APPENDIX L

RESPONSE TO COMMENTS CHECKLIST TABLE (PRI) AND DRAFT RI/ HHRA/ BERA

(Provided on CD)

APPENDIX L

RESPONSE TO COMMENTS CHECKLIST TABLE (PRI)
(Provided on CD)

Table L-1
Response to Comments Table
Remedial Investigation Report - OU1 and OU2
Olin Chemical Superfund Site
Wilmington, Massachusetts

Section: Specific Comments/Supplemental Information **Comment No. 1A** **Comment Title: RI Supplemental CD**				
EPA Comment	**Olin Response to EPA**	**Nobis Response to Olin**	**Olin Response to Nobis**	**Resolution**
CD ROM was submitted with the Draft Report containing digitized data. However, the information provided was limited to data points collected during the RI field work. In order to provide an effective review of the Report, a supplemental CD ROM should be submitted that contains complete digitized results for all historical samples used quantitatively in the OU1 RI nature and extent discussion or risk assessments	USEPA access to the historical data was previously provided in an online data access tool. However, to facilitate review of the Preliminary RI, Olin will provide to USEPA, for USEPA use, a supplemental CD that contains the historical and recent OU1 soil, surface water, and sediment analytical data considered in the Preliminary RI (in the same flat file format requested by USEPA for the data collected for the RI sampling events). Figures showing delineation of specific source areas and extent of impacts (see attached comments for specific examples) will be included in the revised RI Report.	EPA is awaiting the CD. Please be sure historical samples used quantitatively are clearly indicated as such. Olin says it will provide data for all samples considered in the RI.	Olin will provide the requested information on a supplemental CD with the Draft RI report.	CD is included with the Draft RI Report.

Section: Specific Comments/Supplemental Information **Comment No. 1B** **Comment Title: Source Area Figures**				
EPA Comment	**Olin Response to EPA**	**Nobis Response to Olin**	**Olin Response to Nobis**	**Resolution**
Figures showing delineation of specific source areas and extent of impact	The OU1 Preliminary RI report clearly presented soil contaminant distribution figures (for current, post-remedial conditions) for the parameters most frequently detected at concentrations above industrial RSLs. The comprehensive contaminant distribution figures effectively show nature and extent of contamination. To facilitate review of the figures and to provide additional perspective, various process areas and waste disposal features will be outlined on each of the contaminant distribution figures.	EPA is awaiting the figures with sources.	Olin will provide the requested figures with the Draft RI report in sections 1 through 5.	Figure 1.3-1 includes current and historic site features with labels for each. This should be considered a reference figure. Figures 4.1-1 through 4.1-28 are chemcial distribution figures, which also show the current and historical features that are included in Figure 1.3-1 and which are discussed in section 2.0 of the RI Report.

Section: Specific Comments/Supplemental Information
Comment No. 1C
Comment Title: OU1 to OU3 Data Comparison

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
While OU3 is not part of the OU1 study area, the interaction between chemicals in soil and groundwater must be evaluated, particularly with regard to chemicals in soil, which may continue to leach to area groundwater. Therefore, a comparison of OU1 to OU3 data collected to date, and anticipated to be included in upcoming Remedial Investigation reports, is necessary to identify areas where further soil and/or groundwater sampling may be warranted. Figures depicting the location of soil contamination in relationship to groundwater monitoring wells and vice versa would be helpful	Based on a review of the surface (0-1 ft) and shallow subsurface (1-10 ft) soil and the on- Property shallow groundwater data (2007 to present) for several compounds, there appears to be little evidence of leaching from soils to groundwater at the site. Published USEPA Leaching-based Soil Screening Levels (SSLs) will be considered supplemental information to be considered with the evaluation of a comprehensive data set of soil and shallow groundwater. The SSLs are very conservative, and assume that the potential receiving groundwater is drinking water. At OU1, only a small portion of the property has groundwater that is classified, per Massachusetts criteria, as a current or potential future drinking water resource. Only a small portion of the property (northeast corner) is located within the Zone II (zone of contribution) of the Wilmington Town Wells. To evaluate evidence of leaching of contaminants from soil to shallow groundwater, the OU1 soil data summaries (Preliminary RI Tables 4.1-1 through 4.1-3) were compared to on- Property shallow groundwater data (2007 to present) as an initial screening step (attached Tables 1-1 through 1-3). Shallow groundwater samples were obtained from monitoring wells screened across the water table or within 5 feet of the water table (the list of shallow monitoring wells is identified in Table 1-4). The existing soil and shallow groundwater data are the best means for evaluating the current leaching to groundwater. Based on historical and most recent data, deeper groundwater has clearly been impacted most by historical liquid process waste disposal activities that occurred during facility operations prior to connection of the facility to the public sewer system in the early 1970s and prior to Olin ownership. Releases to soils during the manufacturing processes ceased in 1986 (when the facility ceased operations) or earlier. Therefore, releases to soil would have occurred at least 26 years ago. There are fewer volatile organic and semivolatile organic compounds detected in shallow groundwater than in soil. Trimethylpentenes are the most frequently detected VOCs in both soil and groundwater. The most frequently detected semi-volatile organic compounds in shallow groundwater are bis(2-ethylhexyl)phthalate, diphenyl ether, and N-nitrosodiphenylamine. Several polyaromatic hydrocarbon compounds frequently detected in surface soil samples have not been detected or have been detected in only one groundwater sample during the RI. Acetaldehyde, formaldehyde, and phthalic acid/anhydride have been detected in soil samples but not in any shallow groundwater samples. Figures displaying contaminant distribution for on-Property shallow groundwater with soil contaminant distribution for several compounds were prepared to evaluate potential leaching concerns (Figures 1-1 through 1-8). Groundwater data used in these figures is the average of the two rounds of RI groundwater sampling. To facilitate review of the figures and to provide additional perspective, various process areas and waste disposal features have been outlined on each of the contaminant distribution figures. The relationship of contaminant distribution in shallow versus deeper overburden groundwater was also considered in the context of potential for leaching of contaminants from unsaturated soil to groundwater. It should be recognized that the historical liquid waste disposal activities appear to be the predominant but not the only contributors to groundwater impacts (e.g., Plant B production area TMPs and Plant B Tank Farm Area TMPs, phthalates, and processing oil). The OU1 soil and groundwater data summaries (Tables 1-1 through 1-3) were evaluated to identify parameters that were detected frequently (greater than 5 detections) in both soil and groundwater. Based on detection frequencies and site history, contaminant distribution figures were developed for shallow subsurface soil (1-10 ft) and the corresponding shallow groundwater for the following compounds: • total trimethylpentenes (Figure 1-1); • bis(2-ethylhexyl)phthalate (Figure 1-2); • n-Nitrosodiphenylamine (Figure 1-3); • calcium (Figure 1-4); • chromium (Figure 1-5); • nitrogen, ammonia (Figure 1-6); • sulfate (Figure 1-7); and • hydrazine (Figure 1-8). Additional figures were created for surface soil (0-1 ft) and the corresponding shallow groundwater for sulfate (Figure 1-9), and shallow subsurface soil (1-10 ft) and the corresponding deep groundwater for sulfate (Figure 1-10) and chromium (Figure 1-11). Total trimethylpentenes have shallow subsurface soil concentrations ranging from 0.001 to 1,510 mg/kg, predominantly in the areas of the Plant B Production Area and Plant B Treatment Area, Lake Poly, the Buried Debris Area, and Drum Area A (Figure 1-1). Most other areas on the northern portion of the site have no trimethylpentenes detected. Shallow groundwater detections of total trimethylpentenes are located at the Plant B Production Area and Tank Farm as well as around the Slurry Wall/Cap. The trimethylpentenes in shallow groundwater at the Plant B Production Area and Plant B Treatment Building appear to be related to releases of liquid product and processing oil-containing trimethylpentenes, respectively. The trimethylpentenes in shallow groundwater samples along the perimeter of the Slurry Wall/Cap appear to be related to diffuse groundwater. Bis(2-ethylhexyl)phthalate (BEHP) was detected at concentrations of 0.012-8,600 mg/kg in shallow subsurface soil with the highest concentration in the area of the Plant B Treatment Building, Lake Poly, and the Buried Debris Area (Figure 1-2). BEHP was generally not detected in shallow groundwater samples from the former Lake Poly area. The maximum detected BEHP concentration in shallow groundwater is located in the Central Wetland (GW-17S) and is 0.00105 mg/L, which does not exceed the drinking water Maximum Contaminant Level of 0.006 mg/L for bis(2-ethylhexyl)phthalate. The bis(2-ethylhexyl)phthalate in shallow groundwater at the Plant B Treatment Building appear to be related to processing oil containing bis(2-ethylhexyl)phthalate. Given the wide range of soil concentrations and the very low concentrations of BEHP in shallow groundwater, leaching of BEHP does not appear to be of concern.	Olin provided a comparison of soil 0-10 ft to shallow groundwater and pledged to provide comparison to SSLs as a supplement to discussion comparing shallow soil and groundwater data. Conclusion that there is little evidence of leaching from soils to groundwater at the Site is unsupported and incomplete without a point by point comparison of data to the leachability criteria. Please also compare deep soils to groundwater. Comparisons to leaching-based SSLs are required for soil at all depths across whole site. All groundwater at the site will be evaluated as potential drinking water, as specified in OSWER Directive 9283.1-33, regardless of state defined zones. Refer to state Groundwater Use and Value Determination, 2010. Copies of both of these references are attached.	Olin reviewed the approach previously prepared to evaluate leaching to groundwater with EPA during the October 11, 2012 meeting. EPA concurred that the evaluation of leaching to groundwater presented in the response to comments, dated April 3rd 2012, met EPA's objectives and requested that we provide this rationale in the Draft RI report. The information will be presented in the Draft RI report as requested.	Appendix J - Soil leaching Documentation includes the evaluation of potential leaching of chemicals in soil to groundwater. The evaluation previously presented in the April 3, 2012 response to comments has been included in Appendix J.

Section: Specific Comments/Supplemental Information
Comment No. 1C
Comment Title: OU1 to OU3 Data Comparison

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
	N-nitrosodiphenylamine was detected in shallow groundwater in the Plant B Production Area and Plant B treatment Building area (Figure 1-3). Other than the shallow groundwater at these two Plant B areas, the shallow subsurface soil and shallow groundwater on the northern portion of the site are relatively low concentrations or non-detect. N-nitrosodiphenylamine was detected in shallow subsurface soil samples from the former Lake Poly, however, shallow groundwater concentrations in the surrounding area are relatively low or non-detect. With the exception of one soil sample in the Buried Drum Area (BD-C18 at 339 mg/kg), the samples for both shallow subsurface soil and shallow groundwater have relatively low concentrations or N-nitrosodiphenylamine is not detected for the remainder of the site, south of Lake Poly. The N-nitrosodiphenylamine in shallow groundwater at the Plant B Production Area appears to be related to releases of liquid product and possibly processing oil containing N-nitrosodiphenylamine. Given the wide range of soil concentrations and the very low concentrations of N-nitrosodiphenylamine in shallow groundwater, leaching of N-nitrosodiphenylamine does not appear to be of concern. Chromium concentrations for shallow subsurface soil ranged from 1.8-7,900 mg/kg (Figure 1-5). Soil concentrations are substantially lower than the Regional Screening Levels for residential soils of 120,000 mg/kg for trivalent chromium and the risk-based SSL of 28,000.000 mg/kg. The highest shallow subsurface soil concentration of chromium is located at Lake Poly (LPB18 from 8-10 ft bgs). The maximum detected concentration for chromium in shallow groundwater was located at GW-29S in the vicinity of Lake Poly. GW-29S has previously been analyzed for both trivalent and hexavalent chromium and was found to contain trivalent chromium (0.027 mg/L) and hexavalent chromium was not detected (0.005 U mg/L). Shallow groundwater concentrations range from 0.0036-0.035 mg/L, which are also lower than the Regional Screening Levels for tap water of 16 mg/L for trivalent chromium. Chromium concentration ranged from 0.00345-1,700 mg/L for deep groundwater (groundwater deeper than 5 ft below the water table). The maximum detected deep groundwater location (MP-1 #01) is located within the Slurry Wall/Cap (Figure 5-11). That location and sampling port is associated with DAPL. This location has also been analyzed previously with an indication that the chromium is considered to be trivalent chromium, total chromium was detected (1,600 mg/L) while the hexavalent chromium was non-detect (0.001 mg/L). Calcium was detected in shallow groundwater at concentrations ranging from 2.05-250 mg/L with the highest concentration to the east of the Slurry Wall/Cap (GW-6S) (Figure 1-4). Shallow subsurface soil concentrations range from 150-32,000 mg/kg. Several of the higher concentration samples were collected from the shallow subsurface soil within the footprint of the two former lined lagoons (within the Slurry Wall/Cap). However, the maximum concentration in subsurface soil was in a sample from a location east of the cap (RSO-12 from 0-3 ft bgs). Nitrogen, ammonia was detected at concentrations of 3.6-4,700 mg/kg in shallow subsurface soil samples, with the higher concentrations in the vicinity of Lake Poly (4,700 mg/kg at LP-BOT-C) (Figure 1-6). The northern portion of the site appears to have relatively low concentrations of nitrogen, ammonia in both soil and shallow groundwater. Shallow groundwater concentrations are elevated (65-165 mg/L) south of the Slurry Wall/Cap structure. Groundwater on the southern portion of the site is elevated likely due to the continuing effects of the diffuse groundwater present prior to the installation of the Slurry Wall/Cap. The highest concentration of sulfate in surface soil samples was detected within the Slurry Wall/Cap (CPDA-2 at 26,800 mg/kg) (Figure 1-9). However, there are also substantial concentrations reported in the Central Pond area (CPDA-8 at 23,900 mg/kg) and east of the Plant D Tank Farm (SWMU-26 at 19,400 mg/kg). Surface soil, shallow subsurface soil, and shallow groundwater sulfate concentrations on the northern portion of the site are relatively low or sulfate was not detected. Sulfate was detected in shallow subsurface soil samples within the Slurry Wall/Cap; however, the location of maximum detection was located within the West Warehouse at location E1.40 (285,000 mg/kg) (Figure 1-7). However, sulfate concentrations in shallow groundwater samples do not appear to be elevated in this area. Sulfate concentrations in shallow groundwater samples from the Slurry Wall/Cap area and in the southern portion of the site range from 45-1,035 mg/L. These concentrations are likely due to the continuing effects of the diffuse groundwater present prior to the installation of the Slurry Wall/Cap. Sulfate concentrations in deep groundwater (Figure 1-10) are extremely high within the multilevel piezometer located in the Slurry Wall/Cap at 72,000 mg/L in MP-1 at the deepest port (DAPL sample) and range from 278-2,950 mg/L to the south and east. Calcium, sulfate, and nitrogen, ammonia have similar distributions in shallow groundwater. Higher concentrations in shallow groundwater in the southern half of the property appear to be related to those areas that were downgradient of the DAPL pool prior to the installation of the Slurry Wall/Cap. Those areas exhibit residual DAPL/diffuse groundwater parameters. Hydrazine was detected at a concentration of 1.9 mg/kg in a shallow subsurface soil sample collected from Lake Poly (LPB-48) at a depth of 5-8 ft bgs (Figure 1-8). The only other detection of hydrazine in Lake Poly is two orders of magnitude lower (0.0013 mg/kg at SB-448 from 8-10 ft bgs). Hydrazine was not detected in shallow groundwater samples collected northwest and south of the former Lake Poly. The Plant D Tank Farm has an area of hydrazine detections in the shallow subsurface soil ranging from 0.0023 to 0.42 mg/kg which appears to be co-located with the hydrazine detections in shallow groundwater at GW-307 (0.175 mg/L) and GW-308 (0.001665 mg/L). This is suggestive of potential limited localized leaching of hydrazine from soil to groundwater. Some parameters in DAPL and diffuse groundwater may be associated with dissolution of soil or rock material due to the low pH of the DAPL. In some cases, these parameters may be detected in shallow groundwater that is impacted by diffuse material. The Slurry Wall/Cap was installed in 2000; however, diffuse groundwater existing prior to the installation of the Slurry Wall/Cap may have an impact on this area.			

Table L-1
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Section: Specific Comments/Supplemental Information
Comment No. 1D
Comment Title: Boring/Sample Point Table

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
Tables of specific sample results associated with each boring or sample point with detection limits and comparisons to ARARs, guidelines, criteria, and screening values.	The analytical data utilized in the human health and ecological risk assessments were presented in several tables within Appendix E of the OU1 Preliminary RI Report. Each of these tables show detected concentrations and reporting limits for non-detects. The USEPA will be provided the historical data for OU1 in the data format that was requested for the RI data. The discussion of nature and extent for soil has included data summary tables that identify all detected parameters and ranges of detected concentrations in addition to the USEPA industrial RSLs and residential RSLs. The Residential RSLs have been included, not because there is a foreseeable future residential use, but because the Residential RSLs assist in delineating the extent of contamination (in conjunction with background and non- detect criteria). No chemical-specific ARARs for parameters in soil were identified in the OU1 Preliminary RI Report. The human health and ecological risk assessments also compare site soil, surface water, and sediment data to relevant human health and ecological risk assessment screening values in the selection of chemicals of potential concern. It is agreed, however, that tabular data presentation for all samples is important to allow readers to investigate individual sample locations and to be able to confirm results or discussions or conclusions presented in the text. While a point-by-point or sample-by-sample review of the data (several hundred samples) may be interesting, the characterization of risk and remedial decision-making process, consistent with USEPA regulations and guidance, consider the entire body of information and evaluate representative levels of exposure and the associated risks to human and environmental receptors. The request to provide tabular comparison of data to “ARARs, guidelines, criteria, and screening values” suggests there are other and more relevant screening values than were presented in the Preliminary RI. This is misleading. Between the nature and extent section and the two risk assessments, the relevant screening levels have been presented and considered. Relevant screening levels are considered to include USEPA industrial and residential RSLs for soil, ambient water quality criteria and literature-based ecological screening values for surface water as well as overly conservative tap water RSLs for human health considerations, and literature-based ecological screening levels and overly conservative soil RSLs for human health for sediment.	The Olin response directs the reader to tables in Appendix E. These tables present point- by-point data for data used in the risk assessments, but do not include screening levels. It is unclear whether the samples discussed in the N&E section are the same as those used in the HHRA and ERA presented in appendix E-2.2-E-2.10. Olin asserts that summary table comparison to criteria is sufficient, but the requested tables are needed to determine if there are additional hotspots and for clarification of the nature and extent of contamination. Olin must provide point by point soil, sediment, and surface water data tables along with the relevant screening levels, including USEPA industrial and residential RSLs and leaching-based SSLs for soil, ambient water quality criteria and literature-based ecological screening values for surface water as well as tap water RSLs for human health considerations, and literature-based ecological screening levels and soil RSLs for human health for sediment. In addition, comparison of the most recent data with the 2009 Work Plan indicates that the data for several samples (SS-433, SS-448, and SS-452) are missing, that pH for surface water samples and some sediment samples were not reported, that PCB analysis was not performed for SB-404, and that phthalic anhydride was not evaluated at PZ-17RR. Several results were rejected.	This request was further discussed during the October 11th 2012 meeting with EPA. In light of the deed restrictions that have been put on the property, EPA concurred that industrial screening levels were appropriate for evaluating the nature and extent of site impacts (in area OU-1) and that existing RI figures, as presented, negated the need for additional requested tables. Furthermore, the evaluation presented in the April 3rd, 2012 response to comments will be included in the Draft RI report and this will sufficiently address leaching concerns such that a point by point comparison to SSLs will not be necessary. In addition, Olin has provided EPA with an evaluation of the impact on potential contaminants of concern selection of using industrial RSLs rather than residential RSLs in the baseline human health risk assessment. This evaluation concluded that use of industrial RSLs for COPC selection is appropriate and adequately protective of human health.	Appendix F Tables F-1 through F-5 include comparison of analytical data to Industrial RSLs and leaching-based SSLs for OU1 and OU2 soil samples. Concentrations above the RSL and/or leaching-based SSL are flagged in the tables.

Section: Specific Comments/Supplemental Information
Comment No. 1E
Comment Title: Site Soil Data Table with SSL Comparison

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
Tables presenting comparison of Site soil data to leaching based criteria.	Please see previous response to the third bullet of Comment 1.0 in the Supplemental information section of the comments.	See response for Report No. 3 (USEPA Comment No. 1C).	This issue was resolved in the October 11th, 2012 meeting. Please see response to Comment 1C above.	Appendix F Tables F-1 through F-5 include a point by point comparison of all soil data to SSLs. Concentrations above the SSLs are flagged.

Table L-1
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Section: Specific Comments/Supplemental Information
Comment No. 1F
Comment Title: Boring Logs

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
Typed boring logs and field sheets	The boring logs and field sheets that are included in the preliminary RI clearly and neatly present the information collected. Typing these logs would not provide any value.	The following boring logs need to be typed SB-407, SB-409, SB-410, SB-412, SB-414, SB-415, SB-420, SB-421, SB-423, SB-424, SB-427, SB-433, SB-435, SB-438, SB-439, SB-440, SB-441, SB-442, SB-444, SB-447, SB-448, SB-449, SB-450, SB-452, SB-455, SB-459, SB-460, SB-461, SB-462, SB-465, SB-467, SB-469, SB-470, and SB-471.	Olin will review the identified boring logs and provide typed logs for those which may not be sufficiently legible.	Typed boring logs are included in Appendix B.

Section: Specific Comments/Supplemental Information
Comment No. 1G
Comment Title: Field Data Presentation

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
Presentation of field parameters in tabular form	OU1 investigations addressed soil, surface water, and sediment (no groundwater). Aside from PID screening readings for soil borings, there are few, if any, field parameters that warrant presentation in tables. PID data from the RI borings will be presented in a table.	Please present PID readings and visual observations on a table. Observations of contaminant impact or occurrences of unusual or notable conditions as observed and recorded in the field will be included and discussed in the report text. Observations that will be presented include visual or olfactory evidence of contaminant impact, visual observations of fill materials or reworked native materials in shallow or deep soils, or other evidence of anthropogenic impact. This type of information provides an additional line of evidence beyond laboratory analytical results as to the completeness of the nature and extent evaluation. Descriptions of DAPL Material encountered should also be included.	DAPL material was not encountered in OU-1 RI borings. Areas within OU-1 that are impacted by VOCs include the areas north of former Plant B in the parking lot area to the east of the administrative building and adjacent to former Plant B tank farm. PID readings from borings in these areas will be tabulated and presented in a table in the Draft RI. Note that aside from trimethylpentenes, all other VOCs in these areas were detected infrequently and at low concentrations. Analytical data indicate that no other areas outside of the parking lot or plant B area are of concern. Notable visual and olfactory evidence suggesting contamination will be discussed in the text of the Draft RI.	Table 2.2-4 contains PID results for all soil borings.

Section: Specific Comments/Supplemental Information
Comment No. 1H
Comment Title: Presentation of Data Gaps

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
A complete presentation of data gaps and areas in need of additional sampling	Olin identified previously, in the OU1 RIWP Addendum V, data gaps it believed warranted further data collection activities and conducted those data collection activities. USEPA has not formally commented on the OU1 RIWP Addendum V. Olin will again review that information and if it identifies any additional data gaps that would need to be filled to meet the objectives of the RI/FS, it will present such information to USEPA under separate cover.	EPA is awaiting data gap review from Olin. Please include data gaps shown in Report No. 48/49 (Nature and Extent Comment No. 16).	Based on discussions during the November 7th, 2012 meeting with EPA regarding remaining data gaps, Olin submitted an OU-1 work plan addendum on November 16th, 2012 for review and approval. USEPA provided conditional approval of this work plan. The conditions have been satisfied as per teleconference with USEPA and Nobis on December 13, 2012. The supplemental field investigation has been completed as of the date of this response.	Based on discussion during the November 7, 2012 meeting with EPA, Olin submitted a Supplemental Work Plan on November 16, 2012. EPA provided conditional approval of this work plan on December 12, 2012 after a teleconference. The final Supplemental Work plan was submitted on March 19, 2013.

Table L-1
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Section: Specific Comments/Supplemental Information
Comment No. 1I
Comment Title: Temperature Profile Study

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
Discussion of the temperature profile study and resulting conclusions	The temperature profiling of off-Property streams including Landfill Brook, Maple Meadow Brook, and Sawmill Brook was conducted to assist in identifying specific surface water sampling locations (OU2) that might be representative of groundwater (OU3) discharge to off-Property surface water. These are not OU1 activities, and will not be included in the RI/FS for OU1.	Olin will provide discussions of temperature profiling in OU2/OU3. This assumes that EPA agrees with Olin's interpretation and overlooks an opportunity to discuss other OU2 sampling. EPA acknowledges that no temperature profiling was planned for South Ditch.	No response is required.	Appendix H contains the Temperature Profile Trip Reports for Maple meadow Brook Wetland and Landfill brook..

Section: Specific Comments/Supplemental Information
Comment No. 1J
Comment Title: Conceptual Site Model

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
A detailed conceptual Site model, explaining all potential sources (including soil in the containment area and the CSL) and migration of Site contaminants, formation of NDMA, and occurrence and behavior of DAPL.	The CSM for the Olin Site has been developed and stated in detail in previous documents and will be expanded upon in the OU3 RI to include discussion of groundwater quality in the equalization window (GW-CA1) that at times may represent outflows of shallow groundwater from the Containment Area. With respect to the containment area, the groundwater quality in well GW-CA1 is generally consistent with groundwater quality present in nearby shallow screened wells (GW-10S, GW-24, and GW-29S). The concentrations of some parameters (such as sulfate and calcium) are slightly elevated due to the placement of stabilized gypsum (calcium sulfate) under the temporary cover when it was constructed. It should be noted that the historical disposal practices that resulted in the formation of DAPL and diffuse groundwater are the most important release mechanisms at the Site for aqueous phase contaminants. There were no RI/FS soil investigations within the CSL since it has been closed and is monitored in accordance with a post closure plan approved by the MassDEP. The CSL, as its name implies, contains gypsum. Water quality in downgradient and surrounding monitoring wells will be discussed as part of OU3. Activities have been conducted previously to identify the potential source(s) of NDMA detected in groundwater and surface water samples at the Site. These included conducting a detailed review of literature and facility records and evaluation of potential precursors in DAPL and diffuse groundwater. A thorough review of available manufacturing records did not identify any purchase, manufacture, storage, or use of NDMA during manufacturing activities. A literature search was conducted to identify potential mechanisms for the formation of NDMA that might explain the presence of NDMA. Published articles in the literature in 2003 had identified the presence of NDMA in water samples collected from publicly owned wastewater treatment plants and water treatment plants that had been disinfected by chlorination or chloramination. The understanding of NDMA formation mechanisms in literature at that time is consistent with current literature. Articles published include Gerecke, A. C., and Sedlak, D.L., (2003), Precursors of n-Nitrosodimethylamine in Natural Waters, Environ. Sci. Technol., 2003, 37, 1331-1336) and Mitch, W. A., Gerecke, A., Sedlak, D. L., (2003) – A N-nitrosodimethylamine (NDMA) precursor analysis for chlorination of water and wastewater, Wat. Res. 2003, 37 (15): 3733-3741. One potential formation mechanism for NDMA postulated for those treatment plants was a reaction involving NDMA precursor compounds (such as dimethylamine (DMA), dimethyldithiocarbamates, and certain nitrogen-containing cationic polyelectrolytes (used as flocculation aids) and chloramines. The potential formation reaction included an intermediate compound, unsymmetrical dimethylhydrazine (UDMH). The latter article identified an analytical method for determining relative concentrations of potential NDMA "precursor" material in water samples. In 2004, Olin submitted to MassDEP Report for the Initial Testing of the Proposed Test Method for NDMA Precursors, 51 Eames Street Site, Wilmington, MA, DEP RTN 3-0471. That report summarized a study that evaluated the utility of applying the Mitch et. al. precursor analytical method to dense aqueous phase liquid (DAPL) and diffuse groundwater for the purpose of identifying groundwater locations where NDMA precursors might be present and, if present, to determine relative concentrations of precursors at various locations. As reported in pages 18 and 19 of that report, the study did not confirm, for the DAPL and diffuse groundwater samples, that the precursor analytical method was capable of detecting NDMA precursors such as DMA in those matrices. Therefore, the report recommended that the wide-scale application of the method should not be considered since it could not be confirmed that the method could reliably and consistently detect NDMA precursors in groundwater. The information discussed above represents the available information concerning the potential formation of NDMA. It is not possible to reconstruct conditions associated with historical manufacturing operations in order to determine definitively if NDMA was formed during operations, in wastewaters, in groundwater, or if there is some other explanation for the presence of NDMA in groundwater and surface water samples collected from the Site. The Conceptual Site Model for the Site includes the nature and extent, fate and transport of NDMA in Site media, but however cannot definitively conclude upon the actual formation mechanism. The occurrence and behavior of DAPL is an OU3 topic, since it is strictly a groundwater issue. The locations where industrial process waters were disposed have been previously remediated. Those areas are included in the OU1 Preliminary RI activities.	The data requested in the original comment above needs to be included in the CSM; as currently written, the response includes several unsupported statements and assumptions. A complete CSM must be included in the OU1 RI Section 5.0. The Final OU1 report (and OU2 Report) will determine if DAPL is strictly an OU3 topic, also the statement that the locations where industrial process waters were disposed have been previously remediated assumes that all areas have been identified and those areas that were remediated were remediated completely and have not been recontaminated. These and similar assumptions, which should be supported by the data collected in the RI, will be the result of the OU1 RI report and should not be an assertion made prior to the completion of RI activities.	All statements and assumptions provided in our initial response are supported by our current understanding and that of others (i.e., Mitch et al.). We will provide a CSM as part of the OU1 report that is supported by what we know conclusively about the site. No DAPL has been observed in any of the hundreds of vadose zone soil samples, sediment samples, or surface water samples collected as part of the OU1 investigation. Therefore, the occurrence of DAPL is patently not an OU1 issue and will not be addressed in the OU1 report.	Section 5.0 includes the discussion of the Conceptual Site Model and Fate and Transport. Section 5.1 discusses NDMA formation. The occurrence and behavior of DAPL is discussed in Sections 1.3.8, 5.2, and 5.4.

Table L-1
Response to Comments Table
Remedial Investigation Report - OU1 and OU2
Olin Chemical Superfund Site
Wilmington, Massachusetts

Section: RI/FS Work Plan Objectives
Comment No. 2A
Comment Title: EPH and VPH West of Plant B

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
EPH and VPH West of Plant B The OU1 soil sampling objectives from the August 2009 RI/FS Work Plan Volume III-A Field Sampling Plan (FSP), Section 3.2, have not been fully met. For example: There is no evidence of any sampling of soil with analysis of EPH/VPH immediately west of Plant B.	Sampling and analysis of soil samples immediately west of the Plant B Treatment Area was conducted consistent with the approved Field Sampling Plan. Figures 4.1-1 and 4.2-1 of the FSP show locations of proposed surface soil and subsurface soil samples. Those samples were collected. Tables 4.1-1 and 4.2-1 identify soil samples to be collected from Area 8 – all of those samples were collected. Only two of those samples west of Plant B (SB-421 0-1 ft bgs and SB-421 within 1-10 ft bgs) were to be analyzed for EPH/VPH. Concentrations of EPH and VPH fractions were non-detect or low. It should be noted that the area west of the Plant B treatment area that was referred to by Shaw as the "EPH/VPH" area was the area of a trimethylpentene (TMP) release, not petroleum hydrocarbons. Historical sampling and analysis indicated that there was a very good correlation between concentrations of the VPH C5-C8 Aliphatics fraction and the total TMP concentrations in soil samples collected from that area (prior to the installation of the air sparge/soil vacuum extraction system at that location). The naming of the area as the "EPH/VPH" area is a misnomer – the area was primarily an area of TMP release. This is why analysis for EPH/VPH was not proposed and is not required.	Olin's response is acceptable.		Resolved in original Response to Comment Letter

Section: Specific Comments/Supplemental Information
Comment No. 2B
Comment Title: Surface Soil - Lower South Ditch Flooplain

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
The OU1 soil sampling objectives from the August 2009 RI/FS Work Plan Volume III-A Field Sampling Plan (FSP), Section 3.2 have not been fully met. For example: Surface soil in the Lower South Ditch floodplain was sampled and analyzed for SVOCs; however, detection limits appear to be high.	Reporting limits for most SVOCs in RI surface soil samples collected from the Lower South Ditch floodplain were generally in the range of 0.037 mg/kg to 0.35 mg/kg. PAHs are included in this parameter group, but PAHs have not previously been identified as a widespread site-related parameter group. The Industrial RSLs for B(a)P and dibenz(a,h)anthracene (the most toxic PAHs) are both 0.210 mg/kg. In most instances, the reporting limits are below the corresponding RSLs (which are set at cancer risk of 1 in one million – at the lower end of the acceptable excess lifetime cancer risk range). In some samples with high concentrations of specific SVOCs. This is a normal part of the analytical process and it is not expected that all samples will attain the project reporting limits in an RI of this scale.	EPA is concerned about high detection limits for SVOCs in soil samples in the vicinity of South Ditch. Review of Figure 4.1-14 shows the highest detected concentrations of benzo(a)pyrene in surface soil are in this area and that reporting limits for benzo(a)pyrene for most non-detect samples in this area were above even the industrial RSL. The high detection limits make the figure less useful in delineating the extent of benzo(a)pyrene contamination. Please revise this figure with non-detect detection limits greater than the RSL shown in a different color or symbol than those non-detects with detection limits below the RSL. Table E-1-2 indicates that 284 of 471 samples analyzed for benzo(a)pyrene in soils throughout the site had detection limits above the industrial RSL of 0.21 mg/kg. While RI samples collected from the Lower South Ditch floodplain and analyzed for benzo(a)pyrene may have had detection limits ranging from 0.037 to 0.35 mg/kg, Table E-1-2 reports detection limits as high as 670 mg/kg. As shown on Table E-1-3, over 50 samples had detection limits greater than ten times the industrial RSL that were removed from the HHRA and ERA. No figure is provided with these samples removed. Approximately twenty of the eliminated samples had detection limits above the maximum site detected concentration. EPA does not support discarding these approximately 50 samples. EPA's ProUCL software is capable of estimating 95% UCLs for datasets that include samples with high detection limits. Options for addressing this concern are 1) re-sampling at locations with detection limits more than the applicable RSL; 2) running ProUCL (which uses methods designed to include high non-detects in the estimate of 95% UCLs) calculations both with and without the samples exceeding RSLs; or a combination of these two options is required.	Information presented at that meeting is provided in Attachment A. Elevated reporting limits are related to BEHP detections and sample dilution. Site history and soil data were reviewed and PAHs would not be expected in soils along or adjacent to the South Ditch where the highest reporting limits occurred. MDLs for most RI soil samples were below industrial RSLs. Based on these discussions, EPA agreed that no additional sampling/analysis for PAHs in soil along the South Ditch is necessary. In addition, for data that AMEC determined to be unusable for risk assessment purposes, EPA agreed that Olin would prepare a memorandum concerning PAHs. Please find attached an evaluation of soil EPCs for PAHs along the South Ditch as requested by USEPA during the October 11th 2012 meeting (Attachment B).	Figures 4.1-2 to 4.1-28 show reporting limits for non detects which exceed the Industrial RSL as a different symbol. In meetings with USEPA, it was agreed an evaluation of spatial coverage and adequacy of the PAH data for soils would be conducted with respect to the highly elevated reporting limits for PAHs that were the result of sample dilution due to higher levels of BEHP in soil samples from the area of the South Ditch.. Specifically, USEPA requested that figures be provided that should the distribution of PAHs in soil when the highly elevated reporting limits were excluded form the risk assessment data set. Attachment 1 to the First Interim Deliverable for the Human Health Risk Assessment includes Figures 1-10 that show analytical data for PAHs (B(a)P, B(a)A, B(b)F, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene) in surface soil and subsurface soil with samples (with highly elevated reporting limits removed). As reported in Section 2.2.4 of the First Interim Deliverable for the Human Health Risk Assessment, that even with elevated detection limits removed a sufficient data set still exists to calculate human health risks for the PAHs.

Table L-1
Response to Comments Table
Remedial Investigation Report - OU1 and OU2
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Section: Specific Comments/Supplemental Information
Comment No. 2C
Comment Title: Re-Sampling of Historical Background Soil Locations

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
The OU1 soil sampling objectives from the August 2009 RI/FS Work Plan Volume III-A Field Sampling Plan (FSP), Section 3.2 have not been fully met. For example: No re- sampling of historical background soil locations was done; instead the RI relies on on- site background locations.	The use of on-site soil locations for background instead of re-sampling historical background locations was by agreement with USEPA. Please refer to the RI/FS Addendum V – OU1 Remedial Investigation Work Plan Addendum dated September 17, 2010 for discussion of proposed background sampling. Section 3.2.3 proposed cancellation of off-property soil background samples and proposed to use the analytical data for 11 soil samples collected on-property as the soil background data set. The Statement of Work indicates that on- Property background soil samples would be considered appropriate or even preferred. Appendix A of Addendum V identifies and summarized the background soil dataset. Subsequently, in a November 16, 2010 meeting at the Wilmington site, USEPA and its consultants commented on the proposed soil background dataset and orally concurred that the removal of two soil samples collected in proximity of the South Ditch from the background dataset would be appropriate. The initial draft minutes for the meeting (prepared by Nobis) confirm the discussion of the on-Property background soil dataset and confirms USEPA requested removal of samples nearest the South Ditch. USEPA has never commented in writing on Addendum V to the RI/FS Work Plan.	EPA agrees to accept on-site background locations, excluding those collected in wetland areas. Soil type and physical parameters are to be used to define background samples of similar type to on-site soils. The background characterization should include surface streams. To be comparable, soil types and characteristics (clay/silt/sand content, texture, etc.) of the background data set need to be described with respect to the same characteristics as Site samples to judge whether chemical sampling results are comparable or potentially affected by differences. Samples SS-449, SS-450, SS-451, SS-434, SS-453, and SS-454 should be omitted from the background evaluation unless clear evidence indicates they are similar in type to site soils.	During extensive discussion during the October 11th meeting regarding the background dataset, EPA agreed that the nine samples should remain in the background dataset. At this meeting Olin agreed to reconsider including two previously excluded samples (SS-440 and SS-442), if appropriate. As a follow-up to discussion during the recent meetings with EPA, two samples (SS-440 and SS-442) previously removed from the background dataset, were re-evaluated for inclusion in background statistical evaluations. In order to determine whether concentrations from these samples are consistent with the other nine samples currently included in the background dataset, a series of scatter plots were evaluated for each analyte. Plots with all data (including non-detects presented at ½ the laboratory reporting limit) were assessed (Attachment C-1). Based on review of these plots, it was determined that sample SS-440 was not consistent with conditions at the other identified background locations. This sample had consistently higher detections for a variety of different analytes (including a number of PAHs as well as arsenic, chromium, mercury, silver, and tin) and as such, was removed from the dataset. New plots were then developed including all background samples except sample SS-440 (Attachment C-2). These plots demonstrated relatively consistent concentrations across all samples (including sample SS-442) and for all analytes. Consequently, the data associated with these 10 samples comprise the final background soil dataset that will be utilized in the RI Report. Attachment C presents the plots discussed above.	Appendix I contains the Site Specific Background Soil Memorandum. The USEPA agreed with the selection of the site-specific soil background data set in a meeting on February 5, 2013. Published background values are not referenced in the Draft RI Report (tables, text, or figures).

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Section: Data Gaps and QA Issues
Comment No. 3A
Comment Title: Disparity Between Desired/Actual Detection Limits

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
During EPA's review of the Preliminary Draft Remedial Investigation Report for Operable Unit 1 several data gaps and data quality issues were identified, including the following: There's a significant disparity between desired and actual detection limits for numerous compounds	It is not unusual to have reporting limits that are different from Project Action Limits identified in the QAAP. The reporting limits that are identified in the QAPP are targets and they are not always met under normal analytical conditions. For example, if laboratory method blanks detected an analyte, USEPA data validation guidance is to have a reporting action level that is 5 to 10 times the blank detection, and that action level is often above the reporting limit. In the course of environmental investigations it is common to sample impacted media which require sample dilution to obtain quantification within the calibration range. That also results in elevated reporting limits for associated compounds. Organic rich sediment samples that result in low solid content also result in elevated reporting limits. From the perspective of data quality objectives, the overall data set meets the quality objectives in the QAPP. The discussion of nature and extent and the risk assessments address the uncertainties associated with these commonplace differences.	Olin proposed to eliminate a number of samples based on elevated detection limits. These locations may need to be re-sampled. See Report Comment No. 12 (USEPA Comment 2B). PALs were selected in the QAPP to establish desired detection limits for the project. A comparison to PALs (including residential RSLs) is needed to determine if samples met those objectives. The HHRA will utilize residential screening levels for COPC selection; therefore, the majority of data should achieve the detection limits at or below the residential RSLs. Per EPA Region I data validation guidelines, reporting limits are elevated during the data validation process in certain circumstances, such as with regard to blank contamination - reporting limits are generally not elevated if the contaminant is not found in a sample. A reporting limit is elevated in the data validation process when a contaminant is detected in a sample at a concentration between the contract-required quantitation limit (CRQL) and the calculated blank action level. If the contaminant is found in a sample below the CRQL, then it is reported as undetected (U) at the CRQL, and if it is found above the blank action level, then no qualification is needed. The nature of samples, of course, can affect reporting limits. If project requirements are not met, then re-sampling should be performed in an attempt to meet those requirements, though it is understood that even under the best of conditions, requirements cannot be met sometimes. ProUCL is designed to allow for the inclusion of high non-detects within the dataset. Its' use may be preferable to elimination of high non-detects and/or re-sampling.	During the October 11th, 2012 meeting with EPA it was agreed that industrial RSLs are appropriate for the site and that overall data quality based on a combination of reporting and method detection limits meets the work plan objectives. Overall, reporting limits or method detection limits meet the identified Project Action Levels.	During the October 11th, 2012 meeting with EPA it was agreed that Industrial RSLs are appropriate for the site and that overall data quality based on a combination of reporting and method detection limits meets the work plan objectives. Overall, reporting limits or method detection limits meet the identified Project Action Levels. Many of the comments concerning detection limits were focused on Residential RSLs (no longer a concern).

Section: Data Gaps and QA Issues
Comment No. 3B
Comment Title: Identification of QA/QC Samples

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
During EPA's review of the Preliminary Draft Remedial Investigation Report for Operable Unit 1 several data gaps and data quality issues were identified, including the following: Identity of QA/QC samples were apparently not hidden from the laboratories	Sample identification was conducted consistent with the approved Work Plan (including the QAAP and the Field Sampling Plan). The laboratory does not alter the manner in which these samples are run based on the field sample ID code. In a modern commercial laboratory, laboratory ID numbers are assigned to the samples in the same order in which they appear on the chain of custody. The laboratory numbers are then used to track the samples and corresponding analytical data in the Laboratory Information Management (LIM) system. The analysts batches, extracts and runs the samples in groups that are generally consistent with the laboratory sample number system. The samples run in groups commonly contain the field sample with associated QC samples in the same or sometimes a sequential group. The results of the samples and the order and sequence in which they are run, as reported from the LIM system, are reviewed during validation. Not having them as blind samples has no effect on their analysis or usability for QA/QC. Single blind PE samples are also submitted for each major sample event for analytes and matrices for which PE samples are available. These PE samples are scored by USEPA.	The FSP and QAPP spell out the naming protocol for samples, which includes identifying samples as DUP. Olin's response states that the FSP and QAPP will be followed. EPA requests modification to the FSP and QAPP to ensure that duplicates are not known to the laboratory. While it is likely that the laboratory's knowledge of the duplicate samples did not affect the outcome and data usability, the ultimate goal is to assure that the generated data is of high quality and legally defensible. EPA guidance documents state that the identity of field QC samples, which include blanks, duplicates, and split samples, should be kept from the laboratory, and this is to greatly reduce or eliminate the potential that bias could be introduced. While the Field Sampling Plan and QAPP, which presented the sample numbering scheme currently used, were approved, these documents can and should be modified in light of updated knowledge. In addition, it appears that additional site characterization will be required, and Section 3.2.5 of the Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA (EPA/540/G-89/004) states that the FSP and QAPP "should be reviewed and modified as appropriate to guide the collection of additional site data." Thus, please modify the appropriate portions of the FSP and QAPP to ensure that going forward, the field QC samples are not known to the laboratory.	In future RI sampling activities, Olin agreed QA/QC samples will be assigned identifiers that do not explicitly identify them as QA/QC samples for specific locations (single blind samples).	After receipt of this comment, QA/QC samples were submitted to the laboratory without designating them as QA/QC samples.

Section: Data Gaps and QA Issues **Comment No. 3C** **Comment Title: Full Tal Evaluation**				
EPA Comment	**Olin Response to EPA**	**Nobis Response to Olin**	**Olin Response to Nobis**	**Resolution**
During EPA's review of the Preliminary Draft Remedial Investigation Report for Operable Unit 1 several data gaps and data quality issues were identified, including the following: Locations where samples were not evaluated for full TAL and results exceeded PQLs and/or screening levels may require further analysis for the full TAL list	Please clarify this comment by identifying specific examples. Analyses were conducted consistent with the approved Field Sampling Plan and Addenda I through V.	The FSP did not require full TAL at every location. EPA required some sampling for full TAL in each area of the Site, allowing a smaller number of samples for specialty compounds. EPA has always reserved the right to request further sampling and analysis should sample results indicate a need. Based on the results, further sampling may be needed. Please address this issue in the data gap review and identify areas where further sampling is warranted.	Based on review for the frequency of detection and detected concentrations for specialty compounds, EPA agreed during the November 7, 2012 meeting that further analysis of specialty compounds in the TAL was no longer required.	11/7/12 EPA. Analysis was conducted consistent with the Work Plan.

Section: Data Gaps and QA Issues **Comment No. 3D** **Comment Title: Central Pond Sampling**				
EPA Comment	**Olin Response to EPA**	**Nobis Response to Olin**	**Olin Response to Nobis**	**Resolution**
During EPA's review of the Preliminary Draft Remedial Investigation Report for Operable Unit 1 several data gaps and data quality issues were identified, including the following: There's a lack of sampling at Central Pond and the surface water feature immediately south of the containment area	The sampling and analysis was conducted as described in the approved Field Sampling Plan. As a point of clarification, the "surface water feature immediately south of the containment area" is the constructed storm water detention pond. Section 3.1 (page 31) of the Preliminary RI identifies this feature and Figure 3.1-1 also identifies the location of this feature. The text from section 3.1 is reproduced below. "The topographic features include an east-west trending low lying area that forms the South Ditch and Ephemeral Drainage and includes Central Pond, and a storm water detention pond located between the containment area and South Ditch. This low lying area is intersected at the Property boundaries by the East and West Ditches. These features are part of the interconnected drainage system that border two sides of the Property and that cross the center of the Property. Each of these surface water bodies occupies lower topographical areas and is shown on Figure 3.1-1."	According to the FRI, limited sampling of sediment and surface water were conducted at Central Pond. Surface water is reported to have last been performed in 2000 and 2001 as part of the construction-related release abatement measures (C-RAM), and it was concluded that those samples had little potential to represent current site conditions. Thus, additional sampling is needed at Central Pond to adequately characterize the current conditions. The storm water detention pond currently serves as an active aquatic habitat. It should be sampled and characterized for the list of potential Site contaminants, as (at a minimum) it has relevance to ecological habitats at the Site. Olin has agreed to include a discussion of Central Pond and the stormwater retention pond in the report. Central Pond and the Storm water retention pond need to be labeled on Figure 3.1-1. While both are shown on Figure 3.1-1, they are not labeled. Also, please include a summary of ecological habitat and/or references to them in the FRI.	In the work plan addendum, Olin has proposed one surface water and two sediment sample at each of these surface water features.	Surface water samples collected at the Site are shown on Figure 2.2-3 and sediment samples collected at the Site are shown on Figure 2.2-4. These figures show the additional samples collected from Central Pond and the Stormwater Detention Basin. Central Pond and the Stormwater Detention Basin are shown and labeled on Figure 1.3-1. The results of that sampling and analysis are discussed in Sections 4.1.3.2 and 4.1.3.3 for surface water and in Sections 4.1.4.3 and 4.1.4.4 for sediment.

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Section: Data Gaps and QA Issues
Comment No. 3E
Comment Title: Additional South Ditch Sampling

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
During EPA's review of the Preliminary Draft Remedial Investigation Report for Operable Unit 1 several data gaps and data quality issues were identified, including the following: Further sampling in the floodplain soil immediately adjacent to lower South Ditch is needed to complete delineation of nature and extent of contamination in that area	Comment noted.	EPA assumes "comment noted" indicates Olin's agreement to the request.	Further sampling is proposed in the work plan addendum submitted on November 16th, 2012 to EPA for review and approval.	Further sampling was conducted as proposed in the work plan addendum submitted to USEPA on November 16th, 2012 and March 19, 2013 (revised). Samples from soil borings SB-526 through SB-529 were collected in December 2012 and analyzed per Figure 1 and Table 2 of the March 19, 2013 Supplemental Work Plan. Locations of samples are shown in Figure 2.2-1of the Draft RI Report. Analyses conducted for those samples are identified in Table 2.3-1 and 2.3-2 of the RI report. The results of those soil samples are discussed in section 4.2.2 of the RI Report.

Section: Data Gaps and QA Issues
Comment No. 3F
Comment Title: Hexavalent Chromium Sampling

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
During EPA's review of the Preliminary Draft Remedial Investigation Report for Operable Unit 1 several data gaps and data quality issues were identified, including the following: The RI Work Plan was approved by EPA with a limited sampling effort for hexavalent chromium with the expectation that it would not be detected. Further analysis of soil, sediment, and surface water samples for hexavalent chromium is needed	The detection of hexavalent chromium in RI/FS samples collected more recently has generally been restricted to areas adjacent to or within former disposal areas (or locations downstream), and detection of hexavalent chromium is typically at low concentrations with the exception of one sediment sample. The current dataset will be evaluated to determine the specific need for additional hexavalent chromium delineation in site soils.	Sample for hexavalent chromium. Please see responses for Report Nos. 48/49 (Nature and Extent Comments 16 a-xviii, 16b-I, and 16b-ii) and Report No. 62 (Human Health and Ecological Risk Assessment Comment 7) for particular sampling locations.	An extensive sampling and analysis program focused on hexavalent chromium in soil and sediment was proposed in the November 16th, 2012 work plan addendum submitted to EPA. EPA approved the addendum and the hexavalent chromium investigation has been completed.	Further sampling was conducted as proposed in the Supplemental Work Plan submitted to USEPA on November 16th, 2012 and March 19, 2013 (revised). Figures 4.1-8 to 4.1-10 of the RI Report show the distribution of hexavalent chromium concentrations in soils. The results of the sampling and analysis are discussed in Section 4.1.2 Figure 4.1-31 shows the distribution of hexavalent chromium in surface water. Sediment results are shown in Figure 4.1.39.

Section: Data Gaps and QA Issues
Comment No. 3G
Comment Title: Nitrosamines and Phthalates Analysis

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
During EPA's review of the Preliminary Draft Remedial Investigation Report for Operable Unit 1 several data gaps and data quality issues were identified, including the following:Analysis of additional nitrosamines and phthalates should be considered	Olin has agreed to conduct initial sampling for additional nitrosamines in wells GW-10S and GW-10D. These wells exhibit a range of NDMA concentrations (lower and higher) and may provide useful information related to the co-location of additional nitrosamines with those currently in the analytical program. Analysis of additional phthalates will be discussed with USEPA further.	EPA is awaiting results for nitrosamines. Further discussion will be needed following submission of the results. At this point in time, analysis for phthalates has not been agreed to. However, absence of toxicity values is not an excuse to not analyze for the compounds. If additional phthalates are detected, EPA will recommend surrogate toxicity values. Please sample and analyze for phthalates using EPA 8061A at SB-477 (8-10 ft), the location of highest phthalate concentration.	The expanded nitrosamine results were provided to USEPA in June 2012. EPA agreed during discussions on October 1, 2012 that Olin would not be required to conduct sampling/analysis for the additional phthalates at this time.	The expanded nitrosamine results were provided to USEPA in June 2012. EPA agreed during discussions on October 1, 2012 that Olin would not be required to conduct sampling/analysis for the additional phthalates at this time.

