment, it is obvious that more recent data is preferred for surface water and sediment analyses because they both are relatively mobile media. Therefore, EPA's preliminary comment stated that surface water and sediment data must be no older than two years for use in the risk assessment. Olin disagreed with sharp commentary. However, Olin did offer a constructive suggestion that newer data be collected and compared to historic data. If such comparative analysis indicates reasonable correlation, then existing data may be considered as representative. If poor correlation is apparent, then additional data shall be collected and historic data will be used in a qualitative manner only. The application of this approach would apply to both locations being evaluated in OUI, OU2, and background locations. Based on surface water and sediment chemical results presented in Attachment D, previously used background locations appear suitable for use in the risk assessments with the exception of background sediment sample location BS012REF, which had elevated concentrations of several constituents. If Olin plans to use this historical background surface water and sediment data (collected primarily in 1996) and "representative" analysis demonstration (as previously suggested) will need to be performed.

EPA has proposed additional surface water and sediments sampling locations (see Attachment 2) that are needed to supplement historical data and new data proposed by Olin in the field sampling plan.

- b) Olin's ecological risk assessment tables (A-11 to A-30) appear to be reasonable templates for the types of information presented. EPA assumes specific information used to populate these tables (e.g., exposure assumptions, benchmarks values, TRVs etc.) will be provided in subsequent submissions prior to the initiation of the ERA development.
- c) It is essential that Olin revise the draft ecological conceptual site model (CSM) prior to the initiation of field work so that potential data gaps can be determined. EPA has attached an example of a potential ecological CSM for the terrestrial ecosystem.
- d) The earthworm bioaccumulation and toxicity tests and the Frog Embryo Teratogenesis Assay *Xenopus* (FETAX) conducted in 2005 and included in Attachment F, appear to have followed standard ASTM protocols and are appropriate for inclusion in the BERA.
- e) EPA requests that Olin conduct a 42-day sediment toxicity test for the amphipod *Hyalella azteca*, that evaluates the following endpoints: growth, survival and reproduction. This test should be conducted using sediments from South Ditch collected from a location where screening-level hazard quotients indicate the greatest likelihood of adverse ecological effects ("worst-case location"). Existing sediment data (with a preference for data collected after installation of the slurry wall and newly proposed sediment locations in South Ditch should be used to identify the "worst-case location". The basis for longer duration sediment toxicity testing is that EPA and MADEP have found that toxic effects are often found in tests beyond 14-day duration (Ingersoll et al, *Prediction of sediment toxicity using consensus-based freshwater sediment quality guidelines*. EPA 905/R-00/007. June 2000.). Currently, the only useable toxicity information for the South Ditch is the 96-hr FETAX test that was conducted using samples collected in the lower South Ditch wetlands in 2005.
- f) At this time, EPA is not requesting other additional biota collection or toxicity testing; however, since the ecological risk assessment process as outlined in EPA's *Ecological Risk Assessment Guidance for Superfund* (EPA 1997) acknowledges the dynamic nature of the ERA process, EPA reserves the right to request this type of information based on data collected for the RI/FS.

**Response:**

- a) *Olin will conduct the OUI and OU2 sampling and analysis program presented to USEPA on April 15, 2009. That program will include two rounds of surface water sampling conducted at high and low flow conditions (e.g., spring and late summer/early fall). The sample program will include the additional locations requested in South Ditch and the MMB wetland. Olin will also resample surface water and sediment background locations. Section 5.3 of Volume I of the revised RI/FS Work Plan discusses the general approach to the statistical evaluation and comparison of the newly collected data OUI/OU2 surface water and sediment data to historical data and combined use of that data, if appropriate.*
- b) *Information will be provided in the interim deliverable as outlined in Section 6.3 in Volume I of the Work Plan.*
- c) *The CSM will be revised and included as part of the Work Plan (Table 2.0-2 and Figures 6.3-1 and 6.3-2 in Volume I).*
- d) *Comment noted.*
- e) *Comment noted.*
- f) *Comment noted.*

## Operable Unit One – On Site Soil, Sediment, Surface Water and Vapor

### COMMENTS

#### 1. Human Health Risk Assessment

- a) Focused approach – Olin's focused approach implies an assumption that contaminants are limited to localized areas of the Site. While it is reasonable to assume that contaminants may be concentrated in areas of known activity (i.e., – former tank farms or lagoons), experience shows that the extent of contamination often extends well beyond localized source areas. Historic photographs display what appear to be impacted areas, and the former facility layout also suggests possible source areas which have not yet been investigated such as underground pipes and leach fields. EPA concludes that the potential exists for multi-media contamination beyond the known source areas studied under the MCP. Therefore, Olin's approach as proposed appears to limit rather than focus sample location and analyses as it applies to on-property soils within the operational area and is not sufficient to evaluate the full nature and extent of contamination. EPA's approach to RI sampling for OU1 assumes that site-related contaminants may be present throughout the property. However, the density of samples and extent of target analytical compound analysis is focused on suspected source areas with enough overall Site coverage to evaluate each exposure area.
- b) Exposure areas – In preliminary comments, EPA proposed 12 exposure areas for OU1. In Olin's response to comments, 3 exposure areas are assumed for on-site soils:
- A=the former facility operations area,
  - B=the temporary cap area on the northeast side of south ditch, and
  - C=the conservation land south of south ditch.

EPA accepts Olin exposure areas B and C with the exception that soils near the south ditch which should be evaluated as a potential hot spot. The MADEP approach to hot spot analysis is acceptable to EPA.

However, consistent with EPA's preliminary comment, Olin's Exposure Area A needs to be subdivided. When treating nearly the entire former operations area (approximately 20 acres) as one exposure area, there is the potential for areas high in a particular group of contaminants to be masked or diluted by less contaminated areas or by areas with a different set of contaminants. That could underestimate the potential risks, which is not acceptable. For the purpose of planning and assuring sample adequacy both for risk assessment and for nature and extent concerns, EPA strongly recommends the proposed exposure areas for the former operational area as the baseline assumption. Adjustments to the proposed exposure areas may be made once the field data are collected and reviewed. For example, if contaminants are unevenly distributed across the Site, additional smaller exposure areas may be required for the Human Health risk assessment. Likewise, if contaminants are shown to be evenly distributed across broad areas or are not detected, then combining exposure areas may be appropriate.

EPA has evaluated adequacy of Olin's sampling plans considering EPA proposed exposure areas discussed during the November 20, 2008 meeting, which were based on historical Site usage. The goal of sampling is to adequately characterize each of these areas separately. Based on these 8 exposure areas (A1 through A8) within the former operational area, as well as Olin's exposure Areas Band C, Attachment #1A and #1B, propose the additional soil sampling that needs to be performed in each exposure area for surface and subsurface soils, respectively.

- c) Capped area – EPA agrees with Olin that soils beneath the temporary cap area should not be included in the above exposure areas. However, the current temporary cap is not a sufficient barrier to potential direct contact. This exposure area must be characterized for nature and extent as well as to determine if a risk is present. Therefore, EPA continues to request that surface and subsurface soils beneath the cap be sufficiently characterized. EPA has proposed a scope for characterization of soil within this exposure area in Attachment #1.
- d) Composite soil samples and samples with bottom depths greater than 2 feet – Olin has included composite soil samples and samples collected from soils to depths greater than 2 feet in the "useable" surface soil datasets. These samples may be useful for qualitative discussion of nature and extent, but they are not useable for quantitative risk assessment of surface soils. (Soil samples with a bottom depth greater than 2 feet may be included in the quantitative subsurface soil data set). Further, a composite sample comprised of soil from 4 sample points representing corners of an approximate 100 – 200 foot square area does not provide adequate coverage of that area (e.g., 4a, 4b, 4c, and 4d). Therefore, in evaluating the adequacy of surface soil sample data sets for purposes of quantitative risk assessment, EPA has eliminated all historical soil samples with bottom depths more than 2 feet and all composite sample locations.

**Response:**

- a.) *The proposed soil sampling plan has been expanded to incorporate the additional locations and analyses as proposed in Attachments 1A and 1B by USEPA. The proposed program was presented to USEPA on April 15, 2009. The revised RI/FS Work Plan for OUI will contain that program and will address the additional OUI specific requests presented in the Nobis Engineering memoranda dated April 17, 2009, and April 20, 2009 (Section 4.0 in the FSP).*
- b.) *The exposure areas as shown in Figures 1A, 1B, and 1C are currently used for planning purposes of the proposed sampling plan for OUI soils with the understanding that these exposure areas may change as sampling data become available. The proposed soil sampling plan has been expanded to incorporate the additional locations and analyses as proposed in Attachments 1A and 1B by USEPA, as described above and in previous comments (Section 4.1 and 4.2 in the FSP).*
- c.) *As agreed upon with USEPA, surface soil samples will be collected at ten locations within the temporary cap area (Figure 4.1-1 in the FSP). Subsurface samples will not be collected in order to protect the integrity of the area.*
- d.) *Composite samples will not be included in the discussion of historical soil data. Soil samples collected from depths greater than 2 feet bgs are included in discussions of historical subsurface soil sampling at the site (Section 4.2.1 in the FSP).*
2. Soil samples representation – In the material submitted to date, Olin has provided location specific soil data from:
- the Biocell Area (RTC Table H-1),
  - the Vicinity of Buildings 1,2, & 3 (RTC Table H-2),
  - the Area of the Railroad Car (Aerial Photo 1967) (RTC Table H-3),
  - the Northeast Corner of the Property (RTC Table H-4), and
  - the Area South of Plant D (RTC Table H-5).

While this information is detailed, it alone is not sufficient to determine the nature and extent of contamination in all of these areas of the Site. Areas of concern that still remain include:

- the area in the Vicinity of Buildings 1, 2, & 3,
- the Area of the Railroad Car on the railroad spur (Aerial Photo 1967),
- the Northeast Corner of the Property, and
- the Area South of Plant D.

Further surface soil and subsurface soil sampling in these areas will need to be conducted. Additional review of the soil data from the Biocell Area (RTC Table H-1) is on-going. Further comment by EPA is expected on this topic once a thorough review of the supplied data is complete.

**Response:** *The proposed soil sampling plan has been expanded to incorporate the additional locations and analyses as proposed in Attachments 1A and 1B by USEPA, as presented to USEPA on April 15, 2009, and discussed in previous comments (Section 4.1 and 4.2 in the FSP).*

3. Olin Specific Chemicals – EPA requires analysis of Kempore and Opex in surface and subsurface soils. Therefore, method modification or method development of 8000B for soil matrix for these contaminants must be completed so that sampling and analysis of soils for Kempore and Opex can be incorporated into the project plan to accomplish this objective.

**Response:** *A method is not available to analyze soil for Kempore® and Opex®. USEPA has subsequently acknowledged that method development is not warranted due to the inherent low solubility of these solids. These compounds will be analyzed in surface water within OUI and OUII and in groundwater within OUIII (Tables 4.3-2 and Table 6.2-4 in the FSP). The lack of soil data will be addressed as an uncertainty in the risk assessments.*

4. Perimeter Sampling of Surface Soils is required. The current samples designated as perimeter surface soil samples are composite samples. The samples were analyzed for a fairly broad suite of contaminants; however, they were not analyzed for several of the specialty contaminants, including formaldehyde, hydrazine, NDMA, Kempore, Opex, phthalic anhydride, or hexavalent chromium. The composite samples provided previously are inadequate because they are: not all taken directly along the perimeter, composited from 4 samples (especially since the 4 samples are at some distance from one another and generally include at least one sample from the Site interior – e.g., sample 4 is really 4a, 4b, 4c, and 4d), and not evaluated for the expanded RI analyte list. A variety of contaminants have been detected in these samples, including PCE, PAHs, BEHP, other phthalates, NDPA, and phenol among others. These results, coupled with the uncertainty regarding location of the detected contaminants lead to a continued concern for potential off-site migration, need to be addressed through adequate perimeter surface soil sampling.

**Response:** *Olin has included the perimeter soil samples in the proposed soil sampling program as presented to EPA on April 15, 2009 (Section 4.1 in the FSP).*

## **Operable Unit Two-Off Property Surface Water and Sediment**

### **COMMENTS**

1. Ecological Risk Assessment – In OU2 Response to Comments, the extensive list of reports to be used for inclusion in the BERA have not yet been individually evaluated. Many are older (1991) and some are more recent (2007). While the inclusion in the BERA of much of the information presented in these reports is encouraged; caution needs to be exhibited when using older surface water, sediment and aquatic biological data (including toxicity studies) to evaluate current risks (see responses Comment # 10).

**Response:** *Comment noted.*

## **Operable Unit Three – On and Off Property Groundwater**

### **COMMENTS**

1. Under the General Issues section, comment 2.a. – Continuing to answer the questions in the Response to Comments, there are still a number of data gaps where it appears that no effort was made by Olin to respond. In the Conceptual Site Model (CSM) in the Focused Remedial Investigation (FRI) there is a presentation of the three areas of DAPL with its principal constituents of sodium, iron, manganese, sulfate, chlorides, aluminum, ammonia, NDMA, low pH and a floc as it discharges to surface water. Most of the listed constituents exceed their primary or secondary drinking water standards. As DAPL moves along the bedrock in response to gravity, there are several areas where additional chemical and geotechnical data would be necessary to evaluate containment and control options for the DAPL. The first area is adjacent to Lake Poly, the second area is near the upper NAPL pool at Main Street in the vicinity of monitoring wells GW-45D and GW-70D; the third area is further down gradient within the Maple Meadow Brook (MMB). In this area few bedrock wells exist and the deep wells have elevated constituents associated with DAPL including NDMA; and the final area is southwest of the Olin property, where NDMA has recently been detected in residential wells. In order to evaluate remedial alternatives for these locations, additional evaluation and testing is needed. Without any long term containment, contamination by the DAPL constituents listed above could eliminate the long term use of this valuable aquifer system.

**Response:**

*Based on the March 17, 2009, Olin and USEPA meeting, and subsequent discussions, Olin proposed additional wells and seismic studies for OU3 to USEPA on April 15, 2009, for incorporation into the revised RI/FS Work Plan (Section 6.1 and Figure 6.1-2 in the FSP). Olin will also conduct the additional seismic refraction study requested west of Former Lake Poly, and relocate the bedrock and over burden well pair (GW-406D/BR) farther east and south as requested by USEPA. Moving forward Olin would like to point out some information for USEPA's consideration relative to this comment.*

*The DAPL pools are not currently moving along the bedrock surface in response to gravity. Such transport ceased long ago when the DAPL pools formed behind the bedrock saddles which act as dams within the upper portion of the Western Bedrock Valley (WBV).*

**Lake Poly Area** When Lake Poly was excavated, soils were removed over portions of the area to bedrock, and DAPL was not observed at the bedrock surface. Bedrock is interpreted to slope from the north to the south under Lake Poly based on the higher elevation of bedrock to the west of Lake Poly (69.2 feet MSL at GW-28D) and the north of Lake Poly (71.3 feet MSL at GW-54D), and lower elevations to the southeast of Lake Poly (67.1 feet MSL at GW-33D) and to the south of Lake Poly (53.1 feet MSL at GW-35D, 56.3 feet MSL at GW-10D, 61 feet MSL at Slurry Wall boring 1300+00, 55 feet MSL at Slurry Wall boring 1200+00, and 53 feet MSL at Slurry Wall boring 1100+00). This interpretation is consistent with the seismic refraction data that was acquired in 2005 along a seismic line located parallel to the off-Property West Ditch behind the properties at 8 Jewel Drive and 4-6 Jewel Drive. The seismic line indicates higher elevations to the west of Lake Poly and lower elevations, progressively south. These data are also consistent with the formation mechanism for and the location of the on-Property and off-Property portions of the Upper DAPL pool. These DAPL pools are believed to have been the result of southerly migration of DAPL discharged to Lake Poly, and the other unlined pits located to the south. Results of historical groundwater samples collected between these disposal locations and the DAPL pools show elevated concentrations of VOCs and SVOCs that have characteristically been associated with these disposal activities. The groundwater collected from wells west of Lake Poly, but not within known DAPL pools, do not exhibit these same patterns of increased detected analyte frequency and elevated concentrations.

**Main Street DAPL Pool Area** Monitoring wells GW-45D and GW-70D are located within the footprint of the Main Street DAPL pool and are screened in DAPL, as are GW-59D, GW-54D and ports 1 through 4 of MP-3. Monitoring well GW-69D is located within the bedrock depression that contains the Main Street DAPL Pool but is screened at a higher elevation within diffuse groundwater. It is believed that the low point in the saddle that separates the off-Property portion of the Upper DAPL Pool and the Main Street DAPL Pool is in the vicinity of GW-69D. There is a sufficient number of wells within the DAPL in the Main Street Pool to establish the DAPL elevation and a sufficient number seismic profiles and borings to establish the physical shape, elevation and dimension of the bedrock depression that contains the Main Street DAPL Pool. A slurry containment wall has been installed in a geologically similar area around the on-Property portion of the Upper DAPL pool. A DAPL extraction pilot study will be completed within the off-Property portion of the Upper DAPL pool. Information gained during this pilot study will be utilized to develop and evaluate alternatives in the FS.

The lowest elevations where DAPL might be expected in the WBV have been investigated with deep borings and wells installed to the bedrock surface. DAPL has been identified in only the deepest location (GW-83D), within till. Diffuse groundwater contains the same constituents as DAPL but typically at lower concentrations. Other deep wells in the WBV under the MMBA have identified diffuse groundwater, but not DAPL. The presence of diffuse groundwater does not require that DAPL also be present.

2. Under General Issues, comment 2.a. – Olin should discuss the former early unlined ponds (Lake Poly, the East or West Acid Pits) as a source of DAPL and various other chemicals such as ammonia, aluminum, NDMA, sulfate, iron, manganese, phthalates, floc, and other undesirable compounds. Deep wells complete to the top of bedrock or into rock are necessary to confirm that this area does not contain DAPL pool from operations prior to the installation of the lined pits just south and west of Plant C-1 where the slurry wall was constructed.

**Response:** *The former unlined pits are not considered to be a current source of DAPL. Olin has previously discussed the disposal history at the Site and its relationship to the DAPL pools in the Draft FRI Report (MACTEC, 2007). The former facility operations related to the unlined pits was described in Section 1.4.2 Former Facility Operations in the Draft FRI Report. Section 2.1.2.2 Dense Aqueous Phase Liquid (DAPL), beginning on Page 2-16, described investigations related to DAPL in Section 2.3.1 Sources and Section 2.3.1.1 DAPL Areas, described the relationship of disposal areas to the formation of the DAPL.*

*The three acid pits south of the East and West Warehouses are within the Slurry Wall/Cap (Containment Area), and are directly over the on-Property portion of the Upper DAPL Pool and the bedrock depression that contains that DAPL pool. With respect to bedrock topography, the former East and West Acid pits and former Lake Poly are all upslope of the combined on-Property and off-Property portions of the Upper DAPL Pool and the bedrock depression that contains that DAPL pool. Between 1953 and approximately 1970, all liquid wastes generated at the facility were disposed of in these unlined pits. The West and East Pits were filled in sometime between 1964 and 1965, prior to construction of the West and East Warehouses. After construction of the East and West Warehouses, the Acid Pits were excavated further to the south and consisted of three unlined pits located between the warehouses and the South Ditch. In the early 1970's, two lined lagoons and an acid treatment and neutralization system were added to the Property to replace the unlined Acid Pits and Lake Poly, all of which were subsequently filled in.*

*Wells have been installed to bedrock (GW-6D, GW-10D, GW-28D, GW-33D) or just above the bedrock surface (GW-29D) in the general and immediate vicinity of these areas. Results of groundwater sampling and analysis indicate groundwater characteristics consistent with overlying groundwater (GW-6D, GW-28D, GW-29D, GW-33D) and diffuse groundwater (GW-10) in these areas. These data, and groundwater quality from other on-Property wells, do not suggest any residual DAPL is present in vicinity of the former Lake Poly, or the East and West Acid Pits, which is a finding consistent with the current conceptual site model that DAPL constituents released some 56 to 39 years ago migrated to and formed the DAPL pools present in the immediate on- and off-Property areas.*

3. Under General Issues, comment 2.a – EPA has reviewed Figure I-1 and agrees with the two newly proposed bedrock well locations. However, in determining the specific location for the proposed well triplet downgradient of the property in the Maple Meadow Brook Aquifer on either side of the bridge crossing on Route 38, a gravimetric survey should be conducted to establish the shape and dimensions of the buried valley aquifer and additional monitoring wells should be installed along the approximately 1,000 foot zone of no data to assess the propagation of contaminants downgradient in the buried valley aquifer towards the drinking water supplies of Reading and North Reading and to confirm the width of the buried valley aquifer. This information can be used to ensure that the contaminants are not bypassing the previously installed and proposed future monitoring wells through a heretofore previously unmapped portion of the aquifer.

**Response:** *Olin proposes to conduct an additional seismic refraction line along Main Street to compliment seismic profiling conducted in this area in 1996. Proposed well locations will be adjusted based on results of the seismic profiling (Section 6.1.1 in the FSP). The approximate well locations were presented to USEPA on April 15, 2009 and are shown on Figure 6.1-2 in the FSP.*

4. Additional wells are needed near the boundary of the previously defined plume to fully evaluate the nature and extent of contamination. These areas are:
- A deep well (new well #1) to bedrock on Site adjacent Lake Poly (LP) to rule out LP and the former pits beneath the adjacent warehouse building as an ongoing source. These unlined disposal pits operated from 1953 to approximately 1970, when the "lined disposal lagoon" began operation.
  - A deep well (new well #2) adjacent to proposed bedrock well GW-406BR which is between the former Lake Poly and GW 69D. Well GW-69D contained elevated Olin DAPL indicator chemicals chloride (1500 mg/L), ammonia (967 mg/L), NDMA (15.7 µg/L).
  - Three new bedrock wells in the Maple Meadow Wetland Area adjacent to 3 existing well clusters where the deepest wells show elevated NDMA, chloride, and ammonia. At GW-83D (new well #5); GW-85D (new well #6); GW-87D (new well #7), Geomega concluded saddle effective barrier and DAPL solutes not being transported through bedrock to the western bedrock valley.
  - A new deep overburden well or bedrock well between MP-3 and MP-4 (new well #8) where chloride, ammonia, NDMA were all elevated.
  - A bedrock well (new well #9) adjacent to Chestnut Street #1 where low levels of NDMA have been previously detected.
  - A bedrock well (new well #10) adjacent at Butters Row #1 where low levels of NDMA have been previously detected.
  - Shallow or point driven wells in the wetlands adjacent to Maple Meadow Brook to evaluate changes in ground water/surface water relationships and better define the existence and location of the ground water divide and therefore background sampling locations. Although the previous ground (and surface) water data is useful in determining trends in water quality, some historical data may not be relevant because the 5 municipal wells have been taken off line and groundwater now likely discharges into the wetland.

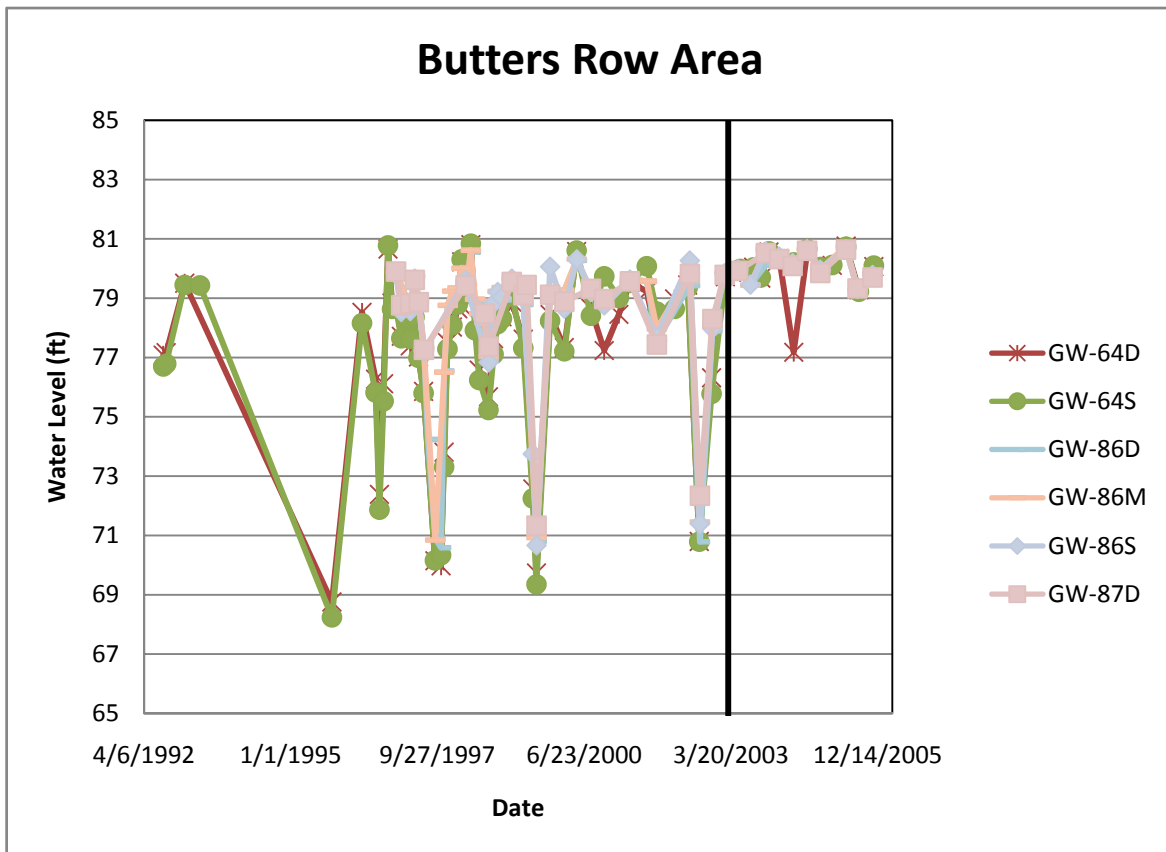
**Response:** *Subsequent to the issuance of this letter by USEPA, Olin, and USEPA held discussions on March 19, 2009, and April 15, 2009, concerning the number and locations of wells to be proposed in the RI WP. Olin will propose well locations as discussed in the April 15, 2009, conference call to address the first six bullets in this comment (Section 6.1 and Figure 6.1-2 in the FSP).*