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Section: Data Gaps and QA Issues
Comment No. 3H
Comment Title: Additional Sampling

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
During EPA's review of the Preliminary Draft Remedial Investigation Report for Operable Unit 1 several data gaps and data quality issues were identified, including the following: Additional sampling needed based on the sampling results, for example, analysis needed in deeper soils or bounding high detections	Responses to specific comments with respect to this issue are provided in latter portions of this RTC letter.	While the recent sampling generally completed the work plan sampling plan, EPA reserves the right to require additional sampling based on results. Further sampling is required to fill data gaps. See responses for Report Nos. 48/49 (Nature and Extent Comments 16 & 17).	Based on discussion during the November 7, 2012 meeting with EPA, Olin submitted a work plan addendum on November 16, 2012. EPA provided conditional approval of this work plan on December 12, 2012.	Based on discussion during the November 7, 2012 meeting with EPA, Olin submitted a Supplemental Work Plan on November 16, 2012. EPA provided conditional approval of this work plan on December 12, 2012. The final Supplemental Work plan was submitted on March 19, 2013.

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General Comments
Comment No. 1
Comment Title: Additional Data Reference and Justification

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
The OU1 RI Report is required to be a stand-alone document. It is inappropriate to rely entirely on references to prior historical reports without providing at least a minimum level of detail to support claims made within the Report text. For example, a. Section 2.1 Previous Investigations references the 2007 Draft Focused RI Report, OCSS (MACTEC, 2007b) detailed descriptions and summaries of numerous previous investigations, monitoring programs, and response actions conducted at the Site (including OU1), but it does not provide a summary of the results of those previous activities, and b. Section 5.0 Contaminant Fate and Transport statements, such as "The elevation of the top of DAPL in these pools has been measured by inductance logging since 1992 and has remained stable, within measurement sensitivity, and is coincidental with the low point of bedrock saddles containing the Upper DAPL Pool and the Main Street DAPL Pool," without providing reference or support for the statement. Therefore, please provide additional explanations, justifications, and supporting data/information throughout the Report, where appropriate, and at a minimum, please provide specific references to prior reports including the title, date, and page numbers of the specific reference.	Future OU1 RI submittals will provide specific references to prior reports including the title, date, and page numbers of the specific reference.	Olin has agreed to provide more specific references to documents complete with page numbers. This is helpful; however, brief summaries with some basic facts of what was done and conclusions would significantly help in clarifying the discussions. The RI needs to be a stand-alone document.	Olin has agreed to expand the CSM discussion by including more information on operational history, past disposal practices, and removal/remedial actions.	The RI Report Sections 1-5 was written in a manner to respond to these comments. Section 2.1 Previous Investigations and Response Actions provides summaries of the previous response actions conducted at the Site and the portions of Section 2 of the Focused RI Report that includes the detailed description of each of those response actions has been reproduced, as a reference for the reader, in Appendix A of the Draft RI Report. Section 5.0 Fate and Transport includes an expanded discussion of the site conceptual model and of the physical, chemical, and fate and transport characteristics of Site chemicals of interest. Appendix K of the RI report also includes chemical fate and transport profiles from the Superfund Chemical Data Matrix and other sources.

General Comments
Comment No. 2
Comment Title: Electronic Copies of Historical Data

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
Only those data that were collected during the OU1 RI field effort have been provided to EPA electronically. However, the Report relies on and quantitatively incorporates a significant volume of historical data. Please provide EPA with electronic copies of all data used quantitatively in the OU1 RI Report. A complete digital data disk in the same format provided for previous data deliverables should be provided along with the revised OU1 RI Report. This data set must include all data points utilized in the OU1 RI, including historical data.	USEPA access to the historical data was previously provided in an online data access tool. However, to facilitate review of the Preliminary RI, Olin will provide to USEPA, for USEPA use, a supplemental CD that contains the historical and recent OU1 soil, surface water, and sediment analytical data considered in the Preliminary RI (in the same flat file format requested by USEPA for the data collected for the RI sampling events).	See response for Report No. 1 (USEPA Comment 1A).	Olin will provide the requested information on a supplemental CD with the Draft RI report. See also Comment 1A	The requested data have been provided on CD.

General Comments
Comment No. 3
Comment Title: Hyperlinks within Report Text

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
The Report contains more than 8500 pages of material and, in its current format, is extremely difficult and costly for a reviewer to navigate from text to tables, figures, and appendices, as necessary, to understand the author's intent. While the use of bookmarks and optical character recognition (OCR) is helpful, the insertion of hyperlinks would greatly facilitate the usability of the Report. In the revised Report, please insert hyperlinks where appropriate (for example, to the referenced table, figure, appendices, and/or previous reports).	The reader will still have to navigate between text and supporting information. This effort would be excessively cumbersome on the authors and we do not believe it will result in significant benefit for the reviewer.	Olin's response is acceptable.		It was agreed that insertion of hyperlinks to other documents is beyond the scope of the RI report ands is not currently feasible. Appendix Q of the RI report does include a number of significant historical documents as a reference for the reader.

General Comments
Comment No. 4
Comment Title: Separation of Historical and Current Data

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
The OU1 RI Report figures merge both historical and current Site data. Separate figures should be included that match the vernacular utilized within the text of the Report (e.g., weir, settling ponds, plant B discharge point, former USTs, former on-property septic systems and associated leach fields, sewer alignment and locations, etc.). Additionally, consistent designation should be provided when identifying specific Site characteristics in all text and figures. For example, clarification should be provided with respect to the reference of "settling ponds" versus "acid pits" and "unlined lagoons."	Adding separate figures as requested will result in increasing the figure list significantly (i.e., individual figures for each subject area, various depths, various constituents, etc…). The Preliminary RI presented soil contaminant distribution figures (for current, post-remedial conditions) for the parameters most frequently detected at concentrations above industrial RSLs. Those figures clearly show contaminant distributions and extent of impacts throughout the Property. Several of the Site features (Lake Poly, Drum Area, Debris Area, the Plant B Production area and the so-called EPH/VPH area, Central Pond, the South Ditch, the On-Property West Ditch and West Ditch Wetland, and the Plant B treatment area) have been the focus of historical and continuing removal and remedial actions. The comprehensive contaminant distribution figures effectively show nature and extent of contamination. To facilitate review of the figures and to provide additional perspective, various process areas and waste disposal features will be highlighted on the contaminant distribution figures that will be included in the revised RI Report.	Separate figures for historical and current data are not needed. However, only data and sample location IDs still representative of current site conditions should be shown on figures.	Only data representative of current site conditions is shown on figures depicting nature and extent of contamination.	The comprehensive contaminant distribution figures effectively show nature and extent of contamination. To facilitate review of the figures and to provide additional perspective, the various process areas and waste disposal features have been identified graphically and also labelled in Figure 1.3-1 of the Draft RI Report. This figure should be considered a "reference figure" for the readers. The nature and extent figures contain the sample locations and analytical data that are representative of current conditions. Each of those figures has the graphical representation of the Site features that are identified in Figire 1.3-1. In those figures, the legend indicates how the reader can distinguish histoircal data from the recently collected data. The legend indicates, for soil: "Samples collected as part of the RI have IDs SS-4XX, SB-4XX, SS-5XX, or SB-5XX. All other samples were collected previoous to the RI." The text describes each of the site features and the figures use consistent terminology for those features.

General Comments
Comment No. 5
Comment Title: Repeat Pages – Appendix E

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
Several pages of Appendix E are repeated. Page 837 through 847 are repeated on pages 848 through 858, page 835 is the same as page 859, and page 836 is the same as page 860.	Comment noted. The repeated pages will be removed.	Olin's response is satisfactory.		Comment has been addressed.

General Comments
Comment No. 6
Comment Title: Data Gaps

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
Please provide a discussion of data gaps and areas in need of additional sampling (both soil and groundwater), completed during preparation of this Report.	Data gaps and data needs for soil, and on-property surface water and sediment have been identified and will be revised in accordance with the responses contained in this letter as appropriate. In addition, if the review of the groundwater data in the context of potential leaching issues identifies data needs for groundwater, they will be identified in the context of OU3.	See responses for Report No. 8 (USEPA Comment 1H) and Report No. 48/49 (Nature and Extent Comment 16).	Olin has worked with EPA to identify data gaps in the OU1 investigation. A work plan addendum aimed at closing all OU1 data gaps was submitted on November 16, 2012 for EPA review and approval. USEPA provided conditional approval of the supplemental work plan on December 12, 2012. Olin reached consensus with EPA regarding the remaining conditions and completed the supplemental OU1 accordingly on December 17, 2012. Please refer to Olin's response to comment reply 1C concerning leaching to groundwater.	Based on discussion during the November 7, 2012 meeting with EPA, Olin submitted a Supplemental Work Plan on November 16, 2012. EPA provided conditional approval of this work plan on December 12, 2012. The final Supplemental Work plan was submitted on March 19, 2013.

General Comments
Comment No. 7
Comment Title: OU1 Soil sampling Objectives

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
The OU1 soil sampling objectives from the August 2009 RI/FS Work Plan Volume III-A Field Sampling Plan (FSP), Section 3.2 have not been fully met. According to the August2009 RI/FS Work Plan Volume III-A Field Sampling Plan (FSP), Section 3.2, the primary sampling objectives for collection of samples in OU1 were:a. Refinement of previous investigation findings.b. Assessment of nature and extent of Site-related contaminants in OU1 media (including the area south of the South Ditch). c. Investigation of manufacturing process areas.d. Data collection for risk assessment purposes, (including results of sediment toxicity testing).Specifically, for OU1 sampling the text of the FSP stated:i. Characterization of surface and subsurface soils outside of and below the foundations of buildings used in former manufacturing processes will be conducted;ii. Post-remedial subsurface soil confirmatory sampling and analysis EPH/VPHiii. area west of Plant B shall be conducted;iv. Sampling shall be conducted in the Lower South Ditch floodplain soils (on-Property and off-Property) to complete the characterization of the nature of and distribution of SVOC contamination in surface soil in that area;v. Re-sampling all historical background locations including soil surface soil (at SS015XXBKX through SS019XXBKX and BS021 REF), surface water SW001XXBKX through SW004XXBKX and SW014XXBKX, and sediment (SD001XXBKX through SD004XXBKX, SD014XXBKX, and BS012REF) locations will be conducted; andvi. The FSP Section 4 investigation program will address the OU1 sampling objectives.These objectives have not been fully met. There is no evidence of any sampling of soil with analysis of EPH/VPH immediately west of Plant B. Surface soil in the Lower South Ditch floodplain was sampled and analyzed for SVOCs; however, detection limits appear to be high (i.e., benzo(a)pyrene non-detects shown on Figure 4.1-4 of the RI are above the residential RSL). No re- sampling of historical background soil locations was done; instead, the RI the September 2010 OU1 RI Work Plan Addendum V, there were several gaps where the sampling did not meet the FSP investigation program or where additional analysis is needed based on the results (See Nature and Extent Comment 16.0).	The goals and objectives were properly addressed. The USEPA reviewed the Draft RI/FS Work Plans, and through numerous comments, and meetings, requested specific data be collected at specific locations. The final approved RI/FS Work Plan addressed all USEPA comments as USEPA approved this document. The entire sampling program for OU1 that was approved by USEPA was completed. For USEPA to now suggest that the work plan it approved does not meet the work plan objectives that were stated in the work plan is inconsistent with that approval.i. Characterization of surface and subsurface soils outside of and below the foundations of buildings used in former manufacturing processes was conducted during the 2009 OU1 soil investigation program and during the November 2010 Supplemental OU1 Soil Boring Program. The 2009 OU1 soil investigation program was completed consistent with the requirements of the USEPA-approved Field Sampling Plan. The soil borings and surface and subsurface soil samples identified in the FSP were completed/collected, and the analytical suite identified for each of the proposed samples was completed by the laboratories. The 2010 Supplemental Soil Boring Program also provided additional delineation of subsurface impacts associated with the area north of the former Plant B Production building and to the east of the current Plant B treatment Building.During the 2009 OU1 soil investigation program, consistent with the approved FSP, borings were completed and surface soil and subsurface soil samples (often at two depths) were collected from locations beneath slabs and adjacent to slabs associated with the former Lab/Office Building, the Pilot Lab, the three Finished Product Storage Buildings, Plant A, Plant B, Plant C-1, Plant C-2, Plant C-3, Plant D, Plant D Tank Farm, the Plant B Treatment Building, the East Warehouse, the West Warehouse, the former Boiler House, the Wastewater Treatment Plant, and the former Lake Poly.ii. Sampling and analysis of soil samples immediately west of the Plant B Treatment Area was conducted consistent with the approved Field Sampling Plan contained within the approved RI/FS Work Plan. Figures 4.1-1and 4.2-1 of the FSP show locations of proposed surface soil and subsurface soil samples. Those samples were collected. Tables 4.1-1 and 4.2-1 identify soil samples to be collected from Area 8 – all of those samples were collected. Only two of those samples west of Plant B (SB-421 0-1 ft bgs and SB-421 within 1 – 10 ft bgs) were to be analyzed for EPH/VPH and they were. Concentrations of EPH and VPH fractions were non-detects or low concentrations. It should be noted that the area west of the Plant B treatment area was referred to by Shaw as the "EPH/VPH" area was impacted by a release of TMPs, not petroleum hydrocarbons., Historical sampling and analysis indicated that there was a very good correlation between concentrations of the VPH fraction C5-C8 Aliphatics and the total trimethylpentene concentrations in soil samples collected from that area prior to the installation of the air sparge/soil vacuum extraction system at that location. The naming of the area as the "EPH/VPH" area is a misnomer – the area was primarily an area of TMP release. This has been explained to USEPA on several occasions including past reports and in meetings. There was historical EPH data that have been assumed to remain representative of site conditions, even after the operation of the AS/SVE system. No additional analysis for EPH/VPH is required.iii. Sampling of soils in the Lower South Ditch area was completed consistent with the FSP.Reporting limits for most SVOCs in RI surface soil samples collected from the Lower South Ditch floodplain were generally in the range of 0.037 mg/kg to 0.35 mg/kg. PAHs are included in this parameter group, but PAHs have not previously been identified as a widespread site-related parameter group (isolated locations of detections in soil). The Industrial RSLs for Benzo(a)pyrene and dibenz(a,h)anthracene (the most toxic PAHs) are 0.210 mg/kg and 0.210 mg/kg respectively. In most instances, the reporting limits are below the corresponding RSLs (which are set at cancer risk of 1 in one million – at the lower end of the allowable cancer risk range). The sampling and analysis program did meet the stated objectives.iv. The RI/FS Addendum V – OU1 Remedial Investigation Work Plan Addendum dated September 17, 2010, (Section 3.2.3) proposed cancellation of off-property soil background samples and proposed to use the analytical data for 11 soil samples collected on-property as the soil background data set. The AOC indicates that on- Property background soil samples would be considered appropriate or even preferred. Appendix A of Addendum V identifies and summarized the background soil dataset. Subsequently, in a November 16, 2010 meeting at the Wilmington site, USEPA and its consultants commented on the proposed soil background dataset and orally concurred that the removal of two soil samples collected in proximity of the South Ditch from the background dataset would be appropriate. The initial draft minutes for the meeting (prepared by Nobis) confirm the discussion of the on-Property background soil dataset and confirms USEPA requested removal of samples nearest the South Ditch. USEPA has never commented in writing on Addendum V to the RI/FS Work Plan. Olin will summarize the soil dataset and establish a means of evaluating Site soil data in the context of the background dataset.v. As described above, the sampling and analysis program did meet the objectives of the OU1 Work Plan.With respect to the comment that the OU1 Work Plan Addendum identified data gaps or additional sampling and analysis was required based on the results of the 2009 OU1 soil investigation, Olin acted on the identified data gaps and conducted, in November 2010, a Supplemental OU1 Soil Boring program to delineate the extent of soil impacted by trimethylpentenes in the area adjacent to the soil boring SB-405 and in the area east of the Plant B Treatment Building to address delineation of subsurface soil impacted by processing oil, BEHP, VPH, and EPH. The statement in the comment "Based on the soil results reported in the September 2010 OU1 RI Work Plan Addendum V, there were several gaps where the sampling did not meet the FSP investigation program…" appears to be unfounded and clarification is requested.	i. Olin's response is satisfactory. i. See responses for Report No. 11 (USEPA Comment 2A). Olin's response is acceptable. iii. See response for Report No. 12 (USEPA Comment 2B). iv. See response for Report No. 13 (USEPA Comment 2C). v. See responses for Report No. 21 (USEPA Comment 3H) and Report No. 48/49 (Nature and Extent Comment 16).	Please refer to Olin's response to Nobis' reply on comments 2B and 2C as well as the OU1 supplemental work plan submitted to EPA on November 16, 2012 for review and approval.	Based on discussion during the November 7, 2012 meeting with EPA, Olin submitted a Supplemental Work Plan on November 16, 2012. EPA provided conditional approval of this work plan on December 12, 2012. The final Supplemental Work Plan was submitted on March 19, 2013. The final Supplemental Work Plan satisfactorily addressed data gaps previously identified by USEPA.

Study Area and Land Use Comments **Comment No. 1** **Comment Title: South Ditch Temperature Profile**				
EPA Comment	**Olin Response to EPA**	**Nobis Response to Olin**	**Olin Response to Nobis**	**Resolution**
Section 3.4: Please describe the temperature profile study, method, and results performed in the South Ditch and ephemeral drainage ditch (and other drainage ways?).	The temperature profiling of off-Property Landfill Brook, Maple Meadow Brook, and Sawmill Brook was conducted to assist in identifying specific surface water sampling locations (OU2) that might be representative of groundwater (OU3) discharge to off-Property surface water. These activities are not OU1 activities, and will not be included in the Preliminary RI for OU1. No temperature profiling in surface water was conducted at OU1 (consistent with approved RI/FS Work Plan).	Please see Response to Report No. 9 (USEPA Comment 1I).	No response is required.	There was no Temperature Profile Study conducted for the South Ditch. No such study was proposed in the RI Work Plan approved by USEPA.

Study Area and Land Use Comments **Comment No. 2** **Comment Title: Additional Sensitive Populations**				
EPA Comment	**Olin Response to EPA**	**Nobis Response to Olin**	**Olin Response to Nobis**	**Resolution**
Section 3.6.2, 4th paragraph: In addition to the listed public schools, please include the children's gym, which operates out of the former Sanmina building on Jewel Drive, and the day school on Mill Road. These potentially sensitive populations are both within the study area.	Comment noted.	EPA assumes "comment noted" indicates Olin's agreement to the request.	The Draft RI report will include identification of potentially sensitive populations as identified above.	Section 3.5.2 identifies these potentially sensitive populations.

Table L-1
Response to Comments Table
Remedial Investigation Report - OU1 and OU2
Olin Chemical Superfund Site
Wilmington, Massachusetts

Study Area and Land Use Comments
Comment No. 3
Comment Title: Clarification of Historical Data

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
Section 3.7 of the Report is a primary example of historical information not being adequately presented or referenced within the text of the document. A great deal of additional information is available in historical reports that could have been added to clarify the ecological setting and provide additional support for the ecological Conceptual Site Model proposed in Section 7.0. The following are some examples of areas of concern that need to be addressed accordingly: a. This subsection lacks the depth and detail required to understand the existing habitat and species adequately. More detailed lists/tables and reference studies to support the findings are required. The documentation appears to be based on a summary of brief field visits. More information is available on the ecology present at the Site and should be incorporated in this Report accordingly; b. The "ditches" present on Site are historical streams and wetlands. Although man may have modified the locations of the "ditches," streams were present on the Site prior to any industrial development. The 1950 USGS Quad map of the Site clearly demonstrates that both streams and wetlands are present where the West and South "ditch" exist today. Note: no buildings are on the Site and the drainage is easterly to the North and South Ponds. As streams, the Ambient Water Quality Criteria (AWQC), for both human and ecological receptors are applicable; c. The monitored ammonia and hexavalent chromium concentrations in the south ditch far exceed levels toxic to fish larvae and macroinvertebrates and hence, cause and/or contribute to the poor aquatic community found at the Site. Additionally, the low dissolved oxygen in the streams can be attributed to the nitrification process of ammonia to nitrite/nitrate. Therefore, evidence is present that the stressed biota can be attributed to contaminants from the facility; and d. Further work, including but not limited to a macroinvertebrate survey and fish larvae inventories, should be performed on the reference streams in the area in order to determine the aquatic and benthic communities in similar streams.	a. The information is contained in previous reports, particularly the Focused RI. b. This topic was thoroughly reviewed with USEPA in context of the Work Plan for North Pond. There is no definitive proof that "the drainage is easterly to the North and South Ponds." With regards to the statement "As streams, the Ambient Water Quality Criteria (AWQC), for both human and ecological receptors are applicable…," the South Ditch and East Ditch are not water bodies for which the human health components of the AWQC are applicable. Those components address consumption of water and consumption of organisms. Neither ditch is a current nor a potential source of potable water and neither of the ditches is a current or future source of organisms for human consumption. c. Concentrations in surface water are above screening criteria and AWQC. Based on quarterly surface water data collected for the IRSWP, DO in South Ditch typically averages between 5 and 6 mg/L, which is not low. Please identify support for contention that there are stressed biota. As described previously in the Focused RI Report, the South Ditch does go dry seasonally and is not suitable for fish habitat. d. The East Ditch is contained in railroad ballast and transitions into a series of culverted sections prior to and after its confluence with Landfill Brook. No fish communities would be expected in a shallow, unprotected ditch. Neither the South nor East Ditch is suitable for fish habitat, and fish species have never been observed in these water courses. Surveys from "similar" streams would, therefore, have no direct bearing on conclusions drawn from the subject ditches.	a. Please see Response to Report No. 22 (General Comment 1). b. Olin's response is satisfactory. c. Response needs further discussion. d. While EPA agrees that South and East Ditches are not now, and probably never were, quality fish habitats, Olin's response failed to address concerns regarding the appropriateness of collecting macroinvertebrate survey information at reference locations. This comment merits further discussion.	a. Comment noted b. No comment is necessary c. Olin will include additional discussion of surface water and ambient water quality criteria in the Draft RI report. d. Additional macroinvertebrate sampling is not proposed and was not identified as an important data gap in the data gap tables presented at the November 7, 2012 meeting.	The habitats and resources are discussed in more detail in the First Interim Deliverable for the Ecological Risk Assessment.

Study Area and Land Use Comments
Comment No. 4
Comment Title: Evidence of Trespassing

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
Section 3.7.1, 2nd paragraph: In addition, deer tracks have been observed on the northern and southern portions of the property. A hunter's perch has been observed on the southern portion of the property on more than one occasion.	Comment noted.	EPA assumes "comment noted" indicates Olin's agreement to the request.	Comment noted indicates that no response was required. A hunters perch was located at the adjacent property, not on the southern portion of the Olin property.	The First Interim Deliverable for the Human Health Risk Assessment includes a trespasser as the receptor to be evaluated for that property.

Table L-1
Response to Comments Table
Remedial Investigation Report - OU1 and OU2
Olin Chemical Superfund Site
Wilmington, Massachusetts

Nature and Extent of Contamination Comments
Comment No. 1
Comment Title: Individual Contaminant Figures

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
The extent of impact per analyte/analyte group, as well as the delineation of the specific contaminant source areas (e.g., the extent of TMP impacts in the vicinity of Plant B production area, and processing oils and associated analytes in the vicinity of the Plant B tank farm, etc.) should be depicted on individual figures. This will aid in determining appropriate exposure areas. Furthermore, soil boring/sampling point locations should also be depicted in association with specific source areas at the Site as applicable (e.g., Lake Poly, Drum Area, Acid Pit, etc.). Additional cross-section figures, showing boring log locations, depths, and associated values, should be provided to demonstrate that the impacts at specific source areas have been adequately defined / delineated.	The contaminant distribution figures (1- ft bgs, 1-10 ft bgs, and > 10 ft bgs) show the distribution of contaminants in soil at and in the vicinity of the Site features. The Preliminary RI presented soil contaminant distribution figures (for current, post-remedial conditions) for the parameters most frequently detected at concentrations above industrial RSLs. Those figures clearly show contaminant distributions and extent of impacts throughout the Property. Several of the Site features (Lake Poly, Drum Area, Debris Area, the Plant B Production area and the so-called EPH/VPH area, Central Pond, the South Ditch, the On- Property West Ditch and West Ditch Wetland, and the Plant B treatment area) have been the focus of historical and continuing removal and remedial actions. The comprehensive contaminant distribution figures effectively shown nature and extent of contamination. To facilitate review of the figures and to provide additional perspective, various process areas and waste disposal features will be added to each of the contaminant distribution figures included in the revised RI Report. Up to six additional cross sections will be prepared for the revised RI Report to assist in documentation of vertical delineation of source areas.	See response for Report No. 2 (USEPA Comment 1B).	Olin will provide the requested figures with the Draft RI report in sections 1 through 5.	The contaminant distribution figures (1- ft bgs, 1-10 ft bgs, and > 10 ft bgs) show the distribution of contaminants in soil at and in the vicinity of the Site features. To facilitate review of the figures and to provide additional perspective, various process areas and waste disposal features have been added to each of the contaminant distribution figures included in the revised RI Report. Figure 1.3-1 identifies the historical and current on-property Site features with text labels. Figures 4.1-2 through 4.1-42 show soil, surface water and sediment sampling locations, chemical concentration distributions, and those historical and current on-Property features. Cross sections are included as Figures 3.2-2 and 3.2-3. The location of the cross section lines are shown in Figure 3.2-1.

Nature and Extent of Contamination Comments
Comment No. 2
Comment Title: Clarification of Historical VS. Current Data and Relationship Between Soils and Groundwater

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
The tables within the Report do not distinguish between historical and new data, and the historical data utilized in the Report has not been made available electronically; therefore, a thorough review of this data was not possible. Please be advised that a thorough and complete comparison of OU3 results with respect to OU1 results should be conducted as part of the RI, so as to correlate those contaminants detected in each OU with respect to the other OUs. This comparison is necessary to determine the nature and extent of contamination at the Site, as there may be contaminants detected in soils as part of OU1 that are not currently being sampled and analyzed for in relevant OU3 groundwater samples, and/or vice versa.	The data tables in Appendix E of the preliminary RI Report identify the sampling date for each sample used in the risk assessments. In addition, sample IDs on the contaminant distribution figures distinguish recent RI samples from historical samples (RI soil samples are either SS-4XX or SB-4XX or SB-5XX (400 and 500 series IDs). USEPA access to the historical data was previously provided in an online data access tool. However, to facilitate review of the Preliminary RI, Olin will provide to USEPA, for USEPA use, a supplemental CD that contains the historical and recent OU1 RI soil, surface water, and sediment analytical data considered in the Preliminary RI (in the same flat file format requested by USEPA for the data collected for the RI sampling events). In the attached Tables 1-1 through 1-3, The OU1 soil data summaries (Preliminary RI Tables 4.1-1 through 4.1-3) have been compared to the on-Property shallow groundwater data summary (2007 to present) to determine if there are any contaminants detected in soil that are not currently being analyzed for in the relevant OU3 groundwater samples. Shallow groundwater samples are from monitoring wells screed across the water table or within 5 feet of the water table, the list of shallow wells is identified in Table 1-4. Five pesticides (4,4'-DDD, 4,4'-DDE, 4,4'-DDT, dieldrin, and Gamma-BHC/Lindane) and cyanide were detected in soil, however, they have not been analyzed for in groundwater. Groundwater is not analyzed for pesticides since they were likely used for their intended purpose. Similarly, the on-Property shallow groundwater data summary was compared to the OU1 soil data summaries (Table 2-1) to determine if there are any contaminants detected in groundwater that were not sampled and analyzed for as part of OU1. Perchlorate, alkyl phenols, and Kempore® were detected in groundwater samples; however, these compounds have not been analyzed for in soil. An analytical method is not available for Opex® and Kempore® in soil and sediment matrices. In addition, an analytical method for alkyl phenol does not currently exist for soil and sediment matrices. Perchlorate was analyzed in groundwater at the request of USEPA to determine the presence or absence of perchlorate in groundwater and its distribution if present.	See response to Report No. 1 (USEPA Comment 1A).	Please see response to Comment 1A.	Appendix F of the Draft RI Report includes all of the analytical data for detected parameters in soil. In Tables F-1 through F-5, all soil samples are identified as well as the sample collection date. All samples for surface water that are used to characterize current conditions are identified in Tables 4.1-4, 4.1-5, 4.1-6, 4.2-3, 4.2-4, 4.2-5, and 4.2-6. All samples for sediment that are used to characterize current conditions are identified in Tables 4.1-7, 4.1-8, 4.1-9, 4.1-10, 4.2-7, 4.2-8, 4.2-9, 4.2-10. These tables identify the sample dates for all samples. Appendix J - Soil leaching Documentation includes the evaluation of potential leaching of chemicals in soil to groundwater. The evaluation previously presented in the April 3, 2012 response to comments has been included in Appendix J. In Tables 1-1 through 1-3 of Appendix J, the OU1 soil data summaries have been compared to the on-Property shallow groundwater data summary (2007 to present) to determine if there are any contaminants detected in soil that are not currently being analyzed for in the relevant OU3 groundwater samples. Shallow groundwater samples are from monitoring wells screened across the water table or within 5 feet of the water table, the list of shallow wells is identified in Table 1-4 of Appendix J. Five pesticides (4,4'-DDD, 4,4'-DDE, 4,4'-DDT, dieldrin, and Gamma-BHC/Lindane) and cyanide were detected in soil, however, they have not been analyzed for in groundwater. Groundwater is not analyzed for pesticides since they were likely only used for their intended purpose. Similarly, the on-Property shallow groundwater data summary was compared to the OU1 soil data summaries (Table 2-1 of appendix J) to determine if there are any contaminants detected in groundwater that were not sampled and analyzed for as part of OU1. Perchlorate, alkyl phenols, and Kempore® were detected in groundwater samples; however, these compounds have not been analyzed for in soil. An analytical method is not available for Opex® and Kempore® in soil and sediment matrices. In addition, an analytical method for alkyl phenol does not currently exist for soil and sediment matrices. Perchlorate was analyzed in groundwater at the request of USEPA to determine the presence or absence of perchlorate in groundwater and its distribution if present.

Table L-1
Response to Comments Table
Remedial Investigation Report - OU1 and OU2
Olin Chemical Superfund Site
Wilmington, Massachusetts

Nature and Extent of Contamination Comments
Comment No. 3
Comment Title: Background Data Inconsistencies

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
The background data set as presented in the Report does not appear to be entirely consistent with the preliminary discussion of background data between EPA and Olin. Additional background discussion under the Risk Assessment Comments addresses published background values. Please revise accordingly. Some concerns with the selected background datasets remain:a. The background characterization should include some discussion of the physical and general chemical characteristics of the soils and surface streams. To be comparable, soil types and characteristics (clay/silt/sand content, texture, etc.) of the background data set need to be described with respect to the same characteristics as Site samples to judge whether chemical sampling results are comparable or potentially affected by differences. Samples SS-449, SS-450, and SS-451 are within designated wetland areas as shown on Figure 2.3-1 of the preliminary RI. It was also noted that locations SS-434, SS-453, and SS-454 are shown in close proximity to the edge of these wetlands. These locations should be omitted from the background evaluation accordingly. These samples are not appropriate for inclusion as background soil samples, as the soil type and characteristics are likely to be different. Review of the proposed background soil chemical data indicates these samples have not been significantly impacted by the manufacturing activities at the Site; therefore, those samples with soil type samples. The analytical data for the selected background samples are very consistent, indicating that each of the samples was appropriately selected from locations not impacted by the site. The consistency also suggests that further evaluation of variability in soil types with respect to the background samples is not necessary.b. Regarding surface water and sediment background samples, in some locations upstream surface water and sediment sampling is not possible at the Site; therefore, data has been collected from nearby streams. The rationale for selecting background locations/streams and the similarities/differences between the background streams and the OU1 drainage ditches (morphology, flow characteristics, sediment characteristics, etc.) should be included in the Report to allow for qualitative evaluation of the representativeness of the background locations.c. There is concern about the usability of sediment samples SDBK-002 and SDREF-012 as background. Both samples appear to be down gradient of the Spinazola Landfill and both samples have elevated ammonia concentrations (63 mg/kg at SDBK-002 and 120 mg/kg at SDREF-012). These concentrations appear to exceed both acute and chronic AWQC for ammonia (Note: the ammonia AWQC is both pH-and temperature-dependent and information for these parameters was not readily available).	a. See previous response to Comment 7.c.b. Information and rationale will be added to the revised RI Report.c. The statement that "both samples have elevated ammonia concentrations" appears to be unsubstantiated (particularly for wetland sediments). We should have a technical dialog concerning ammonia concentrations in un-impacted wetlands sediments and wetlands soils. In addition, AWQC (surface water criteria – expressed as µg/L or mg/L) are neither applicable nor relevant for evaluating sediment concentrations (expressed as µg/kg or mg/kg). AWQC do not apply to sediment data.	a. Refer to Report No. 13 (USEPA Comment 2C).b. Response is acceptable.c. Response is acceptable.	Please see response to Comment 2C.	Appendix I contains the Site Specific Background Soil Memorandum. The USEPA agreed with the selection of the site-specific soil background data set in a meeting on February 5, 2013. Published background values are not referenced in the Draft RI Report (tables, text, or figures).

Nature and Extent of Contamination Comments
Comment No. 4
Comment Title: Supplemental Data Tables

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
The data tables provided within the Report need to be supplemented. The current data tables are limited to the presentation of average detected concentrations and range of sediment/surface water sampling point were provided to EPA in piece-meal fashion as results were validated, complete results need to be provided in the OU1 RI Report with detection limits and a comparison to all applicable and appropriate regulatory standards, guidelines, criteria, and screening values. In addition, the tables should be revised to include means and medians for the range of detected concentrations. The extent of detected analytes depicted on the figures should be interpreted in the text, evaluated against the Conceptual Site Model, and supported with summary analytical tables.	Please clarify which specific data tables are the subject of the comment. Also, please clarify the purpose of the request. The current dataset and the method of presentation is clearly sufficient to verify the nature and extent of contamination consistent with the purpose of the RI. The validated analytical data associated with RI investigations have not been provided to USEPA in a piece-meal fashion. The data have been provided in a database file in a consistent, predictable fashion consistent with requests from USEPA. Consistent with requests from USEPA, as data validation has been completed for a specific RI investigation event, Olin has provided USEPA with a data file in a format specified by USEPA, so that USEPA could build a database of Site data for its own use. Of course, all of the data submittals have included detected concentrations and reporting limits for results identified as "non-detects". Please note: the validated data includes a reporting limit (not a detection limit) for results identified as a "non-detect". That reporting limit is a Sample Quantitation Limit and it is sample specific (dependent on laboratory dilution as well as moisture content in some cases). Each analytical method implemented by a laboratory has a method detection limit (MDL) that represents a lower limit of detection (but with less certainty concerning the actual concentration). In addition to the data file, Olin has provided an Adobe Acrobat® pdf file that contains all of the data organized and presented by sample. Tables 4.1-1 through 4.1-3 summarize historical and recent soil data (surface soil, shallow subsurface soil, and deep subsurface soil), Table 4.1-4 summarizes surface water data, and table 4.1-5 summarizes sediment data. These tables present, for each parameter detected in at least one soil sample, frequency of detection, range of reporting limits for non-detects, range of detected concentrations, arithmetic average concentration for all samples (using ½ the reporting limit to represent "non-detects", the Site-specific background concentration (maximum of background dataset), USEPA Residential Regional Screening Level, USEPA Industrial Regional Screening Level and the Table formatting indicates if the maximum detected concentration is greater than the Industrial Regional Screening Level and/or if it is greater than the Site-specific background concentration. For parameters without USEPA Regional Screening Levels (such as EPH and VPH fractions), Massachusetts Contingency Plan Method 1 soil standards have been utilized as screening levels. The comparison of Site soil data to these screening levels is made to provide context and perspective (and a framework) for preparing the nature and extent discussion. These comparisons are not used to eliminate any analytical parameters from further consideration in the remainder of the RI. We can see no benefit of calculating means and medians as requested. This exercise will not provide any additional insight into the nature and extent of contamination at the site. Please clarify why means and medians of detected concentrations would be necessary or useful for these tables. It is unclear what USEPA means by the "extent of detected analytes contamination in relation to sources is intrinsically part of the CSM.	EPA concurs that means and medians are not required on Tables 4.1-1 through 4.1-5. See response for Report No. 4 (USEPA Comment 1D). The text of the nature and extent section should refer the reader to the point-by-point comparison tables and address any areas where exceedances are seen.	Please refer to responses to comment 1D. As agreed based upon discussion with EPA in the October 11th, 2012 meeting, point by point comparison tables will not be prepared. Olin will either add conditional format shading to detections above the industrial RSLs or produce a stand-alone table that identifies all analytical detected results above an industrial RSL.	Appendix F Tables F-1 through F-5 include comparison of soil analytical data to Industrial RSLs and leaching-based SSLs for OU1 and OU2 soil samples. Analytical data for all detected parameters are presented for each soil sample considered in the RI. Concentrations above the RSL and/or leaching-based SSL are flagged in the tables. Tables showing analytical results for each surface water and sediment sample considered in the RI are also presented in Appendix F.

Table L-1
Response to Comments Table
Remedial Investigation Report - OU1 and OU2
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Nature and Extent of Contamination Comments
Comment No. 5
Comment Title: SSL Comparison Values

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
Tables 4.1-1 through 4.1-3 should be revised to present comparison of Site soil data to leaching based criteria; specifically, the EPA regional screening levels for protection of groundwater (risk-based SSLs). Table 4.2-1 of the Addendum V - OU1 Remedial Investigation Work Plan Addendum Final Remedial Investigation/Feasibility Study Work Plan (dated September 17, 2010) included these values. The SSL comparison values are useful as they speak to the potential for soil contaminants to impact groundwater. It is noted that in general these SSLs are significantly lower than the RSLs, indicating that while soil contaminants may not be a human health concern via direct contact soil exposures, they may be of concern based on potential to impact groundwater. This is true for many of the contaminants reported at the Site.	Comparison of soil data to leaching criteria will be done in the revised RI Report only as a supplement to a comprehensive comparison of nature and extent of contaminants in soil and shallow groundwater on the Property. The evaluation of actual soil and shallow groundwater data are a more appropriate measure of leaching of parameters from soil to groundwater. Groundwater underlying the Property, with the exception of the northeast corner will not be evaluated for drinking water purposes in OU3. Refer to the response to Comment 1.0 Supplemental Information, bullet number 3 for the additional comprehensive discussion for the evaluation of potential of leaching from soil to groundwater. That evaluation concludes there is little evidence that leaching form soil to groundwater at OU1 is of concern.	See response for Report No. 3 (USEPA Comment No. 1C).	As indicated in our response to comment 1C, the leaching from soil to groundwater evaluation previously presented will be included in the Draft RI report, eliminating the need to complete a point by point comparison to leaching based RSLs.	Appendix F Tables F-1 through F-5 include comparison of soil analytical data to Industrial RSLs and leaching-based SSLs for OU1 and OU2 soil samples. Concentrations above the RSL and/or leaching-based SSL are flagged in the tables.

Nature and Extent of Contamination Comments
Comment No. 6
Comment Title: Disparity Between Actual/Desired Detection Limits

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
There are a number of chemicals for which the project's analytical sampling methods were not able to achieve the required Project Quantitation Limits (PQLs) specified in the QAPP. While this is not unusual for a project with numerous target analytes and the analytical approach used in the OU1 sampling (as detailed in the 2009 QAPP) is interpreted to be the best technical approach to obtain data on a wide variety of parameters identified for the RI, while providing low detection limits for use in contamination and risk assessments; the fact remains that it is not possible to determine whether certain target analytes reach risk-based levels of concern. Table E-1-2 indicates more than 60 chemicals in soil data were used in the risk assessments with non-detect reporting limits greater than the Industrial RSLs. Comparisons were made against the industrial RSLs instead of comparison to the Project Action Levels (PALs) presented in the QAPP. However, the Report makes no effort to discuss or evaluate elevated detection limits relative to the PQLs, PALs, or industrial RSLs. This disparity between desired and actual detection limits represents a potentially significant data gap, and EPA reserves the right to request re-sampling with more sensitive analytical methods at a later date. The above concern also applies to other media and OUs. In the review of groundwater sampling results, the project analytical method for 1,4-dioxane reaches a detection limit of 50 µg/L; whereas, the PAL is 3 µg/L. The PAL reflects recent changes in the EPA's toxicity data for 1,4-dioxane, which has led to the adoption of better analytical techniques at many other site investigations. This is directly relevant to the OU1 sampling as well, as all of the sampling results for 1,4-dioxane in surface water (Table E-2-8) have been rejected. Please revise Table E-1-2 to provide a comparison against the PALs as cited in the QAPP. Similar tables should be provided for sediment, surface water, and groundwater results. A comparison of groundwater results is necessary to effectively evaluate potential leaching to groundwater.	a. This comment is inappropriate and inaccurate. The statement "However, the Report makes no effort to discuss or evaluate elevated detection limits relative to the PQLs, PALs, or industrial RSLs" is simply incorrect. Appendix E-1 is focused on the identification and evaluation of elevated reporting limits. Table E.1-3 identifies elevated reporting limits that are substantially above Industrial Screening levels and therefore were considered unsuitable for use in the risk assessments. b. The suggestion that Table E.1-2 be revised to compare reporting limits to PALs provided in the QAPP rather than Industrial Regional Screening Levels is not appropriate for this industrial Site because the RSLs are the values utilized in the risk assessment to select chemicals of potential concern for the risk assessment. c. The groundwater discussion is an OU3 issue. d. There is no historical record of the use or disposal of chlorinated solvents that may have contained 1,4-dioxane as a stabilizer at the site. The 1,4-dioxane discussion for groundwater is not a priority in the evaluation of nature and extent for OU1 at this site.	See response for Report No. 14 (USEPA Comment 3A).	Included and as discussed previously, please see Attachment B. Please see response to Comment 3A.	During the October 11th, 2012 meeting with EPA it was agreed that Industrial RSLs are appropriate for the site and that overall data quality based on a combination of reporting and method detection limits meets the work plan objectives. Overall, reporting limits or method detection limits meet the identified Project Action Levels. Many of the comments concerning detection limits were focused on Residential RSLs (no longer a concern).

Table L-1
Response to Comments Table
Remedial Investigation Report - OU1 and OU2
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Nature and Extent of Contamination Comments
Comment No. 7
Comment Title: Qualitative Review of Observations/Type Logs/Field Parameter Table

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
Observations of general soil conditions, visual impacts, and PID readings should be discussed and highlighted within the text of the Report in order to provide an overall qualitative review of observations and/or impacts in source areas. Boring logs and field sheets generated during the investigation should be typed to avoid any misinterpretation of handwritten notes, comments, or readings. Field parameters (i.e., temperature, pH, conductivity) should be summarized in tabular form.	The requested text discussion and highlighting in the revised RI Report of general soil conditions, visual impacts, and PID readings in order to provide an overall qualitative review of observations and/or impacts in source areas will not add substantial value to the RI Report. The information is provided in attachments to the report. Adding text will not affect the delineation of extent or the risk assessments. The boring logs and field sheets that are included in the preliminary RI clearly and neatly present the information requested. PID data from the RI borings will be presented in a table. Tables 4.1-1 through 4.1-3 summarize the detected VOCs and VPH parameters in surface, shallow subsurface, and deep subsurface soil samples at the Site. Those tables identify detected parameters, frequency of detection, range of reporting limits for non-detects, and range of detected concentrations. Those tables indicate that trimethylpentenes are the most frequently detected VOCs in soil overall. Based on the 2009 RI soil investigation results, the RI Work Plan Addendum V had previously identified the need to conduct additional investigation of the nature and extent of trimethylpentene impacts in the area of SB-405. That additional work was conducted in 2010. The bag headspace PID readings from the 2010 supplemental soil boring program in the area of SB-405 were summarized in Figure 2.2-2 of the Preliminary RI. The hand written boring logs are neatly written and clearly presented and are primary data collection records that are signed by the field geologist. There is no need to type these logs. Field parameters are not applicable to soil and are only applicable to a small subset of surface water samples.	See response for Report No. 7 (USEPA Comment 1G).	Please see response to comment 1G.	

Nature and Extent of Contamination Comments
Comment No. 8
Comment Title: Borings Not Fully Analyzed

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
Consistent with the FSP, certain borings were not analyzed for the full target analyte list (TAL). The Report should discuss boring locations where the full TAL was not analyzed, but one or more analytical results exceeded PQLs. An evaluation needs to be provided for each such result to justify why the result is sufficient or at borings where one or more analytical results exceeded industrial screening levels, additional samples should be obtained and the analyses expanded to include the complete TAL. An example of this scenario is the area behind Plant B (e.g., soil borings S8-474 through 478) where levels of bis(2-ethylhexyl)phthalate (BEHP) and other Site related compounds were detected above industrial screening levels, but the boring was not analyzed for the full TAL.	USEPA approved the current sampling and analysis plan. The plan was followed carefully. The USEPA-approved analytical program was developed with known activities in mind. In other words, where samples were collected for an analyte list that was shorter than a full TAL, the rationale was because past activities at that location (e.g., manufacturing activities, past sampling, etc…) were known. When a sample was analyzed for the complete TAL, much less was known about past activities at that location. Therefore, just because an analyte was detected at concentrations above the PAL, there is likely little reason to believe that an expanded list of analytes should be required – especially when there is no historic reason to believe that other analytes from the TAL would be present. If this were the case, we would have sampled every location for the complete TAL. The request that we consider the expanded TAL everywhere that an analyte exceeded PALs is unwarranted. For the example presented, the subsurface has been characterized in this area with previous investigations and the area is characterized by historical releases of processing oil, trimethylpentenes, and phthalates. Given this information, the analytical suite identified in the approved Work Plan for the samples in this area is appropriate (i.e., VOCs and SVOCs included in the comprehensive analyte list).	See response to Report No. 16 (USEPA Comment 3C).	Based on review for the frequency of detection and detected concentrations for specialty compounds, it was agreed between Olin and EPA on the November 7th 2012 meeting that further analysis of specialty compounds in the TAL was no longer required.	Based on discussion during the November 7, 2012 meeting with EPA, Olin submitted a Supplemental Work Plan on November 16, 2012. EPA provided conditional approval of this work plan on December 12, 2012. The final Supplemental Work Plan was submitted on March 19, 2013. The final Supplemental Work Plan satisfactorily addressed data gaps previously identified by USEPA.

Nature and Extent of Contamination Comments
Comment No. 9
Comment Title: Slurry Wall/Temporary Cap Effect on Groundwater

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
Section 4.1.1, 2nd paragraph: The last sentence states: "The on-property DAPL area has been isolated and contained by the Slurry Wall/Temporary Cap (the Containment Area) to eliminate, to the extent practical, migration of groundwater from within this area to surface water in the South Ditch." The Containment Area does not contain groundwater and was not designed for this purpose. Groundwater from within the Containment Area is routinely observed to be exiting this area through the "window" and may be impacting regional groundwater quality. Please modify the text accordingly.	The objective of the Containment Structure was to reduce the amount of diffuse groundwater migrating from within the area to the South Ditch. There is some flow of shallow groundwater from the equalization window (consistent with the design of the Containment Area), and the water quality in samples collected from just outside the equalization window indicates that the groundwater quality monitored in the equalization window is generally consistent with surrounding shallow groundwater outside the Containment Area. The groundwater exiting the window is overlying groundwater (neither DAPL nor diffuse groundwater). The water quality of the exiting groundwater does not indicate any regional groundwater quality impacts. The DAPL and diffuse groundwater, that is located deeper within the Containment Area is not migrating out the equalization window. No revision to the text will be made.	Olin's response is satisfactory.	No revision to the text will be made.	The objective of the Containment Structure was to reduce the amount of diffuse groundwater migrating from within the area to the South Ditch. There is some flow of shallow groundwater from the equalization window (consistent with the design of the Containment Area), and the water quality in samples collected from just outside the equalization window indicates that the groundwater quality monitored in the equalization window is generally consistent with surrounding shallow groundwater outside the Containment Area. The groundwater exiting the window is overlying groundwater (neither DAPL nor diffuse groundwater). The water quality of the exiting groundwater does not indicate any regional groundwater quality impacts. The DAPL and diffuse groundwater, that is located deeper within the Containment Area is not migrating out the equalization window. No revision to the text will be made.

Nature and Extent of Contamination Comments
Comment No. 10
Comment Title: Calcium Sulfate Landfill

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
Section 4.1.1: The Calcium Sulfate Landfill needs to be identified as a potential source. While capped, it is not lined and may be impacting regional groundwater quality.	Comment noted. Groundwater monitoring is on-going consistent with the post-closure monitoring plan approved by the MassDEP for the Calcium Sulfate Landfill (CSL). Groundwater monitoring results for the CSL will be evaluated under OU3.	Including this discussion in OU3 is appropriate.	No response is needed	Comment noted. Groundwater monitoring is on-going consistent with the post-closure monitoring plan approved by the MassDEP for the Calcium Sulfate Landfill (CSL). Groundwater monitoring results for the CSL will be evaluated under OU3.

Table L-1
Response to Comments Table
Remedial Investigation Report - OU1 and OU2
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Nature and Extent of Contamination Comments
Comment No. 11
Comment Title: Detected RSL Parameters

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
Sections 4.1.2.1, 4.1.2.2, and 4.1.2.3: Each of these sections includes the statement, "There were several detected parameters for which RSLs are not available." While it is possible to determine the list of chemicals without RSLs through review of Tables 4.1-1, 4.1-2, and 4.1-3, given the expansive list of analytes, this is a time-consuming task. Please revise Sections 4.1.2.1, 4.1.2.2, and 4.1.2.3 to include bulleted lists of the chemicals without RSLs.	Bulleted lists of chemicals without RSLs will be included in the revised RI Report.	Olin's response is satisfactory.		In each of these sections, the list of detected parameters without USEPA RSLs (or calculated values or MCP standards) has been identified in the text.

Nature and Extent of Contamination Comments
Comment No. 12
Comment Title: QA/QC Samples

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
The purpose of QA/QC samples is to confirm that laboratory results reflect the condition of the various media in the environment and are not the result of poor sampling or laboratory technique. Additionally, field duplicate samples are collected in order to verify the sampling and laboratory precision. Each field duplicate sample should be given its own unique sample code and should NOT include any reference to the parent sample. According to the Contract Laboratory Program Guidance for Field Samplers (EPA, January 2011), as well as the EPA Risk Assessment Guidance for Superfund, Part A, (EPA, 1989), the identity of these samples should be withheld from the laboratory conducting the analysis. When more than one QA/QC sample is submitted with a set of samples, they should be interspersed within those samples so that they are not easily identifiable by the laboratory. Although there is no indication in the QAPP, the Field Sampling Plan, or the Draft RI that the QA/QC designations would be withheld from the laboratory, this is standard practice. It is apparent this was not done, as evidenced by Appendix D chain of custody reports from MACTEC to the laboratories: a. June 2009 chain of custody to Katahdin WIL-1cd page 23 of 258 identifying sample OC_SB-0426-S.0/7.0-DUP, with a sample QC code of FD, as well as the sample nomenclature showing DUP and the parent sample identification; and b. November 2010 Soil OU1 DVR including chain of custody to Test America Westfield on page 6319 of 6322 identifying sample OC_SB-0475-8.0/10.0-DUP, with a sample QC code of FD, as well as the sample nomenclature showing DUP and the parent sample identification. Please incorporate these concerns into all future Site sampling events and any associated Sampling and Analysis Plans and/or Quality Assurance Project Plans. These two examples were seen in a cursory review of the chain of custody reports. A full review was not completed.	Sample identification was conducted consistent with the approved Work Plan (including the QAAP and the Field Sampling Plan). Although the sample IDs were not kept from the lab per se, the data is completely usable as is. The laboratory does not pick these duplicate samples out individually and run them by themselves knowing that they are duplicates. Therefore, no bias is introduced whether the IDs are known or not. The samples to be analyzed are removed from the respective sample vials via an autosampler in a batch with other samples – all this is done automatically. The field sampling plan and the QAPP will be followed in the future so ensure that data is being generated in a consistent manner over time.	See response for Report No. 15 (USEPA Comment No. 3B).	In future RI sampling activities, QA/QC samples will be assigned identifiers that do not explicitly identify them as QA/QC samples for specific samples locations.	After receipt of this comment, QA/QC samples were submitted to the laboratory without designating them as QA/QC samples.