*When Olin conducts the first round of surface water sampling in the MMB wetland, three drive point piezometers will be installed by hand (Section 6.3 of the FSP). One will be installed within or adjacent to the stream channel of Sawmill Brook near surface water location MMB-SW/SD5, the second adjacent to the stream channel of MMB near surface water location MMB-SW/SD2, and the third adjacent to the MMB stream channel after the confluence of Sawmill Brook and MMB near surface water location MMB-SW/SD1. The water level within the piezometer will be measured and compared to the surface water level outside the piezometer to determine the relative gradient between the two water levels.*

*Olin has compiled historical water level information to assist understanding the response of the MMBA to pumping and non-pumping conditions. Data from several wells in the Butters Row Area are presented graphically below. Historical water level data from MMB indicates that only a small*

change in maximum groundwater levels has occurred since cessation of pumping of the town wells (shown by the vertical line in the graph below). The data also show that annual periods of deeper drawdown occurred in the aquifer in the past in response to municipal well pumping in late summer months (August and September) during periods of expected low recharge and higher water demand. Since cessation of pumping, the groundwater levels in this portion of the MMBA have increased approximately one foot, but are within the historical range of data. The increased groundwater levels would indicate a more active discharge of groundwater discharge to surface water. It would also indicate that shallow depth groundwater and surface water contributed to the municipal wells when they were operated.

Appendix E of the Draft FRI Report, indicated that post pumping changes in overburden groundwater quality were more prevalent (five out of 10 wells) within the central portion of the MMBA in wells with top of screen elevations between 41-63 feet MSL. This is similar to the Butters Row and Chestnut Street municipal wells top of screen elevations which ranged in elevation from 43.5 to 55 feet MSL. While the groundwater elevations would be expected to respond dynamically to the cessation of pumping, changes in water quality are expected to be more gradual due to the moderating affects of groundwater advection, dispersion and solute sorption, desorption, and diffusion. Olin is proposing both groundwater and surface water sampling and additional monitoring well installations to determine the nature of water quality changes that have occurred since the municipal wells ceased operation (Sections 6.0 and 5.1 in the FSP). Synoptic groundwater levels, collected during spring and fall will be valuable in determining current horizontal and vertical gradients within the MMBA.



5. Under the General Issues section, number 2 – As stated earlier, there is a data gap in the location of the deep plume of N-Nitrosodimethylamine at the base of the MMB Aquifer. There are a number of elevated concentrations in GW-82D, GW-83D, GW-84D, GW-85D, GW-86D, GW-87D, and MP-5. All of these wells are greater than 1500 feet northwest of the former operations area. To cover this data gap:
- As discussed above, additional wells are needed to demonstrate if the previously defined plume is either discharging to the wetland and/or continuing to migrate north and/or west.
  - Geophysical surveys would assist in the delineation of any bedrock troughs which would create preferential pathways for the plumes to travel. These may include geophysical surveys in the area of the plant at GW-26 north toward GW-21D along the railroad spur, GW-70D and toward GW-83D.

**Response:** *The location of the deep plume at the base of the MMBA is consistent with the current conceptual site model (CSM) (as discussed in Section 2.2 of the FSP) and does not represent a data gap. The CSM has long held that DAPL migrated by gravity flow down the WBV, overtopping the saddle on the down slope side of the Upper DAPL Pool, thus forming the Main Street DAPL Pool. The interpreted low point in the down slope saddle forming the Main Street DAPL Pool is in the vicinity of MP-4. Overtopping of this saddle allowed DAPL migration as far as the bedrock depression in the vicinity of GW-83D under the MMBA. The topography of bedrock in vicinity of the Main Street DAPL pool was specifically studied at the request of MADEP through the installation of three seismic lines and eight soil borings (for summary see Section 2.1.5.1.1 Main Street Bedrock Saddle Investigations, on page 2-66 of the Draft FRI Report). These investigations in addition to previous and subsequent boring and seismic work provide a detailed interpretation of the WBV topography, which is the major bedrock trough controlling migration of dense aqueous solutes.*

*The results of groundwater sampling from SB-2, SB-3, SB-8 (MP-4), and GW-58D indicate this is the likely location where DAPL constituents migrated from the Main Street Pool down into the MMBA within the WBV. Monitoring data on both sides of this area (MB-2, MB-3, GW-66D, GW-67D, SB-6, MB-1, GW-62D, GW-82D) do not suggest other preferential pathways related to bedrock topography are present. Thus, a geophysical survey oriented parallel with the direction of the sloping bedrock from GW-70 toward GW-83D, which would run through MB1, SB-1, and GW-62D, would not be expected to show the presence of a previously unknown preferential migration pathway.*

6. Under the General Issues section, number 17 – Private wells are sampled for the sole objective of determining if site-related impacts are present. EPA does acknowledge that samples from the private residential drinking water wells may provide broader information. However, private well data is not appropriate for quantitative use in the remedial investigation (i.e., to delineate plumes) or in the baseline human health risk assessment (i.e., to calculate risk beyond the current well user) unless certain information is obtained to ensure the quality and usefulness of this data. Such information includes:
- the total depth of well,
  - the construction details for the well (i.e., fully cased),
  - the amount of storage capacity in the well,
  - the location of the pump or intake,

- the current condition of the well,
- location of any storage tank with regard to sample collection point (sample should be collected prior to any storage tank or the storage tank should be purged properly,) and
- location of any portable treatment unit with regard to sample collection point (sample should be collected prior to any treatment unit).

The revised Work Plan should include efforts to obtain this information for all known private well locations with the study area, otherwise the use of private well data shall remain limited to assessing potential user impacts and providing a qualitative understanding of the extent of groundwater contamination. Also, without this information, it is not appropriate to overlay residential sample results with monitoring well data to map the extent of plumes.

**Response:** *If Olin decides to use residential well data for purposes other than the limited purposes stated above, Olin will make needed efforts to obtain the additional well construction information identified in the comment. In future documents, specifically excluding the RI/FS Work Plan, residential water supply sample results will be plotted separately from other types of groundwater quality information.*

7. General Issue 6b response – Utilizing three wells that are downgradient of the Olin Site for the purpose of establishing background concentrations in groundwater as shown in Figure D-4 is not appropriate. Groundwater wells used for the purpose of establishing background cannot be located downgradient of the Site.

**Response:** *As discussed previously with USEPA and described in the Draft FRI report, a groundwater divide is present that bisects the Site in an area of impacted groundwater. That groundwater then migrates in opposite directions toward different watersheds. Therefore, there is no location within the Site that could be described as upgradient. The use of other types of data, other than upgradient groundwater quality data, will be necessary for evaluation of background concentrations in groundwater. It is expected that Olin and EPA will come to agreement an appropriate alternative during the RI process.*

8. General Issue 11 response – It is understood that PDF data is searchable. EPA comments regarding data at particular locations were intended to highlight the continuing issue that evaluating the data as presented is extremely time consuming. A concerted effort should be made to present that data in the most usable format possible, to avoid project delays and expenses. Continuing to suggest that the users of these documents can meaningfully evaluate the enormous amount of data utilizing a location by location PDF search is unreasonable. Every effort should be made to present data on figures, and provide EPA access to the date base with searchable capabilities. To that end, a conference call was held between Olin and EPA on January 28, 2009 to discuss the format of available data utilizing Olin's web hosted database. When the discussed format changes are implemented by Olin it is expected that data retrieval will be more efficient and usable.

**Response:** *The Olin web based database was updated on March 16, 2009, to allow output of data in a Microsoft® Excel® cross tab format.*

9. General Issue 17 – The term "indicator parameters" is appropriate in the context of the comment. It is also noted that in response to numerous comments Olin refers to "indicator parameters" in the same or similar context and the term has value when describing certain site-related chemicals. If groundwater data shows impact by site related contaminants at a particular location, a more extensive, if not full suite of analysis, must be performed. This rationale should be incorporated into the proposed sampling as part of the RI. For example, if a particular well has historically high levels of sulfate, this location should be sampled for inorganics as well as other appropriate methods included in the RI Analyte List. Sampling this well to confirm the previously detected inorganic compounds does not serve the nature and extent objective of the RI.

**Response:** *There are no locations at which Olin has proposed sampling solely for "indicator parameters".*

10. General Issue 18a – EPA disagrees with this response. Residential wells cannot be used as presented (See above comment). Additional wells must be sampled and installed to clarify the understanding of extent of groundwater impact in the absence of residential well data. Figures included in the Draft RI Work Plan that aim to show the current understanding of the distribution of contaminants in groundwater clearly show that data from residential wells is being quantitatively utilized for this purpose. Additionally, bedrock and overburden data should not be used on the same figure unless it is being suggested that there is significant communication between the two portions of the aquifer. It would be assumed that most residential wells are screened in deep bedrock and, therefore, are not appropriate to include in the same dataset as overburden wells for the purpose of delineating extent of impact. Data gap evaluations for extent of groundwater impact should be made using appropriate data sets. At a minimum, shallow and deep overburden groundwater monitoring wells and bedrock monitoring wells should be evaluated and presented separately.

**Response:** *Additional wells have been proposed (see Response to Comment 4). If Olin decides to use residential well data for purposes other than the limited purposes stated above, Olin will make needed efforts to obtain the additional well construction information identified in the comment. In the future, Olin will plot and evaluate separately bedrock and overburden ground data sets.*

11. Specific Comment #1 – EPA has made numerous comments regarding the presentation of data and the lack of usable plume maps to show the current understanding of the nature and extent of all site-related contaminants. It is acknowledged that extensive amounts of data were presented in the FRI; however, a clear and concise presentation of nature and extent of all Site related contaminants has not yet been provided. The plume maps included in the POP are helpful in understanding the data sets represented and allow for meaningful review. As stated in the prior comments, these maps provide a starting point for discussion and additional maps should be provided to support specific statements relating to the completeness of the understanding of nature and extent. Additionally, when providing data on a figure, please indicate that laboratory results were below the detection limit by providing that detection limit (<0.002mg/L). Do not use the term "ND" without providing the reporting limit.

**Response:** *In the March 18, 2008, scoping meeting, Olin sought clarification from USEPA on what kind of additional maps it would like to see in the RI/FS Work Plan. USEPA specifically did not request figures for all analytes. Recognizing the validity and importance of the indicator parameters as major components of the waste stream that has impacted groundwater, USEPA requested that deep*

*and shallow groundwater contour figures be prepared for several indicator parameters and NDMA, in addition to cross sections within the MMBA to assist USEPA in understanding the vertical and horizontal distribution of impacts in the overburden groundwater. These requested additional figures were provided in the RI/FS Work Plan as Figures 6.2-24 through 6.2-37 in the FSP.*

*The Draft FRI Report and the RI/FS Work Plan focused on presenting the most commonly detected contaminants rather than all detected contaminants, the latter of which were presented in summary tables (Tables 4.3-1, 4.4-1, 5.1-1, 5.2-1, and 6.2-2). We will continue to work with USEPA during the completion of the RI/FS to develop figures that accurately present the information gained during the proposed investigation activities.*

*Olin has agreed to use a value of “less than the method detection limit” rather than ND for non-detect values in future RI/FS figures (specifically excluding figures in the RI/FS Work Plan).*

12. Specific Comment #4 – EPA understands the Site CSM as presented by Olin; however, additional data supporting the CSM are needed. Specifically, that current dissolved groundwater impacts underlying the former facility are in fact separate and distinct from current impacts in groundwater within the MMB aquifer. It should be assumed for the purpose of the RI/FS that all groundwater under the Site and property may be consumed in the future and are subject to drinking water standards and guidance.

**Response:** *Consistent with recent discussions between USEPA and Olin, at USEPA’s request, the Baseline Human Health Risk Assessment (BHHRA) will evaluate potential exposures and risks associated with current and potential hypothetical future uses of groundwater at the Site (including the former facility property) as well as potential exposures and risks associated with vapor intrusion from groundwater (if that pathway is determined to be a complete or potentially complete exposure pathway). The BHHRA will evaluate current or on-going exposures for private wells used for potable and/or non-potable uses. The BHHRA will also evaluate the use of groundwater from the Maple Meadow Brook Aquifer as drinking water. The results of these evaluations will be used to derive risk-based Preliminary Remediation Goals to be utilized in the determination of the need for remediation, and the development and evaluation of remedial alternatives in the Feasibility Study. The evaluation of the hypothetical future use of groundwater as drinking water in areas of the Site that are not currently classified as “current drinking resource areas” per the Massachusetts Contingency Plan will be completed to support determinations concerning the need for institutional controls and to support the development of remedial goals and remedial objectives in the Feasibility Study process.*

*Some of the exposure scenarios involving hypothetical use of groundwater as drinking water may be less likely to occur than others and the BHHRA will discuss the uncertainties associated with the exposure estimates and risk estimates for those less likely scenarios. For example, the use of groundwater at the former facility for drinking water purposes is a less likely scenario, since the risk assessment may indicate the need for an institutional control prohibiting such a use. In addition, the use of untreated DAPL or untreated diffuse groundwater is highly improbable and those scenarios will be discussed in that context. There are no plans to evaluate the use of DAPL material as a drinking water source in the BHHRA.*

*It is also recognized that in the future, institutional controls may prohibit the use of groundwater at some locations (such as at the former facility property), but the migration of groundwater from such locations to other areas where groundwater will not be subject to the same institutional controls needs to be considered in the BHHRA. Therefore, in the BHHRA, the migration pathways for the various components of the groundwater system will be considered in the identification of exposure points or exposure areas with respect to groundwater use as drinking water. In that context, the implementation of an institutional control prohibiting use of groundwater at a particular property would not necessarily mean that all of the groundwater beneath that property would be considered "non-drinking water". The evaluation of the hypothetical drinking water scenarios will provide a broad information base to support decision-making in the Feasibility Study process.*

13. Specific Comment #10 – The response does not satisfy the request of the comment. When presenting the extent of groundwater impacts, only show those wells and data points that were included in the interpretation. Please refer to the comment above where private wells and data were shown on a plume map but then later stated to not contribute to the delineation shown.

**Response:** *In future RI/FS reports, Olin will present overburden, bedrock, and residential well data separately and will include only those data used in the interpretation.*

14. Specific Comment #11 – EPA disagrees with this response by Olin. The monitoring wells that are proposed as part of the POP on figure 6.1.2 coincide with the dashed lines (inferred extent of groundwater impact) as shown on figure 6.1.1 "Extent of Groundwater Impact" noted on the figure to be based on NDMA distribution. There are additional data gaps to be filled, especially when private well data, bedrock data, and over burden data are separated (In Attachment C, groundwater monitoring well data was not included). The comment remains that "NDMA is only one contaminant of concern albeit a relatively soluble and mobile contaminant, but should not constitute the sole rationale for proposed monitoring wells" as these two figures suggest. See comment 3 above for proposed well descriptions.

**Response:** *Comment noted.*

15. Specific Comment #12 – EPA disagrees with the response regarding the northern delineated boundary. There are no relevant data points to support this delineation. An understanding of the geology as stated can be useful to aid in well placement, but it cannot be the primary basis for delineation. The statement regarding the residences in the development being served by public water seems dismissive. Irrigation wells exist on at least two properties in this development and drinking water is not the only exposure pathway to be considered. Moreover, the requirement to delineate the nature and extent of contaminant impacts to the environment is not solely associated with readily identifiable risk exposure pathways.

**Response:** *A bedrock groundwater well will be installed near the Butters Row Municipal Wells as represented in Figure 6.1-2 in the FSP of the RI/FS Work Plan.*

16. Specific Comment#13 and #14 – The response states an "anomalous" detection of ammonia at 2,300 mg/l in the most recent groundwater sample (1999) is the reason for the discrepancy in contouring. The statement that ammonia was analyzed 7 times contradicts the data presented in the cited table. The cited table shows that GW-45s was sampled twice for ammonia, both in July of 1999, thereby eliminating the qualifier of "anomalous" from the result. This high result without follow up underscores the need to resample using expanded analyte lists at wells where indicator parameters are detected at concentrations suggesting impact. The revised Work Plan should include sampling for ammonia and an expanded list of TALs at GW-45s and at monitoring wells in the vicinity.

**Response:** *As indicated in the original response, GW-45S is proposed for additional sampling (Table 6.2-4 in the FSP).*

17. Specific Comment # 15 – The response states that GW-65BR is screened in groundwater having diffuse characteristics and underscores the need for a more robust bedrock investigation. GW-65BR is screened from 15 to 39 feet below the bedrock surface. Bedrock is clearly being impacted and data gaps exist pertaining to the nature and extent of Site contaminants as they reside in and potentially migrate through rock.

**Response:** *The response stated that GW-62BR, not GW-65BR, is screened in groundwater with diffuse characteristics.*

18. The extent of the DAPL appears to have been developed based on the mapping shown on Figure 4-1 of the IRSWP. However, closer examination of this figure, the wells, and the boring logs, indicate that most of the wells installed are quite shallow and not at the encountered depth of DAPL. A review of several deep borings nearby, including GW-29D, 340, 43D and 44D, make no reference to product, odor or oily liquids. In fact, GW-35 where the greatest depth of DAPL appears on the figure shows no product, odors or oily liquids described on the boring log. Therefore, the extent of the DAPL plume cannot be verified based on the supplied information. As part of the RI field effort, additional deep characterization is required in the area of Lake Poly and Jewel Drive.

**Response:** *The extent of DAPL was not established in the IRSWP. The extent of DAPL was established by numerous investigations described in Subsections 2.1.2.2, 2.1.5.1.1, 2.1.6.2.5, and 4.3.1.1 in the Draft FRI Report (MACTEC, 2007). DAPL is an aqueous liquid, not a non-aqueous liquid. DAPL is not a product nor is it an oily liquid.*

19. Olin should investigate and provide a plausible chemical reaction mechanism for the formation of NDMA in groundwater at the site, including the specific precursor chemicals involved and requisite geochemical conditions. Given the frequent detection of NDMA in drinking water wells, this is a critical aspect of the conceptual site model. Without an understanding of the chemistry behind NDMA formation, it is not possible to accurately predict where it might be forming nor to determine locations at which groundwater should be analyzed for its presence.

**Response:** *The detection of NDMA in groundwater samples beginning in 2002 was an unexpected result. The operational history and operational records for the facility indicated that NDMA had not been used as a raw material, it had not been stored at the facility, it was not a manufacturing product of the facility, and it had not been identified as a waste product of the facility. The historical information did not provide an obvious explanation for the detection of NDMA in groundwater samples that were also impacted by Site-related indicator parameters such as ammonia, sulfate, calcium, chloride, and sodium.*

*The presence of NDMA in groundwater and surface water samples associated with the site resulted in investigations concerning the distributions of the compound in environmental media, the potential sources of NDMA, potential chemical stability and possible transformations of the compound in groundwater, and possible correlations with the presence and concentration of Site-related chemicals as well as physical/chemical water quality parameters for groundwater and surface water. Two investigation and evaluation reports were prepared by Olin and submitted to the Massachusetts Department of Environmental Protection (MassDEP) in 2004. These documents were Report for the Initial Testing of the Proposed Analytical Test Method for NDMA Precursors, 51 Eames Street Site, Wilmington, MA, DEP RTN 3-0471 (MACTEC Engineering & Consulting, Inc., 2004a) and Comprehensive Site Assessment Submittal, Distribution of N-Nitrosodimethylamine (NDMA) In Environmental Media, 51 Eames Street, Wilmington, MA, RTN 3-0471 (MACTEC Engineering & Consulting, Inc., 2004b).*

*These reports and the associated investigations and evaluations were conducted to provide some understanding of the source to overburden groundwater, mechanism of formation of NDMA in groundwater, and the stability of NDMA in groundwater, as well as to delineate the distribution of NDMA in environmental media. Clearly, it was impossible to re-create the conditions that may have existed within the various liquid waste streams and surface impoundments that had existed during the operation of the facility. Therefore, it would not be possible, if NDMA had been formed historically, to determine the exact mechanism of formation.*

*It was determined that the NDMA Precursor Test Method was not capable of adequately quantifying total NDMA precursor concentrations in DAPL and diffuse groundwater samples from the Site. MassDEP concurred with the conclusions of that report. Once it was established that this method would not be applicable, extensive testing of NDMA in all environmental media at the Site was performed, the distribution of NDMA in environmental media was characterized, and a correlation analysis was conducted to determine if there were correlations between NDMA presence/concentrations and Site-related chemical parameters or water quality parameters (pH, dissolved oxygen content, specific conductance, etc.).*

*That correlation analysis did conclude that there were correlations between NDMA and various chemical parameters and water quality parameters. This information indicated that the presence and relative concentrations of NDMA in environmental media was consistent with distributions of some Site-related parameters and was consistent with the physical/chemical/ environmental fate characteristics of NDMA (relatively persistent in groundwater, mobile in groundwater and surface water, low affinity for soils, sediments, and biota, relatively non-volatile, readily degradable by ultraviolet light in surface water). NDMA concentrations in groundwater samples in general decreased from DAPL samples to diffuse groundwater samples to overlying groundwater samples. NDMA was not detected in soil or sediment samples.*

*The sampling and analysis of environmental media for NDMA and other Site-related parameters has and will continue to provide information concerning the nature and extent of NDMA and will guide the identification of media and locations that need to be sampled to identify and confirm the limits of NDMA presence in the environment. Sampling and analysis to date has not indicated any increasing concentration trends in groundwater or surface water. No additional field or laboratory investigation of NDMA formation mechanisms is proposed in the RI/FS Work Plan.*

*The two reports identified above are discussed in some detail below.*

### ***Evaluation of Applicability of the NDMA Precursor Test***

*Olin has conducted extensive investigations and evaluations previously to understand the source and/or mechanism of formation of NDMA in groundwater at the Site. Working in conjunction with an expert in the field of NDMA presence and formation in water and wastewater (Dr. William Mitch), Olin evaluated the potential application for the Site of a test method for quantifying NDMA precursor compounds in DAPL and diffuse groundwater at the Site. The test method had been developed by Dr. Mitch in investigations of NDMA formation in water and wastewater treatment applications.*

*NDMA had been identified by researchers as a by-product of chlorination of water and wastewaters (Mitch et al, 2003). The compound had become a compound of interest with respect to public water supply systems that were disinfected by chlorination. It was this notoriety that had lead to a request by a member of the public and MassDEP for testing for NDMA.*

*The Report for the Initial Testing of the Proposed Analytical Test Method for NDMA Precursors detailed an evaluation of the potential applicability of an analytical test for NDMA precursors for identifying NDMA precursors in DAPL or diffuse groundwater samples from the Site.*

*The proposed test method was developed, by William Mitch. The proposed test method is based on the NDMA precursor test described in A N-Nitrosodimethylamine (NDMA) precursor analysis for chlorination of water and wastewater which has been published in the scientific journal Water Research (Vol. 37, pp. 3733-3741) by William Mitch, Andrea Gerecke, and David Sedlak who are recognized experts in NDMA formation.*

*The NDMA Precursor Test Method was intended to determine relative amounts of NDMA precursors present in dense aqueous phase liquid (DAPL) and diffuse layer groundwater samples. The method determines if precursors are present by chloramination of organic nitrogen precursors at near-neutral pH to form chlorinated dimethylamine and unsymmetrical dimethylhydrazine (UDMH), which is then oxidized (by monochloramine) to NDMA, and measuring the resulting increase (if any) in the NDMA concentrations present in the samples. This test method does not identify and quantify specific NDMA precursor compounds, but rather estimates the total NDMA formation potential in a water sample.*

*This NDMA Precursor Test was not intended to and cannot identify and/or quantify specific precursor compounds that might be present in a sample. With the complex nature of the DAPL and Diffuse layer groundwater and the uncertainty associated with the physical, chemical, and*

*geochemical characteristics of historical combined process discharges, it would be very difficult, if not impossible to design a test that would identify and quantify all potential NDMA precursor compounds in DAPL and Diffuse layer samples. However, chemical analysis for certain possible chemical intermediates was conducted as part of the Precursor test evaluation. DAPL and diffuse samples were analyzed for hydrazines (the laboratory reported results for hydrazine, monomethylhydrazine (MMH), and unsymmetrical dimethyl hydrazine (UDMH)) by STL Laboratory in Denver, CO. Obtaining results for UDMH was the primary goal of the analysis, because UDMH has been reported in the literature to be a possible chemical intermediate in the formation of NDMA. UDMH had not been identified as a raw material or product at the facility.*