Table L-1
Response to Comments Table
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Nature and Extent of Contamination Comments
Comment No. 13
Comment Title: Bedrock Testing

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
When drilling to discern the top of rock, use of a Geoprobe (direct push) is inadequate. There are a number of options other than sonic drilling. It is typical to delineate top of rock with Augers at depths shallower than 40 feet below ground surface (bgs). Using Direct Push Technology, it is impossible to discern between refusal on dense Basal Till or bedrock, and therefore leads to potential misinterpretation of the bedrock surface. Use of Direct Push Technology to delineate bedrock surface is not standard practice and is a universally accepted limitation of the technology. Therefore, any and all claims that bedrock was delineated with a direct push drill rig need to be qualified and should be supported where possible with additional data (i.e., visual inspection of extracted core, geophysical logs, nearby wells, etc.).	Comment noted. Drilling at the Olin Site for OU1 was conducted with a sonic rig, except at a locations where access using a sonic rig was not feasible or desirable (i.e., within wetlands, inside buildings or next to Plant B) or where borings were not drilled to the bottom of the soil profile (TMP delineation in the parking lot). The sonic rigs are capable of coring through the till into bedrock for considerable depth if needed. At each sonic boring, bedrock was confirmed by coring up to six inches. The cores were examined by the rig geologist. The basal till at the property is thin where present. There was a good correlation between direct push sampling and sonic drilling bedrock depths during installation of ILW-2 and EW-1 by sonic methods for the DAPL Pilot test. GP-16, located next to EW-1, became very firm at 45.5 ft below ground surface (bgs) and penetrated to final refusal at 48.8 ft bgs. Bedrock was drilled in EW-1 at 45.5 feet bgs. The direct push apparently penetrated through the till into weathered rock, or rock surface was highly variable within a foot or two of distance. GP-7 drilled next to ILW-2 refused at 38.5'; whereas, bedrock was encountered at 39.0 feet. While we agree the direct push can refuse in basal till, given the till characteristics at this site, direct push boring refusal data appears to be able to provide a good approximation of bedrock depth.	The use of direct push drilling techniques has been utilized in a much greater capacity at the Site than alluded to in the response. Due to the geologic conditions in the examples provided, direct push limitations were not a factor in the accuracy of determining top of bedrock. Also as demonstrated by the example in the comment response, confirmation of direct push results with other methods, at least at a percentage of locations is valuable. When utilizing direct push methodology to interpret bedrock elevations, Olin shall confirm results with an alternate, preferably mechanical, method on a percentage basis (percentage to be set on a case by case basis and presented in the applicable work plan). However, discussion of this issue will be delved into greater detail under OU3. Please note that additional drilling under OU1 for data gaps must consider alternate drilling methods for samples at depth.	No additional activities have been proposed at this time. New direct push locations will not be used to interpret bedrock depth.	No additional activities have been proposed at this time. New direct push locations will not be used to interpret bedrock depth.

Nature and Extent of Contamination Comments
Comment No. 14
Comment Title: Drilling Accessibility

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
It is widely accepted that drilling is often necessary on less than flat surfaces and that brush needs to be cleared in order to provide access to drilling locations. Only in extreme circumstances is drilling not technically feasible. However, there are several instances within the OU1 RI Report where the claim is made that further delineation of contamination in certain areas of the Site is not feasible due to slopes or excessive vegetation (for example, the area behind Plant B). Therefore, please provide greater detail and reasoning within the text of the RI where it has been claimed that further delineation of contamination is not feasible due to Site conditions. It is further requested that a Site visit be scheduled, such that the conditions restricting further delineation of contamination may also be presented to EPA visually and sampling approach can be discussed further.	Additional explanation will be provided in the revised RI.	Olin's response is not acceptable. This area of the Site, and any others presented as inaccessible with drilling equipment will be appropriately investigated to delineate the nature and extent of contaminants to fulfill the requirements of the RI. Alternately, an agreement will be reached through discussion and Site visit/review with EPA as to why the necessary delineation is infeasible. These activities are to take place prior to the delivery of the Draft or revised RI.	At the October 11th, 2012 meeting with EPA, EPA agreed that it was not feasible to utilize drilling equipment on the downward slope east of Plant B due to safety concerns with overhead electrical lines and worker protection.	At the October 11th, 2012 meeting with EPA, EPA agreed that it was not feasible to utilize drilling equipment on the downward slope east of Plant B due to safety concerns with overhead electrical lines and worker protection.

Table L-1
Response to Comments Table
Remedial Investigation Report - OU1 and OU2
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Nature and Extent of Contamination Comments
Comment No. 15
Comment Title: Additional Flooplain Data Collection

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
As part of the recommendations for future Site work, the Report states that the nature and extent of contamination in the floodplain soil immediately adjacent to the Lower South Ditch has not been delineated completely and that some data collection is needed to complete the delineation of contamination in soil in that area. However, there is no description, explanation, and/or associated figure explaining how and where the floodplain is being defined or located. Additionally, none of the preceding text indicated that this area was a concern. Please provide all relevant and supporting information.	The requested information will be provided to the extent available.	Please provide tables and figures with specific sample locations, depths, contaminant concentrations, and results in support of the statement provided in the Report. Further, provide figures showing the current understanding of the referenced "flood plain" (historical and current) for this area. Also provide the sources and information (aerial photos, topographic maps, soil sample descriptions) used to delineate the flood plain both for the historical delineation and the current delineation. Understanding that this area has undergone relatively continual geomorphic change due to the progression of development on the Olin Site, the encroachment of North Pond and general development in the adjacent area, multiple figures and delineations are expected.	In the preliminary RI, the "floodplain soil immediately adjacent to the lower South Ditch" refers to the area on the adjacent property that borders the South Ditch and the East Ditch. That area has remained essentially unchanged for decades. Additional soil sampling and analysis in this area has been proposed in the work plan addendum submitted to EPA on November 16th for review and approval. The proposed sampling locations are shown on a Figure 1 in the work plan addendum.	Based on discussion during the November 7, 2012 meeting with EPA, Olin submitted a Supplemental Work Plan on November 16, 2012. EPA provided conditional approval of this work plan on December 12, 2012. The final Supplemental Work Plan was submitted on March 19, 2013. The final Supplemental Work Plan satisfactorily addressed data gaps previously identified by USEPA.

Nature and Extent of Contamination Comments
Comment No. 16.a.ii
Comment Title: OU1 Data Gaps - Soil

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
Analyses of surface soils at SB-432 and SB-437 for N-nitrosodimethylamine (NDMA) and surface soils at SB-441, SB-443, and SB-447 for NDMA and diphenylamine. These analyses were proposed in the August 2009 RI Work Plan and not shown as performed on Table 2.2-1.	NDMA and diphenylamine were not proposed to be analyzed at locations SB-441 and SB-447. According to Table 2.2-1 surface soil at SB-443 was analyzed for NDMA and diphenylamine. SB-432 and SB-437 were analyzed for NDMA, which was ND at both locations; SB-443 was analyzed for NDMA and diphenylamine. Table 2.2-1 will be updated. Please note that NDMA was not detected in any soil sample where it was analyzed in the OU1 program.	EPA is awaiting the updated table 2.2-1.	The table will be provided in the Draft RI report.	Based on discussion during the November 7, 2012 meeting with EPA, Olin submitted a Supplemental Work Plan on November 16, 2012. EPA provided conditional approval of this work plan on December 12, 2012. The final Supplemental Work Plan was submitted on March 19, 2013. The final Supplemental Work Plan satisfactorily addressed data gaps previously identified by USEPA.

Nature and Extent of Contamination Comments
Comment No. 16.a.ii
Comment Title: OU1 Data Gaps - Soil

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
Analysis for hydrazine in SB-468 deeper samples. Although 0-10 ft soils from samples at SB-468 reported hydrazine concentrations at or exceeding the residential RSL (Figures 4.1-23 and 4.1-24), deeper samples from these locations were not analyzed for hydrazine (Figure 4.1-25).	The hydrazine result for the 1-10 ft interval was 0.28 mg/kg which is below the Industrial RSL of 0.95. In accordance with the August 2009 Field Sampling Plan the soil sample from the greater than 10 ft interval was not analyzed for hydrazine since the 1-10 ft sample was below the industrial RSL.	Analysis is required, results exceed residential RSLs.	Based on the October 11, 2012 meeting, and deed restrictions on the Site, EPA agreed to consider only industrial RSLs in nature and extent delineation of soil contamination. Hydrazine is a specialty compound and further analysis of specialty compounds is no longer required by agreement between EPA and Olin.	Based on discussion during the November 7, 2012 meeting with EPA, Olin submitted a Supplemental Work Plan on November 16, 2012. EPA provided conditional approval of this work plan on December 12, 2012. The final Supplemental Work Plan was submitted on March 19, 2013. The final Supplemental Work Plan satisfactorily addressed data gaps previously identified by USEPA.

Table L-1
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Nature and Extent of Contamination Comments
Comment No. 16.a.iii
Comment Title: OU1 Data Gaps - Soil

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
Additional sampling (all depths) in the area of SB-405, located in the parking lot to the east of the office building, for trimethylpentenes (TMPs) and BEHP. Elevated levels of TMPs and BEHP are detected in this location. The sample is unbounded by other sample locations.	TMPs in the 0-1 ft interval at location SB-405 were not detected, in addition TMPs in the 0-1 ft interval for locations SB-485, SB-488, and SB-480 were all not detected (Figure 4.1-11). Therefore it is not necessary for additional sampling in the 0-1 ft interval. As shown on Figure 4.1-12, samples from the following locations analyzed for TMPs were all non-detect: SB-485, SB-490, SB-495, SB-488, SB-496, SB-479, SB-497, and SB-480. The previously mentioned samples surround SB-405. Therefore TMPs in the vicinity of SB-405 have been delineated. The concentration of TMPs in the greater than 10 ft interval at SB-405 is below the calculated residential RSL, therefore no further investigation is necessary. BEHP was not detected above the residential RSL at SB-405 or any of the borings surrounding SB-405 (Figures 4.1-17, 4.1-18, 4.1-19). Therefore, the investigation conducted in December 2010 has sufficiently delineated the boundaries of impact. No further analysis of BEHP is needed in the area around SB-405.	The nearest samples appear to be 30 to 100 feet from SB-405. Further evaluation of TMPs closer to the high detection at SB-405 is needed to define the extent of this hot spot in 1-10 ft soil. Further evaluation of BEHP is not required in this area.	A soil boring program with analysis for VOCs, including TMPs, has been proposed for the area of SB-405 in the work plan addendum submitted to EPA on November 16th 2012 to EPA for review and approval.	Based on discussion during the November 7, 2012 meeting with EPA, Olin submitted a Supplemental Work Plan on November 16, 2012. EPA provided conditional approval of this work plan on December 12, 2012. The final Supplemental Work Plan was submitted on March 19, 2013. The final Supplemental Work Plan satisfactorily addressed data gaps previously identified by USEPA.

Nature and Extent of Contamination Comments
Comment No. 16.a.iv
Comment Title: OU1 Data Gaps - Soil

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
Additional sampling (all depths) in the area of SB-459, located east of the East Warehouse in an area where limited testing has been conducted, and the presence of TMPs, BEHP, and EPH have been reported, including exceedances of the industrial RSL for arsenic, C11-C22 aromatics, and BEHP. Elevated ammonia was also reported in deep soils at this location.	Additional sampling in the 1-10 and greater than 10 intervals may be necessary around SB-459. There are no samples to the north or south within 100 ft of SB-459. A limited boring investigation is proposed in the area of SB-459 to delineate extent of BEHP, EPH/VPH, and SVOCs in soil in that area. Focus of sampling will be on subsurface, near the water table.	Olin's response is satisfactory. Please provide proposed sampling plan in the area of SB-459.	The proposed sampling and analysis program in the area of SB-459 is included in the work plan addendum submitted to EPA on November 16th 2012 to EPA for review and approval.	Based on discussion during the November 7, 2012 meeting with EPA, Olin submitted a Supplemental Work Plan on November 16, 2012. EPA provided conditional approval of this work plan on December 12, 2012. The final Supplemental Work Plan was submitted on March 19, 2013. The final Supplemental Work Plan satisfactorily addressed data gaps previously identified by USEPA.

Nature and Extent of Contamination Comments
Comment No. 16.a.v
Comment Title: OU1 Data Gaps - Soil

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
Additional surface soil and 1-10 ft soil sampling in the area of surface soil at SS-403 for PCBs. PCBs at 13 mg/kg (above the industrial RSL of 0.74 mg/kg) were reported in surface soil at SS-403.	Additional sampling is necessary in the area of SS-403 to delineate horizontal boundaries of PCB-impacted soil. Samples will be collected from 0-1 ft bgs and 1-2 ft bgs.	Olin's response is satisfactory. Please provide proposed sampling plan for PCBs in the area of SS-403.	The proposed sampling and analysis was reviewed with EPA in the field and is proposed in the work plan addendum submitted to EPA on November 16th 2012 to EPA for review and approval and was completed the week of November 19th, 2012.	Based on discussion during the November 7, 2012 meeting with EPA, Olin submitted a Supplemental Work Plan on November 16, 2012. EPA provided conditional approval of this work plan on December 12, 2012. The final Supplemental Work Plan was submitted on March 19, 2013. The final Supplemental Work Plan satisfactorily addressed data gaps previously identified by USEPA.

Table L-1
Response to Comments Table
Remedial Investigation Report - OU1 and OU2
Olin Chemical Superfund Site
Wilmington, Massachusetts

Nature and Extent of Contamination Comments
Comment No. 16.a.vi
Comment Title: OU1 Data Gaps - Soil

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
Additional surface soil sampling in the area of SB-420 for VOCs. SB-420 is listed on the September 2010 OU1 RI Work Plan Addendum V, Table 4.1-4 as the maximum detected location for several VOCs.	As shown in Table 4.1-4, SB-420 has the maximum detected concentrations in surface soil for 1,2-Dichlorobenzene, 2,4,4-Trimethyl-1-pentene, naphthalene, and styrene. However the maximum concentration for each of the VOCs is below the residential RSL. 1,2-Dichlorobenzene has been detected in 1 of 162 surface soil samples on the Site. Naphthalene when analyzed as a VOC has also been detected in 1 of 162 surface soil samples. Styrene has been detected in 2 of 192 surface soil samples. 2,4,4-Trimethyl-1-pentene has been detected in 7 of 187 surface soil samples. Based on the very low frequency of detection site wide for these parameter and low concentrations in surface soil, additional sampling around SB-420 is not necessary. In addition there are 4 surface soil samples within 50 ft of SB-420 (SB-416, SB-421, SB-424, SB-423) none of which show high concentrations of VOCs in surface soil.	Olin's response is satisfactory.		Based on discussion during the November 7, 2012 meeting with EPA, Olin submitted a Supplemental Work Plan on November 16, 2012. EPA provided conditional approval of this work plan on December 12, 2012. The final Supplemental Work Plan was submitted on March 19, 2013. The final Supplemental Work Plan satisfactorily addressed data gaps previously identified by USEPA.

Nature and Extent of Contamination Comments
Comment No. 16.a.vii
Comment Title: OU1 Data Gaps - Soil

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
Additional surface soil sampling in the area of SWMU-27 for phthalates. SWMU-27 is noted on the September 2010 OU1 RI Work Plan Addendum V, Table 4.1-4 as the maximum detected location for acetone, tetrachloroethylene (PCE), BEHP, phthalates, N-nitrosodiphenylamine, pesticides, and mercury.	Surface soil concentrations for acetone, tetrachloroethylene, N-nitrosodiphenylamine, and mercury at SWMU-27 are below their corresponding industrial and even residential RSLs; therefore additional sampling for these parameters is not necessary. Pesticides have been detected on the site at a low frequency and at low concentrations; therefore additional sampling for pesticides is not necessary. The concentration of BEHP in surface soil at SWMU-27 is 5500 mg/kg. Additional surface soil sampling for BEHP may be necessary.	Olin's response is satisfactory. Please provide proposed sampling plan for BEHP at SWMU-27.	The proposed sampling and analysis in the area of SWMU-27 is presented in the work plan addendum submitted to EPA on November 16th 2012 to EPA for review and approval.	Based on discussion during the November 7, 2012 meeting with EPA, Olin submitted a Supplemental Work Plan on November 16, 2012. EPA provided conditional approval of this work plan on December 12, 2012. The final Supplemental Work Plan was submitted on March 19, 2013. The final Supplemental Work Plan satisfactorily addressed data gaps previously identified by USEPA.

Nature and Extent of Contamination Comments
Comment No. 16.a.viii
Comment Title: OU1 Data Gaps - Soil

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
Analyses of deep soils from the same Lake Poly and beneath the cap locations where TMPs are detected in 1-10 ft soils for TMPs. TMPs are detected in 1-10 ft soils throughout the former disposal areas of the Site with highest concentrations in four areas of the Site: the parking area by the office building, Plant B, Lake Poly, and beneath the cap. In deeper soils, TMPs were detected above the Olin calculated industrial RSLs by Plant B, including along the Site perimeter east of Plant B. It appears that TMP has not been analyzed in deeper soils from the same Lake Poly and beneath the cap locations.	Refer to comment III above regarding additional sampling for TMPs in the parking area by the office building. There were no samples collected from the 1-10 ft bgs interval beneath the cap. TMPs were not detected in any of the three samples from SB-448 (0-1 ft bgs, 8-10 ft bgs, and 17-19 ft bgs). Soils were previously excavated from a large portion of the former Lake Poly footprint. No additional sampling and analysis for TMPs is proposed.	High levels of TMPs were found at LBP-10. SB-448 is apparently at least 60 ft away. Please sample for TMPs in deep soil at LBP-10. TMPs at the cap were reported in 1-10 ft soils from historical sampling, indicating potential deeper soils at the cap may contain TMPs. Please sample in subsurface soils beneath the cap.	The proposed sampling and analysis (SB-518 and SB-520) in the area of LPB-10 is presented in the work plan addendum submitted to EPA on November 16th 2012 to EPA for review and approval.	Based on discussion during the November 7, 2012 meeting with EPA, Olin submitted a Supplemental Work Plan on November 16, 2012. EPA provided conditional approval of this work plan on December 12, 2012. The final Supplemental Work Plan was submitted on March 19, 2013. The final Supplemental Work Plan satisfactorily addressed data gaps previously identified by USEPA.

Table L-1
Response to Comments Table
Remedial Investigation Report - OU1 and OU2
Olin Chemical Superfund Site
Wilmington, Massachusetts

Nature and Extent of Contamination Comments
Comment No. 16.a.ix
Comment Title: OU1 Data Gaps - Soil

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
Analyses of PAHs (all depths) under the cap and just to the north of the cap with improved detection limits. The results of benzo(a)pyrene sampling for many locations are shown as non-detects on Figures 4.11-14-4.1-16; however, the detection limits are well above the RSLs and the Massachusetts Contingency Plan (MCP) S-1/GW-1 standard of 2 mg/kg. For example, DA-C23 has a value of < 400 mg/kg. Many of these samples are under the cap or just to the north.	Although some samples have elevated detection limits, there are many samples with adequate detection limits. During the RI soil program 310 soil samples were collected for benzo(a)pyrene. Benzo(a)pyrene was detected in 58 of 310 samples, with only 12 samples above the industrial RSL. Of the 252 non-detects, 215 had detection limits below the industrial RSL. PAHs were mostly not detected in surface soil samples collected from beneath the cap (with low reporting limits). Based on this, further analysis is not warranted.	Detection limits need to meet residential RSLs, not just industrial RSLs. Please remove all non-detects that did not meet residential RSLs from the benzo(a) pyrene figures. EPA reserves the right to request further sampling at lower detection limits upon review of the revised figures.	During the October 11th, 2012 meeting with EPA it was agreed that industrial RSLs are appropriate for the site and that overall data quality based on a combination of reporting and method detection limits meets the work plan objectives. Non-detect results will not be removed from the figures.	Based on discussion during the November 7, 2012 meeting with EPA, Olin submitted a Supplemental Work Plan on November 16, 2012. EPA provided conditional approval of this work plan on December 12, 2012. The final Supplemental Work Plan was submitted on March 19, 2013. The final Supplemental Work Plan satisfactorily addressed data gaps previously identified by USEPA.

Nature and Extent of Contamination Comments
Comment No. 16.a.x
Comment Title: OU1 Data Gaps - Soil

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
Analyses of BEHP in deep samples in the South Ditch delta, in the Lake Poly area, at the buried debris area south of Lake Poly, beneath the cap, along South Ditch, or in the Central Pond area. BEHP was detected throughout the Site. The highest concentrations (above industrial RSLs or residential RSLs) in surface soil were reported in the buried debris area south of Lake Poly, along South Ditch, and in the South Ditch delta. Deeper samples were not collected and analyzed for BEHP in the South Ditch delta. In addition to locations exceeding RSLs, surface soil locations throughout the former industrial and disposal areas of the Site and along South Ditch had detected concentrations of BEHP above SSLs. The highest concentrations in 1-10 ft soil were reported in the Plant B area, including along the Site perimeter east of Plant B, beneath Plant C-1, at Lake Poly, at the buried debris area south of Lake Poly, beneath the cap, along South Ditch, in the Central Pond area, and east of the East Warehouse. Deeper samples were not collected and analyzed for BEHP in the Lake Poly area, at the buried debris area south of Lake Poly, beneath the cap, along South Ditch, or in the Central Pond area.	With respect to Lake Poly, samples with elevated reporting limits include bottom of excavation confirmatory samples. The soils at that depth have subsequently been covered by a synthetic fabric, crushed stone, and backfill material. There is no further delineation needed for the RI/FS. In the delta area, all BEHP results for surface soil samples were below Residential RSLs. There is no need to sample at depth. In the buried debris area, samples with BEHP concentrations greater than RSLs are bounded by other samples with results less than RSLs. In the Central Pond area, one sample with a BEHP concentration greater than the RSL is bounded by other samples. There is no need for further sampling and analysis to address this comment.	Analyze BEHP in deep samples in the South Ditch delta, in the Lake Poly area, at the buried debris area south of Lake Poly, beneath the cap, along South Ditch, and in the Central Pond area. Soils at depth beneath Lake Poly may be impacting groundwater, regardless of the presence of a synthetic fabric, crushed stone layer, etc.	The proposed sampling and analysis for BEHP in deep samples (SB-518, SB-519, SB-520, and SB-522 in the Lake Poly Area is presented in the work plan addendum submitted to EPA on November 16th 2012 to EPA for review and approval. As discussed in the November 7, 2012 meeting, deep soils are in the water table along the South Ditch and Central Pond (an OU3 issue) and there is no history of operations or disposal that would have resulted in releases of BEHP to subsurface soils in those areas. Also, as discussed in the meeting of November 7, 2012, with the filing of the Deed Restriction for the property, there are no foreseeable future human exposures to soils beneath the cap. As requested by EPA, all of the data for soils not previously excavated from within the footprint of the temporary cap have been compiled and submitted to EPA under separate cover. BEHP detections in deep soil samples from the buried debris area south of Lake Poly are bounded by other samples as shown in Figure 4.1-18 and 4.1-19 of the PRI. The available surface soil data collected from twelve soil samples collected from within the footprint of the temporary cap during the OU1 RI are sufficient for risk assessment purposes to evaluate a scenario that is unlikely but theoretically possible – trespasser exposure to surface soils in the event that the cap were somehow damaged or removed temporarily. The deed restriction that is in place would prohibit any other activities that might result in exposure to soils beneath the cap. Therefore, additional data collection is not necessary for risk assessment purposes.	Based on discussion during the November 7, 2012 meeting with EPA, Olin submitted a Supplemental Work Plan on November 16, 2012. EPA provided conditional approval of this work plan on December 12, 2012. The final Supplemental Work Plan was submitted on March 19, 2013. The final Supplemental Work Plan satisfactorily addressed data gaps previously identified by USEPA.

Table L-1
Response to Comments Table
Remedial Investigation Report - OU1 and OU2
Olin Chemical Superfund Site
Wilmington, Massachusetts

Nature and Extent of Contamination Comments
Comment No. 16.a.xi
Comment Title: OU1 Data Gaps - Soil

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
Further sampling of deep soil in the area of SB-427 (deep soil along the Site perimeter east of Plant B), with analysis for diphenylamine. Diphenylamine was detected at concentrations below residential RSLs at scattered locations across the former industrial and disposal areas of the Site, primarily in surface soils. Concentrations exceed the risk-based SSL at SB-451 (surface soil Plant B area) and at SB-427 (deep soil along the Site perimeter east of Plant B). The latter was the highest detected concentration (340 mg/kg). Because this sample is unbounded to the east and at a concentration with potential to impact groundwater, further sampling of deep soil in this area with analysis for diphenylamine is warranted.	At location SB-427 two soil samples were taken from the greater than 10 foot interval (12-14 ft and 17-19 ft). Diphenylamine was detected at 340 mg/kg in the sample collected from 12-14 ft and detected at 0.037 mg/kg in the sample collected from 17-19 ft. These sample intervals are below the water table. Diphenylamine was not detected at location SB-451 in either soil sample collected (0-1 ft or 2.5-4.5 ft) and detection limits (0.34 mg/kg and 0.034 mg/kg) for both of the samples are below the SSL (0.44 mg/kg). The location of SB-427 is in the area of LNAPL (processing oil with BEHP) in the subsurface. Additional investigation of this area has been conducted per Addendum V of the RI/FS Work Plan. There were physical limitations concerning investigation further to the east (very steep slope).	Further sampling of deep soil east of SB-427 with analysis for diphenylamine is required.	Further sampling and analysis was conducted east of SB-427 as part of the scope identified in Addendum V to the RI Work Plan (SB-474 through SB-477). The very steep slope and overhead electrical lines make it infeasible to conduct additional investigation further to the east. No reported concentrations were greater than the residential or industrial RSL. The area is the location of the LNAPL that has been the focus of on-going removal activities. No additional sampling for Diphenylamine is required. By agreement with EPA, Olin is no longer analyzing for specialty compounds.	Based on discussion during the November 7, 2012 meeting with EPA, Olin submitted a Supplemental Work Plan on November 16, 2012. EPA provided conditional approval of this work plan on December 12, 2012. The final Supplemental Work Plan was submitted on March 19, 2013. The final Supplemental Work Plan satisfactorily addressed data gaps previously identified by USEPA.

Nature and Extent of Contamination Comments
Comment No. 16.a.xii
Comment Title: OU1 Data Gaps - Soil

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
Analysis for diphenylamine in 1-10 ft soils or deeper soils beneath the cap or in southern portions of the Site. No samples were analyzed for diphenylamine in 1-10 ft soils or deeper soils beneath the cap or in southern portions of the Site.	If there is a commitment to a continued cap that eliminates direct contact with soils below, then the soil within the containment area is not a concern for either direct contact (human or ecological) or leaching. Please clarify the definition of "Southern portions of the Site."	Further sampling of 1-10 ft soil south of the manufacturing area (wetland north of south ditch and south of south ditch) and in deep soils beneath the cap is needed with analysis for diphenylamine.	As discussed in the meeting of November 7, 2012, with the filing of the Deed Restriction for the property, there are no foreseeable future human exposures to soils beneath the cap. As requested by EPA, all of the data for soils not previously excavated from within the footprint of the temporary cap have been compiled and submitted to EPA under separate cover. The data are useable for risk assessment purposes such that no additional sampling/analysis is proposed for the temporary cap area. As discussed in the November 7, 2012 meeting, deep soils in the low-lying areas south of the manufacturing area (north of the South Ditch and south of the South Ditch) are in the water table – any impacts in deep soils would be a groundwater issue and therefore be an OU3 issue. No additional sampling/analysis is proposed for those areas. By agreement with EPA, Olin is no longer analyzing for specialty compounds.	As discussed in the meeting of November 7, 2012, with the filing of the Deed Restriction for the property, there are no foreseeable future human exposures to subsurface soils beneath the cap. As requested by EPA, all of the data for soils not previously excavated from within the footprint of the temporary cap have been compiled and submitted to EPA under separate cover. The data are useable for risk assessment purposes such that no additional sampling/analysis is proposed for the temporary cap area. As discussed in the November 7, 2012 meeting, deep soils in the low-lying areas south of the manufacturing area (north of the South Ditch and south of the South Ditch) are in the water table – any impacts in deep soils would be a groundwater issue and therefore be an OU3 issue. No additional sampling/analysis is proposed for those areas.

Nature and Extent of Contamination Comments
Comment No. 16.a.xiii
Comment Title: OU1 Data Gaps - Soil

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
Further evaluation of ammonia in subsurface samples in the wetland north of South Ditch, along South Ditch, or at the South Ditch delta. It is noted that high levels are present throughout the Site. The highest concentrations are detected in 1-10 ft soils at Lake Poly. High concentrations in surface soil are noted by the Plant B treatment building, in the West Ditch wetland, and in the wetland north of South Ditch. It is noted that nitrogen as ammonia is present in the surface as well as at depth in the western on-property wetland (8B-435, 453, and 88-415). No subsurface samples have been analyzed for ammonia in the wetland north of South Ditch, along South Ditch, or at the South Ditch delta.	A review of the surface soil ammonia data for the Site indicates a wide range of concentrations, with concentrations in the range of 30-50 mg/kg in upland soils, with higher concentrations in forested areas, and even higher concentrations (greater than 300 mg/kg) in wetland areas. This appears to be unrelated to an impacted Site media.	Analyze subsurface samples for ammonia in the wetland north of South Ditch, along South Ditch, and at the South Ditch delta.	As discussed in the November 7, 2012 meeting, subsurface soils in the low-lying areas south of the manufacturing area (north and south of South Ditch and the South Ditch delta) are in the water table – any impacts in deep soils would be a groundwater issue and therefore be an OU3 issue. As discussed at the November 7, 2012 meeting, groundwater discharging to these areas is impacted by ammonia and these soils are not considered a source of ammonia based on site history. As discussed with EPA, no additional sampling/analysis for ammonia is proposed for those areas.	As discussed in the November 7, 2012 meeting, subsurface soils in the low-lying areas south of the manufacturing area (north and south of South Ditch and the South Ditch delta) are in the water table – any impacts in deep soils would be a groundwater issue and therefore be an OU3 issue. As discussed at the November 7, 2012 meeting, groundwater discharging to these areas is impacted by ammonia and these soils are not considered a source of ammonia based on site history. As discussed with EPA, no additional sampling/analysis for ammonia is proposed for those areas.

Table L-1
Response to Comments Table
Remedial Investigation Report - OU1 and OU2
Olin Chemical Superfund Site
Wilmington, Massachusetts

Nature and Extent of Contamination Comments **Comment No. 16.a.xiv** **Comment Title: OU1 Data Gaps - Soil**				
EPA Comment	**Olin Response to EPA**	**Nobis Response to Olin**	**Olin Response to Nobis**	**Resolution**
Further sampling of surface soil in the South Ditch delta and soil at all depths at Plant C-1 for C11-C22 aromatics. C11-C22 aromatics have not been sampled extensively across the Site; however, results indicate limited areas of potential concern. C11-C22 aromatics are detected at highest concentrations in surface soil in the South Ditch delta and in soil at all depths at Plant C-1. Further sampling surrounding these two locations may be useful in delineating the localized areas of contamination.	In the area of SB-432, a limited soil boring investigation is proposed to delineate the extent of C11-C22 Aromatics. It appears this fraction is related to potential processing oil impact (not fuel-related petroleum and not PAHs). Soil samples will be analyzed for EPH and SVOCs. There is no expectation that this fraction would be present in soil in the delta area.	EPA is awaiting the sampling results of SB-432. Further sampling of surface soil in the South Ditch Delta for C11-C22 aromatics is required.	The proposed sampling and analysis for C11-C22 Aromatics (SB-507) is presented in the work plan addendum submitted to EPA on November 16th 2012 to EPA for review and approval.	The proposed sampling and analysis for C11-C22 Aromatics (SB-507) is presented in the work plan addendum submitted to EPA on November 16th 2012 to EPA for review and approval. EPA provided conditional approval of this work plan on December 12, 2012. The final Supplemental Work Plan was submitted on March 19, 2013. The final Supplemental Work Plan satisfactorily addressed data gaps previously identified by USEPA.

Table L-1
Response to Comments Table
Remedial Investigation Report - OU1 and OU2
Olin Chemical Superfund Site
Wilmington, Massachusetts

Nature and Extent of Contamination Comments
Comment No. 16.a.xv
Comment Title: OU1 Data Gaps - Soil

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
Analysis for N-nitrosodiphenylamine in deep soils at Lake Poly and at the southern end of the West Ditch Wetland. N-Nitrosodiphenylamine was detected in 1-10 ft soils at concentrations above industrial RSLs at the southern end of Lake Poly, above residential RSLs in the same area and at the southern end of the West Ditch Wetland. Deep soils were not sampled in the locations of highest detections in 1-10 ft soils (Lake Poly and at the southern end of the West Ditch Wetland).	Please clarify, with specific sample IDs, what locations and areas are being discussed. No samples were collected in these areas as part of the RI field program.	Analyze deep subsurface samples for N-nitrosodiphenylamine at Lake Poly 1-02, BH12, and BD-C18.	The detections above the industrial RSL of N-nitrosodiphenylamine at Lake Poly 1-02 and BH12 are bounded by other samples as shown in Figure 4.1-21. The reported concentration is below the Industrial RSL for sample BD-C18, and no additional sampling/analysis is required for delineation at that location.	The detections above the industrial RSL of N-nitrosodiphenylamine at Lake Poly 1-02 and BH12 are bounded by other samples as shown in Figure 4.1-21. The reported concentration is below the Industrial RSL for sample BD-C18, and no additional sampling/analysis is required for delineation at that location.

Nature and Extent of Contamination Comments
Comment No. 16.a.xvi
Comment Title: OU1 Data Gaps - Soil

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
Analysis for hydrazine at Lake Poly at LPB-48 and the Plant D area in deep soil. Hydrazine was detected in 1-10 ft soils at Lake Poly and the Plant D area at concentrations above residential RSLs. The sample at Lake Poly (LPB-48) also exceeded the industrial RSL. Deep soils were not sampled in the locations of highest detections in 1-10 ft soils (Lake Poly at LPB-48 and the Plant D area).	Samples were collected from 3 intervals, 2.5-5 ft, 5-8 ft, and 8-20 ft, in boring LPB-48. The 5-8 ft sample had a detected concentration of hydrazine at 1.9 mg/kg. The 8-20 ft sample was a non-detect for hydrazine with a detection limit of 0.28 mg/kg. Therefore analysis of deeper soil at LPB-48 is not necessary (bounded vertically).	Caution should be used in declaring that the hydrazine in soils at LPB-48 is bounded vertically, since the detection limit in the deeper soil sample exceeds the residential RSL. However, EPA will concur that further sampling for hydrazine at that location in deep soil is not required. Analysis for hydrazine at the Plant D area in deep soil is still required. Note that this is the area of the former hydrazine tank and that soil samples from SB-468 and SB-465 and the historical sample at PLD-3 are at or above the residential RSL for hydrazine. In addition, groundwater hydrazine concentrations in October 2010 were reported at 230 µg/L.	Based on review for the frequency of detection and detected concentrations for specialty compounds (including hydrazine), it was agreed between Olin and EPA during the November 7, 2012 meeting that further analysis of specialty compounds in the TAL was no longer required. No additional sampling/analysis is proposed.	Based on review for the frequency of detection and detected concentrations for specialty compounds (including hydrazine), it was agreed between Olin and EPA during the November 7, 2012 meeting that further analysis of hydrazine would be required to address this comment.

Nature and Extent of Contamination Comments
Comment No. 16.a.xvii
Comment Title: OU1 Data Gaps - Soil

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
Reanalysis for hydrazine using lower detection limits in surface soils at the drum storage area and in 1-10 ft soils from the Lake Poly area, Plant D area, and the area east of the product storage buildings. Detection limits for hydrazine exceeded the residential RSL in surface soils at the drum storage area and in most non-detect samples in 1-10 ft soils from the Lake Poly area, Plant D area, and the area east of the product storage buildings.	During the RI field work 113 soil sample were analyzed for hydrazine. Hydrazine was detected in 45 of 113 samples, (only one concentration (1.9 mg/kg) above the Industrial RSL (0.95 mg/kg). All RI reporting limits for non-detects for RI soil samples were below the Residential and Industrial RSL for hydrazine. A total 135 soil samples (historical and RI) were analyzed for hydrazine and all but a very few of the RI reporting limits for non-detects were below the Residential RSL for hydrazine. It should be noted the RSLs for hydrazine are based on a cancer risk of 1 x 10-6, so the reporting limits for both historical and RI samples are clearly protective of public health in the context of the Superfund risk range (10-6 to 10-4). There is no need for re-sampling or for an analytical method with lower reporting limits. The hydrazine concentration reported in the sample from location LPB-48 is bounded to the north by the excavated Lake Poly, to the west by LPB-41, and to the south by LPB-42.	Detection limits need to meet residential RSLs, not just industrial RSLs. Please remove all non-detects that did not meet residential RSLs from the hydrazine figures. EPA reserves the right to request further sampling at lower detection limits upon review of the revised figures.	Based on review for the frequency of detection and detected concentrations for specialty compounds, it was agreed between Olin and EPA during the November 7, 2012 meeting that further analysis of specialty compounds in the TAL was no longer required. As agreed upon with EPA, The delineation will be based on Industrial RSLs. Non-detects will not be removed from the figure.	Based on review for the frequency of detection and detected concentrations for specialty compounds, it was agreed between Olin and EPA during the November 7, 2012 meeting that further analysis of hydrazine would not be required to address this cxomment. As agreed upon with EPA, The delineation will be based on Industrial RSLs. Non-detects will not be removed from the figure.

Table L-1
Response to Comments Table
Remedial Investigation Report - OU1 and OU2
Olin Chemical Superfund Site
Wilmington, Massachusetts

Nature and Extent of Contamination Comments
Comment No. 16.a.xviii
Comment Title: OU1 Data Gaps - Soil

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
Analysis for hexavalent chromium in surface soils in the areas of the East Warehouse, former waste water treatment plant, along South Ditch, in the wetland south of South Ditch, beneath the cap, and in the West Ditch Wetland; in 1-10 ft soils at Lake Poly, the railroad spur, the former waste water treatment plant, along South Ditch, in the South Ditch delta, and in the West Ditch Wetland; and in deep soils at the East and West Warehouses, the railroad spur, near Lined Lagoons I and II (beneath the Capped Area), in the South Ditch delta, in the Lake Poly area, and in the West Ditch Wetland. 1. Limited analysis for hexavalent chromium has been performed, but it is detected in many of the soil and sediment samples for which it was analyzed in the 2009 and 2010 sampling rounds. High concentrations of total chromium were detected in surface soils in the South Ditch delta, along South Ditch, in the wetland south of South Ditch, beneath the cap, and in the West Ditch Wetland; in 1-10 ft soils in the Lake Poly, South Ditch, and South Ditch delta areas; and in deep soils in the Lake Poly area. Because of the presence of hexavalent chromium detections and high concentrations of total chromium, evaluation of hexavalent chromium is warranted in these locations. 2. The highest concentrations of hexavalent chromium were detected in surface soils in the south ditch delta and the West Ditch Wetland. Subsurface samples were not collected in either of these locations. 3. High hexavalent chromium concentrations were reported near Lake Poly (PP-101 (1.22 ppm) and LP-102(2.29 ppm)); the former Warehouses (East and West) at SB-0454, 456, and 457; and further south toward the Pretreatment Plant (SB-470). Since these areas handled the waste water at Olin historically during the plant operations, it is likely that additional sampling near Lined Lagoons I and II (which were used later and are now beneath the Capped Area) would also detect high hexavalent chromium. High concentrations are reported in surface soils at the East Warehouse and former waste water treatment plant; 1-10 ft soils at Lake Poly, the railroad spur, and former waste water treatment plant; and in deep soils at the East and West Warehouses and the railroad spur. Further delineation of hexavalent chromium is warranted in these areas and beneath the cap.	These "high" concentrations near Lake Poly are below the corresponding Industrial RSL. Additional delineation is not warranted. The risk assessment assumed that a permanent cap would be present at some time in the future. Additional delineation of hexavalent chromium in soils will be conducted for the former Lake Poly and South Ditch floodplain.	Olin has agreed to additional analysis of hexavalent chromium at the former Lake Poly and South Ditch floodplain. In addition, please analyze for hexavalent chromium in surface soils in the areas of the East Warehouse, former waste water treatment plant, along South Ditch, in the wetland south of South Ditch, beneath the cap, and in the West Ditch Wetland; in 1-10 ft soils at the railroad spur, the former waste water treatment plant, along South Ditch, and in the West Ditch Wetland; and in deep soils at the East and West Warehouses, the railroad spur, near Lined Lagoons I and II (beneath the Capped Area), in the South Ditch delta, in the Lake Poly area, and in the West Ditch Wetland. Sampling beneath the cap is required until a permanent cap and deed restriction are in place.	The proposed soil sampling and analysis program for hexavalent chromium is presented in the work plan addendum submitted to EPA on November 16th 2012 to EPA for review and approval. The extensive program was designed to bound previous detections above the Industrial RSL, to provide sampling at locations known to have high total chromium concentrations, and to provide spatial coverage for nature and extent delineation and for risk assessment activities. No sampling/analysis is proposed within the temporary cap, consistent with the Deed Restriction that has been filed for the property.	Further sampling was conducted as proposed in the Supplemental Work Plan submitted to USEPA on November 16th, 2012 and March 19, 2013 (revised). Figures 4.1-8 to 4.1-10 of the RI Report show the distribution of hexavalent chromium concentrations in soils. The results of the sampling and analysis are discussed in Section 4.1.2 Figure 4.1-31 shows the distribution of hexavalent chromium in surface water. Sediment results are shown in Figure 4.1.39.

Nature and Extent of Contamination Comments
Comment No. 16.b.i
Comment Title: OU1 Data Gaps - Sediment

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
Sampling for hexavalent chromium in sediments in South Ditch and East Ditch are needed. The FSP proposed analysis of hexavalent chromium along the East Ditch only at EDSD/SW5 (EDSB11). The FSP also proposed analysis of hexavalent chromium for five locations (SD-SD2, SD-SD3, SDSW-E, SD-Prop1, and ISCO-2) along South Ditch (shown on Figure 4.4-4 of the FSP. Sampling for hexavalent chromium in East Ditch sediments at EDSO/SW1 (EDSB5), EDSD/SW2 (EDSB6), and EDSD/SW8 are also recommended.	Work has been completed per the approved Work Plan and Field Sampling Plan. Samples were collected and analyzed for hexavalent chromium from ED/SD-SD1 through ED/SD-SD8 in 2003 and 2004. These historical data indicate that hexavalent chromium has not been detected in East Ditch sediment samples.	EPA concurs that sediment sampling for hexavalent chromium has been completed per the FSP. Historical sediment sampling for hexavalent chromium in East Ditch is too old to be considered representative of current conditions. Sampling for hexavalent chromium in sediments in East Ditch at EDSO/SW1 (EDSB5), EDSD/SW2 (EDSB6), and EDSD/SW8 are still needed.	Sampling and analysis at those East Ditch locations are an OU2 issue and will be addressed in the OU2 program. No additional sampling/analysis is proposed here.	Further sampling was conducted as proposed in the Supplemental Work Plan submitted to USEPA on November 16th, 2012 and March 19, 2013 (revised). Figures 4.1-8 to 4.1-10 of the RI Report show the distribution of hexavalent chromium concentrations in soils. The results of the sampling and analysis are discussed in Section 4.1.2 Figure 4.1-31 shows the distribution of hexavalent chromium in surface water. Sediment results are shown in Figure 4.1.39.

Nature and Extent of Contamination Comments
Comment No. 16.b.ii
Comment Title: OU1 Data Gaps - Sediment

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
Additional sampling for hexavalent chromium in sediment is also suggested: • along the South drainage ditch just south of the Capped Area, • in the wetlands to the south of South Ditch, and • in the stream/drainage feature traveling westerly near GW-42D where total chromium was measured in groundwater at 2800 µg/L.	Additional sampling and analysis for hexavalent chromium in the floodplain of the Lower South Ditch will be conducted. Investigation of the previously remediated portions of the on-property ditch system is also not warranted.	Sampling for hexavalent chromium in sediments as directed in the comment are required. Note that the "wetlands south of south ditch" is not limited to the floodplain of the Lower South Ditch. It also includes the wetland area bordering the western edge of the property, south of the cap and South Ditch.	The proposed soil sampling and analysis program for hexavalent chromium is presented in the work plan addendum submitted to EPA on November 16th 2012 to EPA for review and approval. Sampling of wetland soils (rather than sediment due to the absence of standing water during much of the year) with analysis for hexavalent chromium is proposed for sample locations SS-514 through SS-525. These sample locations cover the wetlands both north and south of the South Ditch and from the eastern property line to close to the eastern property line.	Further sampling was conducted as proposed in the Supplemental Work Plan submitted to USEPA on November 16th, 2012 and March 19, 2013 (revised). Figures 4.1-8 to 4.1-10 of the RI Report show the distribution of hexavalent chromium concentrations in soils. The results of the sampling and analysis are discussed in Section 4.1.2 Figure 4.1-31 shows the distribution of hexavalent chromium in surface water. Sediment results are shown in Figure 4.1.39.

Nature and Extent of Contamination Comments
Comment No. 16
Comment Title: Summary Table

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
The Summary Table tab summarizes the above recommendations. See above for details and reactions.	The responses to the briefly summarized comments in the table above are included in the text responses to the numerous sub-comments under Comment 16.0 and in the attached table that includes the comments as well as a response for each item.	See individual responses and replies above.	Please refer to all previous responses and the work plan addendum submitted to EPA on November 16th 2012. The work plan addendum contains a revised data gap (Table1) that was developed by EPA and has an additional column that describes how each data gap is addressed by proposed investigations that have now been completed. *See Summary Table - Response*	Please refer to all previous responses and the work plan addendum submitted to EPA on November 16th 2012. The work plan addendum contains a revised data gap (Table1) that was developed by EPA and has an additional column that describes how each data gap is addressed by proposed investigations that have now been completed. *See Summary Table - Response*

Table L-1
Response to Comments Table
Remedial Investigation Report - OU1 and OU2
Olin Chemical Superfund Site
Wilmington, Massachusetts

Nature and Extent of Contamination Comments **Comment No. 17** **Comment Title: Data Quality Management**				
EPA Comment	**Olin Response to EPA**	**Nobis Response to Olin**	**Olin Response to Nobis**	**Resolution**
Inconsistencies within the Report require the need for data quality management to be performed to ensure that the correct data is being used appropriately. One example of such inconsistency is as follows: • Table 2.2-5 lists four samples as being collected from the SD-SD4 location (Central Pond). Collection dates are listed as November 16, 2007, November 18, 2008, November 12, 2009, and November 15, 2010. Information provided in Appendix E of the OU1 RI Report, however, is inconsistent with the information in Table 2.2-5. Table E-2-1 does not list the same four samples for the SD-SD4 location. Specifically, the November 16, 2007, November 11, 2009 (assumed to be the same as the 11/12/2009 sampling date in Table 2.2-5 – which one is correct?), and the November 15, 2010 samples are listed in Table E-2-1, but the November 18, 2008 sample is not included and is instead replaced with a different (historical) sampling date of May 19, 2005 that is described nowhere else in the Report. • Figure 4.1-31 provides a chromium concentration of 54 mg/kg for the SD-SD4 location. Information provided in Appendix E of the OU1 RI Report, however, does not support the Figure 4.1-31 value of 54 mg/kg. Table E-2-9 provides individual sample results for chromium of 18 mg/kg for the November 16, 2007 sample, 23 mg/kg for the November 15, 2010 sample, 25 mg/kg for the November 11, 2009 sample, and 43 mg/kg for the May 19, 2005 sample. It is completely unclear how these values relate to the 54 mg/kg value depicted on Figure 4.1-31. • A query of the database provided to EPA, finds no data for SD-SD4. The database, tables, and figures should be consistent.	The concentration values shown in the figure represent the arithmetic mean value for all results (including samples collected at two depths but excluding QA/QC sample results). Many of the results are associated with historical samples and they are associated with Interim Response Steps activities. *See Olin Response 17 Tab*	The reason for not including the 2008 data is not answered, and there is no response to the concerns presented in the third bullet.	The 2008 samples were not included in the risk assessment because its depth information indicated that it was not a surficial sediment sample (top depth of 0.3 ft below sediment surface). All sediment samples used in the risk assessment had a top depth listed as “0”. The analytical data for samples collected at location SD-SD4 are included in the project database and are included in the flat file historical analytical data files provided to EPA (including pre-RI data included in the electronic submittal attached to this RTC package).	Issues discussed and no additional activity required.

Table L-1
Response to Comments Table
Remedial Investigation Report - OU1 and OU2
Olin Chemical Superfund Site
Wilmington, Massachusetts

Contaminant Fate and Transport Comments
Comment No. 1
Comment Title: Calcium Sulfate Landfill

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
Section 5.0, Contaminant Sources: The Calcium Sulfate Landfill is identified as a potential source in the bulleted list and briefly discussed in this section. As indicated in prior comments, EPA considers the CSL to be a potential ongoing source to area groundwater. As such, the brief discussion provided needs to be expanded to provide at a minimum: as-built details including characterizations of the source material at the time of placement and depth of the landfill; details regarding ongoing post-closure monitoring requirements; and evaluation of monitoring results to date.	The available data was provided to MassDEP at the time of the closure approval. These data can be provided as an appendix to the OU1 RI Report. The groundwater associated with the CSL and its relationship to groundwater impacts from the much larger and adjacent Woburn landfill have also been studied. Further assessment of groundwater related to the CSL is an OU3 issue.	Please include the data requested. Since it was provided in a report to MassDEP, adding it as an appendix to the OU1 report is acceptable. While groundwater is an OU3 concern, contaminant fate and transport needs to be addressed as a system and not as three discrete units, thus a brief summary of monitoring results to date, including groundwater monitoring, and the other items in the original comment is appropriate. Leaching of contaminants from the soil and landfill contents to the groundwater is a potential concern. Also, if it is believed that the neighboring Woburn landfill is impacting the site, please describe OU1 impacts in detail, and briefly describe possible impacts to OU2 and OU3.	The existing Geomega Technical Series Report related to discrimination of water quality related to the Woburn Landfill will be provided to USEPA.	The requested Geomega Report is included in Appendix O of the Draft RI Report. This appendix includes other technical document resources provided with the Focused RI Report.

Contaminant Fate and Transport Comments
Comment No. 2
Comment Title: Migration Pathways - South Ditch

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
2Section 5.0, Migration Pathways: The first bullet states that migration of dissolved- phased constituents in overburden groundwater discharge to Surface Water in the South Ditch. The second bullet states discharge of shallow impacted groundwater to the South Ditch. However, Section 4.1.3 indicates that diffuse-layer groundwater discharges to the South Ditch. It is not clear if this is a contradiction or if both shallow dissolved-phased and deeper diffuse-layer groundwater are discharging into the South Ditch. Please clarify.	The statement is not a contradiction. The “shallow” overburden groundwater immediately north of the South Ditch (sampled from monitoring wells GW-202S and GW-202D) is comprised of “diffuse” groundwater, but the deeper “shallow” groundwater collected from GW-202D has higher concentrations of DAPL-related constituents. The well screens for these two wells are not separated by a large vertical distance. The groundwater represented by both GW-202S and GW-202D discharges to the surface water of the South Ditch. This will be discussed in detail in revised text. All of this discussion is in the context of constituents dissolved in the groundwater (dissolved-phase constituents). The constituents present in surface water in Upper South Ditch are those same constituents present in groundwater from GW-202D.	As requested, Olin will be clarifying the groundwater and surface water interaction in greater detail for the revised report.		Text from the Draft RI (section 4.1.3.1) is reproduced here: As discussed previously in Section 3.4, the Upper South Ditch, behind and downstream from the weir, is a gaining stream, receiving discharging shallow and deeper overburden groundwater. The depth to bedrock becomes shallower and the thickness of the overburden groundwater system thinner under Upper South Ditch (approximately 20 feet) in the vicinity of GW-202D, and GW-55D. The VOCs and SVOCs detected in surface water at South Ditch sample locations PZ-17RR, and PZ-16RR are also most frequently detected in deeper overburden groundwater with diffuse characteristics collected from GW-202D, GW-55D, and GW-79S and to a lesser extent, shallower groundwater collected from GW-202S and GW-55S. Collectively these data, along with groundwater elevation measurements in the surrounding well pairs and piezometers indicate that solutes in surface water are related to solutes present in diffuse groundwater underlying the Upper South Ditch and shallow groundwater migrating to the stream.