*Based on the results of the Initial Testing, the following major conclusions were made:*

- The initial application of the NDMA Precursor Analytical Method to DAPL and diffuse groundwater samples did not confirm that the method was capable of detecting NDMA precursors such as DMA in those matrices. The acidic nature of the DAPL and diffuse groundwater samples prevented the adjustment of pH with the phosphate buffer solution to the method-specified target range of 6.7- 7.1 in the First round of testing.*
- In the Second Round of testing, the pH adjustment was accomplished effectively, but once again the application of the NDMA Precursor Analytical Method to DAPL and diffuse groundwater samples did not confirm that the method was capable of detecting NDMA precursors such as DMA in those matrices.*
- It appears that the inherent characteristics of the DAPL and diffuse matrices resulted in the failure of the method to clearly detect the NDMA precursor DMA in DAPL split 9 and diffuse split 9 for both DAPL and Diffuse layer groundwater samples. This result indicates that the results of the precursor test (DAPL splits 5B, 6B, and 7B and diffuse splits 5B, 6B, and 7B) should not be considered reliable indicators of the presence or absence of NDMA precursors.*

### ***Report on Distribution of NDMA In Environmental Media***

*The 2004 report, Distribution of N-Nitrosodimethylamine (NDMA) In Environmental Media, addressed the following components of the overall investigations of NDMA.*

- Correlation analysis of selected indicator compounds that are detected at the Site.*
- A review of all redox and chemical data to clearly establish the geochemical regimes where NDMA is found.*
- A quantitative spatial analysis of the NDMA in the overburden aquifer, delineating both its known vertical and lateral distribution.*

*The report drew the following conclusions:*

- NDMA has been detected in groundwater and surface water.*
- NDMA has not been detected in soil or aquatic sediments.*
- Horizontal and vertical extent of NDMA in overburden groundwater at the Site has been well characterized.*

- *The planned monitoring activities and the proposed sampling and analysis program proposed for the Remedial Investigation will provide sufficient information for evaluating nature and extent, for assessing risks, and for developing and evaluating remedial alternatives.*

## REFERENCES

*MACTEC Engineering & Consulting, Inc., 2004a. Report for the Initial Testing of the Proposed Analytical Test Method for NDMA Precursors, 51 Eames Street Site, Wilmington, MA, DEP RTN 3-047, July.*

*MACTEC Engineering & Consulting, Inc., 2004b. Comprehensive Site Assessment Submittal, Distribution of N-Nitrosodimethylamine (NDMA) In Environmental Media, 51 Eames Street, Wilmington, MA, RTN 3-0471, December.*

*Mitch, W. A.; Gerecke, A.; Sedlak, D. L. 2003 b. A N-nitrosodimethylamine (NDMA) precursor analysis for chlorination of water and wastewater. Wat. Res. 2003, 37 (15): 3733-3741.*

20. The RI/FS Work Plan references two cross sections of the bedrock topography that indicate the presence of bedrock depressions that are acting as DAPL "traps". The cross sections depict these traps on the property. No cross sections have been provided for off-property bedrock topography where substantial pools of DAPL have been previously identified. The revised RI/FS Work Plan should confirm the presence of the bedrock depressions on and off the property and assess the orientation and linearity of bedrock troughs that may be acting as transport conduits for the DAPL. The RI/FS should assess the feasibility of utilizing surface resistivity to mark the presence of the DAPL pools since the Work Plan states that the DAPL plume conductance properties have been a reliable indicator of the presence of DAPL in previous assessments and will continue to be used in the future RI/FS.

**Response:** *The RI/FS Work Plan provided new cross sections that start at the down slope saddle of the Main Street DAPL pool and continue through the WBV (Figure 6.2-24 and 6.2-25 in the FSP). This cross section was produced at the request of USEPA to assist in understanding the vertical differences in constituent concentrations within the MMBA. The other cross section that depicts the on-Property DAPL pool was prepared previously at the request of USEPA to assist in their evaluation of the IRSWP. It was included in the RI/FS Work Plan as a matter of convenience to readers who had not seen that section (Figure 6.2-21 of the FSP). The Draft FRI Report provided a 3-dimensional figure (Figure 3.2-4) depicting bedrock topography and the DAPL pools. This figure used the same interpreted bedrock surface that appears on a number of figures in the RI/FS Work Plan.*

*The presence of the bedrock depressions in both on-Property and off-Property locations and the configuration of the WBV were developed based on an extensive program of soil borings, well installations, seismic profiling, and years of induction logging. The RI/FS program is not proposing additional borings or geophysical investigations to confirm the findings of this previous work.*

*Additional cross sections will be developed for the RI Report to present data collected as part of the RI/FS Work Plan.*

## **Volume IA – Site Management Plan**

The following comments are on the Site Management Plan (SMP) as part of the *Draft Project Operations Plan*.

1. Page 3-1 of the SMP states Olin will begin the process to obtain access agreements after approval of the Draft Work Plan. Although it is recognized that the full and complete list of properties to which Olin will require access agreements cannot be finalized until approval of the Work Plan, Olin should begin formulating letters and contacting those property owners where Olin has proposed sampling activities in the Draft Work Plan. The process of acquiring access to additional properties can follow Work Plan approval. The process of obtaining access to private property can be lengthy and every effort to begin this process immediately should be demonstrated.

**Response:** *Olin has developed updated property maps and a list of property owners for parcels where access may be required sample existing wells, sample streams, and install newly proposed well locations. Olin is in the process of preparing letters for submittal to property owners to obtain executed access agreements.*

2. Page 3-2 of the SMP states that when actual work is to be performed on a property, written notice will be provided at least 30 days in advance of required work. It is understood that relationships with property owners are of upmost importance and that all due courtesy must be given; however, 30 days seems excessive and Olin should work to negotiate a less extensive period of advanced notice with each property owner.

**Response:** *Olin will seek a two week notification period.*

3. Page 3-2 of the SMP states "*Olin has obtained an application from the Massachusetts Bay Transportation Authority (MBTA) for a license to access the MBTA right of way along the east ditch...*", and "*will keep EPA informed as to the progress of that license application and the expected schedule for completion of the required railroad safety training*". Discussions regarding access to the MBTA right of way along the east ditch began during the IRSWP phase of the project (Nov-Dec 2007). In the Olin response dated December 2007 to EPA comments on the Draft IRSWP, Olin states with respect to access to the east ditch "*Work within the MBTA line requires personnel receive training and certification through the MBTA and furnishing specific insurance. MACTEC has completed such training and does not foresee a problem in obtaining access*". The information presented in the SMP regarding access is contradictory. The status of Olin's ability to access the east ditch is currently unclear. Details regarding the discrepancy highlighted above and additional information regarding the topic should be provided in the revised Work Plan.

**Response:** *The purpose of the statement was to convey to USEPA that we did not foresee problems in eventually obtaining access, completing necessary training, and having capacity to meet specific insurance requirements of the MBTA. Access agreements have been obtained in the past, personnel trained and the necessary insurance provided so that sampling in the MBTA property could be completed. The access agreements have a specific term and require that they be renegotiated once*

*that term expires. Since the last time work was conducted on MBTA property, the terms and conditions of the access agreement have changed. Olin is currently engaged with the MBTA in negotiating a new agreement. Once an agreement is reached, MBTA will specify the specific training required, and MACTEC staff will then undergo required safety training and the required insurance will be bound.*

4. Section 3.3.1 of the SMP All decontamination fluids generated on and off site may need to be containerized.

**Response:** *Olin will make provisions to containerize all decontamination fluids generated on-site and off-site. Section 3.3.1 of the SMP shall be revised accordingly.*

5. Page 3-5 of the SMP states that soil borings completed on-property will be completed to a depth of ten feet or to the water table, whichever is shallower. Subsequent comments address this proposed methodology regarding soil boring depth. However, it is necessary to underscore that this approach only satisfies the data requirements with respect to risk assessment and not the delineation of the nature and extent of contamination which is the primary objective of an RI. Soil borings and sample collection must consider field observations when determining termination depth and in some cases extend to the top of rock (or into bedrock as appropriate) for nature and extent of contamination.

**Response:** *Olin has presented a proposal for OUI sampling to USEPA on April 15, 2009, that Olin believes addresses these concerns (Section 4.0 in the FSP).*

6. Section 4 of the SMP does not address the procedure for handling purge water associated with well development or groundwater sampling activities. In addition to the scenarios proposed in this section pertaining to drill waters or cuttings; IDW, regardless of location with respect to DAPL or the water table, may need to be containerized until such time that laboratory data supports it's redistribution to the environment or off-site disposal. All drilling, well development, groundwater sampling and other field logs must note the disposal location of the IDW generated.

**Response:** *Olin will make provisions to containerize purge and well development fluids generated on-Property and off-Property. The field logs or field notes will note the type and approximate quantity of IDW generated at that specific exploration location and that is has been transported to the Olin facility. Other records will be developed to document the disposition of IDW that has been temporarily stored at the Olin property for disposal characterization.*

### **Volume IB – Community Relations Support Plan**

The following comment is on the Community Relations Support Plan (CRSP) as part of the *Draft Project Operations Plan*.

1. Page 7-1 of the CRSP states Olin will support public meetings by preparing and making presentations as well as participating in meetings. The preparation of visual aids such as Site figures should also be

included. It is inferred that support outlined in the SOW, but not specifically mentioned here, is also incorporated into the CRSP.

**Response:** *An additional bullet item will be added to the list on page 7-1 of the CRSP to say, "Preparing visual aids, such as Site figures".*

### **Volume IIA Field Sampling Plan**

The following comments are on the Field Sampling Plan (FSP) as part of the *Draft Project Operations Plan*.

1. Page 6-1 of the FSP states the horizontal extent of contamination is well understood in most areas. However, there are certain areas on and off Site where additional deep monitoring is warranted: Wells in the vicinity of Lake Poly, as identified on the January 2004 MACTEC Report on the Ammonia Hotspot, should be re-sampled, especially GW-LPB-47 and GW-LPB-11. In addition, these wells should be coupled with (new) deep boring(s) to determine if this area is contributing to the deep aqueous phase plumes of NDMA, ammonia, chromium, phthalates or hydrazine and continuing to migrate offsite. See comment # 3 under OU3 comments above for proposed locations.

Another data gap now appears to be the relationship of contaminants in the deeper portion of the MMB Aquifer and future receptors. Since the municipal wells were shut off and no longer pump water from the aquifer, flow paths have changed. Ground water from the deep aquifer likely now discharges into the MMB wetland system. This in turn may affect the chemical loading of ammonia, NDMA, sulfate, iron, manganese, aluminum, floc and other undesirable compounds which were previously within the capture zone of the Town's production wells. Any future sampling should address this data gap with low flow sampling and installation of a shallow well along the stream bottoms. Previous ground water data collected likely did not capture this new stream aquifer relationship which has likely been developing during the past 5 years, since the Town wells were shut off in 2003 (some on/off shut offs in 2002).

**Response:** *The most recent groundwater sampling was conducted in 2006 and was the subject of statistical analysis contained in Appendix E of the Draft FRI Report. Based on available water level measurements, since the cessation of municipal well pumping, groundwater gradients have not changed considerably. It has not been determined that cessation of pumping has had a demonstrable effect on contaminants residing in the deep portions of the MMBA. Proposed groundwater sampling will provide data to assess if spatial changes in contaminant distribution in the MMBA are apparent (Section 6.2 in the FSP). Floc, as it has been defined in the South Ditch, is not present in the MMB wetland. Three hand driven stream piezometers will be installed in the MMB wetland area for the purpose of measuring water levels as described in response to comment number 4 under OU3.*

2. FSP Figure 6-2-40 – This figure shows Olin's proposed locations for sampling of "specialty compounds" in selected wells. Olin has selected 9 chemicals to showcase including PCBs, OPEX, Kempore, Hydrazine, Formaldehyde, Nonylphenol, Phthalic Anhydride, Diphenylamine, NN dimethylformamide (DMF). Each of these wells should be sampled for all specialty compounds.

**Response:** *Olin will sample for all specialty compounds (“additional Site-specific analytes”), including perchlorate, at these locations. Olin has significantly expanded the proposed number of locations at which the standard comprehensive analyte list and the “additional Site-specific analyte” will be evaluated to provide USEPA with a more representative data set to determine the potential nature and extent these compounds. The PCBs, however, are specific to areas where transformers were present, and are not part of the specialty compounds list which includes compounds used or produced at the facility (Section 6.2 in the FSP).*

3. FSP Figure 6.2.1 – This figure shows that 12 new wells are proposed during the RI. The selection and location of these 12 wells is not explained in the Work Plan. All the wells are either north or west of the former operations area. Six of the wells are located in close proximity to the Town Welles). Since the cessation of pumping in 2003, the Town wells have been tested and contain non-detectable levels of NDMA based on the latest sampling results. Since one purpose of the wells is to delineate the plume, including NDMA, please provide a rationale for each of the six proposed wells in this area. Please also include wells discussed in comment #3 of OU3.