Contaminant Fate and Transport Comments
Comment No. 3
Comment Title: On-Property Migration Pathways

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
Section 5.0, Migration Pathways: In addition to the listed bullets, please add the following on-Property migration pathways as bullets and then discuss. a. Leaching of soluble constituents present in shallow soil from within the containment area to groundwater within the containment area. b. Migration of dissolved-phased constituents in shallow groundwater within the containment area to groundwater outside the containment area.	Text will be added to identify these pathways and to indicate that these pathways are not significant relative to the other migration pathways that were discussed.	Olin’s response indicates agreement with the request.	Text will be added to identify these pathways and to indicate that these pathways are not significant relative to the other migration pathways that were discussed.	Leaching of soluble constituents present in shallow soil from within the containment area to groundwater is unlikely given the temporary cap and strom water collection from the cap. Percolation of precipitation throught the shallow soils is minimal. The slurry wall was designed to prevent, to the extent possible, migration of dissolved constituents in shallow groundwater within that area.

Table L-1
Response to Comments Table
Remedial Investigation Report - OU1 and OU2
Olin Chemical Superfund Site
Wilmington, Massachusetts

Contaminant Fate and Transport Comments
Comment No. 4.a
Comment Title: Conceptual Site Model

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
The Contaminant Fate & Transport/Conceptual Site Model (CSM) presented in Section 5.0 lacks detail and is insufficient in describing the complex physical processes for individual contaminants at the Site and their respective source area(s). The CSM needs to explain all of the migration mechanisms whereby each contaminant has formed, may continue to form and/or migrate at the Olin site, including but not limited to the fate and transport of contaminants between each OU. Such information and knowledge is necessary not only to define the nature and extent of contamination, but for evaluating remedial options as well. Therefore, the cause-and-effect of contaminant formation and migration must be thoroughly presented within the text of the Report. The following are some examples of areas of concern that need to be addressed accordingly: a. The source of each contaminant. Specifically address whether the contaminant was used and disposed of on-Site or if the contaminant formed in some chemical process/reaction after disposal. If the contaminant was formed, how and under what conditions did it form? Address if the formation processes occur in soil and/or groundwater. Describe what measures can be taken to prevent any ongoing formation from occurring	This comment is far beyond standard practice for an RI Report. In any RI Report, fate and transport discussions are focused on key contaminants – not on "each contaminant." Previous reports (especially the focused RI Report and the RI/FS Work Plan) have identified manufacturing processes, raw materials, and finished products. That information need not be repeated. Discussion of formation mechanisms is not necessary for raw materials and known manufacturing by-products (including unused raw materials). Investigations to date have not identified any contaminants that are currently forming (26 years after the last manufacturing operations and 42 years after the facility was connected to public sewer).	The RI Report is a stand-alone document, and references to previous reports are acceptable, but a brief summary is warranted. Not all reading this report will be intimately familiar with site history. If there are new findings, they need to be added to the CSM. While a detailed discussion of formation mechanisms is not necessarily warranted, for chlorinated solvents, which have historically been found in site surface water and groundwater, a contaminant fate discussion cannot occur without the mention of biodegradation as a potential mechanism for both formation and destruction of contaminants. It is noted that the FRI does not include a figure for chlorinated solvents in soil. If the conclusion is that contaminants are not being formed, this needs to be included in the report, along with supporting evidence. As stated in the FRI, "The conceptual site model is a dynamic model that is expected to evolve and be updated as new site data are collected."	As EPA is aware, there have been many voluminous reports since investigations at the site commenced. Each document builds on the previous document. To summarize all previous findings would be unnecessarily onerous. We will include an expanded explanation of previous site activities as referenced in several instances above. The PRI did not identify chlorinated solvents as a significant issue in soil. Additionally, our OU1 investigation to date only indicates very minor concentrations of chlorinated solvents in the OU1 soil matrix. The potential degradation of minor concentrations of chlorinated solvents in soil will not result in significant daughter products (by either reductive dechlorination or aerobic cometabolism) such that either nature and extent or risk considerations will be affected in any way. Furthermore, this is an issue that should more appropriately be addressed in the Feasibility Study rather than the investigation. The historical information concerning the chemical processes conducted and the purchased raw materials suggest that chlorinated solvents were not purchased in quantity and were unlikely to be released to the environment in substantial quantities. No storage tanks for chlorinated solvents were listed in any of the historical operations documentation. And ultimately, the data is the data, and we are not seeing any evidence at all of significant releases of chlorinated solvents from past operations. Attached are copies of Tables 4.1-1 through 4.1-3 that include summary statistics for chlorinated solvents in surface-, shallow subsurface-, and deep subsurface- soil samples at OU1. Chlorinated solvents were detected at very low frequency (less than 5% and most commonly only 1 or 2 detections among hundreds of samples) and the concentrations detected in soil samples are low (all below the corresponding Industrial RSLs and often times at low part per billion levels in soil samples) The RI report will only discuss fate and transport of analytes that are determined to be potentially significant contaminants of potential concern in the risk assessment	Section 1.4.1 Manufacturing, Products, Raw Materials, and Wastes discusses in detail the manufacturing processes, products, raw materials, waste constituents, and the disposition of those waste materials. Table 1.4-1 shows the hostory of operations and product lines. Table 1.4-2 identifies the products, raw materials, and waste materials for each manufacturing process. Table 1.4-3 identifies the different manufacturing buildings and products associated with each.The Draft RI Report includes extensive discussion of the CSM and fate and transport (physical Site characteristics and chemical-specific fate and transport characteristics. Section 5.0 Fate and Transport includes an expanded discussion of the site conceptual model and of the physical, chemical, and fate and transport characteristics of Site chemicals of interest. Appendix K of the RI report also includes chemical fate and transport profiles from the Superfund Chemical Data Matrix and other sources. Section 5.1 discusses NDMA formation. The occurrence and behavior of DAPL is discussed in Sections 1.3.8, 5.2, and 5.4. Overall, the raw materials, manufacturing processes, and waste materials and the natural composition of soils explain the presence of most of the chemical parameters that have been detected in soil, surface water, and sediment of OU1 and OU2. NDMA may be the single analytical parameter that is not explicitly explained by the Site history, raw materials, and products associated with the former operations.There is no need to discuss formation mechanisms for most of the Site chemicals of interest.

Contaminant Fate and Transport Comments
Comment No. 4.b
Comment Title: Conceptual Site Model

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
The source(s), origin(s) and transport of N-nitrosodimethylamine (NDMA) as well as the potential for the formation of NDMA and other nitrosamines within Site soils and/or groundwater	The formation mechanism for NDMA at the site is unknown. NDMA has not been detected in unsaturated soil. The physical and chemical properties of NDMA that affected its environmental fate and transport were extensively discussed in the Focused RI Report.	While a detailed discussion of NDMA was included in the FRI, discussion of the data collected after the release of the FRI needs to be included in the RI to update the CSM. A summary of the information present in the FRI and references to the applicable pages also need to be included.	The Draft RI Report will summarize and cite the information related to NDMA fate and transport considerations presented in the FRI.	Section 5.1 discusses NDMA formation. The possible mechanisms of NDMA formation have been investigated but the mechanism for this Site have not been identified. NDMA was not a raw material, product, or identified waste material from the former facility. It has not been determined if it was formed at the Site or if it might have been a contaminant in a raw material used at the facility. The published papers concerning mechmaisms of formation in disinfected wastewaters and drinking water provide some context, but do not identify specific details for this Site.

Table L-1
Response to Comments Table
Remedial Investigation Report - OU1 and OU2
Olin Chemical Superfund Site
Wilmington, Massachusetts

Contaminant Fate and Transport Comments
Comment No. 4.c
Comment Title: Conceptual Site Model

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
The fate and transport of contaminants between all possible operable units (e.g., the ongoing role the on-Site soils play as a source of contamination to OU2 and/or OU3, and vice versa; the impact of contaminated groundwater from OU3 to OU2 and vice versa, etc.);	This comment goes beyond the scope of the OU1 RI Report. The interaction of groundwater and surface water with respect to OU1 and OU2 will be discussed in OU2. To the extent required an assessment of OU1 soil impacts to OU3 will be provided in the OU1 RI Report.	At a minimum, the possible and likely effects of contaminants in OU1 affecting OU2 and OU3 need to be discussed in the OU1 report. If evidence of contaminant migration (or lack thereof) from OU2 and OU3 to OU1 exists at this point, then this information should also be presented. Contaminant fate and transport needs to be considered across the OU "boundaries."	The Draft RI Report will discuss the evaluation of leaching from soil to groundwater and will also discuss interaction of groundwater and OU1 surface water and sediment.	Section 5.0 and Appendix J

Contaminant Fate and Transport Comments
Comment No. 4.d
Comment Title: Conceptual Site Model

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
The occurrence and behavior of the dense aqueous phase liquid [DAPL]. Although groundwater is not technically the focus of OU1, it cannot be separated from discussion, as the contaminants are a potential source of ongoing contamination at the Site, including but not limited to the potential vertical contaminant migration of DAPL into the bedrock aquifer via fractures. The CSM emphasizes the presence of pools of DAPL sitting atop, and confined by, the bedrock surface as the source of groundwater contamination. However, there has been almost no investigation of whether the DAPL has penetrated and contaminated the bedrock aquifer on the Olin property. Due to the very limited number of bedrock monitoring wells on the Olin property, more bedrock wells are necessary to investigate the relationship of groundwater quality with OU1 contamination. Sampling of the GW-202 series (located near but outside of the slurry wall containment area) provides some interesting results that must be supplemented by more data in order to define and understand the CSM. As stated in the CSM, drilling of the GW-202 well "...intercepted three fractured intervals to a depth of 180 ft bgs which contained DAPL." Potential evidence of vertical contaminant transport is supported by the sampling results of wells GW-202BRS and GW-202BRD. Numerous Olin-related contaminants are found in these wells, and the levels are typically greater in the shallower bedrock well (GW-202BRS), suggestive of downward migration from an overlying source. Data from additional bedrock wells, particularly at locations immediately adjacent to and surrounding the slurry wall/containment area, are necessary to construct a credible CSM.	This will be addressed in the OU3 RI report.	A complete CSM needs to incorporate updated findings on the effect of DAPL with regard to contaminant fate and transport. Please include these findings in the OU1 RI.	The Draft RI Report will discuss interaction of groundwater and OU1 surface water and sediment. This discussion will include the association between DAPL and the groundwater at the property.	The occurrence and behavior of DAPL is discussed in Sections 1.3.8, 5.2, and 5.4.

Table L-1
Response to Comments Table
Remedial Investigation Report - OU1 and OU2
Olin Chemical Superfund Site
Wilmington, Massachusetts

Contaminant Fate and Transport Comments
Comment No. 4.e.i
Comment Title: Conceptual Site Model

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
e. Additional potential source(s) of ammonia and other dissolved contaminants found in ground and/or surface water, unrelated to the DAPL plume. As examples, i. Six Volatile Organics (VOCs) and four Semi Volatile Organics (SVOCs) are present in the surface water. Finding volatile and semi-volatile organics in surface water is generally rare, as noted by all the non-detects for background for these chemicals. As the name implies, these contaminants readily volatize when they are in contact with air, either in groundwater or surface water. Their presence in surface water is a strong indication that a source still likely exists on the Site for these contaminants. If the dissolved contaminants in the DAPL plume were migrating to surface water, one would expect a high level of dilution and very low levels of contamination in the surface water. Finding these components in surface water indicates that a very high (relatively undiluted) concentration of source material is likely nearby	There is a positive correlation between constituents detected in diffuse groundwater above the DAPL pool in the vicinity of the south ditch and south ditch surface water. It is unlikely that a separate, unaccounted-for, source is present other than the DAPL pools and overlying diffuse groundwater.	Review of the data validation report final result tables for the VOCs detected in the OU1 surface water during the latest sampling round indicated the presence of trihalomethanes, which may be the result of the treated Plant B effluent. The presence of 2,4,4-trimethyl-1- pentene at PZ-16RR and PZ-17RR at concentrations of 4.2 µg/L and 7.4 µg/L, respectively, indicate that it is unlikely related to the DAPL plume. Such concentrations for VOCs seem very high, considering the amount of dilution and aeration that would be associated with contaminant transport from the subsurface to surface water.	The Draft RI Report will include further evaluation and discussion of timethylpentenes in groundwater and surface water of the South Ditch.	The CSM discussion addresses in detail the surface water quality in the context of groundwater/surface water inrteraction.

Contaminant Fate and Transport Comments
Comment No. 4.e.ii
Comment Title: Conceptual Site Model

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
The long list of metals and organics in surface water is of concern. Though the Report notes the presence of aluminum, chromium, iron, and sulfates in surface water where they form precipitates; the Report fails to address arsenic, cobalt, copper, and manganese in the surface waters	The RI Report identifies all detected parameters and it evaluates them in the human health and ecological risk assessments, and therefore has not failed to address these parameters.	Consideration of arsenic, cobalt, copper, and manganese, though part of the risk assessments, has not been presented as part of the CSM. These metals still need to be addressed in this section of the report, as their detected concentrations were higher than background levels.	The Draft RI report will discuss arsenic, cobalt, copper, and manganese in the context of groundwater/surface water interaction as part of the CSM discussion.	The CSM discussion addresses in detail the surface water quality in the context of groundwater/surface water interaction.

Contaminant Fate and Transport Comments
Comment No. 4.e.iii
Comment Title: Conceptual Site Model

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
The values of ammonia found in the surface waters are three orders of magnitude higher than background (250 mg/l to ND (0.25 mg/l) levels. This is another strong indication that another potential ongoing source is located on-Site, and not associated with the DAPL plume.	The ammonia concentration in the groundwater sample collected on 5/14/10 from monitoring well GW-202D located immediately upstream of the South Ditch surface water was 230 mg/L. All of the data collected to date for GW-202D indicates that the "diffuse" groundwater in the area of GW-202D as well as GW-55D is the primary source of contaminants to surface water of the South Ditch.	Review of the final result tables in the most recent data validation report and Table 4.1-4 provides a clear example of the need to present data with references to dates and locations. From Table 4.1-4, there were apparently 89 surface water samples collected from OU1 to date and analyzed for ammonia. There was a sample that had a concentration of 250 mg/L. When and where was it collected? Was that sample representative of site conditions or the result of some anomaly? The 2010 surface water data from the data validation table shows ammonia concentrations well below 250 mg/L and when the 2010 sediment data and ammonia concentration at GW-202D are considered, the surface water concentrations for ammonia, while high in some locations, are plausible for the South Ditch sampling locations without the possibility of an additional source. This is not evident the way the data is presented. However, an additional source has not necessarily been ruled out for the sample that contained 250 mg/L of ammonia. In addition, the analytical data from the DAPL extraction well provides updated information on DAPL characteristics that will need to be considered in the SCM for OU1.	The Draft RI report will discuss ammonia in the context of groundwater/surface water interaction as part of the CSM discussion.	The CSM discussion addresses in detail the surface water quality in the context of groundwater/surface water interaction.

Table L-1
Response to Comments Table
Remedial Investigation Report - OU1 and OU2
Olin Chemical Superfund Site
Wilmington, Massachusetts

Contaminant Fate and Transport Comments
Comment No. 4.f
Comment Title: Conceptual Site Model

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
The CSM does not adequately describe or characterize surface water features at the Site, which in turn will negatively affect the habitat characterization and the ecological risk assessment. The surface water system includes Central Pond and a second surface water feature south of the containment area, in addition to the series of drainage ditches that has been the focus of data collection.	Text discussing the Central Pond and the storm water detention pond will be added. An extensive discussion of ecological habitat is contained in the Focused RI Report.	See response to Report No. 17 (USEPA Comment 3D).	Please see response to NOBIS reply to Comment 3D.	As discussed in Section 2 and 4 of the Draft RI Report, sampling and analysis of surface water and sediment has been conducted for the Central Pond and the Storm Water Detention Basin.

Contaminant Fate and Transport Comments
Comment No. 4.f.i
Comment Title: Conceptual Site Model

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
Central Pond is part of a wetland system that requires an evaluation in the CSM as well as a better description of the surface water features and characteristics. The sampling of conditions in Central Pond is currently inadequate. Sediment was sampled at one location (SD-SD4) for only three indicator metals (aluminum, chromium, and iron). Results of four sediment samples collected at this location are listed in Table E-2-9. The title of that table indicates that all of the samples pertain to the South Ditch, which is inconsistent with the claim that Central Pond is hydraulically separate from South Ditch. Section 7.2.6.1 lists SD-SD4 as a South Ditch sediment sampling location. Surface water has not been sampled at all in Central Pond	Investigations to date have been consistent with the approved RI Work Plan. The sediments of the Central Pond were previously excavated and disposed off-site. The Central Pond sediment is sampled annually as part of the Interim Response Steps Work Plan activities. The sediment sample is analyzed for the limited analytical suite specified in that Work Plan and it is intended to be a monitoring activity to assess whether there is any recontamination of sediment via floc formation.	See response to Report No. 17 (USEPA Comment 3D).	The proposed surface water and sediment sampling and analysis for Central Pond was presented in the work plan addendum submitted to EPA on November 16th 2012 to EPA for review and approval. The Draft RI Report will discuss the results of that sampling and analysis in the context of the CSM.	Surface water samples collected at the Site are shown on Figure 2.2-3 and sediment samples collected at the Site are shown on Figure 2.2-4. These figures show the additional samples collected from Central Pond and the Stormwater Detention Basin. Central Pond and the Stormwater Detention Basin are shown and labeled on Figure 1.3-1. The results of that sampling and analysis are discussed in Sections 4.1.3.2 and 4.1.3.3 for surface water and in Sections 4.1.4.3 and 4.1.4.4 for sediment.

Contaminant Fate and Transport Comments
Comment No. 4.f.ii
Comment Title: Conceptual Site Model

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
There is a second surface water feature immediately south of the containment area that is not described in the Report, not depicted on Site maps, and not sampled at all. The Figure 6.2-6 aerial photo clearly shows the presence of this surface water feature, located almost directly west of the Central Pond (and south of the containment area). Based on a dry-looking appearance in the current Google Earth map for the area, this surface water may be ephemeral in nature, and its location immediately south of the containment area suggests that it may be related to stormwater control. Even so, it is still part of OU1 and should be described specifically in the OU1 RI Report. Furthermore, it should be sampled and characterized for the list of potential Site contaminants, as (at a minimum) it has relevance to ecological habitats at the Site.	The storm water detention pond is a well known and well documented site feature that was designed to receive run-off from the temporary cap. Please see previous responses for the storm water detention pond.	See response to Report No. 17 (USEPA Comment 3D).	The proposed surface water and sediment sampling and analysis for the storm water detention basin was presented in the work plan addendum submitted to EPA on November 16th 2012 to EPA for review and approval. The Draft RI Report will discuss the results of that sampling and analysis in the context of the CSM.	Surface water samples collected at the Site are shown on Figure 2.2-3 and sediment samples collected at the Site are shown on Figure 2.2-4. These figures show the additional samples collected from Central Pond and the Stormwater Detention Basin. Central Pond and the Stormwater Detention Basin are shown and labeled on Figure 1.3-1. The results of that sampling and analysis are discussed in Sections 4.1.3.2 and 4.1.3.3 for surface water and in Sections 4.1.4.3 and 4.1.4.4 for sediment.

Table L-1
Response to Comments Table
Remedial Investigation Report - OU1 and OU2
Olin Chemical Superfund Site
Wilmington, Massachusetts

Contaminant Fate and Transport Comments
Comment No. 4.g
Comment Title: Conceptual Site Model

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
Groundwater sampling results at locations adjacent to and down-gradient from the Calcium Sulfate Landfill (CSL) indicate the presence of other Olin-related contaminants (e.g., 4-nonylphenol). Although the closure measures taken at the landfill may be sufficient for eliminating direct contact exposure risks, they may be insufficient in preventing contaminants from leaching into groundwater. Hence, it may be necessary to characterize the groundwater in the immediate area of the landfill for the entire suite of chemicals of concern, as well as investigate potential contaminant impacts. These results could be incorporated into the nature and extent discussions accordingly.	Groundwater beneath the Calcium Sulfate Landfill is an OU3 issue and will be addressed in the OU3 RI report. The CSL was closed in accordance with appropriate regulations and is monitored on a routine basis.	Though this is, indeed, largely an OU3 issue, the CSL is still considered to be a potential contaminant source, and available monitoring reports for the CSL will need to be reviewed and potential impacts/data gaps discussed. Based on the results, additional monitoring requirements can be determined.	Olin will provide groundwater data summaries for the CSL with OU3 RI Report.	Olin will provide groundwater data summaries for the CSL with OU3 RI Report.

Contaminant Fate and Transport Comments
Comment No. 4.h
Comment Title: Conceptual Site Model

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
Is all of the ammonia at ISC02 due to stream transport? Figure 4.1-29 indicates transport of ammonia off-site via the South Ditch; however, the highest measured concentration was in fact found at the downstream (off-site) ISC02 sampling location.	The South Ditch surface water ammonia concentrations are initially elevated near the weir as a result of groundwater discharge to the ditch at that location. There is also additional groundwater discharge to the South Ditch in the area of monitoring well GW-79S. In addition, the southern portion of the South Ditch is a documented area of groundwater/surface water interaction. At the lower end of the South Ditch, the ammonia concentrations reflect both stream flow transport of ammonia entering the ditch upstream and flowing to the east as well as groundwater discharge into the ditch at its eastern (downstream) end.	Olin's response is satisfactory. Please add the above response to the RI report.		The RI Report expalins the follwing: The South Ditch surface water ammonia concentrations are initially elevated near the weir as a result of groundwater discharge to the ditch at that location. There is also additional groundwater discharge to the South Ditch in the area of monitoring well GW-79S. In addition, the southern portion of the South Ditch is a documented area of groundwater/surface water interaction. At the lower end of the South Ditch, the ammonia concentrations reflect both stream flow transport of ammonia entering the ditch upstream and flowing to the east as well as groundwater discharge into the ditch at its eastern (downstream) end.

Contaminant Fate and Transport Comments
Comment No. 4.i
Comment Title: Conceptual Site Model

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
NDMA (Figure 4.1-30) and other contaminants appear to be transported off-site via South Ditch discharge on a continuing basis, and the nature of the contaminant transport as it relates to OU1 sources should be described and supported by additional data collection, where necessary.	Additional discussion of contaminant transport beyond the Olin property in surface water and sediment will be included in the OU2 RI Report. The OU2 work plan elements were sufficient to document the nature and extent in surface water and it is not necessary to collect additional information.	While the fate of NDMA off-site is an OU2 issue, there needs to be further clarification on what is occurring on OU1. How is it that concentrations of NDMA in South Ditch, based on Figure 4.1-30, show little, if any, evidence of attenuation? Is this another line of evidence indicating that the groundwater is affecting OU1 or is NDMA forming in the surface water? The notes also state that data used is from January 2007 to the present. The final result table presented in the data validation report shows higher concentrations of NDMA at PZ-16RR, PZ-17RR, SD-1, and ISCO2 than at ISCO1. Does this figure truly represent current site conditions or are additional figures needed for clarification? Additional data collection may be needed to better describe current conditions.	The Draft RI Report will include a detailed discussion of groundwater/surface water interaction in the South Ditch with respect to NDMA.	The Draft RI Report includes a detailed discussion of groundwater/surface water interaction in the South Ditch with respect to NDMA and othe3r solutes present in groundwater and surface water.

Contaminant Fate and Transport Comments
Comment No. 4.j
Comment Title: Conceptual Site Model

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
If the discharge from the present groundwater treatment system were eliminated from the West Ditch, what would happen? Would contaminant levels in South Ditch surface water be reduced, floc formations decrease, etc.? Would contaminants continue to migrate off-site due to sediment transport during storm events, and at what levels? A hydrological/geochemical model of the surface water system would be a useful addition	The treatment plant discharge is a source of "clean" water. There is no basis to speculate on the effect of eliminating the Plant B discharge to the on-Property West Ditch.	While the treatment plant effluent meets the parameters required by the RGP, it is noted that amine compounds (e.g., diphenylamine) are of concern in the area around Plant B, and amine concentrations in the Plant B effluent are unknown at this time. In addition, it is understood that at least trace amounts of chloramine will be present in the effluent as a result of breakpoint chlorination, and as stated in an earlier Olin response, scientific literature indicates that certain amines in wastewater could act as precursors to NDMA formation. Analysis for amines may be warranted. Further discussion is needed in the RI report.	Further discussion will be provided in the RI as requested. Maximum detected concentrations of NDMA in surface water are orders of magnitude less than ecological screening levels, therefore Plant B discharge is a negligible source of NDMA and further evaluation is not warranted.	

Contaminant Fate and Transport Comments
Comment No. 4.k
Comment Title: Conceptual Site Model

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
With respect to the contamination of the Town wells, it is accurate to state that the wells were being taken off-line by the Town during different time periods in response to concerns of potentially exceeding nitrite standards in the distribution system. However, what is not described is that the elevated levels of nitrates/nitrites in distribution were due to the increased levels of ammonia from the Olin Site. Olin developed a pump plan for the Town to minimize the inductance of ammonia, which the Town attempted to implement. One theory explaining why NDMA may not have been detected in the water supply distribution system is because the wells had already ceased pumping by the time the distribution system samples were obtained and tested for NDMA.	The question and statements are not relevant to OU1 Report. These are OU3 issues.	EPA agrees that these issues should be addressed in the OU3 report.		OU3 matter.

Table L-1
Response to Comments Table
Remedial Investigation Report - OU1 and OU2
Olin Chemical Superfund Site
Wilmington, Massachusetts

Contaminant Fate and Transport Comments **Comment No. 5.i** **Comment Title: Vapor Intrusion**				
EPA Comment	**Olin Response to EPA**	**Nobis Response to Olin**	**Olin Response to Nobis**	**Resolution**
Vapor Intrusion. Provide clarification and all supporting documentation to these claims: i. Report Figure F-1-1 identifies numerous locations at which soil headspace analyses indicate high levels of vapors. The magnitude of these values would trigger detailed, chemical-specific soil-gas analyses in a typical investigation under the Massachusetts Contingency Plan.	Figure F-1-1 of Appendix F identifies soil bag headspace measurements for soils obtained from soil borings during the November 2010 supplemental investigation in the area of soil boring SB-405 (detections of the volatile trimethylpentenes). The objective of the November 2010 supplemental investigation was to identify the horizontal and vertical limits of the trimethylpentenes-impacted soil in the area of soil boring SB-405 and to the east of property line to the east of the Plant B Treatment Building. The headspace readings from the borings in the area of SB-405 were utilized to identify trimethylpentenes–impacted locations and to identify the need to step out further from the original SB-405 boring in order to find the horizontal limits of the trimethylpentenes- impacted area. This headspace screening process successfully identified impacted boring locations and assisted in the horizontal delineation of the impacted area, with samples collected from the boundary of the area submitted to the laboratory for analysis of VOCs, including trimethylpentenes (to confirm the boundary). The boundary samples were un-impacted or minimally impacted with VOCs. Soil borings SB-474 through SB-478 were installed and samples were submitted to the laboratory for VOC analysis from each of these borings. These borings were installed along the top of a very steep slope, with the East Ditch located at the bottom of the slope. The laboratory analysis results for these samples confirmed that TMPs are present in soil samples collected from those locations (at a depth of 8-10 ft bgs). There is currently only one on-ground fully occupied structure at the site (the Plant B Treatment Building) that has any potential for a vapor intrusion pathway. There is an operating soil vapor extraction (SVE) system around the perimeter of the building. The SVE system applies a vacuum to the subsurface at the building, creating a net positive pressure in the building relative to the subsurface. This indicates that any vapor migration would be away from the building rather than into the building – this indicates the vapor intrusion pathway is incomplete. The office trailer is elevated approximately 2 feet above land surface, with no direct contact between the land surface and the bottom of the trailer. The former guard shack building is not occupied, except temporarily for sporadic environmental investigation activities. The former office building (including the pilot lab) and the warehouses are not occupied, are not heated, and do not have electrical service. There are no occupied on-ground structures in close proximity to the TMP area around soil boring SB-405. Therefore, there is not currently a complete vapor intrusion pathway to be evaluated with respect to that area, and a soil vapor investigation is not required. A soil vapor investigation has not been conducted because 1) there is no identified potential current vapor intrusion pathway with respect to the area around SB-405 or the Plant B Treatment Building, and 2) there is no specific plan to re-occupy the vacant office building or to construct occupied structures in close proximity to the area around SB-405, and 3) in the future, if construction of occupied structures is proposed, a soil vapor investigation will be conducted to evaluate the need for mitigation of remediation to address the vapor intrusion pathway and/or engineering controls and institutional controls will be implemented to eliminate or minimize the vapor intrusion pathway. The laboratory analytical data for the soil boring SB-405 indicates that the two trimethylpentene compounds are the only VOCs reported in the soil samples (no VOCs were detected in the sample collected from 0-1 ft bgs (Table E-2-2 of the Preliminary RI), and the two trimethylpentene compounds are the only VOCs that were detected in the soil sample collected from 8-9 ft bgs (Table E-2-6 of the preliminary RI).	Evaluation of a potential future vapor intrusion pathway will be required in the HHRA. This may necessitate soil gas sampling in areas where VOCs are detected in vadose zone soils. An institutional control will be required to prevent future occupancy of buildings on-site or to require engineering controls to prevent exposures unless such an evaluation is completed.	The Draft RI Report will include an evaluation of the vapor intrusion pathways for trimethylpentenes.	Vapor intrusion will be evaluated in the Human Health Risk Assessment (Section 6.0 of the RI Report).

Table L-1
Response to Comments Table
Remedial Investigation Report - OU1 and OU2
Olin Chemical Superfund Site
Wilmington, Massachusetts

Contaminant Fate and Transport Comments **Comment No. 5.ii** **Comment Title: Vapor Intrusion**				
EPA Comment	**Olin Response to EPA**	**Nobis Response to Olin**	**Olin Response to Nobis**	**Resolution**
The screening-level analysis set forth in Appendix F-2 involves far too many assumptions and would not be sufficient given current standards of practice. Rather, it is important to know the specific compounds present in subsurface soil- gas that could contribute to future vapor intrusion risks.	The available soil data for trimethylpentene area (adjacent to soil boring SB-405) indicate that trimethylpentenes are the only VOCs reported in vadose zone soil samples and that soil impacts to soil vapor would be expected to be limited to trimethylpentenes. The laboratory analytical data for the soil boring SB-405 indicates that the two trimethylpentene compounds are the only VOCs reported in the soil samples (no VOCs were detected in the sample collected from 0-1 ft bgs (Table E-2-2 of the Preliminary RI), and the two trimethylpentene compounds are the only VOCs that were detected in the soil sample collected from 8-9 ft bgs (Table E-2-6 of the preliminary RI). This information indicates that no other volatiles beyond the trimethylpentene compounds are expected to be present (as the result of soil contamination) in soil vapor in the area of SB-405. As shown in Table E-2-2 and E-2-6 of the Preliminary RI, no VOCs other than trimethylpentenes were detected in any of the boundary samples for the trimethylpentene area in the proximity of SB-405 (SB-479, SB-480, SB-481, SB-485, SB-488, SB-490, SB-494, SB-495, SB-496, SB-497, SB-500, SB-501, SB-502). This further supports the expectation that the trimethylpentenes are the only VOCs that would be expected to migrate from vadose zone soil to soil vapor in this trimethylpentene area adjacent to SB-405.	As noted above, evaluation of a potential future vapor intrusion pathway will be required in the HHRA. Contaminants to be evaluated cannot be eliminated based on frequency of detection across the whole site. All buildable areas of the site where VOCs are detected in vadose zone soils should be included in the evaluation unless institutional controls are in place to prevent future occupancy of current or future buildings on-site or to require engineering controls to prevent exposures. Soil gas sampling in these areas would be helpful.	The Draft RI Report will include an evaluation of the vapor intrusion pathways for trimethylpentenes.	Vapor intrusion will be evaluated in the Human Health Risk Assessment (Section 6.0 of the RI Report).

Table L-1
Response to Comments Table
Remedial Investigation Report - OU1 and OU2
Olin Chemical Superfund Site
Wilmington, Massachusetts

Contaminant Fate and Transport Comments
Comment No. 5.iii
Comment Title: Vapor Intrusion

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
Conflicting statements are made throughout the Report with respect to contaminant volatility in the vadose zone and in shallow groundwater and whether they represent: • a potential for vapor migration into buildings and ambient air during excavation activities; • whether there is a complete migration pathway; or • whether inhalation non-cancer risks associated with vapor intrusion for future buildings and for future excavation of soils may be associated with a Hazard Index greater than 1.	This response addresses the vadose zone soils which are a component of OU1. The vapor intrusion potential associated with shallow groundwater will be evaluated in the OU3 RI Report. 1. The potential for vadose zone soil-related vapor migration into buildings and for release of vapors from vadose zone soil to ambient air during excavation activities are addressed in the following section. The evaluation considers separately the current conditions vapor intrusion potential and the hypothetical future conditions vapor intrusion potential (and the control of that potential via institutional and engineering controls). a. Potential vapor migration into currently occupied structures is not a substantial concern. The only currently fully occupied on-ground structure is the Plant B Treatment Building. As previously discussed, there is an operating soil vapor extraction (SVE) system around the perimeter of the building. The SVE system applies a vacuum to the subsurface at the building, creating a net positive pressure in the building relative to the subsurface. This indicates that any vapor migration would be away from the building rather than into the building – this indicates the vapor intrusion pathway is incomplete. Historical indoor air sampling confirmed the pathway is not complete. The office trailer is not in contact with the ground surface and there is not a complete migration pathway involving subsurface soil and the trailer interior. The former guard shack, located in the northwest corner of the Property, is only sporadically used, and there have not been any substantial detections of VOCs in that area of the Property. Therefore, there is not a complete vapor intrusion pathway for current site conditions. For any future buildings, a preliminary vapor intrusion evaluation for vadose zone soil has been conducted for this response to comments letter, and the evaluation will be enhanced and included in the revised Preliminary RI Report for OU1. The vapor intrusion evaluation with respect to groundwater will be included in the RI Report for OU3. The preliminary vapor intrusion evaluation for vadose zone soil conducted for this response to comment letter 1) identifies the nature and extent of volatile compounds and parameters in vadose zone soils (specific volatile compounds and parameters detected in soil samples and the soil sample locations where VOCs were detected), 2) identifies locations where volatiles have been detected in vadose zone soils where future building construction is not foreseeable (such as in Central Pond), and 4) identifies a proposed process for managing the vapor intrusion pathway with respect to future construction of occupied structures. That process may include pre-construction investigations, engineering measures, and/or institutional land use controls. The attached tables 5-iii-1-1 through 5-iii-1-10 provide vadose zone soil data summaries that are components of the preliminary vadose zone soil vapor intrusion evaluation that was conducted for this response to comment letter. The attached Table 5-iii-1-1 and Table 5-iii-1-2 (5-iii-1 refers to the comment identified as such above) include summary statistics for VOCs, SVOCs, VPH, EPH, and the specialty compounds hydrazine, acetaldehyde, formaldehyde, and phthalic acid/phthalic anhydride in surface soil samples (0-1 ft bgs interval) and in shallow subsurface soil samples (collected from within the 1-10 ft bgs interval). Those tables identify detected compounds and parameters, frequency of detection (number of detects, number of samples analyzed), range of reporting limits for non-detects, range of detected concentrations, and arithmetic mean of all samples (using ½ the reporting limit as the value for non-detects). These tables list VOCs, SVOCs, VPH, EPH, and "specialty chemicals hydrazine, acetaldehyde, formaldehyde, and phthalic acid/phthalic anhydride. In this evaluation, it is assumed that all of the detected VOCs are sufficiently volatile to warrant inclusion in the vapor intrusion evaluation. Tables 5-iii-1-3 and 5-iii-1-4 present summaries of the VOCs detected in surface soil samples (0-1 ft bgs) and shallow subsurface soil samples (collected from within the 1-10 ft bgs interval). Those tables present the detected compounds, listed in order based on the maximum detected concentration of each compound (highest to lowest), and the frequency of detection is also shown for each detected compound. Per Table 5-iii-1-3, as expected, few VOCs were detected in surface soil samples and the detected compounds had low frequency of detection overall. Only methylene chloride, acetone, and toluene were reported in 10 or more samples (most compounds were on the analyte list for 201 surface soil samples). Trimethylpentene compounds (site signature compounds) were detected in fewer than 10 samples. As shown in Table 5-iii-1-4, a greater number of VOCs were detected in shallow subsurface soil samples and several compounds were detected with higher frequency than in the surface soil samples. The trimethylpentene compounds were the VOCs detected most frequently in shallow subsurface soil samples (73 0f 263 samples for 2,4,4-trimethyl-1-pentene and 62 of 263 samples for 2,4,4-trimethyl-2-pentene). Additional VOCs detected with some frequency include methylene chloride, toluene, acetone, formaldehyde, 2-butanone, ethylbenzene, and 2-hexanone.	Response is satisfactory. With regard to volatility, a more conservative approach for analysis is described in response. Operation of SVE system will keep vapors from entering Plant B and for future construction, EC/IC are proposed. The revised RI report will contain evaluation of potential release of volatiles from the vadose zone during construction activities.		This response addresses the vadose zone soils which are a component of OU1. The vapor intrusion potential associated with shallow groundwater will be evaluated in the OU3 RI Report. 1. The potential for vadose zone soil-related vapor migration into buildings and for release of vapors from vadose zone soil to ambient air during excavation activities are addressed in the following section. The evaluation considers separately the current conditions vapor intrusion potential and the hypothetical future conditions vapor intrusion potential (and the control of that potential via institutional and engineering controls). a. Potential vapor migration into currently occupied structures is not a substantial concern. The only currently fully occupied on-ground structure is the Plant B Treatment Building. As previously discussed, there is an operating soil vapor extraction (SVE) system around the perimeter of the building. The SVE system applies a vacuum to the subsurface at the building, creating a net positive pressure in the building relative to the subsurface. This indicates that any vapor migration would be away from the building rather than into the building – this indicates the vapor intrusion pathway is incomplete. Historical indoor air sampling confirmed the pathway is not complete. The office trailer is not in contact with the ground surface and there is not a complete migration pathway involving subsurface soil and the trailer interior. The former guard shack, located in the northwest corner of the Property, is only sporadically used, and there have not been any substantial detections of VOCs in that area of the Property. Therefore, there is not a complete vapor intrusion pathway for current site conditions. For any future buildings, a preliminary vapor intrusion evaluation for vadose zone soil has been conducted for this response to comments letter, and the evaluation will be enhanced and included in the revised Preliminary RI Report for OU1. The vapor intrusion evaluation with respect to groundwater will be included in the RI Report for OU3. The preliminary vapor intrusion evaluation for vadose zone soil conducted for this response to comment letter 1) identifies the nature and extent of volatile compounds and parameters in vadose zone soils (specific volatile compounds and parameters detected in soil samples and the soil sample locations where VOCs were detected), 2) identifies locations where volatiles have been detected in vadose zone soils where future building construction is not foreseeable (such as in Central Pond), and 4) identifies a proposed process for managing the vapor intrusion pathway with respect to future construction of occupied structures. That process may include pre-construction investigations, engineering measures, and/or institutional land use controls. The attached tables 5-iii-1-1 through 5-iii-1-10 provide vadose zone soil data summaries that are components of the preliminary vadose zone soil vapor intrusion evaluation that was conducted for this response to comment letter. The attached Table 5-iii-1-1 and Table 5-iii-1-2 (5-iii-1 refers to the comment identified as such above) include summary statistics for VOCs, SVOCs, VPH, EPH, and the specialty compounds hydrazine, acetaldehyde, formaldehyde, and phthalic acid/phthalic anhydride in surface soil samples (0-1 ft bgs interval) and in shallow subsurface soil samples (collected from within the 1-10 ft bgs interval). Those tables identify detected compounds and parameters, frequency of detection (number of detects, number of samples analyzed), range of reporting limits for non-detects, range of detected concentrations, and arithmetic mean of all samples (using ½ the reporting limit as the value for non-detects). These tables list VOCs, SVOCs, VPH, EPH, and "specialty chemicals hydrazine, acetaldehyde, formaldehyde, and phthalic acid/phthalic anhydride. In this evaluation, it is assumed that all of the detected VOCs are sufficiently volatile to warrant inclusion in the vapor intrusion evaluation. Tables 5-iii-1-3 and 5-iii-1-4 present summaries of the VOCs detected in surface soil samples (0-1 ft bgs) and shallow subsurface soil samples (collected from within the 1-10 ft bgs interval). Those tables present the detected compounds, listed in order based on the maximum detected concentration of each compound (highest to lowest), and the frequency of detection is also shown for each detected compound. Per Table 5-iii-1-3, as expected, few

Contaminant Fate and Transport Comments
Comment No. 5.iii
Comment Title: Vapor Intrusion

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
	For completeness, Tables 5-iii-1-5 and 5-iii-1-6 present summaries of SVOCs, VPH, EPH, and specialty chemicals hydrazine, acetaldehyde, formaldehyde, and phthalic acid/phthalic anhydride in order based on maximum detected concentration (high to low). Many of these compounds and parameters are not sufficiently volatile to warrant a vapor intrusion evaluation. These two tables indicate, in a separate column, if the compound or parameter is not "sufficiently volatile" to require vapor intrusion evaluation (per the USEPA 2002 Vapor Intrusion Guidance, Table 1, which lists compounds and indicates if the compounds are sufficiently volatile). A footnote to that Table 1 indicates that a chemical is considered sufficiently volatile if its Henry's Law Constant is 1 x 10-5 atm-m3/mol or greater. Therefore, detected compounds that are not listed in the USEPA Table 1 were considered not sufficiently volatile, and are not evaluated further, if their Henry's law Constant is less than 1 x 10-5 atm-m3/mol. As expected, many of the SVOCs are not sufficiently volatile to warrant a vapor intrusion evaluation. Among the specialty compounds, acetaldehyde is sufficiently volatile. The VPH fractions are also sufficiently volatile. Tables 5-iii-1-7 and 8 show the detected VOCs and their concentrations in each soil sample with detects in surface soil samples and shallow subsurface soil samples respectively. Those tables also include the "total VOC concentration" for each soil sample with any VOCs detected, and they also include an indication of what percentage of the total VOC concentration is contributed by the two trimethylpentene compounds (on a percentage basis). Tables 5-iii-1-9 and 5-iii-1-10 list the "total VOC concentration" for each of the surface soil samples and each of the shallow subsurface soil samples, respectively. These tables list the samples in order of "total VOC concentration" (from highest to lowest). As shown in Table 5-iii-1-9, for surface soil, there are only four samples with "total VOC concentration" greater than 1 mg/kg. In contrast, for shallow subsurface soil, there are 41 shallow subsurface soil samples with "total VOC concentration" greater than 1 mg/kg. Of those 41 samples, 29 have 'total VOC concentrations" that are primarily trimethylpentenes (all greater than 50% trimethylpentenes, and most of them greater than 85% trimethylpentenes. Figure 5-iii-1-1 shows the shallow subsurface soil sample locations with detected VOCs as well as the "total VOC concentration" for each of those samples. On that figure, "total VOC concentrations" greater than 1 mg/kg are color coded differently than concentrations less than 1 mg/kg, in order to provide visual contrast between locations with higher concentrations and those with lower concentrations. Figure 5-iii-1-1 indicates the highest concentrations of "total VOCs" in shallow subsurface soil samples are located in the trimethylpentene area at SB-405, the former Plant B Building location and the "EPH/VPH Area" immediately east of that former building, east of the Plant B Treatment Building, the area of the former Lake Poly, and Drum Areas A and B (within the Slurry wall/Cap area). b. As previously discussed, the only currently fully occupied on-ground structure is the Plant B Treatment Building. As previously discussed, there is an operating soil vapor extraction (SVE) system around the perimeter of the building. The SVE system applies a vacuum to the subsurface at the building, creating a net positive pressure in the building relative to the subsurface. This indicates that any vapor migration would be away from the building rather than into the building – this indicates the vapor intrusion pathway is incomplete. The office trailer is not in contact with the ground surface and there is not a complete migration pathway involving subsurface soil and the trailer interior. The former guard shack, located in the northwest corner of the Property, is only sporadically used, and there have not been any substantial detections of VOCs in that area of the Property. Therefore, there is not a complete vapor intrusion pathway for current site conditions. Soil-related vapor intrusion should not be a concern for future construction of occupied buildings in areas outside of the locations of vadose zone soil VOC detections shown in Figure 5-iii-1-1. If construction of buildings in areas where VOCs have been detected in vadose zone soil samples is contemplated in the future, there are various options available. A vapor intrusion evaluation for the specific proposed building can be conducted to evaluate the need for any engineering or institutional controls to mitigate or eliminate the vapor intrusion pathway. Such an evaluation might include vapor migration modeling, a soil vapor investigation, and a risk evaluation. Another option may be to include an engineered mitigation or pathway elimination feature for the proposed building (such as a sub-slab vapor barrier or a passive sub-slab venting system. Another possible option might include a land use control, limiting construction of occupied buildings, for specific areas where VOCs have been detected in soil samples. The revised RI Report for OU1 will include additional evaluation of the potential release of volatiles from vadose zone soil to ambient air during excavation activities. The evaluation will employ USEPA-recommended modeling tools to estimate potential rates of release of VOCs to the ambient air and USEPA- recommended approaches for evaluating health risks for construction workers. These evaluations will be conducted for the vadose zone soils at specific areas (examples may include the area of SB-405, the former Plant B Building, the area east of the Plant B treatment			VOCs were detected in surface soil samples and the detected compounds had low frequency of detection overall. Only methylene chloride, acetone, and toluene were reported in 10 or more samples (most compounds were on the analyte list for 201 surface soil samples). Trimethylpentene compounds (site signature compounds) were detected in fewer than 10 samples. As shown in Table 5-iii-1-4, a greater number of VOCs were detected in shallow subsurface soil samples and several compounds were detected with higher frequency than in the surface soil samples. The trimethylpentene compounds were the VOCs detected most frequently in shallow subsurface soil samples (73 0f 263 samples for 2,4,4-trimethyl-1-pentene and 62 of 263 samples for 2,4,4-trimethyl-2-pentene). Additional VOCs detected with some frequency include methylene chloride, toluene, acetone, formaldehyde, 2-butanone, ethylbenzene, and 2-hexanone. For completeness, Tables 5-iii-1-5 and 5-iii-1-6 present summaries of SVOCs, VPH, EPH, and specialty chemicals hydrazine, acetaldehyde, formaldehyde, and phthalic acid/phthalic anhydride in order based on maximum detected concentration (high to low). Many of these compounds and parameters are not sufficiently volatile to warrant a vapor intrusion evaluation. These two tables indicate, in a separate column, if the compound or parameter is not "sufficiently volatile" to require vapor intrusion evaluation (per the USEPA 2002 Vapor Intrusion Guidance, Table 1, which lists compounds and indicates if the compounds are sufficiently volatile). A footnote to that Table 1 indicates that a chemical is considered sufficiently volatile if its Henry's Law Constant is 1 x 10-5 atm-m3/mol or greater. Therefore, detected compounds that are not listed in the USEPA Table 1 were considered not sufficiently volatile, and are not evaluated further, if their Henry's law Constant is less than 1 x 10-5 atm-m3/mol. As expected, many of the SVOCs are not sufficiently volatile to warrant a vapor intrusion evaluation. Among the specialty compounds, acetaldehyde is sufficiently volatile. The VPH fractions are also sufficiently volatile. Tables 5-iii-1-7 and 8 show the detected VOCs and their concentrations in each soil sample with detects in surface soil samples and shallow subsurface soil samples respectively. Those tables also include the "total VOC concentration" for each soil sample with any VOCs detected, and they also include an indication of what percentage of the total VOC concentration is contributed by the two trimethylpentene compounds (on a percentage basis). Tables 5-iii-1-9 and 5-iii-1-10 list the "total VOC concentration" for each of the surface soil samples and each of the shallow subsurface soil samples, respectively. These tables list the samples in order of "total VOC concentration" (from highest to lowest). As shown in Table 5-iii-1-9, for surface soil, there are only four samples with "total VOC concentration" greater than 1 mg/kg. In contrast, for shallow subsurface soil, there are 41 shallow subsurface soil samples with "total VOC concentration" greater than 1 mg/kg. Of those 41 samples, 29 have 'total VOC concentrations" that are primarily trimethylpentenes (all greater than 50% trimethylpentenes, and most of them greater than 85% trimethylpentenes. Figure 5-iii-1-1 shows the shallow subsurface soil sample locations with detected VOCs as well as the "total VOC concentration" for each of those samples. On that figure, "total VOC concentrations" greater than 1 mg/kg are color coded differently than concentrations less than 1 mg/kg, in order to provide visual contrast between locations with higher concentrations and those with lower concentrations. Figure 5-iii-1-1 indicates the highest concentrations of "total VOCs" in shallow subsurface soil samples are located in the trimethylpentene area at SB-405, the former Plant B Building location and the "EPH/VPH Area" immediately east of that former building, east of the Plant B Treatment Building, the area of the former Lake Poly, and Drum Areas A and B (within the Slurry wall/Cap area). b. As previously discussed, the only currently fully occupied on-ground structure is the Plant B Treatment Building. As previously discussed, there is an operating soil vapor extraction (SVE) system around the perimeter of the building. The SVE system applies a vacuum to the subsurface at the building, creating a net positive pressure in the building relative to the subsurface. This indicates that any vapor migration would be away from the building rather than into the building – this indicates the vapor intrusion pathway is incomplete. The office

Contaminant Fate and Transport Comments
Comment No. 5.iii
Comment Title: Vapor Intrusion

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
	Building, and the area of the former Lake Poly. 2. Consistent with the responses above, the available information indicates there is not a complete vapor intrusion pathway associated with vadose zone soil within OU1 for current conditions. The vapor intrusion pathway associated with groundwater will be evaluated in the RI Report for OU3. 3. In response to the comment, "Characterize potential non-cancer risks associated with the vapor intrusion pathway and release of volatiles to the ambient air during excavation activities." The responses presented above indicate the vapor intrusion pathway associated with vadose zone soils is not currently complete and therefore risks associated with that pathway need not be calculated. As discussed previously, the risks associated with release of VOCs from vadose zone soil to ambient air during hypothetical future construction will be evaluated further in the revised RI Report for OU1.			trailer is not in contact with the ground surface and there is not a complete migration pathway involving subsurface soil and the trailer interior. The former guard shack, located in the northwest corner of the Property, is only sporadically used, and there have not been any substantial detections of VOCs in that area of the Property. Therefore, there is not a complete vapor intrusion pathway for current site conditions. Soil-related vapor intrusion should not be a concern for future construction of occupied buildings in areas outside of the locations of vadose zone soil VOC detections shown in Figure 5-iii-1-1. If construction of buildings in areas where VOCs have been detected in vadose zone soil samples is contemplated in the future, there are various options available. A vapor intrusion evaluation for the specific proposed building can be conducted to evaluate the need for any engineering or institutional controls to mitigate or eliminate the vapor intrusion pathway. Such an evaluation might include vapor migration modeling, a soil vapor investigation, and a risk evaluation. Another option may be to include an engineered mitigation or pathway elimination feature for the proposed building (such as a sub-slab vapor barrier or a passive sub-slab venting system. Another possible option might include a land use control, limiting construction of occupied buildings, for specific areas where VOCs have been detected in soil samples. The revised RI Report for OU1 will include additional evaluation of the potential release of volatiles from vadose zone soil to ambient air during excavation activities. The evaluation will employ USEPA-recommended modeling tools to estimate potential rates of release of VOCs to the ambient air and USEPA- recommended approaches for evaluating health risks for construction workers. These evaluations will be conducted for the vadose zone soils at specific areas (examples may include the area of SB-405, the former Plant B Building, the area east of the Plant B treatment Building, and the area of the former Lake Poly. 2. Consistent with the responses above, the available information indicates there is not a complete vapor intrusion pathway associated with vadose zone soil within OU1 for current conditions. The vapor intrusion pathway associated with groundwater will be evaluated in the RI Report for OU3. 3. In response to the comment, "Characterize potential non-cancer risks associated with the vapor intrusion pathway and release of volatiles to the ambient air during excavation activities." The responses presented above indicate the vapor intrusion pathway associated with vadose zone soils is not currently complete and therefore risks associated with that pathway need not be calculated. As discussed previously, the risks associated with release of VOCs from vadose zone soil to ambient air during hypothetical future construction will be evaluated further in the revised RI Report for OU1.

Contaminant Fate and Transport Comments
Comment No. 5.iv
Comment Title: Vapor Intrusion

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
The evaluation of the vapor intrusion pathway was specifically listed as a data gap to be addressed by activities in the approved RI/FS Work Plan and should be incorporated into the Report. For example, Section 2.2.7 provides a general reference to the vapor intrusion screening as Section 6.0. This section should reference Appendix F-2, the Vapor Intrusion Evaluation.	Please refer to the responses to Comment 5.iii.1, 5.iii.2, and 5.iii.3 immediately above. In addition, Section 2.2.7 will be revised to reference Appendix F-2.	Response is satisfactory. Please include above discussions in the revised RI.	The above discussions will be included in the Draft RI Report.	Appendix F-2 of the PRI (with updated soil summary tables) will be included in the RI report (As Appendix R). Also, the information in responses to Comment 5.iii.1, 5.iii.2, and 5.iii.3 will be incorporated into the appendix. The vapor intrusion screening and results will be discussed in Section 6.0 of the RI Report.

Contaminant Fate and Transport Comments
Comment No. 5.v
Comment Title: Vapor Intrusion

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
Section 6.3.1.2 (next to last bullet) states that a detailed evaluation of the vapor intrusion pathway will be conducted under the future OU3 HHRA. Vapor intrusion may be occurring from source material in either soil or groundwater. A full Tier I screening level assessment consistent with the FSP should be performed based on potential soil source material. Then a separate full potential groundwater sources. The assessment in Appendix F-2 dismisses the office trailer as a potential receptor building because it is "an elevated structure." While this is true, skirting has been installed creating an enclosed space where vapors can collect, and then migrate into the structure above. The office trailer must be included in this screening assessment. There should be a figure showing the soil sample locations used in the evaluation (similar to the groundwater figure). The evaluation provided in Appendix F-2 is not a Tier I assessment. A complete Tier I assessment consistent with the FSP should be prepared (including Plant B and the office trailer as existing receptor structures and potential future structures).	The responses to comments 5.iii.1, 5.iii.2, and 5.iii.3 immediately above include the components of a Tier I screening level assessment for vadose zone soils. This type of assessment will be incorporated into the OU1 RI report. The USEPA 2002 Vapor Intrusion guidance identifies the following components for a Tier I assessment for soil: 1) determine if chemicals of sufficient volatility and toxicity are present in the subsurface soil, 2) determine if inhabited buildings or areas of concern under future development scenarios are located near the subsurface contaminants previously identified, 3) if a complete vapor intrusion pathway is identified, evaluate the need to mitigate current risks. The office trailer is constructed in such a way that the space between the land surface and the floor of the trailer is not a completely enclosed space, and there appears to be substantial air flow through that space. None the less, there are three soil borings in close proximity to the office trailer (AS-9, BH29, and BH32). Soil sampling of AS-9 was conducted in 2000, prior to the implementation of the air sparge/soil vapor extraction system in that area. The data from the soil sampling represent pre-remedial conditions (the only VOC detected was 2,4,4-trimethyl-1-pentene at 1 mg/kg) and are not useful to evaluating current, post-remedial conditions. The soil sample from BH32 contained virtually no VOCs as shown in Table E-2-7 (only 2,4,4-trimethyl-1-pentene at 13 µg/kg and 2,4,4-trimethyl-2-pentene at 7 µg/kg were detected in the sample collected from 4-6 ft bgs. The soil sample results for BH29 (4-6 ft bgs) indicate that for the VOC analysis, only 2,4,4-trimethyl-1-pentene (87 µg/kg) and 2,4,4-trimethyl-2-pentene (17 µg/kg) were detected. Soil sample locations BH29, BH32, and AS-9 are shown on Figure 5-iii-1-1.	Response is satisfactory. Please include above discussions in the revised RI.		The responses to comments 5.iii.1, 5.iii.2, and 5.iii.3 immediately above include the components of a Tier I screening level assessment for vadose zone soils. This type of assessment will be incorporated into the OU1 RI report. The USEPA 2002 Vapor Intrusion guidance identifies the following components for a Tier I assessment for soil: 1) determine if chemicals of sufficient volatility and toxicity are present in the subsurface soil, 2) determine if inhabited buildings or areas of concern under future development scenarios are located near the subsurface contaminants previously identified, 3) if a complete vapor intrusion pathway is identified, evaluate the need to mitigate current risks. The office trailer is constructed in such a way that the space between the land surface and the floor of the trailer is not a completely enclosed space, and there appears to be substantial air flow through that space. None the less, there are three soil borings in close proximity to the office trailer (AS-9, BH29, and BH32). Soil sampling of AS-9 was conducted in 2000, prior to the implementation of the air sparge/soil vapor extraction system in that area. The data from the soil sampling represent pre-remedial conditions (the only VOC detected was 2,4,4-trimethyl-1-pentene at 1 mg/kg) and are not useful to evaluating current, post-remedial conditions. The soil sample from BH32 contained virtually no VOCs as shown in Table E-2-7 (only 2,4,4-trimethyl-1-pentene at 13 µg/kg and 2,4,4-trimethyl-2-pentene at 7 µg/kg were detected in the sample collected from 4-6 ft bgs. The soil sample results for BH29 (4-6 ft bgs) indicate that for the VOC analysis, only 2,4,4-trimethyl-1-pentene (87 µg/kg) and 2,4,4-trimethyl-2-pentene (17 µg/kg) were detected. Soil sample locations BH29, BH32, and AS-9 are shown on Figure 5-iii-1-1.

Table L-1
Response to Comments Table
Remedial Investigation Report - OU1 and OU2
Olin Chemical Superfund Site
Wilmington, Massachusetts

Human Health and Ecological Risk Assessment Comments
Comment No. 1
Comment Title: HHRA/ERA - Interim Deliverables

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
The Administrative Order of Consent (AOC) and the August 2009 RI Work Plan specified that the components of the Human Health Risk Assessment (HHRA) and Ecological Risk Assessment (ERA) would be submitted in a series of interim deliverables to allow for EPA comments at several stages in the risk assessment process. However, the Report HHRA and ERA are considered premature. Therefore, review of Sections 6.0 and 7.0 of the Preliminary OU1 RI Report was limited to a review of the first steps of the HHRA and ERA, consistent with what would have been expected in the first Interim deliverable as specified in the AOC and the August 2009 RI Work Plan.	Comment noted. The submittal was Preliminary RI Report (not a formal submittal per SOW and AOC requirements).	EPA assumes "comment noted" indicates Olin's agreement to the request.	"Comment noted" in this case indicates that the comment did not pose a question to which a reply was necessary. It neither infers agreement or lack of agreement with the comment.	No response required. The First Interim Deliverables for the Human Health Risk Assessment and the ecological Risk Assessment are submitted as separate documents with the Draft RI Report.

Human Health and Ecological Risk Assessment Comments
Comment No. 2
Comment Title: Data Completeness

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
Because questions remain in the characterization of nature and extent as well as fate and transport evaluations, the completeness of the soil datasets for use in risk assessment is uncertain. Until questions of data completeness are resolved, the HHRA is premature. EPA concurrence on Section 3.0 (Nature and Extent of Contaminants) and Section 4.0 (Fate and Transport/Nature and Extent of Contaminants) must be reached before determining the risk assessment.	Comment noted.	EPA assumes "comment noted" indicates Olin's agreement to the request.	The First Interim Deliverable for the risk assessments will be submitted to EPA simultaneously with Sections 1 through 5 of the Draft RI Report.	The First Interim Deliverables for the Human Health Risk Assessment and the ecological Risk Assessment are submitted as separate documents with the Draft RI Report. Those interim Deliverables identify the data proposed for use in the risk assessments.

Human Health and Ecological Risk Assessment Comments
Comment No. 3
Comment Title: RAGS D Format

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
EPA Risk Assessment Guidance for Superfund: Volume I – Human Health Evaluation Manual (RAGS/HHEM) Part D (RAGS D, 2001) sets forth precise table formats for use in EPA Superfund risk assessments. The tables used in the Preliminary Draft RI HHRA do not precisely follow the RAGS D format. This is allowable as long as they present the same information. RAGS D Tables 1, 2, 3, 4, 5, 6, 7, and 9 or equivalents were included. No Table 10s or equivalents of Table 10s were included. Please include these in subsequent HHRA submissions.	Comment noted.	EPA assumes "comment noted" indicates Olin's agreement to the request.	The requested table 10s will be included in the Draft BHHRA.	The need for Table 10s will be determined during risk calculations. If determined necessary, they will be included in the Interim Deliverable and the Draft Baseline Human Health Risk Assessment

Table L-1
Response to Comments Table
Remedial Investigation Report - OU1 and OU2
Olin Chemical Superfund Site
Wilmington, Massachusetts

Human Health and Ecological Risk Assessment Comments
Comment No. 4
Comment Title: Background Concentrations

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
The document uses maximum concentrations to represent site-specific background values for soil, sediment, and surface water. Comparison to site-specific background concentrations is important to set the stage for determining impacts from prior Site operations relative to existing conditions. Background concentrations are used for discussion purposes only in the RI and are not for eliminating contaminants from the evaluations. The maximum concentration of background samples is not the most representative and appropriate choice. To aid in risk management decisions, the background dataset should be subjected to an outlier analysis. Following removal of outliers, statistical comparisons of the Site data to the background dataset should be performed. Box plots may be useful in providing a visual comparison of Site data to background data. A mutually agreed upon representative background concentration useful in defining Site clean-up goals can then be determined.	Comments noted. We agree in general with suggested path forward for the evaluation and characterization of background conditions in the formal risk assessment submittal.	Olin's response is satisfactory.		Appendix I contains the Site Specific Background Soil Memorandum. The USEPA agreed with the selection of the site-specific soil background data set in a meeting on February 5, 2013. The identification of Site-specific background concentrations did include an outlier analysis. Published background values are not referenced in the Draft RI Report (tables, text, or figures).

Human Health and Ecological Risk Assessment Comments
Comment No. 5
Comment Title: Background Data

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
Some parts of the OU1 RI Report make use of published background data. For example, Figures 4.1-8 through 4.1-10 cite the MassDEP published background value (Background Levels of Polycyclic Aromatic Hydrocarbons and Metals in Soil; May 2002) of 30 mg/Kg for comparison to Site hexavalent chromium data. This value is based solely on total chromium data as determined in reviewing MassDEP's supporting appendix of the document. Therefore, the value is inappropriate to use in characterizing hexavalent chromium concentrations as greater than or less than background at the Site, among other concerns regarding the applicability of these published values at the property. EPA does not accept this value as a valid background concentration for hexavalent chromium at the Site. It should be noted that the background levels published by Massachusetts generally correspond to the 90th percentiles of data distributions. EPA generally will not consider comparisons to published background concentrations when Site-specific background data exists.	Comments noted and concur with utilization of Site-specific background characterization in the formal submittals.	Olin's response is satisfactory.		Appendix I contains the Site Specific Background Soil Memorandum. The USEPA agreed with the selection of the site-specific soil background data set in a meeting on February 5, 2013. Published background values are not referenced in the Draft RI Report (tables, text, or figures).

Table L-1
Response to Comments Table
Remedial Investigation Report - OU1 and OU2
Olin Chemical Superfund Site
Wilmington, Massachusetts

Human Health and Ecological Risk Assessment Comments
Comment No. 6.a
Comment Title: Historical Data Use

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
Please provide further detail on how the historical data and historical studies are being utilized and interpreted within the Report. Furthermore, the following concerns need to be specifically addressed and revised accordingly: a. Historical 0-3 ft deep soils were utilized as surface soil within the risk evaluations. EPA considers surface soil to be limited to 0-1 ft and requested Olin to utilize prior 0-3 ft results as sub-surface soil only	Comment is not accurate. Surface soil samples were identified as follows: RI samples collected from 0-1 ft bgs or historical soil samples with top depth of zero (land surface) and bottom depth less than 3 feet. Using these criteria, all historical soil samples collected from 0-3 ft bgs were classified as shallow subsurface soil samples (also referred to as samples collected from within the 1-10 ft bgs interval). This approach is consistent with discussions with USEPA.	0-3 ft samples will be utilized as subsurface samples only.	No response is required.	Surface soil samples were identified as follows: RI samples collected from 0-1 ft bgs or historical soil samples with top depth of zero (land surface) and bottom depth less than 3 feet. Using these criteria, all historical soil samples collected from 0-3 ft bgs were classified as shallow subsurface soil samples (also referred to as samples collected from within the 1-10 ft bgs interval). This approach is consistent with discussions with USEPA.

Human Health and Ecological Risk Assessment Comments
Comment No. 6.b
Comment Title: Historical Data Use

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
EPA previously indicated that historic sediment data (greater than 10 years Old) shall not be utilized because it is not representative of current conditions.	To be discussed. In static environments, in general, historical data collected using appropriate sampling techniques and laboratory analytical methods is useful, and in most instances may overestimate current contaminants and associated concentrations (volatile losses, degradation, etc.).	While sediment data greater than 10 years old may be useful to present concentration trends it is not appropriate for assessing current risk. Most surface water bodies of concern like South Ditch experience periodic heavy rain events the move sediments within the system and those water bodies that are “more static” are potentially impacted by sedimentation processes that reduce the usefulness of older sediment data for assessing current risks. As presented in EPA’s Disapproval and Notice of Deficiencies letter from Jim DiLorenzo (EPA) to Steve Morrow (Olin), dated 12 March 2009, EPA is willing to entertain the use of older surface water and sediment data in the risk assessments if Olin can demonstrate a “reasonable” correlation between historic and current data. If this analysis has been done, please provide or reference it for EPA’s evaluation.	The First Interim Deliverable of the risk assessments will provide the comparison of historical and more recent sediment data used in the risk assessment. Only recent surface water data will be used in the risk assessment.	As discussed in the two risk assessment Interim Deliverables, historic sediment data (greater than 10 years old) will not be used to characterize site conditions. USEPA did agree in the February 5, 2013 meeting that the large sediment data set from 2000 would be used for the on-Property West Ditch Wetland.

Human Health and Ecological Risk Assessment Comments
Comment No. 7.a
Comment Title: Hexavalent Chromium Data Gaps

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
There is significant concern that data gaps persist-particularly with respect to hexavalent chromium-that need to be addressed prior to moving forward with the risk assessments. Please address accordingly, including, but not limited to:a. Hexavalent chromium is detected in many of the soil and sediment samples for which it was analyzed in the 2009 and 2010 sampling rounds (for example, in 5 of8 South Ditch samples, Table E-2-9). A relatively limited sampling event was allowed in the FSP based on the expectation that hexavalent chromium would not be detected. The RI field data suggest that hexavalent chromium is present as a percentage of total chromium in a majority of the limited soil samples collected. Historical sampling results that analyzed for total chromium should assume the presence of hexavalent chromium at some conservative, representative percentage based on the newly available data or alternatively, a subsequent field effort should be proposed	There is no apparent correlation between total chromium concentrations and hexavalent chromium concentrations when considering the entire set of RI samples analyzed for hexavalent chromium. There was no expectation that hexavalent chromium would not be detected since historical data for the site detected hexavalent chromium. Additional sampling and analysis will be conducted for soils in the off-property floodplain of the Lower South Ditch.	Olin claims no correlation total to hexavalent chromium. However, there may be insufficient numbers of hexavalent chromium samples to confirm or deny correlations. More sampling planned in floodplain only. See Report Nos. 48/49 (Nature and Extent Comments 16 a-xviii, 16b-I, and 16b-ii). Please parse out aerobic vs. anaerobic soils to see if there is a correlation in one or the other. Also please divide chromium data by area and by concentration to determine if there is a correlation in certain areas of the site and/or when total chromium results are particularly high or low. Run regression analysis to show relationships or not.	The proposed soil sampling and analysis program for hexavalent chromium is presented in the work plan addendum submitted to EPA on November 16th 2012 to EPA for review and approval. The extensive program was designed to bound previous detections above the Industrial RSL, to provide sampling at locations known to have high total chromium concentrations, and to provide spatial coverage for nature and extent delineation and for risk assessment activities.	Further sampling was conducted as proposed in the Supplemental Work Plan submitted to USEPA on November 16th, 2012 and March 19, 2013 (revised). Figures 4.1-8 to 4.1-10 of the RI Report show the distribution of hexavalent chromium concentrations in soils. The results of the sampling and analysis are discussed in Section 4.1.2. Figure 4.1-31 shows the distribution of hexavalent chromium in surface water. Figure 4.1-39 shows the distribution of hexavalent chromium in sediment.

Table L-1
Response to Comments Table
Remedial Investigation Report - OU1 and OU2
Olin Chemical Superfund Site
Wilmington, Massachusetts

Human Health and Ecological Risk Assessment Comments **Comment No. 7.b** **Comment Title: Hexavalent Chromium Data Gaps**				
EPA Comment	**Olin Response to EPA**	**Nobis Response to Olin**	**Olin Response to Nobis**	**Resolution**
Hexavalent chromium needs to be included as an explicit parameter in analyses of surface water. Hexavalent chromium is generally more soluble than trivalent chromium under typical conditions in surface water. Absent alternative information, it is reasonable to assume that the dissolved chromium concentrations reported in Table E-2-8 reflect the hexavalent species. It should be noted that the reported concentrations in many of those samples exceed the U.S. EPA's ambient water quality criteria for hexavalent chromium.	Hexavalent chromium has been analyzed historically down the length of the East Ditch and was not detected.	Surface water in South Ditch needs to be sampled for hexavalent chromium. Given the high frequency of total chromium detections in South Ditch surface water samples and existing environmental conditions present in South Ditch, it is reasonable to assume that hexavalent chromium may be present. Given its relative toxicity when compared to other forms of chromium it may be impacting South Ditch. While historical lack of hexavalent chromium in East Ditch surface waters is reassuring, its absence there does not preclude its presence and associated impacts in South Ditch.	The proposed South Ditch surface water and sediment sampling and analysis program for hexavalent chromium (SD-501 and SD-502) is presented in the work plan addendum submitted to EPA on November 16th 2012 to EPA for review and approval.	Further sampling was conducted as proposed in the Supplemental Work Plan submitted to USEPA on November 16th, 2012 and March 19, 2013 (revised). Figures 4.1-8 to 4.1-10 of the RI Report show the distribution of hexavalent chromium concentrations in soils. The results of the sampling and analysis are discussed in Section 4.1.2. Figure 4.1-31 shows the distribution of hexavalent chromium in surface water. Figure 4.1-39 shows the distribution of hexavalent chromium in sediment.
Human Health and Ecological Risk Assessment Comments **Comment No. 8.a** **Comment Title: Exposure Areas Too Broad**				
EPA Comment	**Olin Response to EPA**	**Nobis Response to Olin**	**Olin Response to Nobis**	**Resolution**
The four (4) exposure areas are too broad. Items that need to be addressed include, but are not limited to: a. Exposure Area 1 includes a large and potentially diverse contaminated area that may need further subdividing. Either further subdivide this area or provide further justification to support treatment of this area as a single exposure area	Further justification for a single exposure area will be provided prior to finalizing the risk assessment scope.	EPA will await justification.	A response is not required at this time.	The First Interim Deliverable for the Human Health Risk Assessment discusses this issue and will be discussed with USEPA.
Human Health and Ecological Risk Assessment Comments **Comment No. 8.b** **Comment Title: Exposure Areas Too Broad**				
EPA Comment	**Olin Response to EPA**	**Nobis Response to Olin**	**Olin Response to Nobis**	**Resolution**
Exposure Areas 2 and 4 only assess risks to trespassers. This is appropriate for the portions of Exposure Area 4 included within the conservation restriction. However, Exposure Area 2 and portions of Exposure Area 4 north of south ditch should also consider industrial workers and construction worker exposure scenarios	Restrictions on commercial/industrial use and construction activities with respect to wetlands and wetland buffer areas and the Rivers Act indicate those future uses are not foreseeable.	Wetlands do not prevent industrial use and construction. Evaluate these areas for future industrial use and construction workers.	Local regulations and the Wetlands Protection Act indicate that industrial use of wetland areas is not a foreseeable use of those areas. This issue will be further discussed in the risk assessment Interim Deliverables.	The First Interim Deliverable for the Human Health Risk Assessment discusses this issue and will be discussed with USEPA.

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Human Health and Ecological Risk Assessment Comments **Comment No. 8.c** **Comment Title: Exposure Areas Too Broad**				
EPA Comment	**Olin Response to EPA**	**Nobis Response to Olin**	**Olin Response to Nobis**	**Resolution**
The exposure areas do not include the CSL and containment area. With respect to the containment area, EPA is not aware of any established institutional controls to prevent exposure for perpetuity. EPA has agreed to eliminate evaluation of exposures to soils at the CSL because of the clean cap closure under the MCP, unless groundwater data suggests an ongoing source from the CSL capped area may exist. EPA has not agreed to exclude evaluation of the temporarily capped DAPL area. Evaluation of exposure to soil under the temporary cap should be incorporated into the risk assessment as a separate or combined Exposure Area accordingly	Commitment to prevent exposure via land use controls should be considered and discussed with USEPA during finalization of risk assessment scope.	Commitment for AUL does not suffice. The AUL must be in place to exclude areas from evaluation.	As discussed in the meeting of November 7, 2012, with the filing of the Deed Restriction for the property, there are no foreseeable future human exposures to soils beneath the cap. As requested by EPA, under separate cover, all of the data for soils not previously excavated from within the footprint of the temporary cap have been compiled and submitted to EPA under separate cover. No additional sampling/analysis is proposed for the temporary cap area. The soils beneath the temporary cap will not be included in the BHHRA. As discussed previously in Olin Response to Nobis Reply 16.a.x, existing soil data are appropriate and adequate to evaluate risk associated with exposure to soil under the cap, if such an evaluation was deemed necessary. Additional soil data collection is not necessary for the purpose of concluding either an RI or an FS that considers soil under the cap within the Containment Area.	The First Interim Deliverable for the Human Health Risk Assessment discusses this issue and will be discussed with USEPA. The First Interim Deliverable for the Human Health Risk Assessment proposes to evaluate surface soil exposures for future trespassers and outdoor indiustrial/commercial workers. The Deed restriction for the Property does not allow activities that could result in human exposure to subsurface soils in that area.

Human Health and Ecological Risk Assessment Comments **Comment No. 8.d** **Comment Title: Exposure Areas Too Broad**				
EPA Comment	**Olin Response to EPA**	**Nobis Response to Olin**	**Olin Response to Nobis**	**Resolution**
The manufacturing area (Exposure Area 1) and Plant B area (Exposure Area 3) evaluations of exposures to industrial workers were limited to surface soils only and should be extended to 10 ft bgs.	To be discussed with USEPA during finalization of the risk assessment scope.	EPA will require evaluation of future industrial use and construction workers exposures to 0-10 ft soils in these areas.	The risk assessment Interim Deliverables will address this topic.	The First Interim Deliverable for the Human Health Risk Assessment discusses this issue and will be discussed with USEPA.

Human Health and Ecological Risk Assessment Comments **Comment No. 9** **Comment Title: Residential Screening Levels**				
EPA Comment	**Olin Response to EPA**	**Nobis Response to Olin**	**Olin Response to Nobis**	**Resolution**
COPC selection used industrial/commercial soil RSLs (2010) adjusted to HQ=0.1 for screening soils and sediments to evaluate chemicals for inclusion in the risk assessment. Residential RSLs (adjusted to HQ=0.1) should be used as conservative (protective) screening criteria. Though the Olin property is clearly an industrial site and EPA concurs with the development of industrial exposure scenarios in the HHRA, EPA Risk Assessment Guidance for Superfund (December 1989) requires screening data against residential screening levels. Residential screening levels should be used when determining which chemicals to include in the risk assessment calculations.	Comment noted.	EPA assumes "comment noted" indicates Olin's agreement to the request.	During the October 11th 2012 meeting with EPA, this request was further discussed. In light of the deed restrictions that have been put on the property, EPA concurred that industrial screening levels were appropriate for evaluating the site (in area OU-1) and that existing RI figures, as presented, negated the need for additional requested tables. Furthermore, the evaluation presented in the April 3rd, 2012 response to comments will be included in the Draft RI report and this will sufficiently address leaching concerns such that a point by point comparison to SSLs will not be necessary. In addition, Olin has provided EPA with an evaluation of the impact on potential contaminants of concern selection of using industrial RSLs rather than residential RSLs in the baseline human health risk assessment. This evaluation concluded that use of industrial RSLs for COPC selection is appropriate and adequately protective of health.	During the October 11th, 2012 meeting with EPA it was agreed that Industrial RSLs are appropriate for the site and that overall data quality based on a combination of reporting and method detection limits meets the work plan objectives. Overall, reporting limits or method detection limits meet the identified Project Action Levels. Many of the comments concerning detection limits were focused on Residential RSLs (no longer a concern).

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Human Health and Ecological Risk Assessment Comments **Comment No. 10** **Comment Title: Chemical Low Frequency Elimination**				
EPA Comment	**Olin Response to EPA**	**Nobis Response to Olin**	**Olin Response to Nobis**	**Resolution**
Chemicals with a low frequency of detection across the entire Site are eliminated from the COPC selection with respect to soil screening. Therefore, chemicals with localized high frequency may be eliminated from the risk assessment scenario because of low overall Site frequency when compared to the entire Site, rather than either the proposed exposure areas or potentially smaller exposure areas. For example, benzo(a)anthracene was eliminated as a COPC in 1-10 ft soil because of low frequency of detection (12/267); however, if these 12 samples are all located within a single small area (for example, all within the Plant B area) they may represent a localized area of contamination.The following chemicals were eliminated as COPCs from surface soil based on low frequency of detection:a. Tetrahydrofuran b. 3-nitroanilinec. Di-n-octylphthalated. N-nitrosodi-n-propylamine e. Delta-BHCThe following chemicals were eliminated as COPCs from 1-10 ft soil based on low frequency of detection:a. 4-isopropyltoluene b. Sec-butylbenzene c. Tetrahydrofurand. 4-chlorophenyl phenyl ether e. benzo(a)anthracenef. benzo(a)pyreneg. benzo(b)fluoranthene h. benzo(k)fluoranthene i. carbazolej. indeno(1,2,3-cd)pyrene k. thalliumIt is also noted that some non-detects of these chemicals eliminated based on low frequency of detection have detection limits above the screening levels and may therefore represent levels of some concern. For example, the detection limits for N-nitroso-di-n-propylamine in surface soil ranged from 0.033 to 36 whereas the industrial RSL used for screening COPCs was 0.25 mg/kg. In addition, Olin has eliminated non-detect data for several PAHs from the risk assessments because of high detection limits (more than 10x the industrial RSLs). While EPA supports the elimination of that data as unusable, it raises the concern that those samples may have had relatively high concentrations. It is particularly concerning when a chemical is eliminated as a COPC based on low frequency of detection when the required detection limits have not achieved the screening levels. Discussion and figures indicating locations of sample data removed because of high detection limits and figures indicating where sample data remains are needed.Please revise accordingly such that chemicals with elevated detection limits or chemicals with localized areas of contamination are not eliminated based on low frequency of detection from the risk assessments. Please clarify text regarding use of frequency of detection to eliminate COPCs.	For surface soil, although 6 parameters were listed in the COPC selection table as being eliminated from the COPC list based on FOD, those parameters were included in the risk calculation spreadsheets in Appendix I and Appendix J and risks were calculated for them as long as toxicity information was available. All six parameters do not appear in every risk calculation spreadsheet – they appear in the spreadsheets for the exposure areas where each of the parameters was detected at least once. Therefore, the application of the FOD criteria in the COPC selection process did not affect the risk calculations in any way. This conservative measure was taken in response to USEPA concerns about the application of FOD as a selection criteria (given potential for clustering of detects in one area and potential for elevated reporting limits affecting FOD.For shallow subsurface soil (soils collected from 1-10 ft bgs), although 11 parameters were listed in the COPC selection table as being eliminated from the COPC list based on FOD, those parameters were included in the risk calculation spreadsheets in Appendix I and Appendix J and risks were calculated for them as long as toxicity information was available. Therefore, the application of the FOD criteria in the COPC selection process did not affect the risk calculations in any way. This conservative measure was taken in response to USEPA concerns about the application of FOD as a selection criteria (given potential for clustering of detects in one area and potential for elevated reporting limits affecting FOD.	Response indicates that Olin did not actually remove the chemicals based on FOD from risk calculations. Please remove the FOD rationale for excluding COPCs from the COPC selection screening tables.	The tables will be revised as requested in the Interim Deliverable.	The First Interim Deliverable for the Human Health Risk Assessment discusses this issue and will be discussed with USEPA. As clarification, FOD was not used to eliminate chemicals form the list of COPCs.

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Human Health and Ecological Risk Assessment Comments **Comment No. 11** **Comment Title: Soil/Surface Water COPC Table Revision**				
EPA Comment	**Olin Response to EPA**	**Nobis Response to Olin**	**Olin Response to Nobis**	**Resolution**
COPC selection was carried out for surface soil as a single dataset and for subsurface soil as a single data set in Tables 6.2-1 and 6.2-2. Similarly surface water COPC selection was carried out as a single dataset (Table 6.2-3). Sediment COPC selection was carried out on two separate tables dividing South Ditch data (Table 6.2-4) from the on-property West Ditch (Table 6.2-5). EPA Risk Assessment Guidance for Superfund: Volume 1 – Human Health Evaluation Manual (RAGS/HHEM) Part D (RAGS D, 2001) requires a Table 2 (COPC selection table) for each combination of Scenario Timeframe, Medium, and Exposure Medium. Since the first column of the standard RAGS D format tables identifies exposure point, it is appropriate to divide COPC selection by exposure areas. The COPC selection tables used in the Report do not precisely follow the RAGS D format. As noted above, this is allowable as long as they present the same information. Exposure points and the summary of data corresponding to each should be presented separately. This can be done on a single table with separate groups of rows for each exposure point, or as separate tables for each exposure point as was done for the sediment datasets. Please revise the soil and surface water COPC selection tables accordingly. This may aid in addressing the previous comment.	As described in the response to the previous comment, the frequency of detection criterion was ignored and substances with FOD less than 5% were retained as COPC unless maximum concentrations were less than the screening value. When the FOD criterion is not used to eliminate chemicals from the risk calculations, site-wide maximum concentrations become the point of comparison for the RSLs. Therefore, there is no need to select COPCs for each area.	Separate COPC selection tables will not be required for each exposure area if FOD is removed from the possible rationales for excluding COPCs.	No response is required.	The First Interim Deliverable for the Human Health Risk Assessment discusses this issue and will be discussed with USEPA.

Human Health and Ecological Risk Assessment Comments **Comment No. 12** **Comment Title: RME/CTE Scenarios**				
EPA Comment	**Olin Response to EPA**	**Nobis Response to Olin**	**Olin Response to Nobis**	**Resolution**
The HHRA included evaluation of only reasonable maximum exposure (RME) scenarios – no central tendency exposure (CTE) scenarios were evaluated. Both scenarios should be evaluated to provide a range of risks for risk management consideration.	To be discussed with USEPA in finalizing the scope of the risk assessment.	EPA is awaiting further discussion.	The discussion will be provided in the First Interim Deliverable.	The First Interim Deliverable for the Human Health Risk Assessment discusses this issue and will be discussed with USEPA.

Human Health and Ecological Risk Assessment Comments **Comment No. 13** **Comment Title: RME Exposure Assumptions**				
EPA Comment	**Olin Response to EPA**	**Nobis Response to Olin**	**Olin Response to Nobis**	**Resolution**
The majority of the RME exposure assumptions were reasonable. However, frequency of trespasser exposures is low - trespassers are assumed present only 12 days per year. For this scenario, EPA uses 78 days per year, corresponding to 2 days per week for 9 months per year.	Current Site security (fencing, locked gates, difficult access from the south and east) is inconsistent with such a high frequency of exposure. Frequency of trespasser access should be low for a future active industrial/commercial use.	Temporary security and fencing cannot be used to limit exposure frequency. Use the recommended exposure frequency.	The trespasser scenario exposure parameters will be identified in the Interim Deliverable.	The First Interim Deliverable for the Human Health Risk Assessment discusses this issue and will be discussed with USEPA. The suggested frequency has been incorporated into the First Interim Deliverable.

Human Health and Ecological Risk Assessment Comments **Comment No. 14** **Comment Title: Exposure Point Concentrations**				
EPA Comment	**Olin Response to EPA**	**Nobis Response to Olin**	**Olin Response to Nobis**	**Resolution**
The assumptions that were made with respect to the exposure point concentrations need to be further clarified. For example, please provide information with respect to how non- detects (ND's) are handled in the calculation of the 95% upper confidence levels (UCLs).	Clarification will be provided with respect to the calculations conducted by the Pro-UCL software.	EPA is awaiting clarification.	Clarification will be provided in the Interim Deliverable.	The First Interim Deliverable for the Human Health Risk Assessment discusses this issue and will be discussed with USEPA.

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Human Health and Ecological Risk Assessment Comments
Comment No. 15
Comment Title: Additional Nitrosamines

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
There are several other nitrosamines, in addition to NDMA, N-nitroso-di-n-propylamine (NDPA), and N-nitrosodiphenylamine, which have published toxicity values, have available analytical methods, and may be present at the Site. Specifically, EPA Method 521 can be utilized to test for five (5) additional nitrosamines, in addition to NDMA and NDPA (Olin is currently utilizing a "modified 521" method). • N-nitrosodiethylamine (NDEA) • N-nitrosodi-n-butylamine (NDBA) • N-nitrosomethylethylamine (NMEA) • N-nitrosopiperidine (NPIP) • N-nitrosopyrrolidine (NPYR) These seven (7) nitrosamines are on EPA's 2006 UCMR (Unregulated Contaminants for which Monitoring is Required) list 2 (screening survey list). Olin is also currently testing for some of the likely NDMA precursors, such as dimethylamine, unsymmetrical dimethylhydrazine (UDMH), and mono-methylhydrazine. Further analysis for the additional nitrosamines would determine if any of the other nitrosamines are present and would help develop the conceptual site model for the formation of NDMA. Limited sampling and analysis at locations of high nitrosamine levels may aid in establishing ratios of nitrosamines, which could be applied across the Site to develop estimated risks for the nitrosamines not analyzed for more extensively. In the absence of further analysis, the possible presence of these nitrosamines must be considered in the uncertainty discussions. Possible application of ratios found at similar sites may be useful.	Sampling and analysis has been conducted (GW-10S and GW-10D) to determine if these compounds are present in groundwater areas where NDMA has been detected in order to determine if this analysis would be necessary elsewhere (particularly in private well testing program). Laboratory results are pending. A decision concerning the need for additional sampling and analysis will depend on the results of this initial sampling and analysis.	See response to Report No. 20 (USEPA Comment 3G).	EPA has been provided with the results of the nitrosamine analysis in June, 2012. The possible presence of these nitrosamines will be considered in the uncertainty discussions.	The expanded groundwater analysis for nitrosamines were provided to USEPA in June 2012. No additional analysis was conducted subsequent to that submittal.

Human Health and Ecological Risk Assessment Comments
Comment No. 16
Comment Title: Phthalates Detection

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
Phthalates, most notably bis(2-ethylhexyl)phthalate, have been detected in soils throughout the Site. There are several other phthalates, which have available analytical methods, and may be present at the Site. EPA Method 8061A can be employed for this sampling, which would provide a broader analytical test for phthalates than the currently utilized 8070 Method; and would test for:• bis(2-n-Butoxyethyl)phthalate• Butyl benzyl phthalate• Diamyl phthalate• Di-n-butyl phthalate• Dicyclohexyl phthalate• Diethyl phthalate• Dihexyl phthalate• Disobutyl phthalate• Dimethyl phthalateo Dinonyl phthalateo Di-n-octyl phthalateo bis(2-Ethoxyethyl)phthalateo bis(2-Ethylhexyl)phthalateo bis(2-Methoxyethyl)phthalateo bis(4-Methyl-2-pentyl)phthalateNote that the six phthalates that are bolded above are currently being analyzed for (as they are part of the 8070 Method). If the additional phthalates are present, it may mean that risks are collectively higher. Limited sampling and analysis for the additional phthalates at locations of highest phthalate concentrations may aid in establishing ratios of phthalates, which could be applied across the Site to develop estimated risks for the phthalates not analyzed for more extensively. It is noted that there are currently no widely accepted toxicity values for these additional phthalates. If detections are found, EPA can seek toxicity values or the use of surrogate toxicity values may be possible. In the absence of further analysis, the possible presence of these phthalates must be considered in the uncertainty discussions.	If there are no widely accepted toxicity values, analysis should not be conducted. The collection of data in the absence of accepted toxicity information is not an efficient use of available funds.	See response to Report No. 20 (USEPA Comment 3G).	It was agreed during discussions on October 12th, 2012 meeting with EPA that Olin would not conduct sampling/analysis for the additional phthalates at this time.	EPA agreed during discussions on October 1, 2012 that Olin would not be required to conduct sampling/analysis for the additional phthalates at this time.

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Human Health and Ecological Risk Assessment Comments **Comment No. 17** **Comment Title: General Discussion of ERA Process**				
EPA Comment	**Olin Response to EPA**	**Nobis Response to Olin**	**Olin Response to Nobis**	**Resolution**
There should be a general discussion of EPA's ecological risk assessment process and how it is iterative in nature, such that risk assessors and managers are able to look for data gaps that can be filled to strengthen the risk characterization by reducing uncertainty.	Discussion will be added to the RI Report.	Olin's response is acceptable. EPA is awaiting ERA.		The First Interim Deliverable for the Ecological Risk Assessment discusses this issue and will be discussed with USEPA.
Human Health and Ecological Risk Assessment Comments **Comment No. 18** **Comment Title: Assessment Endpoints**				
EPA Comment	**Olin Response to EPA**	**Nobis Response to Olin**	**Olin Response to Nobis**	**Resolution**
Tere is a general lack of clarity of the assessment endpoints. Assessment endpoints to be utilized in the risk assessments need to be better defined and should include, but are not limited to: a. Each receptor and associated attribute(s) being assessed needs to be spelled out pursuant to EPA guidelines; b. The weight given to each measurement endpoint needs to be supported with more information regarding the weight-of-evidence approach utilized - transparency is essential; and c. It is unclear how measurement endpoints 3A and 4A apply to the assessment endpoint listed; please Clarify.	Additional discussion will be provided in the RI Report.	Olin's response is acceptable. EPA is awaiting ERA.		The First Interim Deliverable for the Ecological Risk Assessment discusses this issue and will be discussed with USEPA.
Human Health and Ecological Risk Assessment Comments **Comment No. 19** **Comment Title: Bethic Organisms**				
EPA Comment	**Olin Response to EPA**	**Nobis Response to Olin**	**Olin Response to Nobis**	**Resolution**
Reproductive and survival effects to benthic organisms were identified with respect to the 42-day sediment toxicity test conducted at the Site, however no growth effects were observed. Please discuss these findings in greater detail. Comments on the 42-day sediment toxicity test are presented below.	Additional discussion will be added to the RI Report.	Olin's response is acceptable. EPA is awaiting ERA.		The Second Interim Deliverable for the Ecological Risk Assessment will discuss this issue and will be discussed with USEPA.
Human Health and Ecological Risk Assessment Comments **Comment No. 20** **Comment Title: Clarification of Semi-Aquatic**				
EPA Comment	**Olin Response to EPA**	**Nobis Response to Olin**	**Olin Response to Nobis**	**Resolution**
The term "semi-aquatic" is used within the Report; however, it is not defined. This term gets confusing when referring to a shallow pond as "semi-aquatic." Please address accordingly.	The term "semi-aquatic" refers to receptors such as raccoons that are primarily terrestrial, but spend time at or in aquatic environments and may consume prey captured from aquatic environments.	Explanation needs to be incorporated into the text. EPA is awaiting ERA.	The explanation will be included in the ERA.	The First Interim Deliverable for the Ecological Risk Assessment discusses this issue and will be discussed with USEPA.

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Appendix L - General Comments **Comment No. 1** **Comment Title: Text Tables**				
EPA Comment	**Olin Response to EPA**	**Nobis Response to Olin**	**Olin Response to Nobis**	**Resolution**
All text tables presenting the results of statistical tests should include the statistical test used and the resulting p-value.	Comment noted.	EPA assumes "comment noted" indicates Olin's agreement to the request. EPA is awaiting ERA.	Requested information will be included in the ERA.	The Second Interim Deliverable for the Ecological Risk Assessment will discuss this issue and will be discussed with USEPA.
Appendix L - General Comments **Comment No. 2** **Comment Title: Review of Statistical Results**				
EPA Comment	**Olin Response to EPA**	**Nobis Response to Olin**	**Olin Response to Nobis**	**Resolution**
The review of statistical results presented in the text would be easier to verify if a reference to the associated CETIS® tables were provided.	The appropriate reference will be provided.	Olin's response is acceptable. EPA is awaiting ERA.		The Second Interim Deliverable for the Ecological Risk Assessment will discuss this issue and will be discussed with USEPA.
Appendix L - Specific Comments **Comment No. 1** **Comment Title: Section 2.5 Statistical Analysis**				
EPA Comment	**Olin Response to EPA**	**Nobis Response to Olin**	**Olin Response to Nobis**	**Resolution**
Section 2.5 Statistical Analysis – The text suggests "appropriate parametric or non- parametric Analysis of Variance (ANOVA)" were used to determine significant differences between the test sediment and both the reference site and laboratory control sediment results. Specific decision criteria for selecting the appropriate statistical analysis should be presented.	Information will be presented.	Olin's response is acceptable. EPA is awaiting ERA.		The Second Interim Deliverable for the Ecological Risk Assessment will discuss this issue and will be discussed with USEPA.
Appendix L - Specific Comments **Comment No. 2** **Comment Title: Section 2.5 Statistical Analysis**				
EPA Comment	**Olin Response to EPA**	**Nobis Response to Olin**	**Olin Response to Nobis**	**Resolution**
Section 2.5 Statistical Analysis – While selecting α=0.05 for significance testing is standard, the p-value for all statistical tests should be presented in the text of Appendix L (see General Comment 1).	Comment noted. The requested information will be provided.	Olin's response is acceptable. EPA is awaiting ERA.		The Second Interim Deliverable for the Ecological Risk Assessment will discuss this issue and will be discussed with USEPA.
Appendix L - Specific Comments **Comment No. 3** **Comment Title: Table 1 - Site Samples**				
EPA Comment	**Olin Response to EPA**	**Nobis Response to Olin**	**Olin Response to Nobis**	**Resolution**
Table 1 – EPA needs to confirm that the site samples used OC-SD-SDBK-002-XXX and OC-SD-MMB-SW/SD-1-XXX for reference, and OC-SD-ISCO.2-XXX for the site were the locations agreed upon for this test. Based on Figures provided in other sections of the RI, both reference locations may be influenced by Site contamination. (Note: sediment chemistry for these samples was not provided in Appendix L.)	The collected samples were consistent with the approved Work Plan.	Olin's response is acceptable; locations are consistent with information provided to EPA in a letter from Janet Keating-Connally (MACTEC) to Jim DiLorenzo (EPA) dated 15 February, 2011. EPA is awaiting ERA.		The Second Interim Deliverable for the Ecological Risk Assessment will discuss this issue and will be discussed with USEPA.

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Appendix L - Specific Comments **Comment No. 4** **Comment Title: Table 5 - 42-day Growth and Survival Information**				
EPA Comment	**Olin Response to EPA**	**Nobis Response to Olin**	**Olin Response to Nobis**	**Resolution**
Table 5 – The 42-day growth and survival information is not included in this table; it is unclear why this information was omitted.	This information will be provided in the revised RI Report.	Olin's response is acceptable. EPA is awaiting ERA.		The Second Interim Deliverable for the Ecological Risk Assessment will discuss this issue and will be discussed with USEPA.
Appendix L - Specific Comments **Comment No. 5** **Comment Title: Table 5 - 28-day Growth results**				
EPA Comment	**Olin Response to EPA**	**Nobis Response to Olin**	**Olin Response to Nobis**	**Resolution**
Table 5 – More information explaining the difference in the two 28-day growth results presented (footnotes A and B) should be provided. This comment also applies to the results presented in Tables 10 and 11 (28-day) and Tables 12 and 13 (42-day).	This additional discussion will be provided in the revised RI Report.	Olin's response is acceptable. EPA is awaiting ERA.		The Second Interim Deliverable for the Ecological Risk Assessment will discuss this issue and will be discussed with USEPA.
Appendix L - Specific Comments **Comment No. 6** **Comment Title: Conclusions**				
EPA Comment	**Olin Response to EPA**	**Nobis Response to Olin**	**Olin Response to Nobis**	**Resolution**
Conclusions – This section should include a discussion of the statistical testing results and appropriate table referencing. There is no discussion of the finding that all growth results were significantly different for the laboratory control (See Tables 10-13).	Differences from the laboratory control are not critical. That information is quality control information. Differences between site samples and the reference samples are the critical information for the test. Those differences are the true measure of potential site-related effects.	While comparisons to "good" reference sample is more valuable when interpreting test results, significant differences between site samples and lab control results should be explored.	Significant differences between site samples and lab control results will be discussed in the BERA.	The Second Interim Deliverable for the Ecological Risk Assessment will discuss this issue and will be discussed with USEPA.

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Meeting Minutes
Comment No. Not Numbered
Comment Title: Optimization of Interim Response Steps Work Plan Monitoring Program

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
The current Slurry Wall and Cap monitoring locations, their hydrogeologic setting, and general elements of the Upper South Ditch groundwater discharge conceptual site model (CSM) were presented by AMEC. This was followed by a review of several water quality plots to introduce terminology to describe temporal patterns in constituent concentrations that are present in the monitoring data and how they differ with respect to up gradient and down gradient locations relative to the Slurry Wall. An example matrix table was presented that summarizes these observed patterns for individual constituents at each monitoring location. The combination of these water quality graphs from the IRSWP Semi-Annual Status Report (SASR) and the matrix table will form the basis of the proposal for an optimized monitoring program. The proposal will also include a discussion of the conceptual site model, and revised deliverable format.	Olin will prepare and submit a proposal for a modification and optimization of the current monitoring program for the slurry wall and cap and present background chemistry and hydrogeological information to support the recommendations. As requested by USEPA, the proposal will include an update of general conditions from section 2.2.4 of the IRSWP The proposal will also include other elements of the IRSWP including a request to eliminate potentiometric maps and LNAPL distribution figures at Plant B, and related activities.			Not relevant to this Draft RI Report submittal.

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Meeting Minutes
Comment No. 2
Comment Title: Cap Data

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
AMEC presented a discussion of the remedial history of identified areas of soil contamination at the Site, including those within and outside of the Containment Area. The purpose of this discussion was to provide a factual basis to explain that the Containment Area was not used to consolidate significant quantities of excavated materials, especially highly contaminated materials, from elsewhere at the Site. Olin noted that a deed restriction prohibiting disturbance of the soil beneath the cap was in place and that the only potential exposure was that of the trespasser to surface soils. A risk assessment of a future trespasser scenario has been conducted and does not indicate an unacceptable risk. Based on these considerations and the surface soils collected as part of the remedial investigation work plan, Olin does not believe there is any tangible benefit to collecting deeper soil samples. AMEC presented a figure from the FR I that showed the location of former remediated areas including Drum Area A, Drum Area B, and the Debris Disposal Area in relation to the location of the Slurry wall. This discussion presented the detail review of the process for screening and removal of debris and the volumes all the materials excavated from these areas, the manner in which they were tested, the volumes of materials that were ultimately disposed offsite, placed back in the excavation after testing, or otherwise stockpiled for future use as upland soil, approved for use by the Mass DEP. AMEC also provided discussion on the disposition of soils excavated from the On-property West Ditch, On-property West Ditch Wetland, the Upper South Ditch, Central Pond and associated wetlands, and former Lake Poly. These soil volumes are summarized in the table below. * See Meeting Minutes Table Tab* Nobis inquired if the RAM documents provided data on confirmation soil sampling for the Buried Debris Area excavation. Olin agreed to check on that information. Nobis also asked about the ultimate fate of the sand that had been placed in the Biocell. AMEC indicated they would find and share that information. There was a discussion of the data sets provided to USEPA for soils within the footprint of the Slurry Wall. Nobis had asked why it appeared the data sets did not contain certain samples. AMEC indicated that the data set provided included analytical results for soil samples collected from within the footprint that were not identified in the AMEC database as “excavated”. AMEC indicated that soils from Drum Area A, Drum Area B, and a small amount of granular material from the Buried Debris Area had been used to backfill Drum Area A and Drum Area B, but the exact location of soils associated with those samples are not known. Olin stated its position that the discussion of deep sampling of soils under the cap was essentially a data gap issue. Groundwater surface beneath the cap is shallow therefore only a shallow depth of vadose soil is in question. It is unlikely that a trespasser would have access to soils 5 to 6 feet beneath the cap. The trespasser scenario is covered in a risk assessment. Olin stated its position that deep soils (below the water table) under the cap are an OU3 issue. Olin’s position is that it is hesitant to collect data for no defined purpose and that collecting samples deeper than surface soils serves no additional purpose. Jim DiLorenzo (USEPA) stated that our rationale for no additional soil sampling within the containment wall sounded reasonable but questioned how we would move forward with selection of a permanent remedy (i.e., how we would handle the perceived data gap from a regulatory standpoint). James offered that we should deal with this simply from an exposure standpoint. The only potential exposure pathway is from a potential trespasser and the current RI data for shallow soils within the containment area indicates no unacceptable risk to human health. There was a discussion of the purpose of the temporary cap and previous requests for soil sampling for deeper soils. Cindy Woods indicated that Nobis had been concerned (prior to the Deed Restriction) about having data to evaluate potential future worker exposure to deeper soils – she acknowledged that this concern was pre-deed restriction. Olin and AMEC indicated that the purpose of the temporary cap and any future barrier is to minimize infiltration into the Containment Area (not to prevent exposure to deeper soils). Minimizing infiltration is beneficial to the purpose of the Slurry Wall (to minimize, to the extent practicable, migration of the diffuse layer groundwater within the slurry Wall to the South Ditch). Nobis asked what the driver to make the cap permanent is. Olin stated that future use of the site and the site development plan also intended a permanent cap and that use could include an asphalt parking lot in that area. James stated that Olin’s position is that there is a deed restriction prohibiting future intrusive development within the cap area and that we have surface soil data collected during the RI that indicates no unacceptable risk to human health via the trespasser scenario. Rick Sugatt asked Olin to consider an ecological risk screening for surface soil beneath the temporary cap. Olin indicated this would be discussed internally.	It was agreed that EPA would have discussions and get back to Olin concerning the need for additional soil sampling and analysis. Olin will provide a summary of historical soil and sediment remedial activities and the relationship of those activities to soils within the footprint of the temporary cap as part of the RI report.			This information has been incorporated into Section 2.1 of the Draft RI Report.

Table L-1
Response to Comments Table
Remedial Investigation Report - OU1 and OU2
Olin Chemical Superfund Site
Wilmington, Massachusetts

Meeting Minutes
Comment No. 3
Comment Title: Specialty Compounds

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
Nobis Engineering comments indicate there is a discrepancy in understanding whether specialty compounds are to be considered in other media other than soil. EPA indicated it needs confidence that specialty compounds are not an OU 3 issue. EPA stated that further characterization of soils no longer needed to consider specialty compounds. EPA was unsure if it had agreed to the same for surface water and sediment. EPA approval of the supplemental work plan and modification all the analytical parameters for the North Pond investigation did not include specialty compounds. EPA wants those approvals not to be construed as a permanent hiatus on analysis of specialty compounds for the Site. For OU1 soils, there was a consensus that no additional sampling /analysis for specialty compounds is required. The RI Report will present a detailed discussion of frequency of detection and spatial distribution of detections. In addition, the risk assessments will consider all of the data collected for specialty compounds and it is anticipated they will fall out of the risk assessments based on low frequency of detection and risk-based screening during selection of chemicals of potential concern (COPCs).	The RI Report will present a detailed discussion of frequency of detection and spatial distribution of detections. In addition, the risk assessments will consider all of the data collected for specialty compounds and it is anticipated they will fall out of the risk assessments based on low frequency of detection and risk-based screening during selection of chemicals of potential concern (COPCs).			Not relevant to this Draft RI Report submittal.