**Response:** *A rationale will be provided for all proposed new wells (Section 6.1 in the FSP).*

4. FSP Figures 6.2-20 – 6.2-23

- What was the methodology behind selecting the locations for cross sections? Why were some wells included while other excluded? Why is there only one cross section of through the Containment Area from east to west but not north to south?
- 85D is where 2 cross sections intersect in the MMBA (Cross section A, A and B, B). Yet the configuration of the bedrock appears to be different in A than in B. Please explain/clarify.
- Why in the Cross Section for NDMA, A – A are the levels of NDMA higher than anywhere else in the aquifer at MP5, which indicates by the figures it is 20 to 30 fl below bedrock at 8.8 ug/l's? Please explain.
- Were the data used to established these cross sections consistent, or spread out over multiple rounds?
- Why are no Analytes shown in the Cross Section of the Slurry Wall/Containment Area
- The cross section of Containment Area shows the DAPL is not in contact with Slurry Wall. Yet, the text in the report (Section 2-2) indicates that the" hydraulic conductivity of the design slurry mixture improves over a six month period in contact with the DAPL material. These results suggest that hydraulic performance of the design slurry improves when in contact with DAPL material." Please clarify.

**Response:** *USEPA requested cross sections through the MMBA to better understand the relationship between the WBV topography and vertical distribution of contaminants in the MMBA. Section A-A' was selected to run parallel to the approximate axis of the WBV in the straightest direction and include the largest possible number of vertical well pairs to depict both geology and water quality (both laterally and vertically) and include the Butters Row municipal well. Section B-B' was established to provide a cross section through the WBV with the greatest density of well pairs along the straightest direction, including the Chestnut Street municipal well. The Containment Area cross section was prepared and provided to USEPA at its request during initial review of the IRSWP. This*

*cross section was included since it had been prepared previously. The purpose of the cross section was to convey the relationship of the Containment Area to the South Ditch.*

*The well GW-85D intersects bedrock on the back side of a bedrock knob. The cross section lines are perpendicular to each other and will show different slopes depending on the orientation of the section lines and how they relate to this bedrock knob. Please see Figure 6.2-38 and 6.2-39 in the FSP which show the bedrock topography contours in relationship to the wells.*

*The results for NDMA were simply higher at the lower elevation associated with MP-5 in that section. The highest concentrations of NDMA occur in GW-83D, and comparable concentrations are present in GW-84D.*

*The groundwater results represent average values over the last ten years, and are the same values used in the plan view figures. The NDMA results are more recent, generally being collected between 2003 and 2005.*

*The cross sections were initially drawn to assist USEPA in understanding the physical and hydrologic relationship between the Containment Area and the South Ditch. The figures were not changed from their original submittal to USEPA which occurred at the time USEPA was reviewing the Draft IRSWP.*

*A portion of the slurry wall on the western side of the Containment Area is in contact with DAPL. The independent testing of the slurry wall mixture showed that when DAPL was in contact with the slurry wall material the hydraulic properties of that material improved. It is inferred from the results and physical observations reported that when DAPL was in contact with the slurry mixture precipitation of insoluble minerals occurred in the pore spaces in the slurry. This resulted in the slurry mixture being partially cemented making it less permeable.*

5. Section 8.1 Surface and Subsurface Soil Samples: The first paragraph states "Surface soil samples are to be collected between zero and two feet bgs. Subsurface soil samples will be collected to a depth of 10 feet bgs. This is a variance from the SOW which defines surface soil as zero to six inches and subsurface soil as six inches to ten feet bgs." Please revise this statement to be consistent with the SOW. EPA accepts that surface soil samples will be collected between 0-1 feet, also note as previously stated that samples from below 10 feet are required.

**Response:** *Olin and USEPA have agreed that surface soils to be collected shall be collected from the 0-1 foot depth interval. The existing 0-2 foot data shall also be considered surface soil. Historical data collected from 0-3 feet shall be considered subsurface soil.*

6. Appendix A Historic Summary of Operations:

- There appears to be a large data gap of waste materials and discharges between approximately 1972 – 1986 in the text and Waste Disposal Location (Table 2). Table 1 indicates a time line yet Table 2 and the text contradict the data.

- Table 2 indicates the only major materials produced and discharged on site via wastewater treatment plant was to MDC sewer; yet text in 2.3 and Table 1 indicates from" 1972 – 1986 process liquid wastes from Opex, Kempore, Wytox 312, Nitroprore (OBSh & OT) Expandex 5 PT went to the Pretreatment Plant (neutralization of acid), Lined Lagoons and MDC Sewer, Calcium Sulfate Landfill.
- The only chemicals indicated in table 2 that Olin produced as waste products are Kempore and Opex. Are these the only waste products from 1980 to 1986?
- Once the pretreatment plant was connected to the MWRA sewer system in 1972, there appears to be a loss of data regarding production and the waste stream. Wastewater was still being discharged on site. Not all wastewater was discharged to MWRA system. And surely Opex, Kempore, Wytox 312, Nitroprore (OBSh&OT) Expandex 5 PT were not the only products. For instance, according to Geomega's PCOC list "Constituents Found In Business Records And Correspondence In Geomega's Files", there are thirteen pages, approx. 30 to 40 a page, of products either indicating "pre" Olin or unknown. Please clarify.
- Was Kempore, Opex, Hyrdazine, Wytox, Formaldehyde, etc. removed by the onsite treatment plan before discharged to lagoons, Lake Poly, and subsurface septic systems?
- What constituents, if any, were removed from the portion of the wastewater stream that was not connected to the MWRA sewer system? The assumption cannot be made that when gypsum was removed from the lagoons and place in the calcium sulfate landfill that it removed all contaminants simply by neutralizing the pH.

**Response:** *The information presented in Appendix A is a summary of the information that is available to Olin, and the available information does not document all of the operations and waste disposal practices for the entire duration of the operations at the facility.*

*During the period 1972 to 1986, the facility had already been connected to the MWRA sewer system. During that period of time, the available information indicates that liquid process wastes were pH adjusted (neutralized) prior to discharge to the MDC (Metropolitan District Commission) sewer. During that time, the liquid process waste from the Opex and Kempore manufacturing processes were piped to the lined lagoons where calcium sulfate settled out of solution and accumulated in the bottom of the lined lagoons. The remaining water was then discharged to the MDC sewer. Only four processes that were in operation during this time period did not have a "waste disposal location" listed in Table 2 of Appendix A. All four of the manufacturing processes that operated during that time period, as shown in Table 2 of Appendix A, had no waste materials associated with them (Column Heading "Waste Materials"). Therefore, the lack of an identified waste location is not a data gap.*

*To clarify, between 1972 and 1986, liquid process wastes were only disposed via the sewer system. For some processes, the liquid waste was neutralized in the pretreatment plant, piped to the lined lagoons for settling where the calcium sulfate settled out. The remaining liquid was discharged to the sewer. Periodically, the lined lagoons were drained of water and the solid calcium sulfate (gypsum) was removed from the lined lagoons and was transported to the Calcium Sulfate Landfill for disposal.*

*Table 2 lists numerous chemicals in the column with the heading "Waste Materials". Opex and Kempore were the primary products manufactured during that time period.*

*Table 2 summarizes the information that was available for compilation of an operational history. During the time period of 1972 until closure of the facility in 1986, liquid waste materials were discharged to the MDC sewer. No information indicated that process wastewater was being discharged anywhere on-site other than to the MDC sewer after 1972.*

*The pretreatment plant began operation in 1970. By that time, Lake Poly was no longer used for disposal of process waste (as shown in Table 1 of Appendix A). The available information did not indicate that any process liquid wastes were discharged to on-site septic systems. The septic systems were utilized for sanitary waste. Information concerning removal of materials other than calcium sulfate from the wastewater that was pretreated and pumped to the lined lagoons is not known. It is also not known what constituents were present in that liquid waste.*

*The process liquid wastes from during the period of 1972 to 1986 were discharged to the MDC sewer. The liquid from the lined lagoons was included in the waste discharge to the MDC sewer. No portion of the process liquid waste stream "was not connected to the MWRA sewer". (The MDC has become the MWRA).*

7. Appendix B SOP No. S-1 Low-Flow/Low-Stress Groundwater Sampling: While the SOP closely follows the EPA's Low-Flow Guidance, no direction is given on what to do if the field parameters do not stabilize or achieve the target ranges. Apparent difficulty achieving stabilization or target ranges has been observed in the Semi-Annual status reports. Please indicate the procedures to be followed if parameter stabilization and target ranges are not achieved.

**Response:** *A specific notation will be made on the field data record form, in accordance with guidance, as to the decisions made in the field when field parameters do not stabilize. Typically, a notation will indicate what parameter(s) has not stabilized and the rationale for either collecting a sample or not collecting a sample, or additional efforts made in an attempt to achieve parameter stabilization.*

### **Volume IIB – Quality Assurance Project Plan**

The draft QAPP was reviewed to verify the incorporation of comments provided by EPA in response to the draft Focused Remedial Investigation Report and the adequacy of the planned work to achieve the RI/FS objectives. The comments below are presented as general comments for the entire document and specific for each of the sections of the document. There is some overlap between general comments and specific comments given the complexity of the material and the need to state an idea in more than one presentation.

1. EPA requests that Olin use the EPA Region 1's new QAPP development tool (<http://www.epa.gov/region1/lab/qa/qaprojectplandevtool.html>) to ensure that the QAPP requirements are met.

**Response:** *Olin has reviewed the QAPP development tool and the applicability to development of this project QAPP. Based on the development tool review, Olin has determined that use of the Region I QAPP Guidance document covers the information presented in the referenced development tool guideline. USEPA subsequently acknowledged that this tool was not intended for the stated purpose.*

- There are several worksheets that list methods, matrices, and/or analytes that are not consistent as to the combinations of tests that will be conducted. Additionally, the order of the methods, matrices, and analytes is not presented the same from worksheet to worksheet, which makes it more difficult to verify that all tests are accounted for, and has led to inconsistencies throughout the document. In the final QAPP, all analytes and methods that are to be tested on each matrix must be listed on each worksheet appropriately. This includes preparation of the worksheets in a consistent order by test and matrix to aid in review. Some inconsistencies are noted in the specific comments below.

**Response:** *The revised QAPP will be re-ordered to present the methods and matrices in the same order from worksheet to worksheet throughout the document. Worksheet #9b's will be presented in the following order: Media (GW, SW, Soil, SD) and then by method (VOC, SVOC, Pest, PCB, Herb, Metals, Wet Chem, additional project compounds).*

- Because of the issues noted in item 2, it is not clear as to the testing that is planned under this program. One comprehensive table showing all the methods, matrices, and analytes that are planned to be sampled is advised, even if it may be an overlap of the Field Sampling Plan (FSP).

The analyte lists presented in Worksheet #9B and the Final RI Analyte List published in August 2008 was compared and discrepancies are noted as summarized below. These discrepancies need to be explained and addressed.