Meeting Minutes
Comment No. 4
Comment Title: Industrial RSLs and Residential RSLs

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
Specific comments were provided under the four bullets and are discussed below. The statement for each bullet represents individual issue Consensus Statements	Bullet 1. USEPA requested that the previously submitted evaluation of the use of industrial RSLs for soil COPC selection be updated with analytical data associated with the November/December 2012 sampling events. Olin agreed to do so and to provide that information to USEPA. Although not specifically discussed, it is suggested here that information be provided in the First Interim Deliverable for the human health risk assessment. The cap data will not be included in this evaluation (deed restriction). Bullet 2. The data used in the evaluation will be identified clearly Bullet 3. The analytical results indicate chromium speciation is dominantly trivalent. In the First Interim Deliverable, side-by-side box plots of total chromium and hexavalent chromium concentrations for all OU1 soils will be presented to show what fraction of total chromium concentrations are contributed by hexavalent chromium. In addition, co-located total chromium and hexavalent chromium concentrations will be compared. Also, an effort will be made to identify and evaluate additional total/hexavalent chromium concentration pairs that are not strictly “co-located” but are very close to being co-located. This evaluation will be the basis for a recommendation concerning the appropriate soil RSL to be applied to total chromium soil data in the human health risk assessment COPC selection process (possibly trivalent chromium RSL as discussed in the meeting). Bullet 4. A point by point comparison of soil analytical results to industrial RSLs will be provided in tables of the RI. A point by point discussion will not be included except for notable observations (such as clusters of concentrations above the RSLs).			During the October 11th, 2012 meeting with EPA it was agreed that Industrial RSLs are appropriate for the site and that overall data quality based on a combination of reporting and method detection limits meets the work plan objectives. Overall, reporting limits or method detection limits meet the identified Project Action Levels. Many of the comments concerning detection limits were focused on Residential RSLs (no longer a concern).

Table L-1
Response to Comments Table
Remedial Investigation Report - OU1 and OU2
Olin Chemical Superfund Site
Wilmington, Massachusetts

Meeting Minutes
Comment No. 5
Comment Title: Leaching

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
EPA agreed Olin's evaluation has demonstrated that no leaching for soil is currently occurring. Olin will provide comparison of soil data to leaching-based SSLs as a first step in identifying potential for leaching in the revised evaluation to be presented in the RI report.	EPA agreed Olin's evaluation has demonstrated that no leaching for soil is currently occurring. Olin will provide comparison of soil data to leaching-based SSLs as a first step in identifying potential for leaching in the revised evaluation to be presented in the RI report.			The evaluation of leraching potential is included in Appendix J of the Draft RI Report.

Meeting Minutes
Comment No. 6
Comment Title: Conceptual Site Model

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
Discussion occurred to clarify what items EPA felt were contradictory. Specific comments were provided under eleven bullets and are discussed below. The statement for each bullet represents individual issue Consensus Statements	Bullet 1. Olin will include discussions of NDMA from the FRI and include a description and results of an updated literature review. Bullet 2. DAPL is not present in OU1 soil and to that extent will not be discussed in the OU1 RI report. Bullet 3. The OU1 RI report will discuss interaction of groundwater and OU1 surface water and sediment including the relationship of diffuse groundwater and overlying groundwater at the Property. Bullet 4. Olin will include in the CSM discussion of operational history, past disposal practices and a summary of remedial actions completed at the Site. This discussion will include a summary of available information on operational history from the RI Work Plan and brief summaries of remedial actions from Section 2 of the FRI. Bullet 5. Olin will include appropriate portions of Section 2 from the FRI as an appendix in the OU1 RI report, including specific references to past documents from the FRI list of references. The electronic compendium of documents provided for the FRI will be reproduced and included on a CD. Bullet 6. It was confirmed that Olin will provide the information requested in the bullet. Bullet 7. Confirmed. Bullet 8. Confirmed. Bullet 9. Confirmed. Bullet 10. Calcium Sulfate Landfill (CSL) A. It was discussed that the CSL waste is comprised of gypsum and has been closed and is monitored under Mass DEP regulations. There are no soil samples representative of this material. B. It was discussed and agreed that Olin has been responsive to EPA requests concerning the CSL but that a difference of opinion exists on the disposition of the CSL under the RI process. Olin believes the CSL is an OU3 issue related to groundwater. C. Olin will reference the requested Geomega Technical Series Report and include an electronic copy in the electronic compendium of documents from the FRI. Bullet 11. A literature review will be conducted to locate any ecological toxicity information that has become available since the identification of benchmarks used in the PRI risk assessment. Olin will acknowledge and summarize the basis, strength and uncertainty associated with the benchmarks in the RI Report.		The CSL will be evaluated as part of OU 1 in accordance with SOW/AOC for the Olin Chemical Superfund Site.	Each of the 11 items have been addfressed in the Draft RI Report as discussed above.

Table L-1
Response to Comments Table
Remedial Investigation Report - OU1 and OU2
Olin Chemical Superfund Site
Wilmington, Massachusetts

Meeting Minutes
Comment No. 7
Comment Title: Attachment A, Detection Limits

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
EPA expressed its concern that high reporting limits for some semi-volatile organic compounds (SVOCs), namely PAHs, due to the presence of elevated concentrations of Bis-2-ethylhexylphthalate (BEHP) left uncertainty as to the presence and concentration of these other compounds reported as non-detects. Olin discussed elements of the CSM and other PAH data in sediments that supported an interpretation that PAHs were not contaminants associated with disposal practices that led to BEHP, chromium, and related contamination in South Ditch. PAHs sources were restricted to boiler operations, associated ash, and atmospheric deposition. Boiler ash has never been observed in South Ditch sediments. To draw a conclusion that BEHP and PAHs are expected to be co-located is not consistent with the CSM.Specific comments were provided under six bullets and are discussed below. The statement for each bullet represents individual issue Consensus Statements	Bullet 1. The parenthetical phrase (with a "J" qualifier) will be corrected to read (without a "J" qualifier).Bullet 2. Olin will put an "MDL" discussion of older data (i.e., data collected prior to the RI Work plan) in the uncertainty section of the risk assessment that indicates MDLs of the older data are not known although they are likely to be similar to MDLs of newer data analyzed by the same methods. This discussion will acknowledge that MDLs are higher in highly contaminated sediment samples. Bullet 3. Olin agreed to provide the requested figure of data to be used in the risk assessments that removes "unusable" PAH data to show spatial coverage. Bullet 4. Olin agreed to provide the figures in the RI with all data to be used in the risk assessments with a symbology that clearly indicates compound detections, non-detects, and where non –detection reporting limits (RL / SQL) are greater than the associated screening level.Bullet 5. EPA indicated it is comfortable with the discussion of prior comment bullets and is looking for Olin to provide an expanded write-up in the RI concerning PAH distribution in sediment and the CSM.Bullet 6. Noted			This issue is discussed in the text of the first interim Deliverable for the Human health Risk Assessment and in Attachment 1 of that Interim Delverable. Attachment 1 to the First Interim Deliverable for the Human Health Risk Assessment includes Figures 1-10 that show analytical data for PAHs (B(a)P, B(a)A, B(b)F, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene) in surface soil and subsurface soil with samples (with highly elevated reporting limits removed). As reported in Section 2.2.4 of the First Interim Deliverable for the Human Health Risk Assessment, that even with elevated detection limits removed a sufficient data set still exists to calculate human health risks for the PAHs.

Meeting Minutes
Comment No. 8
Comment Title: Unusable Data

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
Olin indicated it had provided the "mini-"sensitivity analysis requested by Rick Suggatt (EPA) during the October 11, 2012 meeting in which elevated PAH values would be replaced in ProUCL as ND=0 or ND=Absent. Olin re-iterated its belief that PAHs and BEHP were not co-located contaminants based on the CSM, and that attempting to use ProUCL to predict contaminant concentrations had no basis and could artificially result in prediction of risk that did not exist. EPA confirmed that the analysis that was performed was adequate.	A figure with unusable PAH data removed will be prepared in the near term and provided to EPA for Nobis review. The "mini-sensitivity" analysis will be provided in the uncertainty analysis in the RI report.			No action required.

Meeting Minutes
Comment No. 9
Comment Title: Background Soil Samples

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
Olin and EPA agreed on all three bullets in the comment.	SS-440 and SS-442 will be excluded from the background soil data set.			Appendix I contains the Site Specific Background Soil Memorandum. The USEPA agreed with the selection of the site-specific soil background data set in a meeting on February 5, 2013. The identification of Site-specific background concentrations did include an outlier analysis. Published background values are not referenced in the Draft RI Report (tables, text, or figures).

Table L-1
Response to Comments Table
Remedial Investigation Report - OU1 and OU2
Olin Chemical Superfund Site
Wilmington, Massachusetts

Meeting Minutes
Comment No. 10
Comment Title: Use of Older Sediment Data

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
AMEC reviewed the data sets used in the RA and confirmed that for surface water only data collected under the EPA approved RI Work Plan (also referred to as "RI data") since 2009 was used. AMEC also reviewed the extent of the data available for sediment for use in the RA which included RI data and data collected under the IRSWP. For sediment data in South Ditch this includes data from 2005. These data sets are not large enough for statistical analysis and comparison of underlying sample distributions (i.e., Student T-tests and ANOVA). Data available for on-Property West Ditch Wetland is extensive and includes more than 21 pre-excavation sediment samples. EPA commented that data set was more than adequate for RA. Nobis commented that the northern and southern portions of Exposure Area 2 (EA2) were different in upland habitat composition, and that the northern half might be included with the other parts of the former facility areas of the Site. Olin indicated it would take that question back to its management team for internal discussion and consideration.	Due to the size of the data set, South Ditch data for sediments in the un-remediated portion of the South Ditch will be used in both the OU1 and OU2 RA. The data set for the on-Property West Ditch Wetland are adequate for the RA.			Items are discussed in the First interim Deliverables for the Human health and Ecological Risk Assessments and wiill be discussed with USEPA.

Meeting Minutes
Comment No. 11
Comment Title: Use of Background Sediment Data

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
Olin and EPA discussed and agreed that background sediment locations did not exist for South Ditch and would not be considered in the RA. Olin acknowledged it accepted that the contaminants present in South Ditch surface water and sediment were related to former Site operations. AMEC indicated that two good background locations were available for Maple Meadow Brook.	It was agreed that the RI/RA could proceed with a lack of OU1 background sediment data.			No action required.

Meeting Minutes
Comment No. 12
Comment Title: Final Work Plan Addendum

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
	Olin will provide a final OU1 Supplemental Work Plan document.			Final Supplemental Work Plan was submitted to USEPA March 19, 2013.

Meeting Minutes
Comment No. 13
Comment Title: Vapor Intrusion

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
	It was agreed that vapor intrusion would be discussed as part of OU3 groundwater.			It was agreed that vapor intrusion would be discussed as part of OU3 groundwater. No action for this OU1 and OU2 Report.

Table L-1
Response to Comments Table
Remedial Investigation Report - OU1 and OU2
Olin Chemical Superfund Site
Wilmington, Massachusetts

Meeting Minutes
Comment No. 14
Comment Title: Other

EPA Comment	Olin Response to EPA	Nobis Response to Olin	Olin Response to Nobis	Resolution
Specific comments were provided under 10 items labeled a. through j. and are discussed below. The statement for each item represents individual item Consensus Statements a. Olin will review the specific logs and provide typed copies of each. b. PID readings are recorded on boring logs and will be summarized in a table in the RI. c. Olin acknowledges that there is evidence of trespassing on the Property. d. The items identified will be submitted with the RI report. It was not Olin's intention to attach the items to the RTC letter, as was inadvertently stated in the letter. e. The question of industrial exposure in wetlands will be discussed further between Olin and EPA at later date. f. EPA requested additional sampling of deep soils for NDPA near Lake Poly unless these soils are below the water table. Olin will verify that deep soils at these locations are below the water table, in which case additional sampling will not be required. g. Sediment sampling for hexavalent chromium was included in the RI sampling program for specific requested location in East Ditch pursuant to a 2010 conference call. Olin will verify which samples in East Ditch were analyzed for hexavalent chromium. h. It was agreed that samples within the range of 0 to 0.5 feet were acceptable as sediment samples, even if they did not start at the water - sediment interface (0 feet). i. Noted j. Noted.				Items identified as "Other" are adressed in previous comments. The specifric requested typed boring logs and a soil PID table is provided in the Draft RI. The HHRA will include a tresspasser scenario. The other RA scenarios will be developed with the interim RA devilerables. Specific sampling requestes were adrressed in the supplemental work plan executred in December 2012.

APPENDIX L

RESPONSE TO COMMENTS DRAFT OU1/OU2 RI
(Provided on CD)

6107140016

March 21, 2014

Mr. James M. DiLorenzo
Remedial Project Manager
USEPA Region 1 - New England
5 Post Office Square
Mailcode: OSRR07-4
Boston, MA 02109-3912

Subject: Olin Chemical Superfund Site, Wilmington, Massachusetts
Response to USEPA Comments Dated September 30, 2014
OU1 /OU2 RI Sections 1-5 Including Stakeholder Comments

On behalf of Olin Corporation (Olin), AMEC Environment & Infrastructure, Inc. (AMEC) respectfully submits the following responses to United States Environmental Protection Agency's (USEPA's) September 30, 2013 comment responses prepared by Nobis Engineering, Inc. (NOBIS) to:

1) Olin's Response to Comments Letter dated July 26, 2013 for USEPA's June 24, 2013 comments on Sections 1 through 5 of the Draft Remedial Investigation Report for Operable Unit 1 and Operable Unit 2, dated April 19, 2013 (OU1/2 RI) for the Olin Chemical Superfund Site in Wilmington, Massachusetts; and

2) Olin's Response to Comments Letter dated September 13, 2013 for USEPA's August 9, 2013 Supplemental Review – Stakeholder Comments, Draft Remedial Investigation Risk Assessment for OU1 and OU2, Olin Chemical Superfund Site.

Below please find the unresolved USEPA comments on the OU1/OU2 RI followed by Olin's initial response, EPA's reply and then Olin's response to that EPA reply. The comments and responses are arranged by section as they were presented by USEPA/ NOBIS. Separate Response to Comments letters are being submitted to USEPA to address comments on the first and second interim deliverables for the Baseline Human Health Risk and the Baseline Ecological Risk Assessment, the latter of which were submitted on July 26, 2013.

If you have any questions concerning this letter, please feel free to contact James Cashwell at (423) 336-4012.

Sincerely,

AMEC Environment & Infrastructure, Inc.

Peter H. Thompson
Project Manager

Michael J. Murphy
Project Principal

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USEPA COMMENTS

GENERAL COMMENTS

Entire Document

Comment No. 1: Clarify and standardize the usage of "property", "site", "facility/former facility". Provide a figure that shows the OU1, OU2, and site features, as features mentioned throughout the report are difficult to find on the referenced figures and/or are not included on any figure. Examples are: water bodies, conservation and open space restriction, delta area, on-property and off-property water bodies, Aberjona River, Jewel Drive, Sanmina property, groundwater topographic divide, to name a few. When a site feature is used to make a point, a reference to a figure is needed. In addition, the wording of site features varied based on topic. This is a comment throughout the report. Terminology is not consistent.

Response No. 1: Terminology for Site features will be reviewed for consistency. Figures 1.0-2 (Site Features) and 1.3-1 (Site Features (Current and Historic)) indicate, at different scales, a majority of the referenced features. The border of the conservation area, Jewel Drive, the former Sanmina property will be added. The boundary of OU1 is indicated on Figure 1.0-2. OU2 is not an area, rather is comprised of individual streams and these are all labeled on Figure 1.0-2. It should be unnecessary to reference these two figures each time a site feature is referenced.

USEPA Reply: EPA concurs with the edits to Figure 1.0-2 and 1.3-1. Please insert "see figure x-x for site features" when they're first discussed in a section to help direct the reader. OU2 includes off-property soils in addition to the various streams. This area, EA5, needs to be labeled on the figure.

Olin Response to USEPA Reply: *The reader will be directed to specific Figures for site features when first discussed in a Section. Area EA5 will be added to Figure 1.0-2.*

Comment No. 2: A comprehensive package of updated groundwater data has not been submitted. Olin's Conceptual Site Model (CSM) indicates contaminants migrate 1) via groundwater to South Ditch, and from there by surface water into East Ditch and 2) via deep groundwater to the groundwater beneath the Maple Meadow Brook Wetland (MMBW) with hypothetical potential to eventually discharge to MMBW surface water. Olin asserts that deep groundwater beneath MMBW is not impacting shallow groundwater and surface water in this area. In order to evaluate these conclusions regarding site-related impacts to surface water and sediments, the comprehensive OU3 groundwater. EPA reserves the right to revisit the adequacy of the OU2 sampling efforts and results once the OU3 data has been provided. The CSM needs expanded discussion of groundwater including potential divergent impacts to the two watersheds and town wells.

Response No. 2: We interpret "comprehensive" OU3 groundwater data to mean "all" OU3 groundwater data. As such, a comprehensive OU3 groundwater data package is not required to fully evaluate the nature and extent of impacts or risks associated with OU1/OU2 features or to develop an appropriate conceptual site model for OU1 and OU2.

We do agree that an understanding of the interaction between groundwater and soil, sediment, and surface water is important to the OU1/OU2 RI effort where these different media are in contact with one another. Certainly, all groundwater within the OU3 study area is not in contact with OU1/OU2 features. As we've discussed on numerous occasions, impacted groundwater may be having, or has had, a direct impact on soils, surface water, or sediments in certain portions of the site. We have made this concept clear in the RI document. USEPA has requested submittal of the data to be used in the OU3 data gap analysis currently underway. The CD will be provided upon its completion, which is expected to be in 3rd quarter 2013.

The CSM will be prepared according to these potential interactions to facilitate review of conditions within OU1/OU2. The CSM will be further expanded to facilitate review of conditions within OU3 as part of the OU3 RI reporting effort. To be clear, we do not believe that potential divergent impacts to the watersheds or the Town Wells needs to be described to understand the nature, extent, or risks associated with OU1/OU2 features. Therefore, this information will be provided as part of the OU3 RI reporting effort.

USEPA Reply: EPA does not agree with the statement in your above response *"We have made this concept clear in the RI document."* as that is the basis for the comment (and others on the topic of inclusion of additional groundwater information). Additional clarity and groundwater information is needed to provide the Site setting in the OU1/OU2 RI to more fully evaluate the soils, surface water, sediment, and groundwater associated with these operable units. EPA does not agree that a full evaluation of source areas, leaching, and groundwater impacts can be performed without a complete review of existing groundwater data. It is assumed that these topics will be discussed more fully in the next draft OU1/OU2 RI and in detail in the OU3 RI.

Olin Response to USEPA Reply: *Additional discussion and presentation of groundwater impacts underlying OU1 will be provided to help clarify questions concerning leaching potential of unsaturated soils. Additional discussion of groundwater data will also include more information on the nature, extent and migration of contaminants within shallow groundwater, groundwater flow and interaction of shallow groundwater with surface water within OU1 and OU2 surface water bodies. Additional detail on bedrock and deep overburden groundwater systems will be provided in OU3 as requested.*

Comment No. 4: EPA acknowledges that the inclusion of OU3 groundwater, hydrogeology, geology, etc information into the OU1/OU2 RI may be redundant with the OU3 RI; however, this redundancy is needed so that the relationships between groundwater and surface water are

understood. As we discussed in our meeting on May 28, 2013, topics for inclusion in the OU3 RI (with some discussion in the OU1/OU2 RI) are:

- Relationship with each surface water body
- Leaching analysis
- Groundwater discussions in general met the needs of the OU1/OU2 RI; however, more details are expected under OU3.
- CSL is considered part of the CERCLA site.
- Provide the backup for the DAPL description.
- NDMA formation at low pH via through nitrosation, which involves the formation of nitrosyl cation or similar nitrogen-containing species, such as dinitrogen trioxide, during acidification of nitrite. The nitrosyl cation then reacts with an amine, such as dimethylamine, to form NDMA.
- Saturated soils are part of OU3.
- Groundwater divide
- All groundwater, including DAPL, will be considered as drinking water.
- "Deep groundwater lateral flow patterns are essentially the same as shallow groundwater."

Response No. 4: Responses to each bullet are provided below.

- *Relationship with Each surface water body*: Discussion will be provided in the OU1/OU2 RI report as appropriate.
- *Leaching Analysis*: The leaching analysis has been provided in Appendix J of the OU1/OU2 RI report.
- *Groundwater discussions in general met the needs of the OU1/OU2 RI; however, more details are expected under OU3*: Comment Noted; Olin agrees.
- *CSL is considered part of the CERCLA site*: Olin agrees.
- *Provide the backup for the DAPL description*: We will provide the requested information in the OU3 RI report**.**
- *NDMA formation at low pH via through nitrosation, which involves the formation of nitrosyl cation or similar nitrogen-containing species, such as dinitrogen trioxide, during acidification of nitrite. The nitrosyl cation then reacts with an amine, such as dimethylamine, to form NDMA*: We have addressed the potential formation mechanisms of NDMA in various reports and will provide any new information gained in the OU3 RI report**.**
- *Saturated soils are part of OU3*: Olin agrees**.**
- *Groundwater divide*: We will provide discussion regarding the groundwater divide in the OU3 RI report.

- *All groundwater, including DAPL, will be considered as drinking water*: Olin does not agree that all groundwater should be considered drinking water, and vigorously disagrees that DAPL represents a source of drinking water. The rationale for these positions will be provided in the OU3 RI report.
- *"Deep groundwater lateral flow patterns are essentially the same as shallow groundwater:"* We will discuss this in the OU1/OU2 and OU3 RI reports as appropriate.

USEPA Reply: EPA expects its original comment, "All groundwater, including DAPL, will be considered as drinking water" to stand. The OU1/OU2 RI and the OU3 RI must reflect this approach.

Olin Response to USEPA Reply: *Olin and USEPA have held several meetings to discuss the Site's Groundwater Use and Value Determination to arrive at mutually acceptable criteria for evaluating groundwater uses for OU3. It is Olin's understanding that USEPA recognizes the fact that there are two distinct groundwater features at the site according to the Massachusetts Contingency Plan. USEPA has stated that they consider the current value and use determination a draft determination that will be revised as appropriate upon completion of the OU3 RI. In the interim, Olin maintains that DAPL is a discrete phase that is not groundwater and should not be treated as groundwater in risk assessments. DAPL did not exist as groundwater when it was released, nor is it groundwater currently. This will not affect OU1 /OU2.*

Comment No. 6: In Section 4.0, details on the RI investigation are presented on tables and discussed by depth; however, there needs to be further presentation of the soil data (similar to the presentation of surface water and sediments) by area or site feature to allow a better understanding of contamination in specific areas of the site (for example, OU2 soils west of the property, OU2 soils east of the property, containment area, manufacturing area soils, soils beneath Central Pond sediment, soils beneath West Ditch wetland, soils near Plant B, etc).

Response No. 6: The nature and extent of OU1 contamination is presented by soil depth group (surface, shallow and deep) and by chemical class. Locations where industrial based regional screening levels (RSLs), or other appropriate criteria, have been exceeded are depicted on figures. This format was followed in the preliminary RI and the draft RI reports. To restructure the current RI to present and discuss data by specific areas (e.g., exposure areas, manufacturing areas, or historic disposal areas) would be a very time labor intensive task that would not result in adding clarity to the nature and extent of contamination present at the site above screening levels. Olin will add additional general discussion in the current format to describe areas where primary site-related contaminant concentrations are greater than RSLs.

USEPA Reply: EPA disagrees that breaking down the soil evaluation by specific areas would not provide clarity to the discussions. On the contrary, breaking down the

evaluation would allow for a better connection to the HHRA areas. When data is presented by massive areas, then data in specific areas, "hotter" spots, inaccessible areas beneath sediment, or in areas no longer representative of site conditions but not excavated (i.e. the VOC and VPH data from the AVSE treatment area), are hidden. As the current draft OU1/OU2 RI presents the surface water and sediment data broken down, it is expected that the soil data will also be presented similarly.

Olin Response to USEPA Reply: *As discussed with USEPA, Olin will not re-organize the entire soil description which would require re-doing all the current RI tables and text. However to meet the objective of USEPA's comment Chemicals of Interest that exceed RSLs for specific areas will be identified and described in general terms by depth and by area. These specific areas include the former Lake Poly, TMP area under the parking lot located on the northeast portion of the property; the former VPH/EPH area and Plant B where the former AS/SVE system operated, the lower South Ditch EA5 area, Other areas where impacts have been noted related to railroad activities will also be described including arsenic and PAHs along Pan AM property and portions of EA5 near the MBTA rail line.*

<u>Section 3.0</u>

Comment No. 13: There should be a section on bedrock hydrogeology, indicating direction of flow etc, in bedrock.

Response No. 13: The bedrock hydrogeology and direction of groundwater flow in bedrock has no direct bearing on OU1/OU2 and will be addressed in OU3.

USEPA Reply: Bedrock hydrogeology and groundwater flow direction are site characteristics that need to be included in the overall Site discussion. Given the interactions between surface water and groundwater, the text should explain why bedrock hydrogeology doesn't have any bearing on OU1 and OU2 RI discussions and that it will be fully described in the OU3 RI.

Olin Response to USEPA Reply: *Discussion of the shallow groundwater interactions with OU1/OU2 surface water will be detailed in the Nature and Extent (Section 4) of the draft OU1/OU2 RI and CSM. Additional discussion of the general hydrogeologic setting and the general relationship between bedrock hydrology and overburden groundwater will be further discussed. Discussion of why bedrock does not have a direct bearing on OU1 and OU2 will be added, acknowledging that bedrock will be fully described under the OU3 RI.*

Comment No. 15: Geologic data from previous borings should be used to supplement the existing dataset and discussion so that Section 3.0 includes all applicable data. In several locations, such as the first paragraph of Section 3.2.1 (page 3-2), the reader is referred to the previous FRI for additional geological detail. Given that the RI's extensive drilling program was performed after the FRI, it is assumed that the FRI's geologic descriptions are less complete. It

was expected that the RI investigation may have modified the FRI findings and those complete observations would be included in the RI.

Response No. 15: The statement in question was that *"Additional detail on both overburden and bedrock geology for the Site in general is provided in the Draft FRI (MACTEC, 2007a)."* The OU1 /OU2 RI report provided updated geologic descriptions and cross sections for the on-Property areas where borings were installed. Consequently, the OU1/OU2 RI report does not discuss geology of the entire **Site** (emphasis added) and the reader is referred to that document for those additional discussions (for example the Western Bedrock Valley, Main Street Saddle, bedrock, etc.)

The RI investigation generally confirmed the FRI findings.

USEPA Reply: The entire geology section and the cross-sections describe only the 400-series borings and refer to the FRI for additional detail (note that the FRI was not formally commented on and is not an accepted document). Information in the document is relevant, but must be transferred to the OU1/OU2 RI. The OU1/OU2 RI must be a complete and standalone document to allow for EPA decision-making. The historical soil stratigraphy is relevant because it should not have changed, and the entire data set of both old and new borings should have been integrated into the discussion as a complete discussion. The discussion of non-OU1 Site features sidesteps this primary issue. It is difficult to have two documents – one discussing the historical setting and one discussing current action; both old and new information need to be merged together to allow for a complete picture. EPA expects that the next draft OU1/OU2 RI will include this information.

Olin Response to USEPA Reply: *As stated, the OU1 RI generally confirmed FRI findings with regards to geology. The FRI provides considerable additional detail on geologic features that are not necessarily germane to the geologic and hydrogeologic setting of OU1/OU2 (such as the seismic studies to define the bedrock topography underling DAPL pools and the western Bedrock valley, the details of petrography studies and classification of bedrock lithologies, locations of bedrock outcrops, etc) and the FRI was referred to as a source of additional information that included these and other details. Additional detail and descriptions of geology from the FRI and the RI Work Plan will be added to the draft OU1/OU2 RI report so that USEPA has a standalone document with sufficient detail for EPA decision making.*

Comment No. 16: Synoptic groundwater level measurements should be compared to surface water level measurements to evaluate the interaction between groundwater and surface water. Water elevations in surface water bodies such as the MMBW should be included in synoptic water level rounds.

Response No. 16: Stage elevations of the various streams are not surveyed. Stream piezometers were installed in accordance with the RI work plan to evaluate heads immediately below the physical stream bottom by measurement of the groundwater level inside the piezometer to the surface water outside. The piezometers installed in sapric peat

below MMBW did not yield good information since the peat does not yield water easily. Piezometers in peat take a very long time to equilibrate and do not respond well to short term fluctuations in water levels or piezometeric pressures. Data from South Ditch stream piezometers are measured as part of the IRSWP and that data can be tabulated.

USEPA Reply: Olin should include South Ditch water levels inside and outside piezometers in the OU1/OU2 RI Report. The data should be tabulated and included in the report. In addition, the elevation data and chemistry data, as available, from the West Ditch piezometers, those installed in Landfill Brook, and the MMBW piezometers (with the caveat noted by Olin) should also be included.

Olin Response to USEPA Reply: *Water levels from the South Ditch piezometers are summarized in SASRs and will be tabulated in the draft OU1/OU2 RI. Water levels from MMBW piezometers are summarized in Table 2.3-3 of the draft OU1/OU2 Report. Piezometers were not installed in Landfill Brook or the West Ditch.*

<u>Section 4.0</u>

Comment No. 18: In Section 4.1.3 and 4.1.4, surface water and sediment analytes are not compared to any criteria. Because of this, it is difficult to determine contaminant distribution from looking at Figures 4.1-29 through 4.1.42. In addition, the tables associated with the surface water and sediment results do not provide comparison levels or flag any anomalous results. Appropriate reference criteria should be used for comparison for both surface water and sediment. Tables 4.2-4 through 4.2-10 should compare results to federal and state sediment/surface water screening benchmarks and to background where appropriate. Please move the specific sediment and surface water sample results to a separate appendix in the same format as the Appendix F presentation of the individual soil sample results. Note both this recommended additional appendix and Appendix F should show comparison levels and flag exceedances (See Comment 218).

Response No. 18: The surface water and sediment data are screened in the human health and ecological selection of chemicals of potential concern in subsequent sections of the report. Ambient Water Quality Criteria will be presented for detected parameters in surface water. There are not corresponding national or state criteria for sediment. The criteria to be used in discussion of surface water and sediments results will be the reference locations (background), since no robust background data sets are available for surface water and sediment.

USEPA Reply: There are only two sediment reference locations that have been agreed to – one north of the Site (SDBK-001) applicable as reference for East Ditch and one (SDBK-004) applicable for MMBW. There are no reference locations appropriate for comparison to the other surface water bodies. Sediment should be compared to some standard (soil RSLs?) other than reference locations for discussion in Section 4.0.

Olin Response to USEPA Reply: *Since there are no national or state criteria for sediment comparison, analytical data for sediment samples from OU1 and OU2 will be compared to reference locations SDBK-001 for the East Ditch and SDBK-004 for MMBW. For chemicals of interest that USEPA has noted in comments, Olin will provide additional discussion of groundwater migration pathways to aid clarifying which compounds may represent potential contaminant impacts and which may represent natural or anthropogenic conditions.*

Comment No. 20: In previous meetings, Olin had agreed to provide chemical data for soils returned to excavations within the current containment area. These results were not identified in Section 4.0. Please include in Section 4.0 of the RI, both the data provided with the November 2012 Supplemental Work Plan, as well as data collected as part of post excavation confirmatory samples for materials placed within the containment area, which may not have known location coordinates.

Response No. 20: Olin and USEPA continue to discuss the means by which soils within the containment area will be handled under the RI. This comment will be more fully addressed once these discussions are completed.

USEPA Reply: As recently agreed to between EPA and Olin, an evaluation of the containment area will now be included in the OU1/OU2 RI report. The evaluation is based on the following:

a. There is no presumptive remedy for a cap over the containment area.

b. The deed restriction in place for the containment area has no bearing on the CERCLA process.

c. Since a. and b. are now out, and the containment area must go through the CERCLA process, Olin will be tabulating all of the known historical samples from within the containment area (with and without coordinates – mainly from the removal actions done) and creating exposure risk scenarios for the risk assessors to review/agree with. Samples without coordinates will be included in the 1 to 10 “accessible” category.

d. The release of DAPL within the area from the containment area will be part of the OU3 review.

e. In addition to the risk discussions, containment area samples must be looked at from the N&E perspective.

Based on the data tabulated under “c” above, Olin has agreed to provide a “focused risk assessment” for the soils in the cap area. This information will be consistent with the approaches in the HHRA Interim Deliverables #1 and #2. Once EPA and the stakeholders have reviewed the information, and approved the approach/outcome, it will become part of the OU1/OU2 RI Report in the HHRA.

Olin Response to USEPA Reply: *Even though the existing Deed Restriction does not necessarily remove the containment area from the CERCLA process, it is in*

fact a legally binding document that does have impact on future use of the site. That being said, chemical data for soils within the Containment Area will be included in the draft OU1/OU2 RI nature and extent evaluation and a hypothetical future construction worker and hypothetical future industrial worker soil exposure scenario (surface and shallow subsurface) will be included in the human health risk assessment. A draft of this risk evaluation has been forwarded to USEPA for their review and does not show risk above USEPA risk Guidelines. Based on discussions with USEPA, a permanent cap will be included as a component of each remedial alternative evaluated in the OU1/OU2 Feasibility Study. Installation of a permanent cap is a continuation of the actions begun under the MCP and is a conservative approach given that the soils within the containment area do not pose any unacceptable risk to human health or the environment.

Comment No. 21: An evaluation of the nature and extent of soil contamination in the containment area is needed within Section 4.0. In order to conduct this evaluation, analytical results for the containment area must be included separately from the general description of the overall site soil results. Further, if the final location of the sample result in the containment area is unknown, assume that the sample is within the 1-10 ft depth range. Note that samples in the containment area may or may not be the result of previously regulated activities such as RCRA or TSCA and an understanding of the movement of the historical wastes generated, handled, and possibly disposed of at the site is important. This ties into Comment 99 regarding sewer systems.

Beginning on page 2-5 of the draft RI, Olin provided a summary of soils that were disposed of, including a table showing which ones were disposed of on-site. See pages 2-5 through 2-6. However, this material does not include any specific chemical discussion of RCRA wastes (listed/characteristic that were indicated on the submitted Part A (August 8, 1980, August 18, 1980, and November 18, 1980 as Stepan Chemical) and the amended Part A (April 30, 1984 and June 29, 1992 as Olin Chemical). Although the most recent regulatory interaction was with the MassDEP under the MCP, the site did handle listed and characteristic waste as identified under RCRA. As such, the movement of these wastes from the onsite tanks/containers to the onsite distribution systems to Lake Poly and the identified treatment systems and ultimately to the containment area must also include a discussion of the movement of the RCRA materials.

This RCRA / TSCA information will be needed for the Applicable or Relevant and Appropriate Requirements (ARAR) determination.

Response No. 21: Olin and USEPA continue to discuss the means by which soils within the containment area will be handled under the RI. This comment will be more fully addressed once these discussions are completed.

USEPA Reply: Further EPA and Olin discussion needed.

Olin Response to USEPA Reply: *Please see Olin's response to Comment 20 above.*

Comment No. 25: Olin previously agreed to revisit the toxicity assessment that was used to determine N-nitrosodimethylamine (NDMA) benchmarks. Has this been done, and if so, should the current benchmarks be adjusted?

Response No. 25: A comprehensive literature review was conducted and original published articles and other sources of information have been requested and obtained. Review of the articles and other sources of information are on-going. Upon completion of the review, recommendations will be made concerning updates to the selected benchmarks.

USEPA Reply: Completion of this review is critical; changes to the NDMA benchmarks will have a significant impact on the text, tables and figures of both the RI and the risk assessments. Please complete the review and make any changes before submitting Interim Deliverable #3 for the HHRA and ERA.

Olin Response to USEPA Reply: *Review of the information to date has not identified any changes to NDMA benchmarks. Olin will continue to keep abreast of newly published literature and any identified updates to the selected benchmarks will be evaluated and incorporated into the HHRA and BERA.*

Comment No. 26: Section 4.0 should discuss all detections above screening criteria, not just the ones considered to be related to known site operations. In several subsections, such as the discussion of surface water, only site-related parameters are described. Other analytes are often present at elevated concentrations or high frequencies and should be mentioned.

Response No. 26: Surface water and sediment do not have applicable screening criteria. The data can be compared to reference sample results. For those compounds detected above reference values but which are not considered to be Site-related, they will be acknowledged with a statement that they are not considered Site-related. It is also common that substances or elements that occur naturally are often detected at a high frequency and their detection should not be construed with being Site-related.

USEPA Reply: All detections above screening levels should be discussed. Details should be provided indicating why some contaminants are not Site-related, as appropriate. See HHRA Interim Deliverable #2, Comment No. 1. The screening levels for surface water and sediment should be addressed as stated in Comment 18.

Olin Response to USEPA Reply: *Olin will acknowledge the presence of constituents that have elevated concentrations, are detected frequently, or are above screening levels and will identify if the constituents are believed to be naturally occurring or if they are considered to be contributed from other anthropogenic sources. In situations where Olin believes specific chemicals of interest are not related to releases from the Olin Site, we will provide rationale. Where applicable, Olin will discuss data relative to: Soil (background on-site locations and Industrial RSL); Surface Water (background/reference locations and AWQC); Sediment (background/reference locations). There are no national or state screening levels for sediment.*

Comment No. 27: Section 4.0 should include a conclusion section listing the analytes that exceed screening criteria (whether Olin considers them to be site-related or not). This section may eliminate certain analytes after the initial summary. Section 5.0 should reference this summary section and discuss each chemical or chemical group. An initial group of contaminants that are commonly detected and exceed screening criteria in soils include TMPs, BEHP, NDPA, several PAHs, C5-C8 aliphatics, hydrazine, Aroclor-1260, arsenic, and hexavalent chromium. A similar comparison should be performed for sediment and surface water.

Response No. 27: A summary section will be prepared as requested. If Olin believes an analyte is not Site-related it will acknowledge that the compound is present above a screening level and it will state the compound is not-Site related. For infrequently detected analytes, it will also indicate whether the analyte is an important contributor to risk or not.

USEPA Reply: There is currently no mutually agreed upon list of "Site-related" contaminants. See HHRA Interim Deliverable #2, Comment No. 1.

Olin Response to USEPA Reply: *Olin has agreed to identify chemicals of interest for the Site as those compounds that were used, manufactured, or released (raw materials, products, and constituents associated with waste streams and spills). Please also see response to Comment 60. Certain SVOCs, metals, and inorganics also occur naturally or are common anthropogenic contaminants. In circumstances where detected chemicals of interest are naturally occurring or believed to be from anthropogenic sources, Olin will make provide rationale in support of such conclusions.*

<u>Section 5.0</u>

Comment No. 29: Section 5.1 should include a discussion of all chemicals that exceed screening criteria and have not been ruled out in Section 4.0. For example, several PAHs and NDPA exceeded site-specific background as well as industrial RSLs and should be discussed.

Response No. 29: The fate and transport section will focus on chemical that are Site-related and important relative to risk. Other chemicals will be discussed but the degree of emphasis and detail will commensurate with their importance to the Site.

USEPA Reply: There is currently no mutually agreed upon list of "Site-related" contaminants. See HHRA Interim Deliverable #2, Comment No. 1.

Olin Response to USEPA Reply: *Please see response to Comment 27 above.*

Comment No. 30: Page 5-4, Section 5.2: Leaching is dismissed as a migration pathway in the second paragraph of the section. This is contradicted by the discussion of leaching of TMPs (and other compounds, as discussed in the comments on Appendix J) in the second bullet on

page 5-7. Please add a separate subsection, such as 5.2.3, to address locations where leaching may occur.

Response No. 30: Leaching is typically considered to be a vadose zone process where a leachate is generated that then migrates vertically to the water table. A separate discussion will be added to discuss the solubilization of TMPs and related compounds that occur associated with former LNAPL smear zones related to releases from Plant B Production Area and Tank Farm.

USEPA Reply: Appendix J needs to be revised as discussed in the Appendix J comments, and conclusions need to be added to this leachability section in addition to the TMP discussion.

Olin Response to USEPA Reply: *Appendix J will be revised to address Appendix J specific comments. Conclusions from Appendix J regarding leachability will be added to Section 5.2 and the TMP discussion as requested.*

<u>Appendix J</u>

Comment No. 36: Comparisons of soil data to Soil Screening Levels (SSLs) have been performed, as presented in the Tables 4.1-1 through 4.1-3 and Appendix F. Appendix J text needs to discuss the results of these comparisons. This discussion should provide a list of soil analytes that may be a continued source of potential contamination to groundwater. The focus of the OU1/OU2 RI is based on risk from direct contact with soil. Risk from leaching to groundwater is separate and may be from a different set of analytes. The results of the comparisons to SSLs should be the basis for the leaching discussion in Appendix J.

Response No. 36: The SSLs provide an overly conservative estimate of leaching potential that would predict impacts to groundwater from essentially every compound detected. Olin did perform the assessment USEPA requested which was to include a tabulation of the SSL values that were exceeded, and acknowledge that SSLs are exceeded, but then rely on a visual and spatial comparison of soil concentrations to shallow groundwater data to identify a correlation between soil and groundwater. This was accomplished and there was no obvious areas where leaching to groundwater are an issue. The TMPs and related chemicals associated with water table LNAPL smear zones are an entirely different issue Olin will be discussing separately.

USEPA Reply: The part of the evaluation that was not performed was a critical **evaluation** of the compounds that did exceed SSLs. Appendix J appears to have ignored the SSL comparison and evaluates only the same compounds that were a concern for direct contact risk. To have a complete evaluation of the compounds that exceeded the SSLs, all compounds need to be included even if they did not exceed (to indicate that they were evaluated and not forgotten).

Olin Response to USEPA Reply: *Olin will provide what we believe to be a "critical **evaluation."** This critical **evaluation** will more or less be a statement that*

every constituent, even those that are present at concentrations at or below background, are typically present at concentrations in excess of the extremely conservative SSLs. Based on the significant work we have completed regarding leachability during this investigation, it is quite clear that there are no constituents of interest that are present at concentrations that pose an on-going source of contamination to groundwater in such a way as to pose an unacceptable risk in groundwater. This information has been presented to USEPA and USEPA has indicated that they do not believe leaching to groundwater is an issue at this site. Having said this, chemicals within unsaturated soils with concentrations above SSLs will be identified in Tables 4.1-1 through 4.1-3. The uncertainties associated with the comparison of soil data to the SSLs will be discussed in Appendix J. The focus of Appendix J will continue to be the comparison of actual soil analytical data and shallow groundwater analytical data that is Appended. Appendix J will be revised to include the Plant B LNAPL and TMP smear zones area as requested. This additional discussion will be provided in Section 4 of the draft OU1/OU2 RI.

Comment No. 37: The text in Appendix J still does not address the interaction of deep soil (greater than 10 feet) and groundwater. Figures 1-10 and 1-11 should compare groundwater to deep subsurface soil (greater than 10 feet) instead of only to shallow subsurface soil.

Response No. 37: Deep soil below the water table is not an OU1 soil leaching issue. It is an OU3 issue since soil and groundwater below the water table are in equilibrium and deep groundwater is impacted from dense fluids that migrated through the water table vertically to deeper saturated soil.

USEPA Reply: Please present evidence showing soil and groundwater below the water table are in equilibrium as horizontal groundwater migration may deposit or pick up contamination from the soil. It should be noted that not all deep soil samples are below the water table; therefore, those above the water table should be evaluated as part of the OU1/OU2 RI.

Olin Response to USEPA Reply: *The leaching evaluation will only be completed for soils above the water table (regardless of depth) based on the technical information provided below. We believe that it is abundantly evident what is meant by soil and groundwater being in equilibrium. Continued presentation of evidence and discussion, as previously completed, to support this is nonsensical. USEPA clearly agrees that soils below the water table will not be described in the OU1/OU2 RI process according to statements made in many meetings as well as herein.*

The idea here is simple while the chemical/physical processes involved are somewhat more complex. The idea is based on the fact that there will not be a significant source of impacts that are solely associated with the saturated soil matrix and not associated with the surrounding groundwater. Likewise, there is not likely to be a significant source of contamination solely associated with groundwater that is not also associated with the surrounding saturated soil matrix. This is not true of

unsaturated soils (or soils above the water table). It is possible for there to exist sources of contamination in unsaturated soils that have not impacted groundwater, or that can potentially contribute to on-going groundwater contamination. This is why we are evaluating potential leaching concerns with unsaturated soil at the Site.

As the idea of soil/groundwater partitioning is simple. The processes involved with this partitioning of constituents between groundwater and soil matrices are more complex than simply "picking up and depositing contamination from soil along a horizontal migration pathway". In any event, the kinetics of such mechanisms are generally considered to be fast compared to the long time frames that transpire after contaminant releases from any given Site have occurred. These processes are integral to the rate of advancement of groundwater plumes and the rate of dissipation of the plumes once they have developed and as sources decay.

By definition, these processes are in equilibrium whether they are partitioning contaminants to soil or removing them since the direction of the transfer is controlled by solubility, concentration and the distribution coefficient that controls the amount of mass that can be sorbed; which in turn controls pore water concentrations in the immobile water fraction.

Olin will review the data contained in Appendix J to ensure that all unsaturated soils (regardless of depth) have been considered in the leachability evaluation.

SPECIFIC COMMENTS:

The following specific comments are arranged by section.

Executive Summary:

Comment No. 45: Page ES-3. Please specify that On-Property soils located within the water table will be evaluated under OU3.

Response No. 45: A statement will be included that specifies that On-Property soils located within the water table will be evaluated under OU3.

USEPA Reply: It should be noted that not all deep soil samples are below the water table, and therefore those that are above the water table need to be evaluated as part of the OU1/OU2 RI.

Olin Response to USEPA Reply: *The analytical data associated with unsaturated soil samples will be evaluated in the draft OU1/OU2 RI. The data associated with saturated soil samples will be evaluated as part of OU3.*

Comment No. 60: Page ES-11. Define COI. Not on list of abbreviations. How were the bolded contaminants identified? What is the process of this identification? Specify and direct the reader to the text.

Response No. 60: Chemicals of Interest. The text states" Chemicals with maximum concentrations that are greater than corresponding USEPA RSLs (triggering comparison to background and/or evaluation of risks) include (Site primary COIs are bolded):" The bolded chemicals have maximum concentrations greater than industrial RSLs.

USEPA Reply: Please elaborate on what is a Contaminant of Interest (COI). How is this defined/selected and what does it mean to be greater than the RSLs? How will this information be used in the Site decision-making process? As this is an important issue to both EPA and its stakeholders, further explanation on the RSL/ISL and how these COIs will be handled is important. Although not considered in this question previously, we have not yet agreed to a list of what is "site-related" and this will figure into any response. See HHRA Interim Deliverable #2, Comment No. 1. Although not stated above, it is assumed that COI will also be added to the list of abbreviations. The text should be revised and clarified further.

Olin Response to USEPA Reply: *On page ES-11, the term "chemicals of interest" is introduced and the associated acronym COI is also introduced. This term was used to identify those chemicals that have been associated with the former facility (as a raw material, product, or a constituent of waste streams or accidental releases) and that have been released to one or more environmental media. The COIs are "of interest" for the RI, because the RI is intended to define the nature and extent of contamination and to determine if the contamination poses risks to public health or the environment that require remedial action per the requirements of CERCLA. The RI should focus on COIs in order to meet those objectives. The term "chemical of interest" is intended to identify those chemicals that should be investigated in the RI because they were associated with activities at the property, were released to the environment, and therefore have some potential to contribute to human health or ecological risk. The term COI should be considered a descriptor that indicates a chemical is a* ***potential*** *risk contributor. The term COI does not indicate that a chemical poses a risks or requires action. That determination is made during the risk assessments.*

The original comment requests that the term "COI" as it appears on page ES-11 be defined and it requests information about the process of identifying those chemicals. It should be noted that the term "chemicals of interest" and the acronym "COI" are first introduced on page ES-4, where the primary chemicals of interest were identified. Page ES-11 discussed which chemicals detected above Industrial RSLS were COIs and identified the chemicals for which Industrial RSLs were not available. The text from page ES-4 is shown below.

> *Constituents in liquid waste streams and unintentional releases included chromium, bis(2-ethylhexyl)phthalate, N-Nitrosodiphenylamine, N-nitrosodipropylamine, diisobutylene (mixture of 2,4,4,-trimethyl-1-pentene and 2,4,4,-trimethyl-2-pentene), formaldehyde, dimethylformamide, Opex, and Kempore, sulfuric acid, hydrochloric acid, and numerous salts of sodium and ammonium (sulfates, chlorides, nitrates, and nitrites). Calcium sulfate (gypsum)*

was produced and precipitated when wastewaters were neutralized with lime (calcium hydroxide) – after the use of sodium dichromate had been discontinued. Polychlorinated biphenyls (PCBs) were used in electrical transformers at OU1 and some release to soil has been documented. Processing oil was released to soil and the subsurface in the area of the Plant B Tank Farm. Based on that information, the chemicals identified in the preceding sentences are considered primary chemicals of interest (COIs) for the Site.

The primary COIs were identified based on the site history and the results of several investigation efforts that were conducted to identify nature and extent of contamination. The "primary COIs" reflect history but also presence/absence/ concentrations in environmental media. The "primary COIs" list is not intended to represent all chemicals used or released at the site. Other chemicals associated with activities at the site have been reported in environmental media at low concentrations and low frequency of detection – those have not been included in the list of "primary COIs".

The term "site-related" has important connotations and denotations.

- *On one level, it might be said that because a chemical was used at the site, that chemical is "site-related". On this general level, COIs could be considered "site-related" chemicals. This level of designation of "site-related" is not the best level of designation for determining nature and extent of contamination of for evaluating site risks.*

- *On another important level (important to determining if there has been a release and to delineating nature and extent of contamination and in evaluating risks), it might be said that if the concentrations of sodium in soil samples from an area are above corresponding background levels, the concentrations of sodium in soils at that area are "site-related". It should be noted that if sodium concentrations in soil samples in an area are consistent with background concentrations, then neither the presence of sodium in soil nor the concentrations of sodium in that area would be considered "site-related".* ***In other words, the detection of a COI (particularly naturally-occurring (e.g., metals and inorganics) and anthropogenic "background" constituents (e.g. PAHs)) in an environmental sample, by itself, does not necessarily mean that the detection or the concentration is "site-related".***

- *Conversely, the detection of certain chemicals (not naturally occurring, not typical of anthropogenic background, included on the list of COIs, and does not have local known sources other than the site) in an environmental sample, could by itself, suggest that there has been a site-related release of the chemical. NDMA is an example of such a "site signature" chemical.*

While the term "site-related" is an important one for decision-making, determining if presence and/or concentrations of chemicals in environmental media should not be based solely on a list of chemicals that have been associated with site history and activities. Having a list of "chemicals of interest" for the site and having a shorter list of "signature chemicals" is useful in making decisions about site-related releases. Olin will proposed a list of "chemicals of interest" and "signature chemicals"

The RSLs have two roles in the RI – assisting in the horizontal and vertical delineation of releases and screening to determine what chemicals are associated with negligible risk and therefore need not be evaluated further in the human health risk assessment.

The soil RSLs represent concentrations below which human health risks for direct contact exposures are negligible. The RSLs are therefore very useful in eliminating chemicals from further evaluation because the associated risks are very low. ***An important note, the converse is not true: the RSLs are not to be used to determine if there is a risk that requires remediation.*** *Also, comparison to an RSL of a single concentration from a single soil sample cannot be used to determine if there is a site risk that requires remediation.*

For RSLs that are based on cancer risk, the RSL is associated with a cancer risk of 1 x 10^{-6} (one in one million). Typically, under CERCLA, the cancer risk that would trigger the need for remediation is a risk greater than 1 x 10^{-4} (one in ten thousand). That cancer risk level is 100 times higher than the cancer risk associated with the RSL. Consequently, concentrations that are above the RSL but less than 100 times the RSL may contribute cancer risk, but that cancer risk would not be sufficiently high to require remediation. For RSLs based on non-cancer risk, the RSL is associated with a hazard quotient of one (a level of exposure considered safe, even for sensitive individuals). In this instance, concentrations below the RSL are considered to be without substantial non-cancer risk. A concentration above the non-cancer risk-based soil RSL would indicate a potential for non-cancer hazard. If a representative soil concentration for an exposure area was above the non-cancer risk-based RSL and exposure was occurring, that would suggest that remediation may be required (to be confirmed by a risk assessment). Human health risk assessments typically use RSLs adjusted to a hazard index of 0.1 (instead of 1.0) to screen chemical concentrations and to select chemicals to be included in the risk assessment calculations.

The COI definition will be added to the list of abbreviations and text will be clarified as necessary. Compounds exceeding RSLs will be acknowledged in the draft OU1/OU2 RI.

Comment No. 64: Pages ES-12 through ES-14. Please reference the tables that identity the background samples (Tables 2.4-1 2.4-2, and 2.5-1 through 2.5-3) in the background discussion sections. These tables should be limited to the final background datasets.

Response No. 64: The data tables will be modified to include only those data sets USEPA and Olin agree are applicable as reference locations for specific streams.

USEPA Reply: Based on review of the HHRA Interim Deliverable #2, Olin continues to use one of the sediment/surface water locations (SDBK-002) that EPA does not approve.