Analyte	Parameter	Method	On RI List	On Worksheet 9b
1,1,1,2-Tetrachloroethane	VOC	8260	Yes	No
1,2,4-Trimethylbenzene	VOC	8260	Yes	No
Benzophenone	SVOC	8270	Yes	No
Diphenylamine	SVOC	8270	Yes	No
Aroclor-1262	PCBs	8082	Yes	No
Aroclor-1268	PCBs	8082	Yes	No
Total PCBs	PCBs	8082	No	Yes
PAHs	PAHs	8270 Low	Yes	No
Herbicides	Herbicides	8151	No	Yes
Pesticides	Pesticides	8081	No	Yes
Perchlorate	Perchlorate	6850	No	Yes
Acetaldehyde	Formaldehyde/Acetaldehyde	8315	No	Yes

**Response:**

<i>Analyte</i>	<i>Parameter</i>	<i>Method</i>	<i>On RI List</i>	<i>On Worksheet 9b</i>	<i>OLIN Response</i>
<i>1,1,1,2Tetrachloroethane</i>	<i>VOC</i>	<i>8260</i>	<i>Yes</i>	<i>No</i>	<i>Will add to Worksheet 9b</i>
<i>1,2,4Trimethylbenzene</i>	<i>VOC</i>	<i>8260</i>	<i>Yes</i>	<i>No</i>	<i>Will add to Worksheet 9b</i>
<i>Benzophenone</i>	<i>SVOC</i>	<i>8270</i>	<i>Yes</i>	<i>No</i>	<i>Will add to Worksheet 9b</i>
<i>Diphenylamine</i>	<i>SVOC</i>	<i>8270</i>	<i>Yes</i>	<i>No</i>	<i>*See below</i>
<i>Aroclor-1262</i>	<i>PCBs</i>	<i>8082</i>	<i>Yes</i>	<i>No</i>	<i>Will add to Worksheet 9b</i>
<i>Aroclor-1268</i>	<i>PCBs</i>	<i>8082</i>	<i>Yes</i>	<i>No</i>	<i>Will add to Worksheet 9b</i>
<i>Total PCBs</i>	<i>PCBs</i>	<i>8082</i>	<i>No</i>	<i>Yes</i>	<i>Will remove from Worksheet 9b</i>
<i>PAHs</i>	<i>PAHs</i>	<i>8270 Low</i>	<i>Yes</i>	<i>No</i>	<i>**See below</i>
<i>Herbicides</i>	<i>Herbicides</i>	<i>8151</i>	<i>No</i>	<i>Yes</i>	<i>***See below</i>
<i>Pesticides</i>	<i>Pesticides</i>	<i>8081</i>	<i>No</i>	<i>Yes</i>	<i>***See below</i>
<i>Perchlorate</i>	<i>Perchlorate</i>	<i>6850</i>	<i>No</i>	<i>Yes</i>	<i>Compound currently planned for analysis</i>
<i>Acetaldehyde</i>	<i>Formaldehyde/Acetaldehyde</i>	<i>8315</i>	<i>No</i>	<i>Yes</i>	<i>Compounds currently planned for analysis</i>
<i>Acetaldehyde</i>	<i>Formaldehyde/Acetaldehyde</i>	<i>8315</i>	<i>No</i>	<i>Yes</i>	<i>Compounds currently planned for analysis</i>

*\*diphenylamine will be represented as either n-nitrosodiphenylamine or diphenylamine in Worksheet 9b. An additional clean-up step will be used by the lab to separate diphenylamine and n-nitrosodiphenylamine.*

*\*\* PAHs are included in Worksheet 9b under the Method 8270C SVOCs.*

*\*\*\* OLIN is keeping Herbicides and Pesticides in the QAPP for possible future analysis.*

*Olin will present a table in the document that precedes Worksheet 9b that will show methods, matrices and analytes that are planned to be sampled (Table 6.1 in the QAPP). Olin's response for individual analytes listed is contained in the table above.*

4. There are a few analytes being tested by more than one method. It may be advisable to limit the testing of these analytes to one method to avoid possible discrepancies of results.

<b>Analyte</b>	<b>Method 1</b>	<b>Method 2</b>
1,2,4-Trichlorobenzene	8260	8270
1,2-Dichlorobenzene	8260	8270
1,3-Dichlorobenzene	8260	8270
1A-Dichlorobenzene	8260	8270
Hexachlorobutadiene	8260	8270
Naphthalene	8260	8270

**Response:** *These analytes are included in both lists under the MCP Program. These analytes are separated under CLP. In samples where both VOCs and SVOCs are analyzed, and report a common analyte, the quantitative data assessment will use the highest detected value for detected compounds and the lowest detection limit for non-detected compounds.*

5. Some of the inorganic methods should be evaluated and updated to currently approved EPA methods. Several cited methods have been deleted from both the Clean Water Act (CWA, 40 CFR Part 136) and Safe Drinking Water Act (SDWA, 40 CFR Part 141). Additionally, there are some discrepancies in the QAPP, listing different methods for these parameters, suggesting knowledge of the approved methods. If there is potential application to these programs, the methods currently proposed for the following inorganic tests should be updated:

<b>Parameter</b>	<b>QAPP Method</b>	<b>Approved Method</b>
Hardness	130.2	SM2340B or C
pH	150.1	SM 4500-H+B
TDS	160.1	SM 2540C
TSS	160.2	SM 2540D
Sulfide	376.1	SM 4500SO2
COD	410.1	SM 5220C
TOC	415.1	SM 5310B,C, or D

**Response:** *Olin will review the methods listed in the column titled “Approved Method” with the analytical laboratory performing the analysis and update the QAPP accordingly.*

6. In Worksheet #9d, no backup laboratories are identified. As no volume of samples and sampling schedule are presented in the QAPP, the need for backup laboratory capacity may need to be reconsidered based on sample volume and turnaround time requirements. Some discussion of laboratory capacity and capability to manage the sample load may be warranted.

**Response:** *Currently, Olin plans to use TestAmerica in Westfield, Massachusetts, for the majority of the analyses presented in the QAPP. The Westfield laboratory is part of a large network of labs in the TestAmerica network. Other TestAmerica labs have the ability to serve as a back-up for the Westfield lab.*

7. Laboratory certifications were provided in Appendix E. Appendix E was not listed on the Table of Contents or on the List of Appendices. The laboratory certificates show that all of the proposed laboratories hold NELAP certification and two of the laboratories (Katahdin and Test America Laboratories, Westfield) hold Massachusetts State Certification. However, as some of the certifications have expired or will be expiring soon, current certification at time of sampling should be verified.

**Response:** *Olin will update the Table of Contents to include Appendix E. Current certifications will be included in the revised QAPP.*

8. No laboratory audits are planned for this project at this time. It is strongly suggested that at least a kick off meeting for the project be held with the laboratories that are involved to review the scope of work and the requirements of the QAPP, just as there is a field kick off meeting. If the QA Officer has not audited the primary laboratory before, it is also advised that this be done before or during the project to be assured that all quality elements of the project are in place.

**Response:** *The requirements in the QAPP and laboratory SOW will be reviewed with the laboratory at the beginning of field sampling activities. No lab audits are planned; however, the QA Officer will request documentation of audit reports from recent lab audits and review observations and findings. Based on these audit reviews a decision will be made if Olin needs to perform an audit for this program. If no major findings are documented, then no project-specific audit will be completed.*

9. Section 1: The Title and Approval Page title do not match the actual title on the cover page of the document. Please make them consistent.

**Response:** *The Title and Approval Page will be revised accordingly.*

10. Section 2: The anticipated date of QAPP implementation is listed as Spring 2008. Should this be Spring 2009?

**Response:** *Olin will revise the anticipated date of the QAPP implementation to Spring 2009.*

11. Section 3: There are various QAPP sign off sheets but none for the laboratories. It is suggested that one be provided for the laboratories as they are a key component of implementing this QAPP.

**Response:** *Olin will add a sign off sheet for laboratories under Worksheet #4.*

12. Section 4: Olin Corporate Project Manager and Site Manager are used interchangeably. Please use one consistent title, if possible. What is the role of the Site Team Leader? The Project Chemist is discussed but not listed on Worksheet #5a/5b. This staff position should be added to the worksheet. The addition of the laboratories and field staff to Worksheet #5a/5b is suggested to include the organization and communication pathways. Staff listed on Worksheet #6 are not shown on Worksheet #5a/5b. Please correlate these worksheets. What role does Geomega play on the project? They are listed on Worksheet #5a/5b but are not discussed in the text.

**Response:** *Olin will add the Site Team Leaders role to Section 4.3.1 in the QAPP. Olin will update Worksheet #5a/5b to correlate with Worksheet #6. Olin will update Section 4.3 to include Geomega's role on the project.*

13. Worksheet #9b: Comments related to this worksheet follow:

- a) Ammonia is listed with a laboratory SOP only. Please include the appropriate EPA or Standard Method reference method in the table.
- b) The attached Table I is a summary Worksheet #9b for each parameter by matrix. This table shows that there are 22 missing worksheets for the parameter/matrix combinations, including NDMA for drinking water. Please provide the missing worksheets.
- c) Pages 6-18 and 6-20, Selenium should be added to method 6020 to meet the PAL of 5 µg/L.
- d) The PAHs using the 8270C low concentration procedure are not included in the worksheet to show how well the laboratory QLs will achieve the PALs. Please include these analytes in a separate table.
- e) Page 6-23, Thallium PAL is not met for GW by 6010B. It can be met by 6020 at 1 µg/L. This should be considered as an option.
- f) Page 6-27, the analytical parameter should be PCBs and the method should be 8082.
- g) Pages 6-29-6-32, there are several MDLs that are listed as "TBD". Does this mean that the laboratory is not prepared to analyze these compounds? Also, it should be noted that the MDLs typically are updated annually and therefore, will not necessarily be the same at the time of reporting.
- h) It is suggested that this worksheet be put in order of the method references (L-1, L-2, etc.) and by matrix (all SW, then all GW, etc.) to make it easier to find the information and account for all parameters.
- i) The groundwater PALs should also be reviewed against the USEPA 2008 *Regional Screening Levels for Chemical Contaminants. Residential Tap Water*. September 22.
- j) Parameters other than NDMA are being tested for in private wells and should be listed for drinking water.

**Response:**

- a) *The method currently proposed (Quikchem 10-107-06-1-A) is an USEPA approved method used by TestAmerica which utilizes the Lachat instrument for ammonia analysis. This method is similar to EPA Method 310.1. Method 310.1 will be added to ammonia worksheets*
- b) *Worksheet # 9b will be organized as per Comment 2 and reviewed for completeness.*
- c) *Selenium will be reported by Method 6010B and results will be reported to MDL to meet PAL.*
- d) *TAL-Westfield has developed a low concentration 8270 analysis that provides results for the full list of SVOC target compounds and simultaneously obtains low detection limits for PAHs. This procedure is proposed for routine SVOC analysis. Olin recommends keeping the PAHs included under low concentration Method 8270C as listed in the Worksheet 9b.*
- e) *The QAPP will be revised to indicate that thallium will be reported using Method 6020 for groundwater samples.*
- f) *Olin will make this change.*

- g) *Olin has plans in place with the laboratory to complete a MDL study for the compounds that have a TBD in the MDL column. The MDL studies will be completed when the lab is contracted for the Olin project.*
- h) *See Comment #2. Similar re-ordering will be completed for other applicable worksheets. Olin recommends leaving Worksheet #20 ordered by SOP Reference #.*
- i) *Olin will include contaminant levels in revised Worksheet 9b and evaluate these when identifying groundwater PALs.*
- j) *The first round of residential well sampling was done at the request of the USEPA and analysis of these samples was performed using USEPA drinking water methods (i.e., 524, 525). Wells with detections of NDMA were re-sampled and samples were analyzed using SW-846 methods that are currently presented in the QAPP (i.e., 8270C for SVOCs). Olin proposes that samples collected during future residential well sampling (at the request of USEPA) be analyzed by methods currently presented in the QAPP (8270C, 8260C, etc.) for groundwater which include a comprehensive list of analytes from the Massachusetts MCP list, Superfund CLP list (including TICs), and other site-related parameters.*

14. Worksheet #9d: Comments related to this worksheet follow:

- a) The preparation method for VOC in SO, SD should be 5035, not 5030.
- b) The other preparation method to add for SVOC in SO, SD should be 3550.
- c) Preparation methods are not consistently referenced on this worksheet (e.g., PAH has no preparation method referenced).
- d) Method 6020 is indicated for SO, SD on this worksheet but not on other worksheets.
- e) Alkalinity is referenced as method SM 2320B on this table but as 310.2 on others.
- f) Hardness is referenced as method SM 2340B on this table but as 130.2 on others.
- g) Ammonia is referenced as "QuickChem" method on this table but as Lachat on others.
- h) Add sediments to Formaldehyde/Acetaldehyde.

**Response:**

- a) *The requested change will be made in the document.*
- b) *The requested change will be made in the document.*
- c) *Preparation methods will be referenced in the final document.*
- d) *Project Action Limits (PALs) are met by Method 6010B for soil and sediment. The reference to Method 6020 will be removed.*
- e) *The method will be updated on the appropriate worksheets to SM 2320B.*
- f) *The method will be updated on the appropriate worksheets to SM 2340B.*
- g) *Ammonia by Quikchem 10-107-06-1-A will be updated on the appropriate tables. See Comment 13a.*
- h) *Worksheet #9d will be updated for formaldehyde in sediments.*

15. Section 7: Page 7-10, Atrazine is listed as one of the analytes for groundwater that has a PAL lower than the laboratory QL. No MDL is available. Atrazine is not further discussed. On page 7-14, decanting of sediment and soil samples before final shipment is indicated. Because this is not possible to do for the volatile fraction, a separate moisture aliquot should be collected for the volatile samples. Section 7.2.12 should include the use of PE samples for pesticides and herbicides analyses to be consistent with that shown in Worksheet #9c.

**Response:** *For atrazine, plans are in place with the laboratory to complete a MDL study when the lab is contracted for the project.*

*A separate jar will be collected for percent moisture determination for VOCs.*

*Section 7.2.12 will be update to include PE Samples for herbicides and pesticides.*

16. Worksheet #11: Comments related to this worksheet follow:

- a) Sediment is only listed for hydrazine. It needs to be added to all other applicable parameters.
- b) This is the first worksheet where total and dissolved metals are indicated. This should be updated consistently throughout the QAPP.
- c) The sensitivity DQI is missing from several parameters: Opex and Kempore; hydrazine; formaldehyde and acetaldehyde; nonyl phenols; DMF; phthalic anhydride; alkalinity, conductivity, ammonia, COD, sulfide, TOC, and anions; TDS, TSS, and pH; and perchlorate.
- d) Sampling methods S-3 and S-15 are listed for surface water and groundwater on Opex and Kempore, which are for solid sampling.
- e) Sampling methods S-1 and S-2 are listed for soils and sediments on hydrazine, which have been used for aqueous sampling.

**Response:**

- a) *Worksheet #11 will be reviewed and other applicable parameters added.*
- b) *Worksheet #11 covers analytical specifications. For the analyses parameters covered in this worksheet there is no difference between total and dissolved samples. Collection of dissolved metals is detailed in the Groundwater Sampling SOP in the Field Sampling Plan.*
- c) *Sensitivity DQIs will be added to Worksheet #11.*
- d) *Methods S-3 and S-15 will be removed for Opex® and Kempore®.*
- e) *Proper sampling methods for soils and sediments will be update for hydrazine in Worksheet #11.*

17. Worksheet # 12b: Comments related to this worksheet follow:

- a) A separate 2 oz. jar for percent moisture should be included for VOC in soils and sediments.

- b) The DI water preserved VOC soils and sediment vials should not be frozen. The HT should be 14 days to analysis.
- c) VPH sample volume for surface water and groundwater should be 3 x 40 mL not 2 x 1L.
- d) The sample volume and number of containers for Metals (total and dissolved) for surface water and groundwater should be doubled as one volume will be needed for total metals and one for dissolved metals.
- e) The DMF method reference should be 8033, not 8330.
- f) Alkalinity is referenced as method 310.1 on this table but as 310.2 on others.
- g) Hardness is referenced as method SM 2340B on this table but as 130.2 on others.
- h) Ammonia is referenced as "QuickChem" method on this table but as Lachat on others.
- i) Sampling method S-2 is titled, "Surface Water and Sediment Sampling". Based on that, should this table show S-2 as a Sampling SOP reference for the sediments matrix?

**Response:**

- a) *A separate soil jar for percent moisture will be added to Worksheet #12 for VOCs.*
- b) *The change will be made to Worksheet #12.*
- c) *The change to Worksheet #12 will be made to reflect 3 x 40 mL vials for VPH.*
- d) *The change Worksheet #12 will be made to reflect this bottle addition.*
- e) *Worksheet #12 will be updated to reflect the DMF reference.*
- f) *Alkalinity will be analyzed by SM 2320B. Method 310.1 and 310.2 will be updated to SM 2320B.*
- g) *Hardness will be analyzed by SM 2340B, and updated in this worksheet.*
- h) *Ammonia will be analyzed by Quick Chem-Lachat 10-107-06-1-A, and updated in this worksheet.*
- i) *This worksheet will be updated to present S-2 as the SOP when sediment is being collected.*

18. Worksheet # 15: Calibration of groundwater field monitoring equipment for pH, specific conductance, DO, temperature, and turbidity should be included in this worksheet. Also, calibration of the PID meter and water level meter.

**Response:** *The calibration of groundwater field equipment is presented in Worksheet #18.*

19. Section 10: Page 10-11, one of the methods for collecting surface soil samples is direct push. If so, should S-16 be indicated on appropriate worksheets? Page 10-14, verification of acid preservation is discussed, however, it is unclear if this will also be done on volatile organic samples because in one sentence it's stated that it will not be done and at the top of page 10-15, it indicates that the vial used for confirmation of preservation will be discarded. Please clarify. It appears that Figure 10-1 is not referenced in the text.

**Response:** *Field sample collection method S-16 will be updated on the appropriate worksheets. The verification of preservation of aqueous VOC samples will be clarified in Section 10. The pH of aqueous samples will be confirmed at the analytical laboratory. A reference for Figure 10-1 will be added.*

20. Section 12: This section indicates that copies of the laboratory's QA manuals are in Appendix B. However, even though there are 7 laboratories being used for this project, only one laboratory QA manual was in Appendix B. Please clarify contents of Appendix B. It is not necessary to include all of the laboratory's QA manuals in the QAPP. The hydrazine SOP is not provided as it is considered proprietary. In section 12.2.1 the reporting limit for NDMA in ground water is stated as 2 ng/L and as 5 ng/L. Please clarify that it is 2 ng/l. In order to reduce NDMA background, it may be necessary to pre-extract laboratory glassware before extraction of field samples. Herbicides and hydrazine are missing in worksheet #21.

**Response:** *A clarification of the contents of Appendix B will be made in Section 12. The primary lab's QA manual will be included in Appendix B. The reporting limit on NDMA in groundwater will be clarified to be 2 ng/L. Herbicides and hydrazine will be added to Worksheet #21.*

21. Worksheet #20: Comments related to this worksheet follow:

- a) Region I NEST Method Codes could be completed for more parameters instead of listing NA. For example, L-1 should be listed as 601 OB/7470A16020A.
- b) L-34 (Alkyl phenols) has a note that SOP is proprietary and will be furnished to Olin by special request. However, this SOP is in Appendix B. This note likely belongs on L-24 (hydrazine). See item 11 comment.
- c) Methods that are indicated they are modified for project work are: L-3 (VOCs), L5 and L-6 (NDMA), and L-27 and L-28 (PCBs). Of these methods, only NDMA are addressed in the text as to the modifications for the project.
- d) Other methods that are not based on EPA methods are project specific methods that should be marked as modified on worksheet #20 are: Opex and Kempore; hydrazine; alkyl phenols (modified GC/MS SIM); phthalic anhydride (acid) [modified method 8000]; and DMF (modified method 8033).

**Response:**

- a) *The NEST methods codes will be updated in Worksheet #20.*
- b) *This note will be moved to L-24.*
- c) *VOCs, Pest and PCB methods will not be modified and Worksheet #20 will be updated to reflect this.*
- d) *Worksheet #20 will be updated to identify these methods as modified.*

22. Worksheet #22a: Comments related to this worksheet follow:

- a) The inorganic parameters are listed over 3 tables. It makes sense to put at least the same method together, for instance method 300 analytes, chloride, sulfate, nitrate, and nitrite.
- b) Page 13-11, DMF is misspelled.
- c) The sediment (SD) matrix is missing for all applicable parameters.
- d) Page 13-27 introduces hexavalent chromium for the first time as a parameter. This analyte will need to be updated throughout all the tables.

**Response:**

- a) *Analytes will be combined when applicable.*
- b) *This spelling correction will be made.*
- c) *Sediment (SD) will be added for applicable methods.*
- d) *Hexavalent chromium will be added to other applicable worksheets.*

23. Worksheet #22b: This worksheet is only prepared for VOCs, SVOCs, PAHs, Pesticides, PCBs, Herbicides, and metals, showing field duplicate precision. What about all of the other parameters with field duplicate criteria? Page 13-1 indicates this worksheet summarizes information for each parameter, matrix and method.

**Response:** *Worksheet #22b will be removed from the QAPP. Information presented in Worksheet #22b will be presented in Worksheet #22a.*

24. Worksheet #24a: Hydrazine in soil is not listed on a table and sediment matrix for all applicable parameters. It should be provided on tables.

**Response:** *Hydrazine will be updated on applicable tables and a reference to sediment matrix will be included in Worksheet #24a.*

25. Section 16: Again, a laboratory audit of the primary laboratory is strongly suggested to ensure the project scope and requirements are understood. Page 16-7, another potential action would be qualification of the data and/or limited use of the data.

**Response:** *Olin will review current lab audits (provided by the lab) that have been recently completed under other programs. Based on these audits, a decision will be made if Olin needs to perform an audit for this program. Second comment from page 16-7 is noted.*

26. Section 18: Why are only VOCs, SVOCs, and metals subjected to Tier II (90%)/Tier III (10%) data validation? This should be stated in this section. Is the level of validation sufficient for the use of the data? Describe what instances the level of validation would be increased.

**Response:** *Tier II and Tier III are identified for methods that have Region I validation guidelines (VOC, SVOC, Pest, PCB and metals). Region I guidelines are not provided for the other analytical methods. For these methods project-specific validation procedures have been developed by Olin. Chemist reviews and/or full validation procedures for these methods will be described in the revised document.*

27. Worksheet #29b: Comments related to this worksheet follow:

- a) Hydrazine in soils and sediments are missing from the table.
- b) NDMA in drinking water is not covered in the table.
- c) Alkyl phenols for all matrices are missing from the table.
- d) DMF and phthalic anhydride (acid) for surface water and groundwater are missing from the table.

**Response:** *Worksheet #29b will be reviewed for completeness and updated where necessary.*

28. Section 19: The data validation checklists that are proposed are not the Region I data validation checklists. Verify this is acceptable to Region I QA.

**Response:** *For VOCs, SVOCs, pesticides, PCBs, and metal, data validation checklists that have been prepared by MACTEC to summarize checks specified in USEPA Guidelines are proposed for use in documenting validation activities. These checklists are used in association with the written Region I guidelines. Olin Level I and Chemist Review checklists are prepared for methods that do not have EPA Region I guidelines. They provide documentation of a Tier II type review. In addition to the Level I and Chemist Reviews, full validation following general procedures described in USEPA Region I guidelines and the professional judgment of the project chemist will be completed on a subset of data. This information will be added to Worksheet #29b. Olin recommends verification of acceptability from USEPA.*

### **Volume III – Health and Safety Plan**

The following comments are concerning the Health & Safety Plan (HASP), which is Volume III of the Draft Project Operations Plan (no general comments provided).

1. Section 3.3 Safety Hazards: Heat Stress is missing from the list of identified safety hazards at the Site. Due to the fact that on-site activities could be performed during any season, a discussion of heat stress should be included in this section.

**Response:**

*Heat stress and the mitigation/controls are listed in the SFJHA Field Work – General in Appendix E. MACTEC will add language to Section 3.3 (before or after Cold Stress) as follows:*

*Due to the increase in ambient air temperatures and the effects of protective outer wear decreasing body ventilation, there is increased potential for injury, specifically heat casualties during the summer months. Site personnel will be instructed in accordance with Site safety procedures and first aid practices in the identification of a heat-related emergency, the first-aid treatment procedures for the victim, and the prevention of heat stress casualties. All personnel will follow the safe practices outlined in the SFJHA Field Work – General for heat-related emergencies contained in Appendix E.*

2. Section 3.5.4 Site Monitoring Plan: There is no discussion included regarding air monitoring for volatile organic compounds (VOCs) during groundwater sampling activities. The Job Hazard Analysis – Short Form for groundwater sampling included in Appendix E describes the air monitoring actions to be taken during groundwater sampling. A description of air monitoring procedures during groundwater sampling should be included in the text of Section 3.5.4.

**Response:**

*Table 3-2 indicates that air monitoring for VOCs will be conducted for “All Tasks.” To clarify that air monitoring will be done during groundwater sampling tasks, Sections 3.5.4.1 Volatile Organic Compounds and 3.5.4.3 Direct Reading Instrumentation will be revised to indicate that continuous total VOC air monitoring using direct reading instruments such as a PID will be conducted in the worker breathing zone during all Site investigation work.*

3. Appendix B Material Safety Data Sheets (MSDS): Table 1-1: Site Chemical Inventory on Page 1-10 lists the chemicals brought on-site by personnel. The following chemicals are listed in Table 1-1, but the MSDSs are missing from Appendix B: Bentonite, Liqui-Nox, and Portland Cement.

**Response:**

*The correct spelling of the chemical used for decontamination purposes is Liquinox. Table 1-1 will be revised to reflect the correct spelling of the chemical. The material safety data sheet (MSDS) included in Appendix B reflects the correct spelling.*

*As indicated at the bottom of Table 1-1, the MSDSs included in the draft HASP for Bentonite and Portland Cement were included for reference. The actual products and their MSDSs will be provided by the driller.*

4. Appendix D HASP Addendum: Sampling in the Maple Meadow Brook: On pages 3-16 and 3-17, the Project Manager's signature is missing from the "Certification of PPE Hazard Assessment" section.

**Response:**

*The Certification of PPE Hazard Assessment will be signed by the Project Manager in the Final document, and is included in the revision.*

5. Appendix D HASP Addendum: Sampling in the Maple Meadow Brook: The table titled "Site Chemical Inventory" in Section 4.0 lists the chemicals brought on site by personnel and is the list of MSDSs provided in the addendum. The MSDS for Alconox is included, but is not listed in the table. Alconox should be added to the table if it will be used by on-site personnel.

**Response:**

*The decontamination chemical, Alconox, will be added to the chemical inventory table in Section 4.0 of Appendix D HASP Addendum.*