Olin Response to USEPA Reply: *This will be corrected in the HHRA as well as the RI.*

Comment No. 66: Page ES-15. North Pond sample data should be included in the RI report as it will be available before the report is finalized.

Response No. 66: The North Pond data will be presented in a separate stand-alone report that will eventually be added to the RI as an appendix.

USEPA Reply: North Pond and the data associated with it should be included in the body of the OU1/OU2 RI text, figures, and tables.

Olin Response to USEPA Reply: *The North Pond Investigation Memorandum, which has been provided to USEPA, will be included as an Appendix in the RI and summarized in the Nature and Extent (Section 4) of the draft OU1/OU2 RI. Tables and figures will be referenced in the body of the RI as well.*

<u>Section 1.0</u>

Comment No. 77: Page 1-4. Section 1.3. Please include a stand-alone section upfront that discusses the Site/Property itself (not just all the features). Section 1.3 has separate sub-sections for various site areas, i.e. Plant B, containment area, ditch system, etc. There should be a separate description of the former manufacturing area, the undeveloped area east of the containment area (partly wetland), and the land around West Ditch Wetland. Note Section 1.4 site history explains various uses within the manufacturing area - warehouses, Plant A vs. Plant C vs. Plant D etc. Some words from this section along with words at the start of Section 1.3 could be moved into a subsection on the former manufacturing area.

Response No. 77: A brief summary section will be provided that does not make section 1.4 repetitive. The area called the Central Wetland will be introduced. The on- and off-Property West ditch are discussed.

USEPA Reply: The West Ditch is discussed in the draft OU1/OU2 RI; however, the soil exposure area identified in the HHRA as EA2 is not discussed in Section 1.3. Please apply the “Central Wetland” terminology to the HHRA as well as the RI.

Olin Response to USEPA Reply: *As requested, the HHRA and draft OU1/OU2 RI will include this terminology for “Central Wetland.”*

Comment No. 79: Page 1-6. Section 1.3.2. Please reword the discussion about the capture area for the slurry wall/cap containment area as the slurry wall/cap does not "fully contain" the on-property DAPL as the monitoring wells located outside the slurry wall/cap display. Suggested to modification of "The slurry wall fully contains the on-property DAPL and overlying groundwater located within the containment structure." with the following: "The slurry wall was designed and built to form a perimeter barrier around a discrete area of the Site where DAPL and DAPL-impacted overlying groundwater had been identified. As stated above, this source control action was intended to contain DAPL and to eliminate to the extent feasible (not fully contain) overlying groundwater. The effectiveness and degree of containment provided by this structure is undergoing evaluation through hydraulic pulse interference testing and will also be evaluated as part of OU3".

Response No. 79: The comment mischaracterizes the statements in the report. The report states" The intent of this source control action was to eliminate, to the extent feasible, the on-Property DAPL source material as a source of dissolved constituents to groundwater." Therefore the slurry wall contains the Diffuse Layer over the DAPL which represents the resultant dissolved contaminants whose source is the DAPL. The report does not state the Slurry Wall fully contains the DAPL.

USEPA Reply: Delete the sentence on Page 1-6. Section 1.3.2: "The slurry wall fully contains the on-Property DAPL and overlying groundwater located within the containment structure."

Olin Response to USEPA Reply: *The sentence will be deleted as it does not change the meaning or context of this section. However, the fact is that the slurry wall does fully contain the on-Property DAPL and overlying groundwater located <u>within the containment structure</u>. This sentence does not say (and certainly was not intended to say) that the slurry wall contains all on-Property DAPL and diffuse groundwater period.*

Comment No. 84: Page 1-6. Section 1.3.3 discusses the Ephemeral Drainage, which flows into Lower South Ditch - have any samples been collected in this area? If so, should this data be included in RI/ HHRA/ ERA? This area is in close proximity to samples used as background soils, is there potential to use sediment/surface water samples in this area for background sediment/surface water?

Response No. 84: Seven sediment samples were collected in Jan 2000 in this general area (RSD-09 through RSD-15). The samples collected from locations RSD-11 through RSD-15 were collected from the soil background area. The samples collected from locations RSD-09 and RSD-10 were collected just east of the soil background area. The only organics detected in any of the samples were TMPs (low concentrations only in RSD-09), acetone, and BEHP (only in RSD-10). There were no Site-related organics detected in any of the RSD samples collected from the soil background area. Metal and inorganic concentrations in samples collected from samples RSD-11 through RSD-15 do not indicate evidence of any Site-related impacts. Therefore, these sediment samples are considered representative of an area where no manufacturing activities are known to have occurred and

where impacts did not occur. The current background dataset that has been agreed upon with USEPA is adequate.

USEPA Reply: At the request of EPA, Olin has provided the data for these samples in an email (June 10, 2013). Based on EPA review of the information provided, EPA requested that Olin include samples RSD-09 and RSD-10 as surface soil samples in the nature and extent, HHRA, and ERA evaluations of EA 4 with the explanation that these "sediment" samples are "wetland soils." Although these two samples were collected as "sediment" in 2000, they are more likely representative of wetland soil (Olin concurred with that statement). There are no other soil samples collected at these locations included in the EA4 surface soil dataset. TMPs were detected in one of these two samples and BEHP in the other. Olin should include these samples in the EA4 soil dataset; consistent with the Site-wide inclusion of older soil data that remains representative of current conditions (has not been removed from the Site). Because of low concentrations of detected metals and organics, EPA concurs that samples RSD-11 through RSD-15 do not represent an impacted area. Because of the age of the data and the physical contrast between the ephemeral drainage area and other OU1 and OU2 surface water bodies, EPA concurs that the samples collected from RSD-11 through RSD-15 are not appropriate for use as sediment background samples. See HHRA Interim Deliverable #2, Comment No. 1.

Olin Response to USEPA Reply: *The data associated with samples RSD-09 and RSD-10 will be added to the surface soil data set for EA4 and will be included in the risk assessments for EA4.*

Comment No. 91: Page 1-9. Section 1.3.8. The DAPL description needs to include the backup on how DAPL is defined. The description is very specific on concentrations and is assumed to be based on specific groundwater data. As the OU1/OU2 report will "describe in general terms the nature of surface water interaction with impacted groundwater to the extent that such interaction has resulted in impacts to surface water" then this description is important to clarify in OU1/OU2 RI and not wait until OU3 RI.

Response No. 91: The definition of DAPL and the Diffuse Layer has been reviewed with USEPA on several occasions. References to definitions will be provided.

USEPA Reply: Definitions need to be included in the OU1/OU2 (and OU3) RI document (s). The reader should not be forced to acquire and review additional documents in order to understand DAPL and the Diffuse Layer.

Olin Response to USEPA Reply: *DAPL and Diffuse Layer are and were defined in Section 1.3.8 paragraph 3 of the draft OU1/OU2 RI. This definition will be augmented with the threshold values of major constituents that were used in the empirical equation to estimate DAPL density.*

Comment No. 94: Page 1-11. Section 1.4.2.1. What is HEXA? Please define.

Response No. 94: HEXA was a shortened name for hexamine.

USEPA Reply: The definition for HEXA should be added to the text or spelled out as hexamine in the text.

Olin Response to USEPA Reply: *HEXA will be defined in Section 1.4.2.1 of the draft OU1/OU2 RI as requested.*

Comment No. 95: Page 1-11. Section 1.4.2.1. It should be noted that Nitropore OT and Nitropore 5T were included in the preliminary RI analyte list, but were eliminated because of a lack of toxicity information and EPA analytical methods. Has any new information become available that would suggest re-visiting this decision? Please include in uncertainty discussion.

Response No. 95: No new information has become available. There is no toxicity information or chemical analytical data that would allow either compound to be addressed in the uncertainty discussion.

USEPA Reply: The uncertainty discussion (in the HHRA) should acknowledge potential contaminants, such as Nitropore OT and Nitropore 5T, which were used or produced at the Site but not analyzed for in Site media because of a lack of EPA analytical methods or toxicity information.

Olin Response to USEPA Reply: *This information will be added to the HHRA uncertainty discussion.*

Comment No. 96: Page 1-13. Section 1.4.2.2. Complete the PCB discussion with the inclusion of the most recent sampling results and the intended removal of the contaminated soil.

Response No. 96: As mentioned in prior comments Olin will keep EPA apprised of the results of the PCB sampling and if it decides to conduct a voluntary removal action.

USEPA Reply: Data from the PCB sampling should be added to the OU1/OU2 RI regardless of any future cleanup actions. Evaluation of PCB data within EA1 under the HHRA and under nature and extent in the OU1/OU2 RI should be included.

Olin Response to USEPA Reply: *Appropriate PCB data will be included in Nature and Extent (Section 4) of the draft OU1/OU2 RI and evaluated as appropriate in the HHRA.*

Comment No. 100: Page 1-17. Section 1.4.2.5. This section discusses a 150,000 water tank that is not included on Figure 1.3-2 that identifies on site tanks.

Response No. 100: The large tank is Tank 7 that is still used for storage in the Plant B system.

USEPA Reply: Please revise and include this tank on appropriate figure and within the text.

Olin Response to USEPA Reply: *The tank will be included and identified as requested.*

Comment No. 101: Page 1-18. Section 1.5, discussion of Section 4 states that discussion of vapor intrusion assessment for TMPs is included in Section 4; however, it is not. Brief discussion occurs in Section 5.2. Section 5.3 states that this pathway has been evaluated and is not currently a complete migration pathway. However, no VI assessment has been provided in the RI.

Response No. 101: The VI assessment is part of the second interim HHRA deliverable.

USEPA Reply: Please revise the OU1/OU2 (and later OU3) RI discussions based on this assessment.

Olin Response to USEPA Reply: *The VI evaluation will be discussed in greater detail in Fate and Transport (Section 5.3) of the draft OU1/OU2 RI with regards to pathway to receptors.*

Section 2.0:

Comment No. 107: Page 2-4. Section 2.1. Were sediments and soils removed from Central Pond disposed of off-site?

Response No. 107: Yes.

USEPA Reply: Please revise the text accordingly.

Olin Response to USEPA Reply: *Text in the draft OU1/OU2 RI will be revised accordingly.*

Comment No. 109: Page 2-4. Section 2.1. Where are RSO-6 and A8-CW-1? Please provide time frame for soil PAH hot spot removals here. Also Olin has stated at numerous meetings that PAHs are not a site-related contaminant. Does this removal action have implications for the discussions of PAH data adequacy?

Response No. 109: The removal actions were conducted in 2000 and were very small volumes and are discussed in Section 2.1.6.1.2.8 of Appendix A. These areas had been identified as hot spots because they met the definition of hotspot per the MCP. These removal actions do not have any implications concerning the adequacy of PAH characterization data. The A8CW-1 excavation was 10 feet wide, 10 feet long and 3 feet deep. The RSO-6 excavation was 12 feet wide, 14 feet long and 8 feet deep. Four confirmatory sidewall samples (A8CW-1-N, A8CW-1-E, A8CW-1-S, A8CW-1-W and RSO-06-N,RSO-06-E, RSO-06-S, RSO-06-W) and one bottom of excavation sample (A8CW-1-B

and RSO-06-B) were collected. The locations of the confirmation samples are shown on Figure 4.1-1. The figure is searchable using the find function in Adobe PDF to assist in locating the samples.

USEPA Reply: Please include a brief definition of a hotspot per the MCP. Further, provide clearer location information within the text of the OU1/OU2 RI to a specific section within Appendix A. Note that Appendix A was neither formally commented on nor modified since 2007 and there may be conflicting information to the OU1/OU2 RI. To avoid these conflicts, specific location within the FRI needs to be made so that it is clear to the reader what has transpired.

Olin Response to USEPA Reply: *The definition of a hotspot per the MCP will be included in the draft OU1/OU2 RI text and the reader will be directed to Appendix A - Section 2.1.6.1.2.8 of the FRI. There is no conflict between this information and the OU1/OU2 RI.*

Comment No. 111: Page 2-4. Section 2.1, EPH/VPH. Also Page 2-9. Discussions throughout the RI on the AS/SVE system are confusing. Based on review of the Semi-Annual Status Reports, it is apparent that there is still some portion of the AS/SVE system that continues to operate; yet the RI indicates that this system is closed. Some clarification in the various locations of the RI is needed to provide the correct status of the system.

Response No. 111: A majority of the system was removed based on MassDEP approval. The remainder of the AS/SVE system located immediately adjacent to Plant B Tank farm is not currently operating but the system components have not been removed per request of USEPA.

USEPA Reply: Please clarify the text accordingly.

Olin Response to USEPA Reply: *The text will be clarified as requested.*

<u>Section 3.0:</u>

Comment No. 115: Page 3-2. Section 3.2.1 appears to be based primarily on the 400-series borings. Borings from previous investigations should be used to supplement this information in locations where 400-series borings were not installed. For example, the FRI refers to boring logs from monitoring wells in the MMBW, which indicated that peat deposits could be up to 30 feet thick and could have implications for fate and transport in this area.

Response No. 115: Cross Sections of the MMBW were provided in the RI Work Plan.

USEPA Reply: Please include the cross sections, perhaps as an appendix, so the OU1/OU2 RI can be a stand-alone document and doesn't cause the reader to acquire and review additional documents. The focus of this comment is the use of new borings as a supplement to existing previous geological data. See Stakeholder Comment No.1 (GeoInsight).

Olin Response to USEPA Reply: *The cross-sections will be included as requested. New overburden borings were not installed along the alignment of these cross-sections.*

Comment No. 117: Pages 3-5 through 3-9. Section 3.3 should also include a discussion of the hydraulic conductivity and transmissivity of the shallow overburden groundwater. This is necessary to support Section 5.2's discussion of the migration pathways and expected fate of contaminants in surface water bodies.

Response No. 117: A reference to hydraulic conductivity data that was compiled for the groundwater model described in the FRI will be provided.

USEPA Reply: The hydraulic conductivity data should be included and discussed in the OU1/OU2 RI and not simply referenced.

Olin Response to USEPA Reply: *Hydraulic conductivity of the overburden aquifer will be discussed in Section 3.3 the draft OU1/OU2 RI. The table summarizing hydraulic conductivity test data from the groundwater model appendix in the FRI will be included and referenced in the text.*

Comment No. 118: Page 3-6, last paragraph. Groundwater gradients and the water levels used to calculate them should be provided either in a table or an appendix to support the discussion of vertical gradients.

Response No. 118: As mentioned previously, the synoptic water level data will be tabulated and provided. Horizontal gradients may be calculated from figures 3.3-1 and 3.3-2.

USEPA Reply: Calculations of horizontal gradients should be provided and not left up to the reader. Vertical gradients should also be determined and provided.

Olin Response to USEPA Reply: *Representative horizontal gradients for overburden groundwater will be calculated. The paired well data (shallow-deep) from the synoptic rounds will be used to calculate vertical gradients of the Site. These will be summarized in Section 3.3.*

Comment No. 119: Page 3-6, Section 3.3 refers the reader to the RI/FS Work Plan. Given the Work Plan consists of numerous documents, the definition of shallow and deep groundwater site wide (not just MMBW/MMBA – with the deep groundwater at 20 feet) needs to be clearly stated so that the terms "shallow" and "deep" groundwater are appropriate.

Response No. 119: The reader will be referred to the volume, section and page where the discussions were presented.

USEPA Reply: It is not acceptable to force the reader to locate and find such basic information in another document. A simple definition of "shallow" and "deep" groundwater in on-property areas should be added to the text of the OU1/OU2 RI.

Olin Response to USEPA Reply: *Shallow and Deep groundwater definitions and discussions that have been used to prepare groundwater contour figures will be provided as requested in Section 3.3.*

Comment No. 120: Page 3-7 through 3-9. Available surface water flow information should be added to the description of each applicable surface water body described in Section 3.3.1.1.

Response No. 120: Other than the flow measurements collected as part of the RI for the MMBW, only flows in the South Ditch have been quantified. These were summarized in the FRI and referenced in the RI report. That summary will be pulled forward and inserted into the South Ditch discussion.

USEPA Reply: Seasonal water flow variations and whether they are often dry have been noted in other surface water bodies in the OU1/OU2 RI. This type of qualitative information should be added if it is available for consistency.

Olin Response to USEPA Reply: *The only water body which has been observed to go dry seasonally is the middle reach of South Ditch and this will be clarified in the document. On-Property West Ditch and Ephemeral Drainage are ephemeral.*

Comment No. 121: Page 3-7. Section 3.3.1.1. North Pond is described as being under investigation for potential inclusion in OU2. As North Pond is a surface water body, it should be described in this section; although there is apparently no current surface water connection, please note the historical connection. Please include samples from here in Section 4.0 and describe the potential migration pathways in Section 5.0 as applicable.

Response No. 121: A separate report will be prepared for North Pond when all data is available and validated. If the North pond data indicates it should be included in the OU1/OU2 RI then adjustments to the document will be included at that time.

USEPA Reply: Regardless of what the North Pond data indicate, the evaluation should be included in the OU1/OU2 RI.

Olin Response to USEPA Reply: *The North Pond Investigation Memorandum, which has been provided to USEPA will be included as an Appendix and summarized in the Nature and Extent Section 4 of the draft OU1/OU2 RI with reference to appropriate tables and figures.*

Comment No. 122: Page 3-7. Section 3.3.1.1, Off-Property West Ditch. The text states that 20 of the 38 acres in this watershed are either impervious or standing water. The acreage which is impervious (e.g. pavement or buildings) should be specified on a figure, as this has

implications for surface water flow. Please clarify surface water flow direction site-wide, but in particular in this area relative to the wetland west of Jewel Drive.

Response No. 122: Location of buildings and roadways on the figures is adequate to indicate the general extent of impervious surfaces. An aerial photographic background was on figures since it tends to obscure text and investigation labels on figures that have a lot of data presented on them. This level of information is not required for an RI report. Paved surfaces and buildings are also readily available on Google Earth and other mapping programs. Arrows will be provided on figures depicting site features for surface water flow directions.

USEPA Reply: EPA disagrees that the amount of pervious vs. impervious surfaces is "too much detail" for an RI, given the fact that surface water and sediment are a major part of the RI report. Please indicate on a figure which areas are impervious.

Olin Response to USEPA Reply: *Site-wide surface water flow directions will be specified on a new Figure 3.3-3. An aerial photograph depicting pervious vs. impervious surfaces in vicinity of jewel Drive and the off-PWD will be added as Figure 3.3-4.*

Comment No. 123: Page 3-7. Section 3.3.1.1, On-Property West Ditch. The relationship between the Off-Property West Ditch (off-PWD), on-PWD, and South Ditch should be clarified. Is it possible for water to flow from the off-PWD into the on-PWD, or vice versa, or does the surface topography prevent this?

Response No. 123: Surface topography prevents a direct connection between the on-PWD and off-PWD. Both ditches flow into South Ditch.

USEPA Reply: Response accepted. Please revise the text as appropriate.

Olin Response to USEPA Reply: *The text will be revised as requested.*

Comment No. 125: Page 3-8, Section 3.3.1.1, Central Pond. The statement that the underlying aquifer is unconfined requires additional evaluation. Local stratigraphy (boring logs) and an evaluation of relative water levels between the pond and nearby shallow monitoring wells/piezometers should be used to support this. Also describe the size of the drainage area for this feature.

Response No. 125: The unconsolidated deposits in this portion of the property consist of fine to coarse sand and sand with gravel. Concurrent surface water elevation survey data and water level data do not exist. Based on topographic and water table elevation information contained in the RI report, the elevation of the bank or land surface around the pond is approximately 80 feet MSL and the groundwater elevation in the vicinity of the pond is around 78 feet MSL. The water in the pond is typically several feet below the land surface. The nearby wells are water table wells (screened across the water table) and the pond elevation and the water table elevation appear to be the same. There is no indication

geologically of silty material in the stratigraphy and the pond sediments were excavated to underlying soil (sandy unconsolidated deposits). Therefore by definition and supporting information, the underlying aquifer is unconfined. By inspection of topography in Figure 3.1-1, the drainage area for Central Pond is small and of very limited extent and does warrant calculation at this time.

USEPA Reply: It is assumed that the response should state that the drainage area does *not* warrant calculation. Please revise and include this write up in the OU1/OU2 RI.

Olin Response to USEPA Reply: *As requested, the text will be revised to state that the drainage area does "not" warrant calculation.*

Comment No. 127: Page 3-9. Section 3.3.1.1, Landfill Brook. The section notes that flocculent was noted through the reach of the brook included in the temperature survey. Which portion of the brook does this include?

Response No. 127: The entire section that fronts the Woburn Sanitary Landfill.

USEPA Reply: Response accepted. Please revise the text as appropriate

Olin Response to USEPA Reply: *The text will be revised as requested. In addition, at the request of EPA, this condition will also be noted in the evaluation of the Woburn Sanitary Landfill on water quality within Landfill Brook.*

<u>Section 4.0:</u>

Comment No. 129: Page 4-1. Section 4.1.1. This section titled "Sources" discusses previous remediation activities. Please merge this section into Section 2.1, with the following comments applied:

a. Section 4.1 of the Draft FRI should be referenced.

b. Please show both source areas remediated AND those potential source areas that were investigated on a figure, as well as DAPL pools.

c. Is the mentioned "waste water treatment plant" shown on a figure or described in the text. EPA would like information on the operations of this treatment plant. Is it the same as the "pretreatment plant" described briefly in section 1.4.2? Does this represent a possible source of NDMA?

d. Discussion of isolation and containment of DAPL has not been confirmed.

Response No. 129:

a. The reference will be added.

b. Historic sources, though remediated are germane to the nature and extent of contamination and the very brief summary will be retained in Section 4. Section 2 will be referenced as well for more detailed information.

c. The waste water treatment plant by east Warehouse was investigated with 4 soil borings none of which detected NDMA in soil and is not considered a potential source of NDMA. This facility was used to pre-treat water that went to the MDC sewer.

d. The statement in the text discusses the DAPL **area** (emphasis added) and that the intent was to "to eliminate, to the extent practical, migration of groundwater from within this **area** to surface water in the South Ditch". DAPL is a discrete aqueous phase and is not groundwater. Furthermore, DAPL is denser than water and cannot migrate to surface water.

USEPA Reply:

b) Please include potential source areas and DAPL pools on a figure.

d) The DAPL in this area presumably has a diffuse layer above it, which can certainly contaminate water. Just as with DNAPL, the DAPL presence is a potential source of continuing contamination to groundwater, which may move through this area. The emphasis on area does not negate the original comment

Olin Response to USEPA Reply: *Currently the known extent of DAPL pools will be provided as Figure 1.0-3 at an appropriate scale that allows depiction of the Containment Area, including the on-property and off-property portions of the Upper DAPL Pool and the Main Street DAPL Pool.*

Comment No. 131: Page 4-2. Section 4.1.2. Several analytes exceeded SSLs; the soil leaching comments (Comments 221-226) discuss soil leaching and SSLs.

Response No. 131: The leaching evaluation was conducted per agreement with USEPA. Please see Olin's response to comments 221-226.

USEPA Reply: Please refer to the specific responses for comments indicated in Olin's response and include this information in Section 4.1.2.

Olin Response to USEPA Reply: *Please see Comments 221 and 222 below and how they will be addressed. As requested, Comments 223-226 will be addressed as previously indicated. Groundwater distribution figures for the following analytes: Cr, Cr+6, TMPs, NDPA, and BEHP along with further general discussion of the SSLs will be provided in Section 4 of the draft OU1/OU2 RI. It should be noted that Olin pointed out and USEPA concurred that the overly conservative nature of the SSLs precludes their use for developing a useful, realistic assessment of actual expected impact in groundwater from vadose zone soil contamination. The only reasonable approach to answer this question, which Olin provided in Appendix J with USEAP agreement, is a comparison of frequently detected chemicals of interest and*

site groundwater. The SSLs will not be used to determine which groundwater distributions need to be developed.

Comment No. 133: *Page 4-3, Section 4.1.2.2 contains several inconsistencies between the text and Table 4.1-2.*

a. The third-most common SVOC detected was pyrene, according to the table. Diphenyl ether was detected in less than 10 samples.

b. Aroclor-1260 exceeded its industrial RSL in the table and was not mentioned in the text.

c. Alpha-chlordane and endosulfan sulfate also do not have industrial soil SSL criteria and should be added to the text.

Response No. 133:

a. The text also considered frequency of detection. It has been agreed to acknowledge compounds with low frequency of detection that exceeded industrial RSLs as well.

b. It has been agreed to acknowledge compounds with low frequency of detection that exceeded industrial RSLs as well. A separate discussion of the PCB area will be included and EPA will be updated as new data is received.

c. Alpha-chlordane and endosulfan sulfate do not have industrial RSLs. These two compounds will be added to the text.

USEPA Reply:

a) EPA agrees that compounds with a low frequency of detection exceeding RSLs should be mentioned in the text. However, the fact remains that pyrene is the third most common SVOC detected and should be listed as one of the SVOCs that was frequently detected, as its detection frequency was much higher than other SVOCs listed.

Olin Response to USEPA Reply: *Pyrene is a PAH and is a common anthropogenic contaminant. The draft OU1/OU2 RI will indicate it was detected frequently; however, it will be acknowledged appropriately as a common anthropogenic contaminant.*

Comment No. 140: Page 4-5. Section 4.1.2, Metals and Inorganics. The described area of hexavalent chromium exceedances of RSLs should be evaluated separately in the HHRA from the rest of EA1. This area also has highest levels of BEHP and NDPA within EA1. See comments on the HHRA Interim Deliverable #1.

Response No. 140: An area east of the former office building which has higher concentrations of TMPs will be separated from EA1 into a new exposure area (EA7). The remaining portion of EA1 will be evaluated as one exposure area.

USEPA Reply: In addition to separating off EA7, the described area of hexavalent chromium exceedances of RSLs should also be evaluated separately in the HHRA from the former manufacturing portions of EA1. See HHRA Interim Deliverable #2, Comment No. 3. This area (encompassing the former disposal areas) also has the highest levels of BEHP and NDPA within EA1. Olin needs to evaluate the former manufacturing and disposal areas separately or provide justification in the OU1/OU2 RI and HHRA for not dividing this area off as its own exposure area. During the June 25, 2013 meeting discussion, Olin offered to provide a technical memorandum to provide assurance that the treatment of EA1 as one large area did not make a significant difference to the results. The technical memorandum will become part of the HHRA uncertainty discussion and carried into the HHRA as an appendix. Please provide this memorandum for EPA approval prior to further evaluation of EA1.

Olin Response to USEPA Reply: *The referenced technical memorandum was recently submitted to USEPA. We have evaluated these areas separately and together in each way that USEPA has requested. The result of these evaluations continues to indicate that there is no unacceptable excess lifetime cancer risk regardless of how the areas are separated. The memorandum provides justification for not sub dividing this area into component exposure areas. This response and the memorandum itself will serve as technical backup for the assumptions made in the OU1/OU2 RI. The evaluation of these areas will be described briefly in the report.*

Comment No. 145: Page 4-6 to 4-7. Section 4.1.2.4 states perimeter concentrations are below RSLs or "published" background. There is site specific background, so why compare to published background?

Response No. 145:

USEPA Reply: This seems like a minor issue that just got missed in the response, but it is flagged here for follow-up.

Olin Response to USEPA Reply: *Background values for arsenic published by the MassDEP are useful and have also been used to place Site specific data in context. The use of this data (unbiased background data) adds to the conclusions that metals (arsenic) represent background conditions at the Site. This has been further supported by statistical analysis of the on-site arsenic distribution.*

Comment No. 146: Page 4-7. Section 4.1.3. No on-PWD surface water was collected during the RI investigations. Please confirm. If this is accurate, please provide some discussion of older surface water data from the On-PWD and an explanation of why no recent surface water samples were collected.

Response No. 146: The on-PWD is not a flowing ditch or stream and therefore SW samples were not collected and none were specified in the approved work plan or the work plan addendum.

USEPA Reply: If older surface water data exists, it should be discussed and the explanation above added to the text. If it does not exist, no correlation between sediment and surface water should be drawn in the OU1/OU2 RI for this area.

Olin Response to USEPA Reply: *Older surface water data does not exist. The collection of surface water samples was not required in the approved work plan or the work plan addendum.*

Comment No. 147: Page 4-7. Section 4.1.3.1. The first paragraph states that Table 4.1.4 compares the surface water results to maximum background concentrations, but it does not. Olin has acknowledged that there are no valid background locations for comparison to the on-site surface water and sediments. For MMBW, background concentrations from the SDBK-004 should be used. For East Ditch, background concentrations from the SDBK-001 should be used. Appropriate reference criteria should be used for comparison for both surface water and sediment. Section 4.0 and Tables 4.2-4 through 4.2-10 should compare surface water and sediment results to federal and state sediment/surface water screening benchmarks and to background where appropriate.

Response No. 147: It has been agreed to use those specific locations as reference samples for comparison. The human health and ecological risk assessments utilize surface water and sediment screening criteria to evaluate the surface water and sediment data.

USEPA Reply: The response to this comment did not address the request to compare surface water and sediment results to federal and state sediment/surface water screening benchmarks in the Section 4.0 text and tables. Olin's response to Comment No. 18 above indicates a willingness to provide comparison of surface water data to Ambient Water Quality Criteria in Section 4.0. EPA recommends comparing sediment data to recreational soil RSLs as a conservative measure for purposes of the nature and extent discussion.

Olin Response to USEPA Reply: *As mentioned previously, surfacewater discussions will reference AWQCs. There are no federal/state screening benchmarks for sediments. Therefore, sediment samples from OU1 and OU2 will be compared to reference locations SDBK-001 for the East Ditch and SDBK-004 for MMBW. Olin does not agree that comparing sediment data to recreational soil RSLs is appropriate. None of the surface water bodies evaluated in the RI Report have been identified as recreational areas. The use of recreational soil RSLs to evaluation delineation of nature and extent would not be appropriate. Evaluation of the significance of the data with respect to risk will be conducted in the Baseline Ecological Risk Assessment, and where appropriate, the Human Health Risk Assessment.*

Comment No. 149: Page 4-7, Section 4.1.3.1. The third paragraph of this section describes surface water in relation to nearby shallow groundwater samples. This discussion should either include a reference to specific figures depicting the groundwater concentrations discussed, or

should be expanded to describe the location of the monitoring wells in more details. Also, "diffuse characteristics" is vague. Add details or reference a figure that shows these.

Response No. 149: The definition of diffuse characteristics is not vague as the working definition of diffuse material; is that is has specific conductance ranging from 20,600 µS/cm to 3,000 µS/cm. A table will be provided that lists the detected analytes in groundwater.

USEPA Reply: Please ensure that the table in question also identifies the monitoring wells and the concentrations of all parameters which are commonly detected and above screening criteria. The term "diffuse characteristics" should be replaced with the specific definition noted in the response or provide a reference for this definition.

Olin Response to USEPA Reply: *The surface water tables will list the AWQCs as screening criteria and the report will discuss what constituent concentrations in surface water are above those criteria. There are no applicable "screening criteria" for groundwater results that are directly comparable to surface water. Evaluation of the significance of the surface water data will be conducted in the Baseline Ecological Risk Assessment.*

A summary table of analytes detected in groundwater collected from wells with characteristics of Diffuse material will be added to the RI. This will include data from for GW-202D, GW-202S, GW-202BR, GW-79S, GW-55S, and GW-55D which provide context for groundwater/ surface water interactions near South Ditch. In addition this table will include data from other shallow and deep groundwater wells that are germane to explaining the origin of specific constituents detected in South Ditch surface water. These wells include GW-202S, GW-10S/D, GW-208S/D and GW-78S. Groundwater from GW-79S is appropriate for surface water for Central Pond and the Detention Basin. Groundwater from GW-202S is also relevant to surface water in the adjacent Detention Basin. The term "diffuse characteristics" will be defined as described in the original response as requested.

Comment No. 152: Page 4-8, Section 4.1.3.2. The third sentence states that the analytes detected were found at concentrations lower than adjoining water bodies. This conflicts with the first sentence, which states that Central Pond has no surface water inlet or outlet. If the first sentence is true, then the third sentence should be revised to "…nearby water bodies". Also, it is not clear which water bodies and samples this sentence is referring to. The closest sample is PZ-16RR from the South Ditch. If this is the sample in question, then the statement is incorrect for calcium (SD-501 from the Central Pond is 190 mg/L as opposed to 57 and 72 mg/L at PZ-16RR).

Response No. 152: Central Pond has no outlet. The sentence will be revised to "adjacent water bodies". South Ditch is adjacent to Central Pond.

USEPA Reply: This part of the Response is accepted. In addition, as requested in the original comment, please clarify which samples the text is referring to.

Olin Response to USEPA Reply: *The text refers to sample locations shown in Figures 4.1-29 through 4.1-36 surface water. Concentrations within Central Pond are lower than corresponding concentrations at surface water location PZ-16RR with the exception of calcium. As requested, the text in Section 4.1.3.2 will be revised accordingly.*

Comment No. 154: Page 4-8, Section 4.1.3.2. Surface water samples from Central Pond were not analyzed for specialty compounds other than NDMA as agreed to by EPA. In light of the detections of hydrazine, formaldehyde, nonylphenol, and Kempore in the nearby South Ditch, please provide an explanation for not analyzing for these site-specific specialty compounds. Is nearby groundwater also impacted by these contaminants?

Response No. 154: Upper South Ditch is impacted by discharge of groundwater with dissolved phase concentrations consistent with Diffuse Layer material. The groundwater in vicinity of Central Pond is not.

USEPA Reply: Please provide details/support for the statement that groundwater in the vicinity of Central Pond is not impacted by discharge of groundwater with dissolved phase concentrations consistent with Diffuse Layer material. Surface water (1 sample) and sediment data (9 samples, but 7 of the 9 samples were only analyzed for aluminum, iron, and chromium) from Central Pond presented in the HHRA Interim Deliverable #2, Attachment 2, Tables 16 and 24, indicate some evidence of contamination, including detections of numerous metals and inorganics, including sulfate, in surface water and detections of TMPs and inorganics, including sulfate and hexavalent chromium, in sediment. Based on this review of the data, further surface water and sediment sampling is being warranted at this water body, including specialty compounds.

Olin Response to USEPA Reply: *As summarized in the draft OU1/OU2 RI, Central Pond was remediated by excavation and sediments were disposed off-site in 2000. Any impacts to surface water and sediment in Central Pond would be associated with the presence of shallow groundwater. Although the available surface water and sediment data (metals, inorganics, TMPs) indicate some impact associated with migration of shallow groundwater into Central Pond, the available groundwater analytical data for specialty compounds from the area around Central Pond (GW-79) indicate that specialty compound impacts to surface water and sediment are unlikely to be significant. Groundwater results from monitoring well (GW-79) adjacent to Central Pond, has been sampled and analyzed for specialty compounds three times. Results are tabulated below.*

Chemical	Units (ug/L)	GW-79S-DUP	GW-79S	GW-79S
Hydrazine	ug/L	0.2 U	0.2 U	0.2 UJ
Monomethylhydrazine (MMH)	ug/L	0.5 U	0.5 U	0.5 UJ
UDMH	ug/L	0.5 U	0.5 U	0.5 UJ
Acetaldehyde	ug/L	30 UJ	30 U	30 U
Formaldehyde	ug/L	30 UJ	30 U	30 U
Phthalic Acid/Phthalic anhydride	ug/L	10 U	10 U	10 U
4-(1,1,3,3-Tetramethylbutyl)phenol	ug/L	0.95 U	0.95 U	0.95 UJ
4-Nonylphenol (Tech.)	ug/L	3.8 J	3.2 J	6.1 J
Nonylphenol Diethoxylate	ug/L	19 U	19 U	19 UJ
Kempore (Azodicarbonamide)	ug/L	1000 UJ	1000 UJ	1000 UJ
OPEX	ug/L	100 UJ	100 UJ	100 U

Results indicate non-detectable concentrations for all specialty compounds with the exception of nonylphenol. Nonylphenol was the only detected specialty compound at concentrations ranging from 3.2 to 6.1 ug/L. These concentrations are lower than the AWQC of 6.6 ug/L and the REACH screening benchmark of 54 ug/L. Based on the groundwater data (adjacent to Central Pond), the collection of additional specialty compound data is not necessary for characterizing nature and extent or for characterizing risk. The available data for surface water and sediment, including metals, inorganics, VOCs, and SVOCs are adequate for the purposes of characterizing nature and extent and for conducting the risk assessments for Central Pond.

Comment No. 155: Page 4-8, Section 4.1.3.3. Surface water samples from the Stormwater Detention Basin were not analyzed for specialty compounds other than NDMA as agreed to by EPA. In light of the detections of hydrazine, formaldehyde, nonylphenol, and Kempore in the nearby South Ditch, please provide an explanation for not analyzing for these site-specific specialty compounds. Is nearby groundwater also impacted by these contaminants?

Response No. 155: The concentrations of detected analytes in the detention basin are low compared to Upper South Ditch and shallow groundwater underlying Upper South Ditch which is an active groundwater discharge area.

USEPA Reply: Please explain that the detention basin is not an active groundwater discharge area because of its relatively high elevation. This discussion should also be added to Section 3.0. Surface water (1 sample) and sediment data (2 samples) from the detention basin presented in the HHRA Interim Deliverable #2, Attachment 2, Tables 15 and 23, indicate some evidence of contamination, including detections of NDMA, N-nitroso-di-propylamine, and numerous metals including hexavalent chromium, in surface water and detections of TMPs, BEHP, NDPA, and metals in sediment. Based on this review of the data, further surface water and sediment sampling is warranted at this water body, including specialty compounds.

Olin Response to USEPA Reply: *We will explain that the detention basin is not an active groundwater discharge area as requested. However, additional surface water and sediment sampling is not warranted as per the following discussion.*

As summarized in the draft OU1/OU2 RI, the Detention Basin was created by blasting into bedrock prior to construction of the slurry wall. The northern side of the detention basin is a concrete wall that abuts the slurry wall. The drain for the surface water on the temporary cap discharges to the detention basin. The outlet structure maintains the surface water elevation at 80.32 feet MSL. During periods when surrounding groundwater elevations are greater than 80.32 feet MSL, groundwater may be discharging into the Detention Basin. Groundwater elevation data from wells GW-78S, PZ-24, PZ-25, GW-202S, and GW-202D indicate that such conditions do periodically exist. The bedrock ridge was blasted, was highly resistant and blasting may have contributed locally a blast fracture pattern in shallow bedrock. Otherwise the transmissivity of the bedrock is expected to be low, similar to GW-202BR.

The primary pathway of impact to surface water and sediment would be through shallow groundwater. As presented in the RI and HHRA, given the low concentrations of NDMA, ammonia and sulfate, there is evidence of minimal impact from groundwater on the surface water of the Detention Basin. Groundwater adjacent to the Detention Basin (GW-202S) has been sampled and analyzed for specialty compounds two times. Results are tabulated below.

Chemical	Units	GW-202S		GW-202S	
1,1-Dimethylhydrazine	ug/L	0.5	UJ	0.5	U
4-Nonylphenol	ug/L	38		29	
Acetaldehyde	ug/L	30	U	30	U
Formaldehyde	ug/L	30	U	30	U
Hydrazine	ug/L	0.2	UJ	0.2	U
Kempore (Azodicarbonamide)	ug/L	1000	U	1000	U
Methylhydrazine	ug/L	0.5	UJ	0.5	U
Nonylphenol Diethoxylate	ug/L	19	U	19	U
OPEX	ug/L	100	U	100	U
Phenol, 4-(1,1,3,3-Tetramethylbutyl)-	ug/L	0.95	U	0.95	U
Phthalic Acid/Phthalic anhydride	ug/L	10	U	10	U

Results indicate non-detectable concentrations for all specialty compounds with the exception of nonylphenol. Nonylphenol was the only detected specialty compound at concentrations ranging from 29 to 38 ppb. These concentrations are lower than the REACH screening benchmark of 54 ug/L. Based on the groundwater data (adjacent to the Detention Basin), the collection of additional specialty compound data is not necessary for characterizing nature and extent or for characterizing risk. The available data for surface water and sediment, including metals, inorganics, VOCs, and SVOCs are adequate for the purposes of characterizing nature and extent and for conducting the risk assessments for the Detention Basin. Given the broader

range of detected analytes in sediment it is reasonable that organic contaminates in groundwater partition to highly organic sediment present in the detention basin that has accumulated from decomposition of aquatic plants in the basin.

Comment No. 156: Page 4-8 and 4-9, Section 4.1.4.1. The most frequently detected SVOCs are BEHP, phenol, and benzaldehyde, according to Table 4.1-7. Phenol and benzaldehyde should be added and 3,4-dimethylphenol removed. A large number of metals were detected in every sample collected and should be included in the list of most-frequently detected analytes. These metals include arsenic, barium, beryllium, cadmium, cobalt, copper, lead, magnesium, manganese, nickel, potassium, silver, vanadium, and zinc.

Response No. 156: Metals are naturally occurring and soluble and it is expected they will be detected frequently, as they are in reference or background samples. The presence of other chemicals will be acknowledged in the text as well as those metals that are naturally occurring. The purpose in focusing on the other most commonly detected analytes is to alert the reader to those constituents that are most characteristic of the chemical impacts, and are ultimately the most important. All the constituents are considered in the risk characterization and those which are important from a risk perspective will be identified. It is equally important to not distract the readers understanding of the site by placing undue emphasis on detected constituents that are of minor or little importance.

USEPA Reply: In Section 4.0, it is commonplace to describe how many metals have been detected while also indicating how many of those metals exceeded comparison criteria. It is important to give an overall picture and then, through comparisons to criteria, begin to narrow down the discussion to those most “important”. Please revise the text accordingly.

Olin Response to USEPA Reply: *The most frequently detected metals and metals exceeding RSLs will be identified and discussed to highlight those that are most important to understanding impacts at the Site in Section 4 of the draft OU1/OU2 RI.*

Comment No. 160: Page 4-10. Section 4.2.1. Olin states Plant B area is the source of TMPs to East Ditch. Is this also the source of TMPs to Central Pond and the Stormwater Detention Basin? Please discuss in Section 5.0.

Response No. 160: The source of low levels of TMPs will be discussed from a fate and transport perspective.

USEPA Reply: Please ensure the discussion in Section 5.0 will now include Central Pond and the stormwater retention basin.

Olin Response to USEPA Reply: *Plant B area is definitively not the source of TMPs to Central Pond and the Detention Basin. A discussion of impacts to Central Pond and the Detention Basin will be included in Section 5 of the draft OU1/OU2 RI,*

as requested. The TMPs present in the vicinity of South Ditch are not related to Plant B.

Groundwater in the vicinity of Plant B, and which is not captured by Plant B, flows eastward. The fifteen shallow overburden groundwater wells located between Plant B and Central Pond and the Detention Basin did not detect TMPs. (E-10, W-10, GW-304, GW-305, GW-306, GW-307, GW-308, GW-6S, GW-17S, GW-7, GW-79S, GW-78S, GW-51S, and GW-52S). The corresponding five deep overburden wells also did not detect TMPs (GW-52D, GW-6D, GW-3D, GW-51D, and GW-17D).

Comment No. 161: Page 4-10. Section 4.2.1. Please add possible migration of groundwater to headwaters of Landfill Brook. The headwaters of the brook are south of the contaminated drinking water wells on Cook Ave. Therefore, it is not unreasonable to assume groundwater migration may also contaminate the brook. The headwaters of the brook are located down gradient of the Site and cross gradient to Woburn Landfill.

Response No. 161: A detailed discussion of the evidence of geochemical impacts from the Woburn Sanitary Landfill to groundwater surrounding Landfill Brook and Landfill Brook will be prepared.

USEPA Reply: In addition to a detailed discussion about the Woburn Sanitary Landfill, please include details about the potential groundwater impacts from the Site to the headwaters of the (down gradient) Landfill Brook.

Olin Response to USEPA Reply: *Based on a thorough review of hydrogeology associated with the headwaters of Landfill Brook and the surrounding area, including groundwater chemical data, groundwater impacted by the Olin site is not impacting the headwater of Landfill Brook. The deep bedrock groundwater impact at Cooke Ave residential wells consists of low part per trillion concentrations of NDMA, and has no bearing on groundwater quality within the Landfill Brook headwaters. This information was presented to USEPA in a meeting on November 19, 2013. As discussed in said meeting, impacts from the Woburn Landfill to Landfill Brook will be described in Section 4 of the draft OU1/OU2 RI. The discussion summarizes the hydrogeologic setting and geochemical discrimination of impacts from the Woburn Sanitary Landfill to the headwaters of Landfill Brook and downstream. As discussed in the meeting, the impacts from the Olin Site are certainly de minimis, if even measurable, and the draft OU1/OU2 RI will conclude that Landfill Brook is not impacted from releases at the Olin Site.*

Comment No. 162: Page 4-10. Section 4.2.2. West off-Property soils have been eliminated from the risk assessment as representative of an area not impacted by the Site. Please demonstrate this by discussion and presentation of west off-property soils separately from east off-property soils.

Response No. 162: A table presenting only the soil data from off Property locations to the west of the site will be added and the data will be discussed separately as requested.

USEPA Reply: Upon further review of data from the Pam Am railway soils, EPA concludes that these soils (and this area) should be carried through the quantitative risk assessment. Also see HHRA Interim Deliverable #2, Comment No. 1.

Olin Response to USEPA Reply: *Analytical data associated with soil samples from the off-property locations west of the Site will be included in the summary of investigations (Section 3) and the nature and extent (Section 4) portions of the draft OU1/OU2 RI. At the November 19, 2013 meeting with the USEPA, the topographic setting of the Pan AM railroad bed was discussed along with the elevated arsenic and PAHs in soil that are associated with the former railway activities. It is our understanding following this meeting that USEPA concurs that these impacts are unrelated to the Olin Site and do not represent data gaps. The nature and extent evaluation (Section 4.0) of the draft OU1/OU2 RI will present this information and conclude that the soil samples collected off-Property to the west represent impacts from the Pan AM railroad bed rather than impacts from the Olin Site, and therefore are not part of the Site, and will not be evaluated quantitatively in the HHRA for the Site.*

Comment No. 166: Page 4-11, Section 4.2.2.1, Perimeter. In addition to arsenic and chromium, elevated concentrations of PAHs (benzo(a)pyrene), as shown in Figure 4.1-14, are present west of the property. Therefore, PAHs have not been bounded in this area. Olin asserts it is not feasible to bound west of SS445. Please confirm that this sample is as close to the drainage swale as possible.

Response No. 166: Sample SS-445 is on the eastern side of the property. Please clarify the comment.

USEPA Reply: Sample SS-445 was a typo – SB-443 is west of the property and benzo(a)pyrene is above the industrial RSL. Please confirm that this sample is as close to the drainage swale as possible.

Olin Response to USEPA Reply: *SB-433 sample was collected at the top of the slope located on the former Pan AM railroad bed, adjacent to off-PWD. As discussed in the November 19, 2013 meeting with USEPA, railroads are sources of PAHs and other constituents. This is supported by the high frequency of PAH detections in Off-PWD sediment adjacent to the rail bed. Olin will also include information summarized from the MassDEP BMP-Development of Rail Trails, specifically that "Railroads are known to have elevated metals, pesticides, (such as lead arsenate), and constituents of oil or fuel (petroleum products). It would not be uncommon to find arsenic (up to ten times natural background levels) present in the soil along a right-of-way from old railroad ties dipped in an arsenic solution, arsenic weed-control sprays, and arsenic laced slag used as the railroad bed fill. Lubricating oil and diesel that dripped from the trains are likely sources of the petroleum product found along the lines. Other sources of contaminants associated with historic railroad operation may include coal ash from engines, creosote from ties, and PAHs from the diesel exhaust."*

Comment No. 167: Page 4-12. Section 4.2.3.1. There is concern about the usability of surface water and sediment samples SDBK-002 and SDREF-012 as background. In March 2013 meetings with Olin, it was agreed that the sample location SDBK-001, north of the Eames Street Bridge, was a valid background location for comparison to the East Ditch surface water and sediments and that sample location SDBK-004, the Wildwood Street location, was a valid background location for comparison to the MMBW samples. SDBK-002 and SDREF-012 are located at or in close proximity to the Spinazola Landfill. Olin is using the combined background information from the two questionable sampling locations as well as SDBK-001 and SDBK-004 to bolster their argument for not evaluating MMBW. Olin assured EPA that it would not be using background surface water and sediment to eliminate COPCs or calculate risks associated with background conditions, but here the background is used to eliminate not just COPCs, but an entire area. EPA considers SDBK-004 as the only valid background sample location for comparison to surface water and sediment samples at MMBW.

Response No. 167: This issue has been discussed and resolved per other comments on the same topic.

USEPA Reply: Based on a review of the HHRA Interim Deliverable #2, Olin continues to use one of the sediment/surface water locations (SDBK-002) that EPA does not approve.

Olin Response to USEPA Reply: *The HHRA will be revised to address this inadvertent oversight.*

Comment No. 172: Page 4-13 and 4-14, Section 4.2.3.3, Metals and Inorganics. Other inorganics detected in every surface water sample from the East Ditch include nitrate, barium, copper, iron, magnesium, manganese, and sodium. These should be added to the text.

Response No. 172: These additional analytes will be noted while acknowledging those which are naturally occurring and /or not necessarily site-related.

USEPA Reply: See HHRA Interim Deliverable #2, Comment No. 1 and note that contaminants that may occur naturally, but also have known historical use or production at the Site, should be acknowledged as potentially Site-related.

Olin Response to USEPA Reply: *As discussed with the USEPA, analytes known to be associated with raw materials, products, or waste streams etc. at the Site will be identified as chemicals of interest. The East Ditch discussion will include reference to metals and inorganics identified above in the original comment. The text will be revised to indicate whether or not these analytes are potentially related to the Site.*

Comment No. 174: Page 4-14 Section 4.2.3.3 states “further downstream (EDSD/SW0)”, but this sample is north on the upstream end of East Ditch.

Response No. 174: Flow direction reverses in East Ditch north of Eames Street due to changes in the grade of the rail road bed. Discussion of direction is relative to flow.

USEPA Reply: Agreed, but the second sentence of the text states that the discussion starts north or upstream of the facility at "EDSW0", which contradicts the response. EPA suggests separating the discussion into sections for each reach of the ditch so that each "upstream to downstream" discussion stands on its own. Note: please present the location names consistently or clarify if these are two different sample locations.

Olin Response to USEPA Reply: *The discussion of East Ditch will be clarified as suggested by dividing the discussion into reaches.*

Comment No. 175: Page 4-14. Section 4.2.3.3. Are ammonia and NDMA sufficiently bounded in East Ditch? EPA notes that although ammonia and NDMA levels at the southern end of East Ditch are lower than those found in South Ditch, ammonia concentrations in this area are still above the ecological benchmark and NDMA concentrations in this area are still detected well above the tap water RSL. It is currently inconclusive on whether ammonia and NDMA in surface water have been adequately delineated in surface water in the East Ditch. EPA recommends collecting additional surface water samples from ED SD/SW7 and/or further downstream.

Response No. 175: Ammonia and NDMA are sufficiently bounded in East Ditch. As per previous discussions with USEPA on the matter, NDMA was not detected in the sample collected from EDSD/SW 7 during the most recent sampling event (November 2012). Ammonia was detected, but at low concentrations. Sample EDSD/SW 7 is approximately 800 feet from Halls Brook Holding Area, which is associated with the Industriplex site remedy. Ammonia concentrations are known to be elevated in the Halls Brook Holding area, in fact well in excess of the ammonia concentrations detected in the south end of East Ditch. Therefore, additional sample collection for ammonia from the south end of East Ditch would not yield results that would lend any additional explanation to the nature and extent considerations of the RI.

USEPA Reply: Although NDMA was not detected in the most recent sampling event (November 2012), it was detected in the previous round (June 2012). Collection of additional samples would be necessary to reach a conclusion that NDMA is bounded to the south in East Ditch.

Ammonia continues to be detected and EPA cannot conclude that ammonia contamination in East Ditch is fully bounded. However, EPA does concur that the full nature and extent of contamination in this area of East Ditch has been sufficiently characterized, and in consideration of existing conditions immediately downstream of EDSD/SW 7, EPA concurs that additional sample collection from the south end of East Ditch would not yield results that would lend any additional explanation to the nature and extent considerations of the OU1/OU2 RI.

Olin Response to USEPA Reply: *No response required.*

Comment No. 181: Page 4-16, Section 4.2.3.5, SVOCs. The second paragraph compares NDMA concentrations to ecological screening benchmarks. If used, these benchmarks should be identified and the specific concentrations listed for comparison. In addition, please include a comparison to tap water screening levels.

Response No. 181: A reference to the BERA will be added. The BERA contains the ecological screening benchmarks.

USEPA Reply: The reader should not be forced to look through another document to find the comparison benchmarks. Please include ecological screening benchmarks when using them for comparison.

Olin Response to USEPA Reply: *The text in Section 4.2.3.5 will be revised to identify the NDMA benchmark.*

Comment No. 182: Page 4-16, Section 4.2.3.5, Specialty Compounds. The section describes a review of the distribution of hydrazine and formaldehyde. This distribution should be described (e.g. locations where detected and not detected). Also, hydrazine is not a common contaminant. Additional evidence is required for the assertion that hydrazine and formaldehyde detected in the wetland are not related to the site.

Response No. 182: Formaldehyde occurs naturally and is as a common anthropogenic contaminant that is deposited atmospherically. Hydrazine is an unstable compound and is difficult to analyze for due to interferences that can result in false positive detections. For hydrazine to be site-related and present in the wetland it would need to be transported in groundwater at significant concentrations from the Site. Hydrazine is detected sporadically at the site but always at low concentrations. There is no documented groundwater pathway from the Site that could explain the detection of hydrazine in only one sample at a low estimated concentration (e.g. below the reporting limit). When a compound is detected only once from multiple samples and sample rounds and at such low estimated concentrations it should not be assumed to be present unless there is other data that clearly documents a confirmed migration pathway.

USEPA Reply: The text included in Olin's response should be included in the Section 4.0 text. However, it should also be noted that both formaldehyde and hydrazine have been used/stored at the Site, leading to the possibility that their presence could be Site-related. Without having an understanding (yet) of groundwater interactions with these contaminants, and without knowing whether groundwater could act as a migration pathway, these contaminants cannot be ruled out as being from solely non-site-related sources. See HHRA Interim Deliverable #2, Comment No.1.

Olin Response to USEPA Reply: *The text in Olin's response will be included in Section 4.0 as requested. In addition, the nature and distribution of these constituents in overburden groundwater will be discussed and presented on a figure.*

Comment No. 184: Page 4-17. Section 4.2.4.2. Off-Property West Ditch - Because of the small size of the sediment dataset and the lack of movement of sediment, inclusion of older data from 2003 and 2004 may be a reasonable approach.

Response No. 184: The recent RI sediment data set is adequate as agreed with USEPA and inclusion of older data is not necessary.

USEPA Reply: There are three samples, two of which were evaluated for VOCs, SVOCs, metals, inorganics, and specialty compounds. The third was evaluated for VOCs, SVOCs, metals, and inorganics, but most of the VOCs and SVOCs results were rejected. This is the comment made on the OU2 data gaps memo Olin sent out in March 2013: "The RI dataset is very small, too small to 'reliably calculate risk'. EPA acknowledges the limited area. No further sampling is requested. Because of the small size of the dataset, and the lack of movement of sediment, inclusion of older data from 2003 and 2004 may be a reasonable approach. Otherwise, risk calculations will be based on maximum concentrations. Even with the inclusion of older data, the dataset may still be too small for calculation of 95%UCLs for some contaminants; however, the dataset would be considered adequate to evaluate risk." The March 7, 2013 meeting notes state that we agreed to use just these three samples in the risk assessment, but to use older sediment data as well as the RI sediment data in the nature and extent evaluation. Please revise this section to reflect this approach.

Olin Response to USEPA Reply: *The nature and extent evaluation for the off-PWD will be revised to include the historical sediment data.*

Comment No. 185: Page 4-17. Section 4.2.4.2. Olin used background, including Spinazola locations, to conclude off-PWD sediments are not site related. As noted in Comment 167, EPA is not in agreement with the use of these samples as background. Off-PWD sediments should be retained and evaluated in the HHRA.

Response No. 185: The off-PWD sediments were not excluded from the HHRA and a trespasser scenario was evaluated.

USEPA Reply: EPA agrees that the off-PWD sediments were not excluded from the HHRA and a trespasser scenario was evaluated. However, EPA is not in agreement with the use of these samples as background. See Comment No.167.

Olin Response to USEPA Reply: *Olin has agreed not to use the two background sediment samples near the Spinazzola Landfill as reference locations. The draft OU1/OU2 RI text will be revised accordingly.*

Comment No. 187: Page 4-18, Section 4.2.4.2, Specialty Compounds. Formaldehyde was detected in both samples analyzed for. Given the common presence of formaldehyde in environmental media (including on-property soil, sediment and surface water), the formaldehyde detected may have originated at the property. Further evaluation of the formaldehyde is required to rule out the property as a source.

Response No. 187: Formaldehyde occurs naturally and is as a common anthropogenic contaminant that is deposited atmospherically. USEPA references concerning formaldehyde in the environment will be provided.

USEPA Reply: Given that formaldehyde was used as a raw material and produced as a by-product, it is not reasonable to assume that the formaldehyde is naturally occurring at this Site without more data. This could include a comparison to background.

Olin Response to USEPA Reply: *References concerning formaldehyde and the environment will be included. Reference locations were not analyzed for formaldehyde. The formaldehyde analytical data for sediment samples from the off-PWD will be compared to all other formaldehyde analytical data associated with sediment samples collected from the South Ditch (OU1) and separately, for OU2 (East Ditch, MMBW) to determine if there is evidence of a site-related release to the off-PWD sediments. A preliminary review of the data suggests similar concentrations of formaldehyde in sediments from off-PWD, South Ditch, East Ditch, and MMBW. The concentrations in the MMBW (furthest from the site) are actually somewhat higher than in the other locations. The distribution of formaldehyde in overburden groundwater will be presented and discussed as an additional line of evidence that the widespread detection of formaldehyde in the environment is unrelated to the Site.*

Comment No. 189: Page 4-18. Section 4.2.4.3. Olin suggests other sources, including "Industriplex and Woburn Landfill", for sediments in East Ditch contaminated with ammonia, chromium, hexavalent chromium. Industriplex is located downstream from Olin and the relationship needs to be clarified. Please discuss the relationship between these sites in greater detail in Section 5.0.

Response No. 189: It was pointed out that there were and are multiple sources for impacts to East Ditch. Industriplex boundary along East Ditch starts in front of the Woburn Landfill where removal actions occurred.

USEPA Reply: The response does not address the comment, which requires additional details. Olin will need to include these potential sources on a map, explain which may or may not be down gradient or downstream, and evaluate the concentrations emanating from these other potential sources if they believe them to be sources.

Olin Response to USEPA Reply: *The point of the draft OU1/OU2 RI text in question was not to suggest that the Olin Site was not a contributor to the East Ditch, but was one of several potential contributors. For example, the USEPA Final Site Inspection Prioritization Report for E.C. Whitney (1993) identifies Raffi and Swanson, US Pigments and Resins; E.C. Whitney Barrel and Woburn Landfill, and other as inputs. That study focused primarily on VOC and fuel oil compounds. In addition, concentrations of ammonia and chloride in sediment from Landfill Brook are higher*

than those found in South Ditch. Currently, sediment is not present between East Ditch/South Ditch confluence and East Ditch/Landfill Brook confluence. As such, it is not feasible through sampling to quantify other potential inputs other than Landfill Brook. Olin will clarify the text in the draft OU1/OU2 RI.

Comment No. 192: Page 4-21, Section 4.2.4.5, Specialty Compounds. Formaldehyde was detected in 49 of 50 OU1 surface soil samples, 16 of 26 OU1 shallow subsurface samples, and 43 of 45 OU1 deep subsurface soil samples. It was also detected in surface water and on-site sediment. Discussion of groundwater is needed before determination of what contaminants in MMBW are or are not site-related. Therefore, formaldehyde cannot be considered "not" a site-related constituent and should be retained.

Response No. 192: Formaldehyde occurs naturally and is as a common anthropogenic contaminant that is deposited atmospherically. Further discussion of groundwater will also be provided.

USEPA Reply: As noted above in comment No. 187, it should also be noted that formaldehyde has been used/stored at the Site, leading to the possibility that its presence could be Site-related. Without having an understanding (yet) of groundwater interactions with these contaminants, and without knowing whether groundwater could act as a migration pathway, this contaminant cannot be ruled out as being from solely non-site-related sources. See HHRA Interim Deliverable #2, Comment No.1.

Olin Response to USEPA Reply: *Formaldehyde is frequently detected but it is detected in a narrow and consistent range at low concentrations in surface, and subsurface soil. Formaldehyde was also detected in five background soil samples at similar concentrations. The maximum concentration detected in surface and shallow and deep subsurface soil is 5 orders of magnitude lower than the Industrial RSL. There are no areas of anomalously elevated concentrations of formaldehyde in soil at the Site that would be indicative of a release. The high frequency of detection and the uniformly low concentrations indicates formaldehyde is widely distributed in the environment and it presence is likely due to anthropogenic sources. The USEPA Air Toxics Program fact sheet on formaldehyde reports it is detected in ambient air in urban areas nationwide from anthropogenic sources that include power plants and automobile exhaust. Aquatic screening levels (literature derived AWQCs) for formaldehyde are 2-3 orders of magnitude higher than concentrations detected in South Ditch surface water. Lastly formaldehyde is not detected in any shallow groundwater well sampled on-property. It was only detected in one deep overburden groundwater well on- property (GW-10DR). Formaldehyde is present in DAPL.*

The body of RI data indicates formaldehyde is not a COI for OU1/OU2 soil, or surface water and is not transported to surface water from groundwater.

Section 5.0:

Comment No. 199: Page 5-3. 3rd paragraph. Section 5.2. Please include Landfill Brook in the surface water features within the Aberjona Watershed.

Response No. 199: Landfill Brook will be included with appropriate acknowledgement that impacts there are not site-related.

USEPA Reply: Please include the results of the evaluation prior to making the statement that impacts there are not Site-related. See HHRA Interim Deliverable #2, Comment No.1.

Olin Response to USEPA Reply: *The information presented to the USEPA during the November 19, 2013 meeting concerning the Woburn Sanitary Landfill and its impacts on Landfill Brook will be included in the draft OU1/OU2 RI.*

Comment No. 200: Page 5-3, last paragraph. Section 5.1. Arsenic was detected above industrial RSLs and site-specific background concentrations in soil, with a maximum concentration of 56 mg/kg in soil. Additional evaluation is required to support the contention that none of the arsenic is site-related.

Response No. 200: Additional discussion will be provided.

USEPA Reply: Also see HHRA Interim Deliverable #2, Comment No. 1.

Olin Response to USEPA Reply: *Statistical review of the arsenic data indicates it is a single sample population with distinct outliers (i.e., a large difference in arsenic concentrations for specific samples) that were identified in soils located along the Pan AM railroad bed, and the OU2 soils in EA5. These two off-property locations are adjacent to railway lines and have higher arsenic concentrations than any of the on-property exposure areas, the Containment Area, and the background soil sample areas.*

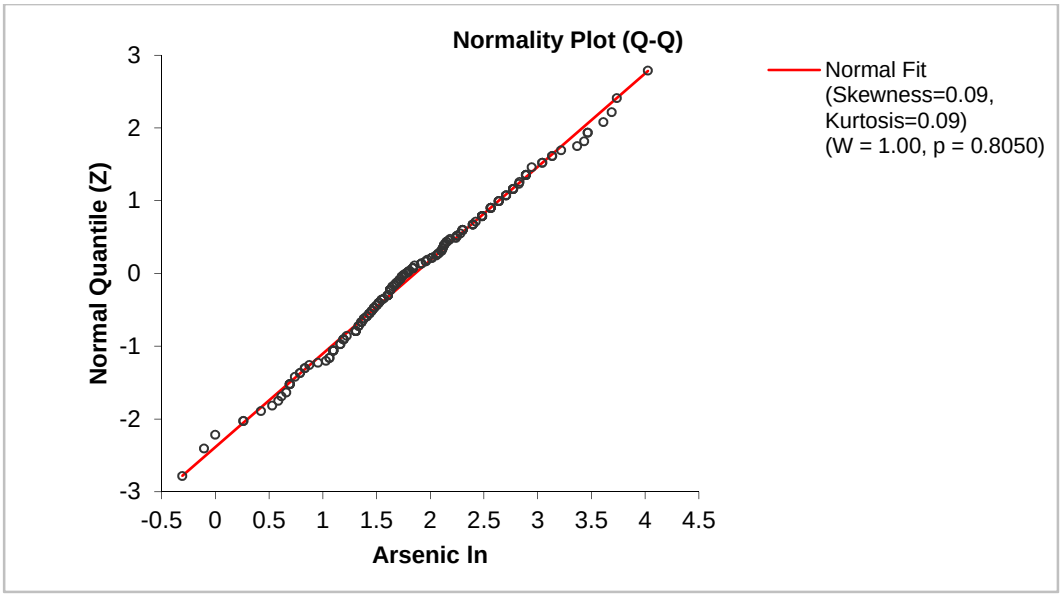
As indicated in the MassDEP BMP-Development of Rail Trails; "Railroads are known to have elevated metals, pesticides, (such as lead arsenate), and constituents of oil or fuel (petroleum products). It would not be uncommon to find arsenic (up to ten times natural background levels) present in the soil along a right-of-way from old railroad ties dipped in an arsenic solution, arsenic weed-control sprays, and arsenic laced slag used as the railroad bed fill."

This information suggests that sources and releases of arsenic should be expected at the two off-property locations (Pan AM railroad bed and EA5) from railroad operations.

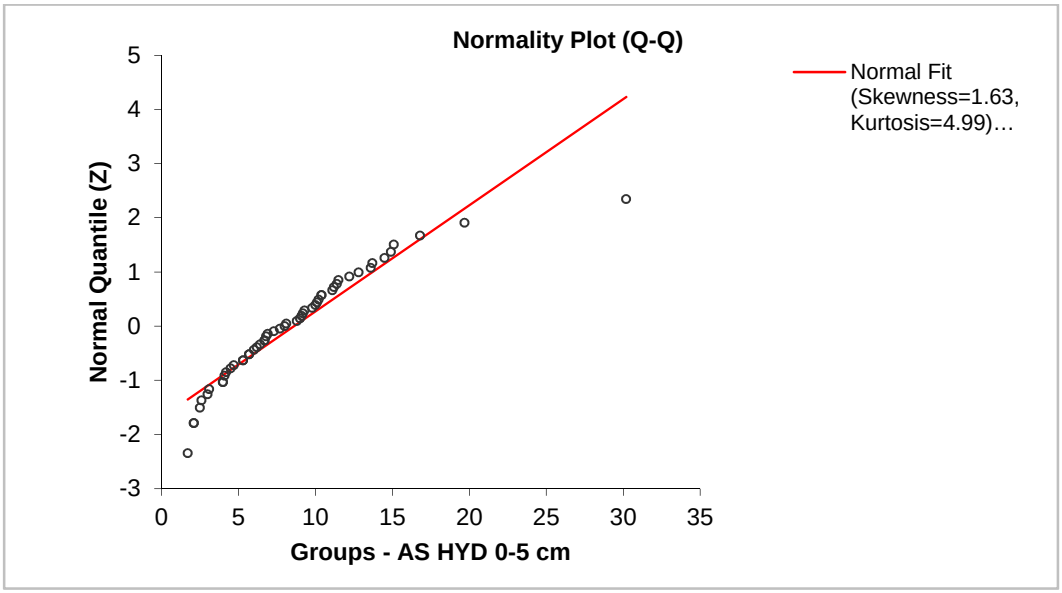
The following graphs represent the distribution of arsenic in soil for OU1 with the two outlier areas (Pan AM railroad bed and EA5) removed from the sample population

and of USGS Soil Background Data for Maine and New Hampshire. Both data sets are Log-transformed with normal distributions that represent a single sample population that is background.

Arsenic Log-transformed – Surface Soil (Olin Data) (Normal-One Population)



USGS – Arsenic Log-transformed Background Soil – Maine & New Hampshire



Review of the graphs and data indicate arsenic concentrations are consistent in OU1 surface soils among all of the exposure areas and represent a single sample population. This would indicate a background data set and does not indicate a release of arsenic.

Comment No. 204: Page 5-4. Section 5.2. There is potential for vapor intrusion into future buildings associated with TMPs in both areas of soil TMP impacts (under the parking lot east of the former administrative building, as well as in the EPH/VPH area).

Response No. 204: The HHRA will contain an evaluation for vapor intrusion.

USEPA Reply: Discussion is needed in Section 5.2 based on the results of the HHRA VI evaluation contained in HHRA Interim Deliverable #2.

Olin Response to USEPA Reply: *The VI evaluation will be discussed in Section 5.2 and Section 6.0 of the draft OU1/OU2 RI.*

Comment No. 205: Pages 5-5 through 5-7. Sections 5.2.1 and 5.2.2 contain numerous statements with no evidence in the report to support them. Additional information is needed as follows:

a. Water levels have not been provided to substantiate the assertion that vertical hydraulic gradients are small within the aquifer beneath the MMBW. The following should be added to Section 3.0 and referenced in this section: water level data and gradient calculations based on that data. Contaminant travel times should also be discussed in these sections.

b. Evidence must be provided for the assertion that the surface water systems are hydraulically connected to shallow groundwater and that most streams receive input from groundwater. These include comparison of water levels in the surface water bodies to nearby shallow monitoring wells or piezometers (this should be added to Section 3.0 and that section referred to in Section 5.0) and comparison of indicator concentrations in surface water bodies to nearby shallow groundwater monitoring points (this should be added to Section 4.0).

c. Groundwater data has not been included in this report to substantiate the statements regarding potential site-related impacts to shallow groundwater. Another subsection should be added to Section 4.0 to address shallow groundwater and assist with evaluation of the surface water. This should include complete analytical results (potentially as a new appendix), discussion of which analytes can be considered site-related for the purpose of determining migration to surface water, and figures showing shallow groundwater concentrations.

Response No. 205:

a. The additional water level data will be provided. Contaminant fate and transport modeling has not been conducted and is very complex due to historical subsurface movement of DAPL and the complex geochemistry associated with diffuse material. Therefore contaminant travel times will not be discussed and is by definition an OU3 topic.

b. Other piezometric data (from the SASRs) will be provided in tables.

c. A subset of pertinent groundwater data will be provided in a summary table or Appendix.

USEPA Reply: *see below.*

a) Contaminant fate and transport modeling of DAPL has not been requested for the OU1/OU2 RI; however, the groundwater velocity and potential transport of dissolved constituents is important in evaluating transport to surface water bodies and should be included.

c) Please provide details on how a subset of pertinent groundwater data will be created.

Olin Response to USEPA Reply: *We will provide water levels as requested and calculation/discussion of vertical gradients to substantiate our positions. However, contaminant travel times are not needed to fulfill the purpose of the RI reporting effort. The fact is that we know where groundwater is impacting surface water (due to the existence of impacts to surface water) and have indicated that we will discuss this in the RI report. We have the data necessary to draw appropriate conclusions regarding nature and extent of contamination in the environmental medial associated with OU1/OU2 and the corresponding risk to human health and the environment (if any exists). This will all be presented in the RI report.*

c. Pertinent groundwater data will be presented in the form of distribution figures for overburden groundwater for constituents which USEPA has indicated an interest in determining whether the chemical/constituent is site related or not.

Comment No. 207: Page 5-6. Section 5.2.1. The exception noted by Olin negates the assertion that the "contaminant migration pathway from groundwater to surface water bodies within the Ipswich watershed via shallow groundwater discharge is not complete". Please remove the statement.

Response No. 207: The pathway is largely incomplete and the statement will stand with acknowledgement of one detection of NDMA.

USEPA Reply: It is difficult to evaluate the assertion that only one location in the MMBW is impacted by Site-related groundwater, as the surface water and sediment results (Table 4.2-6 and 4.2-10) are provided without comparison to any criteria. Other analytes detected in the surface water which are related to plant processes include multiple detections of formaldehyde (as discussed in several comments), Kempore, and NDPrA, in addition to other analytes which may not be as readily traced to the Site as opposed to other sources. Acetaldehyde and formaldehyde were also detected in sediment. Olin should provide additional evidence, such as groundwater flow paths and gradients, to show that the contaminant migration pathway from Olin is not a concern for the MMBW. See HHRA Interim Deliverable #2, Comment No.1. Also note that the list of indicator parameters described on page 5-9, including copper, cobalt, and manganese,

which have been detected in South Ditch surface water, should be used in this evaluation.

Olin Response to USEPA Reply: *First of all, our conclusions are not assertions; they are conclusions based solely on data rather than speculation or contrivance. Second, we have clearly shown that the groundwater impacts related to past site activities only exists to any appreciable extent in deep groundwater underlying MMB. The shallow groundwater is not impacted to a large extent. We only observed NDMA in MMB surface water one time at an estimated concentration (below the laboratory detection limit). Olin has agreed to provide additional discussion of groundwater in context to migration pathways to surface water receptors in the draft OU1/OU2 RI. Olin does not agree that copper, cobalt and manganese detections in South Ditch surface water, which are all naturally occurring elements, have any bearing what so ever on Site impacts, let alone within the Ipswich watershed. Formaldehyde is not a groundwater contaminant with a pathway to the MMB. Kempore has limited solubility and should not be considered a mobile contaminant or a good indicator of contaminant pathways or impact. This will all be demonstrated in the RI report.*

Comment No. 211: Page 5-7. Section 5.3 states that the "VI migration pathway associated with OU1 soil and shallow groundwater at the Property has been evaluated….." Please provide this evaluation.

Response No. 211: The evaluation is included in the second interim deliverable.

USEPA Reply: The VI evaluation in the HHRA Interim Deliverable #2 is limited to a qualitative evaluation of potential VI from OU1 soils. Please delete reference to the VI evaluation of shallow groundwater and note that although the pathway is not currently complete, total VOC concentrations in soil in four areas of the Site (EA3, EA7, the former Lake Poly area within EA1, and the containment area) indicate potential future vapor intrusion concerns if occupied buildings were to be constructed there without preventative measures.

Olin Response to USEPA Reply: *The HHRA will evaluate potential exposure and risk for hypothetical future industrial/commercial buildings that could be constructed in EA3, EA7, and the former Lake Poly area. . The containment area will capped and no buildings will be erected there such that VI is an incomplete pathway.*

The reference to shallow groundwater will be removed. Potential vapor intrusion from groundwater will be evaluated in the OU3 RI.

Comment No. 212: Page 5-9. Section 5.4 states "Hexavalent chromium has not been determined to pose a risk to human or ecological receptors and is not discussed further." What is this determination based on? Please provide supporting information.

Response No. 212: This statement was from the PRI which has a complete RA. The statement will be retained if consistent with the current RA which is based on a larger dataset of hexavalent chromium data.

USEPA Reply: Fate and transport discussion of hexavalent chromium should be included in the OU1/OU2 RI as a Site-related contaminant and potential marker contaminant regardless of the HHRA and ERA. See HHRA Interim Deliverable #2, Comment No.1.

Olin Response to USEPA Reply: *Olin has agreed to include a general discussion of the fate and transport of hexavalent chromium in Section 5.0 of the draft OU1/OU2 RI.*

Comment No. 213: Page 5-9, second paragraph. Section 5.4. Although hexavalent chromium in groundwater may be expected to be rapidly reduced to trivalent chromium in groundwater, it still remains in soil at concentrations above direct-contact criteria. Hexavalent chromium in soil exceeds industrial RSLs and should be discussed.

Response No. 213: The final version of the section 5.0 will consider the final conclusions of the RA and focus on analytes that contribute to risk.

USEPA Reply: Contamination, including hexavalent chromium, with known Site history, should be discussed in the fate and transport section regardless of the results of the risk assessments.

Olin Response to USEPA Reply: *As indicated above, Olin has agreed to include a general discussion of the fate and transport of hexavalent chromium in Section 5.0 of the draft OU1/OU2 RI.*

Comment No. 215: Page 5-10. Section 5.4. This section would benefit from being divided into separate sections describing the fate and transport of the compound groups, rather than a series of bullets: for example, NDMA, ammonia, metals, BEHP/SVOCs, and TMPs/VOCs. Other analyte groups, such as PAHs, should be added to this discussion if they exceed screening criteria.

Response No. 215: The comment will be considered and if re-arrangement of the discussion ads clarity it will be modified.

USEPA Reply: Please revise the text to include other analyte groups, such as PAHs, if they exceed screening criteria.

Olin Response to USEPA Reply: *Other analyte groups such as PAHs will be included and discussed in Section 5.0 as requested to the degree the contaminant is important, relative to risk posed by the contaminant to human or ecological receptors.*

Comment No. 216: Page 5-10. Section 5.4 describes the DAPL fate and transport. The relevance of the DAPL should be tied to the soils, sediment, and surface water.

Response No. 216: The section will be reviewed and additional discussion of DAPL will be included if warranted. Note that DAPL is not applicable to unsaturated soil, sediment and surface water.

USEPA Reply: The additional discussion should also include that the DAPL and the diffuse layer serve as sources of contamination via groundwater to soil, sediment, and surface water.

Olin Response to USEPA Reply: *The CSM relating DAPL and diffuse groundwater and groundwater migration of dissolved constituents to surface water bodies will be included in Section 5.0 of the draft OU1/OU2 RI.*

Appendix E:

Comment No. 217: The following data are missing or not bookmarked:

Description	**On CD (Y/N)**	**Bookmarked (Y/N)**
Lab Reports Associated with DV Report for 2010 OU1 SW/Sediment	No	No
Lab Reports Associated with DV Report for 2010 OU2 SW/Sediment	No	No
Lab Reports Associated with DV Report for June 2011 OU1/OU2 SW	No	No
Lab Reports: 360-33835, 360-33892, 360-34011, 360-34709 (May/June 2011 Slurry Wall)	No	Yes
Lab Reports: 360-35962, 360-35898 (Aug. 2011 Slurry Wall)	No	Yes
November 2011 Slurry Wall GW/SW/Sediment DV Report	Yes	No
Lab Reports: 360-37491, 360-37526, 360-37595, 360-37596	No	Yes
Lab Reports: 360-39255, 360-39262, 360-39434, 360-39540 (Feb-Mar. 2012 Slurry Wall SW/GW)	No	Yes
May/June 2012 Slurry Wall/Cap GW/SW DV Report	Yes	No
Lab Reports: 360-40743, 360-40846, 360-40979	No	No
June 2012 OU2 SW/Sediment DV Report	Yes	No
Lab Reports: 360-41200, 360-41203	No	No
August 2012 Slurry Wall/Cap GW/SW DV Report	Yes	No
Lab Reports: 360-42351, 360-42352	No	Yes
November 2012 Slurry Wall/Cap GW/SW/Sediment DV Report	Yes	No
Lab Reports: 480-28728, 480-28687, 480-28600, 480-28730	No	No
November/December 2012 SW/Sediment OU1/OU2 DV Report	Yes	No
Lab Reports: 480-27937, 480-27939, 480-30406, 480-30497	No	No
December 2012 Soil DV Report	Yes	No
Lab Reports: 480-29484, 480-29598, 480-29976, 480-30106, 480-30197, 480-30346	No	No

Please verify that all laboratory data associated with OU1 and OU2 RI sampling events are included in this document.

Response No. 217: The data content will be verified.

USEPA Reply: Please ensure that the missing data are added to the OU1/OU2 RI.

Olin Response to USEPA Reply: *The above lab data will be reviewed and indicate "when" and "by what means" the data was delivered to the USEPA (e.g. within SASRs). If the data was determined to have been accidentally omitted, it will be provided within the draft OU1/OU2 RI.*

Appendix I:

Comment No. 219: Formaldehyde and acetone are not naturally occurring. Background summary should be limited to metals, inorganics, and PAHs.

Response No. 219: Please consult readily available EPA literature. Formaldehyde is naturally occurring as a well as ubiquitous anthropogenic contaminant.

USEPA Reply: While formaldehyde is naturally occurring, it has a known history of use at the Site and, therefore, inclusion in the background data set is not appropriate.

Olin Response to USEPA Reply: *The background soil data set was agreed to by the USEPA, with consideration to USEPA literature, which states formaldehyde is a ubiquitous anthropogenic contaminant from the atmosphere. Because it is known to be a ubiquitous anthropogenic contaminant, it is quite important to understand it's presence in background so that site-related concentrations of formaldehyde can be placed in context. There is no technical justification by the USEPA to exclude formaldehyde from the background soil data set. Olin will evaluate other information, such as groundwater data, to ascertain if formaldehyde was released in a manner that would result in soil impacts.*

Appendix J:

Comment No. 221: Table 4.2-1 and 4.2-2 include EPA Soil Screening Level (SSL) values. These tables identify a large number of SSL exceedances for contaminants that are not described in Appendix J. Olin may determine that these contaminants are not a concern for leaching, but they should be included in the initial screen. Comparison of the average concentration for contaminants with more than 10 detections to the SSL, if available, found the following contaminants with average concentrations above the SSL:

a. Surface soil (0-1 foot): benzo(a)anthracene, benzo(a)pyrene, benzo(b) fluoranthene, benzo(k)fluoranthene, bis(2-ethylhexyl)phthalate (BEHP), dibenz(a,h)anthracene,

indeno(1,2,3-cd)pyrene, n-nitrosodiphenylamine (NDPA), arsenic, hexavalent chromium, cobalt, iron, lead, manganese, mercury, silver, and acetaldehyde.

b. Shallow subsurface soil (1-10 feet): acetone, ethylbenzene, toluene, benzoic acid, BEHP, butylbenzylphthalate, di-n-butylphthalate, NDPA, antimony, arsenic, hexavalent chromium, cobalt, iron, manganese, mercury, silver, and acetaldehyde.

c. Deep subsurface soil (>10 feet): BEHP, NDPA, arsenic, hexavalent chromium, cobalt, iron, manganese, silver, and acetaldehyde.

d. Olin may elect to use different criteria for comparison, but should explain the selection process in Appendix J. Although additional figures may not be necessary, all analytes retained should be described in Appendix J. Trimethylpentenes do not have SSLs, but should be retained as described in the existing discussion. Presumed site history should not be used to exclude or ignore known elevated soil concentrations.

Response No. 221: Tables 1-1 and 1-2 of Appendix J identify all analytical parameters detected in surface soil and shallow subsurface soil respectively. The tables present summary statistics for each detected parameter in soil and also provide summary statistics for those same parameters in shallow groundwater. If parameters are detected in soil but not in groundwater, or are detected with low frequency and low concentration in groundwater, that is real-world documentation that leaching is nor occurring to any significant degree. A detailed discussion of potential leaching for all parameters with soil concentrations above leaching-based SSLs would not change the conclusion that leaching is not a significant concern.

USEPA Reply: EPA has agreed to the comparison of soil and groundwater data, but requested a comparison to SSLs be provided as a preliminary step leading into the evaluation. Screening comparisons have been provided on tables, but the exceedances have not been discussed or used to help determine what contaminants to then look at in the soil vs. groundwater comparison. Please revise the discussion.

Olin Response to USEPA Reply: *USEPA requested that the SSLs be included for completeness for the draft OU1/OU2 RI. USEPA also acknowledged that the SSLs are extremely conservative and limit their usefulness as reliable indicators of which contaminants will leach from soils resulting in an impact to groundwater. Therefore, Olin compared actual distribution of soil data to actual distribution of groundwater contaminant concentrations to assess whether there were locations of elevated soil impacts that corresponded locally to similar groundwater impacts. These comparisons demonstrate very clearly that potential soil leaching is not a pervasive problem as suggested by the SSLs as a current source of on-going groundwater impacts.*

Comment No. 222: An explanation of leaching mechanisms, including potential percolation (areas of cover and non-covered soil) and depth of groundwater (zones of potential groundwater flow) should be added to the introduction.

Response No. 222: A brief discussion of leaching mechanisms and depth to groundwater at the Site will be added to Appendix J.

USEPA Reply: Please ensure percolation (via permeable vs. impermeable surfaces) is included in the evaluation and discussion of leaching mechanisms.

Olin Response to USEPA Reply: *Our response clearly committed to a discussion of leaching mechanisms as requested.*

Figures:

Comment No. 228: Figure 2.2-4 presents sediment sample locations for the RI discussions. Please include historical samples considered representative of current conditions and included in the HHRA (Figure 2.3-4). These data should be included in the RI discussions.

Response No. 228: As stated in the text, **Figure 2.2-4** identifies the 2010 OU1 RI sediment sample locations. The purpose of this Section 2 figure is to show the 2010 RI sediment sample locations because this particular section of the text is describing that investigation program. No change will be made to the figure.

USEPA Reply: These additional historical sample locations are considered to be representative and should be included on a figure in the OU1/OU2 RI, either on or separate from Figure 2.2-4, with a reference for the reader.

Olin Response to USEPA Reply: *The historic sample locations which are considered to be representative of current sediments will be presented on a separate figure from Figure 2.2-4. These sediments will be discussed in Section 4.0.*

Comment No. 230: Figures 3.3-1 and 3.3-2: Groundwater Elevation Maps –

a. Both figures have a note that water levels from May 2010 were used to verify the shape of the potentiometric surface in the southern portion of the map. The following are comments regarding this note and the plume contours south of the property boundary:

   i. If the data from these monitoring wells are used, they should be added to the figure, preferably with a different symbol to distinguish them from the other monitoring wells.

   ii. GW-75S is screened from 10-20 feet bgs and GW-75D is screened from 36-46 feet bgs. Water levels from GW-75S should have been used instead of GW-75D, which was indicated in the note.

   iii. Water levels from times outside the synoptic water level round are not generally applicable for water level maps. Olin should provide justification for inclusion of these monitoring wells, such as proof that the water levels in these wells do not vary significantly over time.

b. The existing water level maps show features that are not justified by existing data.

   i. The 82-foot contour west of the southern portion of the 51 Eames Street property boundary is shown as a closed loop with the water divide in the center. Although a bedrock knob is located in this area, this information is not sufficient to place the 82-foot contour. Please use dashed lines to represent the entirety of the contour, leaving the western side of the contour not depicted, given the lack of well control. Additional shallow monitoring wells that may have supported interpretations in this area include GW-68D to the east and GW-60S to the northwest. These wells should be included in future synoptic water level rounds.

   ii. The 80-foot contour southeast of the 51 Eames Street property is shown as a closed loop. Contours to the east appear to have been placed arbitrarily, with no well control to bound them. None of the data presented supports this interpretation. The bedrock knob, as shown on Figure 3.2-2 of the draft RI, is also not in the area shown. Wells GW-20, GW-72D and GW-75S should be included in future synoptic water level rounds, and the entire contour set southeast of the property boundary should be cut short if no data is available in this area.

c. For both figures, the northern end of the groundwater divide should be drawn south of the 82-foot contour instead of merging with it for a short distance.

d. The figures are difficult to read at the scale shown and should be re-sized so that the map view is zoomed in.

e. Water level contour scaling should be consistent. The 81.2-foot contour should be removed from both figures. Also, in Figure 3.3-2 the 80-foot contour on the east side of the 51 Eames Street property is adjacent to the 83-foot contour. Please revise as needed.

f. Additional well control is recommended for future synoptic water level rounds in preparation for the OU3 RI, including the area northwest of the 51 Eames Street property (GW-57D) and the area south of the LNAPL extraction area (GW-15, GW-306, or other nearby wells).

Response No. 230: The comments will be considered and discussed further as needed. As contour maps are interpretive by nature it is expected that there will be some disagreement with fine details however the general overall groundwater pattern and interpreted groundwater flow directions that results should not change. Intermediate contours are still equipoentials and are useful where gradients are extremely flat.

USEPA Reply: Factual errors in building the contours and readability issues should be addressed. The presence of apparently arbitrary contours south of the Site implies a degree of specificity that is not known in the southern portion of the Site based on current data. Groundwater contour maps in previous reports have not included these phantom contours. Please revise.

Olin Response to USEPA Reply: *We do not believe any factual errors exist. However, we will review the figures according to the comment to make sure that our groundwater contours are appropriately represented. . All available synoptic data was used and use of any supplemental data was clearly footnoted appropriately if used to improve areas of interpretation where data limitations were noted. Supplementing the primary data set with additional information that has been reviewed and evaluated does not constitute a factual error. Some of the comments suggest interpretative adjustments which will not affect the overall picture of groundwater flow at the Site and are changes which Olin has previously indicated it is not averse to considering. The following provide responses to individual USEPA original comments.*

i. Several wells in the southern portion of the Site no longer exist, but there does exist decades of water level measurements from sampling events which allows an understanding of the consistency and variation of water levels between wells and at well pairs. Supplemental well data used will be noted on the figure.

ii. GW-75S no longer exists. Historical water levels between the now-abandoned GW-75S and GW-75D were evaluated for vertical gradient differences to help place the southern contours. Data used will be shown.

iii. Justification and data will be provided.

iv. The large bedrock protrusion is a major Site hydrologic feature, and is a continuation of a series of bedrock highs that protrude through the overburden , limiting the connection of overburden groundwater on either side of these features. The interpretation in question was based on the topographic contours and the depth of water in overburden observed on the opposite side of the bedrock protrusion when drilling GW-405 BR. That said, there is no objection to showing a gap in the contour as requested or using all dashed lines, as it has no effect on the interpretation of groundwater flow at the Site. Olin previously indicated it would consider this comment but did not see it as having an effect on the overall interpretation of groundwater conditions at the Site.

v. The 80 foot contour surrounds the Woburn Sanitary Landfill (WSL) and is based on topography, and historical groundwater data provided to USEPA. Since USEPA has on several occasions requested that Olin provide, to the extent possible, interpretation of groundwater conditions in this area of the Site, Olin questions why USEPA is now requesting this information be removed. A footnote will be provided concerning the WSL area.

vi. Effects on water levels from Plant B pumping make interpretation of the divide complex. Moving the location slightly south from the 82 foot contour is not objectionable and does not fundamentally change the interpretation.

vii. *We will review the size of the figures with regards to clarity and readability and will adjust them appropriately.*

Comment No. 231: Figure 4.1-1 includes soil samples excluded from the HHRA. **Please distinguish results of data excluded from the risk assessments,** i.e. soils beneath Central Pond and South Ditch, west off-Property soils, VOC/VPH soil data collected in the EPH/VPH area prior to the operation of the AS/SVE, etc. from those used in the risk assessments on the figure and discuss these results separately in the RI. Please present surface soil, subsurface soil, and deep subsurface soil sample locations on separate figures.

Response No. 231: Figure 4.1 was prepared to support the Section 4 discussions of nature and extent of contamination. The samples included in that figure include samples representative of current conditions at the Site and the purpose of the figure is not to discuss the use of samples in the risk assessments (that is discussed in subsequent sections of the report). Figure 4.1-1 will be replaced by three separate figures, one each for surface soil, shallow subsurface soil, and deep subsurface soil.

USEPA Reply: The HHRA interim deliverables discuss data excluded from the HHRA, but the HHRA figure only shows the data included. Please distinguish in the RI the data used in the HHRA.

Olin Response to USEPA Reply: *Figure 4.1-1 will be replaced by three separate figures, one each for surface soil, shallow subsurface soil and deep subsurface soil. Locations not used in the HHRA will be distinguished from data used in the HHRA on the surface soil and shallow subsurface soil figures. The HHRA considered soil to maximum depth of 10 feet for a construction worker exposure condition. By definition, deep subsurface soils are not considered in the HHRA.*

Comment No. 232: *Figures 4.1-2 through 4.1-4:*

a. Arsenic soil figures use site-specific background (95%UPL) for comparison rather than RSLs, yet use the same symbols as the figures for other contaminants. EPA acknowledges the logic of comparing arsenic to background rather than RSLs; however, EPA suggests that different symbols should be used to avoid confusion or misinterpretation.

b. Arsenic contamination may not have been fully delineated in the surface soil (Figure 4.1-2). The Area 5 sample is above site-specific background levels and is close to the edge of the property, with no additional samples to the north to bound these concentrations. In addition, a few samples with concentrations above background represent relatively large areas of potential contamination, as there are no other samples nearby. These include the Area 7 sample and SS-457.

c. “Industrial” is misspelled in the legend of all three figures.

Response No. 232: Legends will be reviewed and corrected as necessary.

USEPA Reply: In addition, please address comment "b" above by indicating in the text what is shown on the figures as incomplete delineation of arsenic in surface soils.

Olin Response to USEPA Reply: *As discussed in the November 19, 2013 meeting with USEPA, arsenic concentrations in soil within the property boundaries represent background conditions. USEPA concurs that elevated arsenic are present due to railroad operations along the Pan AM railroad bed (west of the property) and EA5 (MBTA railway east of the property). Olin will include these discussions in the draft OU1/OU2 RI and USEPA concurrence that the nature and extent of arsenic is delineated. See Response to Comment No. 200.*

Comment No. 233: *Figures 4.1-8 through 4.1-10: In several locations, samples exceed the RSL and are not bounded by relatively clean samples.*

a. Hexavalent chromium may not have been fully delineated in the surface soil to the west of SB-506 (Figure 4.1-8), which is above the RSL. Note that another exceedance of the RSL is located to the southwest as well (SB-510).

b. In Figure 4.1-9, hexavalent chromium exceeded the RSL in SB-510. There are no shallow subsurface samples to the northwest, so delineation may not be complete in this area. Hexavalent chromium also exceeded the RSL in SB-510, which does not have any samples to the west.

c. Figure 4.1-10 shows relatively few hexavalent chromium samples. Three samples exceed the RSL and do not have outer samples to bound the concentrations: SB-518 (nothing to the north and northwest of this relatively high concentration), SB-521 (nothing to the west), and SB-525 (nothing to the south or east).

Response No. 233: Figure 4.1-10 presents hexavalent chromium data for deep subsurface soils (deeper than 10 ft bgs and below the water table). There is no current or foreseeable human or ecological exposure to the isolated soil where these samples were collected.

USEPA Reply: The purpose of Section 4.0 is to present the extent of contamination regardless of whether there are current or foreseeable exposures. Hexavalent chromium concentrations do not appear to be well delineated at any of the three levels presented on the figures. Hexavalent chromium analysis has been extremely limited relative to analysis for other contaminants at the Site as shown on the draft RI figures (soil – Figures 4.1-8 through 4.1-10; surface water – Figure 4.1-31; and sediment – Figure 4.1-39). Because these are RI figures, they do not show exposure areas and may have data that were eliminated from the HHRA. There are no similar figures for just the HHRA samples. Based on the tables, the following was developed:

The COPC selection tables for the HHRA indicate the following total number of samples evaluated for hexavalent chromium by media:

- 72 surface soil samples;
- 31 subsurface (1-10 ft) soil samples;
- 12 surface water samples; and
- 13 sediment samples.

Looking at the data tables in the HHRA Interim #2 (Attachment #2) (data used in the HHRA only), the breakdown by exposure area is as follows:

Surface soil-

i. Exposure area 1 – 22 samples;
ii. Exposure area 2 – 4 samples;
iii. Exposure area 3 – 1 sample;
iv. Exposure area 4 – 5 samples;
v. Exposure area 5 – 16 samples;
vi. Exposure area 6 – 23 samples;
vii. Exposure area 7 – 1 sample; and
viii. Containment area – 0 samples.

Subsurface soil (1-10 ft)-

ix. Exposure area 1 – 29 samples;
x. Exposure area 2 – 0 samples; wetland
xi. Exposure area 3 – 1 sample;
xii. Exposure area 4 – 0 samples; wetland/conservation area
xiii. Exposure area 5 – 0 samples; wetland
xiv. Exposure area 6 – 0 samples; wetland
xv. Exposure area 7 – 1 sample; and
xvi. Containment area – 0 samples.

Surface water:

xvii. South Ditch – 4 samples;
xviii. Stormwater Detention Pond – 1 sample;
xix. Central Pond – 1 sample;
xx. East Ditch – 4 samples;
xxi. Off-Prop West Ditch – 2 samples;
xxii. MMBW – 0 samples; and
xxiii. Landfill Brook – 0 samples.

Sediment:

xxiv. South Ditch – 8 samples;
xxv. Stormwater Detention Pond – 2 samples;
xxvi. Central Pond – 2 samples;
xxvii. East Ditch – 0 samples;
xxviii. Off-Prop West Ditch – 1 sample;
xxix. On-Prop West Ditch – 0 samples;
xxx. MMBW – 0 samples; and
xxxi. Landfill Brook – 0 samples.

Please indicate in the text that this lack of data indicates a data gap for hexavalent chromium that needs to be addressed. See HHRA Interim Deliverable #2, Comment No. 53b.

Olin Response to USEPA Reply: *As discussed with USEPA during the November 19 2013 meeting, the presence of hexavalent chromium represents a subset of the chromium distribution data, which is an extensive data set. In the meeting, the conclusion of this discussion resulted in a recognition that a strong correlation between total chromium and hexavalent species was not supported by the data but that a process could be developed to address USEPA concerns for areas where hexavalent chromium was not analyzed or has few samples (less than 3)*

Attachment 7 of the HHRA Second Interim Deliverable contains a discussion regarding the relationship of hexavalent chromium to total chromium in soil. The discussion concludes that hexavalent chromium is a relatively small percentage of the total chromium detected in soil at OU1 and OU2. Hexavalent chromium is often non-detect in samples for which total chromium is relatively elevated or the ratio of hexavalent chromium to total chromium is often quite low for the higher detections of total chromium. Box plots included in Attachment 7 indicate the spread (quartile range) of total chromium and hexavalent chromium data are not consistent with one another. These findings indicate a general lack of correlation between total chromium and hexavalent chromium concentrations in soil for OU1 and OU2. Surrogate hexavalent chromium concentrations derived for the higher detected total chromium concentrations, using the ratio derived, would result in surrogate hexavalent chromium concentrations that are not likely representative of actual hexavalent chromium concentrations at the Site. Therefore, it would not be appropriate to convert total chromium data to hexavalent chromium concentrations in soil at OU1 and OU2 for purposes of the HHRA. Total chromium soil concentrations should be evaluated as trivalent chromium based on the analysis.

As discussed at the November 19, 2013 meeting at USEPA it was agreed for the HHRA, for a given medium, at any exposure point with fewer than three hexavalent chromium results, an estimate of the hexavalent chromium concentration will be calculated. The estimated hexavalent chromium concentration will be calculated by applying a ratio to each total chromium result for a specific exposure point and medium. The ratio will be the 95% UCL on the mean for the ratio of hexavalent chromium to total chromium for all samples in that medium that have both total chromium and hexavalent chromium results. This estimated hexavalent chromium concentrations will be used to calculate EPCs for those scenarios that have fewer than 3 measured hexavalent chromium concentrations at an exposure point.

Comment No. 234: Figures 4.1-11 through 4.1-13:

a. In Figure 4.1-12, TMP exceedances of the calculated industrial RSL were detected in SB-475 through SB-477. Given that these concentrations are at the property boundary, it

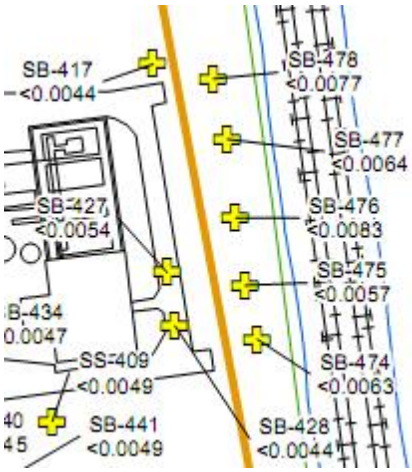
is possible for additional soil contamination to be located across the railroad tracks to the east. Therefore, TMP has not been fully delineated in this area.

b. In Figure 4.1-13, TMP exceedances of the calculated industrial RSL were detected in SB-427 and SB-476 through SB-478. No samples are located to the north or east, suggesting that TMP has not been delineated in this area.

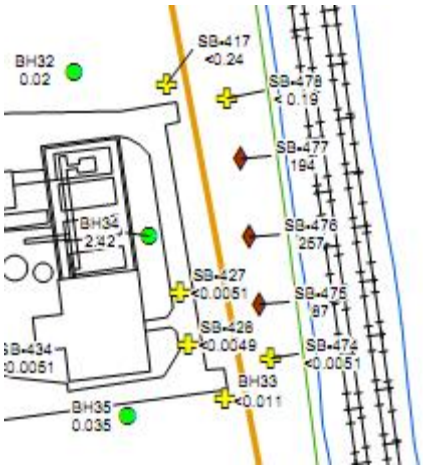
Response No. 234: Samples are located North and South. EPA has acknowledged there is no need to sample to the east and that the railroad embankment prevents this. Olin does not understand why this comment keeps coming up when it was resolved in meeting and on-site discussions.

USEPA Reply: On Figure 4.1-13 the northern most sample exceeds the calculated industrial RSL. Because the figures demonstrate contamination above screening levels, with no apparent closure to the extent of contamination, the text needs to explain why this is not an issue. EPA understands that the tracks limit sampling to the east. An explanation is needed for **why** sampling to the north has not occurred.

Olin Response to USEPA Reply: *TMPs at SB-478 (0-1 and 1-10 feet below grade) have been delineated and at the northern boundary are below RSLs (see data from RI figures below). At a depth greater than 10 feet, soils are below the water table. Soil boring SB-478 was drilled on November 18, 2010. A water level from an adjacent well (IW-6) was collected on November 15, 2010. Depth to water was 9.90 feet. Soil sample SB-478 (greater than 10 feet) was collected at 10 to 12 feet below grade (within the water table). Refusal was noted at 12 feet. The TMPs are associated with the LNAPL smear zone at Plant B and the northern most LNAPL extraction (EW-12) well has not historically recovered any significant LNAPL volume indicating this well is located near the northern edge of the release area and that the smear zone is not expected to extend much farther to the north.*



0-1 feet



1-10 feet

Further delineation to the north is hampered by heavily vegetated / wooded terrain that is uneven and would require clearing along the MBTA railroad right of way. A little further north are areas of bedrock outcrop indicating a limited extent of overburden providing a physical boundary to the potential northern extent of the former LNAPL smear zone.

Comment No. 237: Figures 4.1-29 through 4.1-36: Based on high frequency of detection in one or more OU2 surface water body and presence at concentrations exceeding screening levels, additional figures presenting surface water results should be provided in the RI for the following contaminants:

- Aluminum
- Manganese
- Arsenic
- Barium
- Cobalt
- Copper
- Chromium
- Iron
- Zinc
- PAHs
- Bis-2-ethylhexyl phthalate
- 1,1-Dichloroethane
- TCE
- N-nitrosodiphenylamine

Response No. 237: Additional figures for Site-related parameters will be considered.

USEPA Reply: Please verify that contaminants exceeding screening levels are represented on additional figures. There is currently no mutually agreed upon list of "Site-related" contaminants. See HHRA Interim Deliverable #2, Comment No. 1.

Olin Response to USEPA Reply: *At the November 19, 2013 meeting, Olin indicated it will identify the group of chemicals that were used as raw materials, produced as products, or were known to have been released at the facility as "chemicals of interest". The constituents released can further be documented by their presence in DAPL and diffuse groundwater. As discussed with USEPA these chemicals of interest also include metals, inorganic compounds, and organic compounds that either occur naturally or are common anthropogenic contaminants in the environment and the presence of such constituents is not by itself evidence that the detection is related to a release from the Site. In this context the term Site-related is unfortunate since it often can result in an incorrect presumption that a detection equates to evidence of a release and an incorrect conclusion can result as to the actual source of a detected compound or element.*

Chromium distribution in surface water is already presented in Figure 4.1-30

1,1-Dichloroethane and TCE do not have AWQCs for comparison purposes. Furthermore, a total of five samples had TCE detections and two had 1,1-DCA detections from 58 total samples. Neither 1,1-DCA nor TCE is not detected in South Ditch, but are detected in East Ditch either downstream of E.C. Whitney and Son's or upstream of the Olin Property near Raffi and Swanson. 1,1-DCA is also detected in Landfill Brook. Based on the limited number of sample results, the distribution of

detections, these constituents are un-related to the Olin Site and do not warrant figures for the OU1/OU2 RI.

BEHP and NDPA do not have AWQCs. Of the 58 samples collected, only five had detectable concentrations for BEHP and two had detectable concentrations of NDPA. BEHP was detected in South Ditch (twice) and East Ditch (twice) and Landfill Brook (once). NDPA was detected twice in South Ditch. Based on the limited number of analyte detections, and the obvious relationships in East Ditch and South Ditch detections, additional figures are not warranted to understand distribution.

Aluminum, copper, and iron are frequently detected compounds and exceed their respective AWQC (chronic) criteria. In most cases the average concentration also exceeds their respective AWQC. Aluminum and iron are metals associated with the Floc in South Ditch but are highest in concentration in Landfill Brook. Figures for Aluminum, and iron will be added to the draft OU1/OU2 RI. Copper is present in all surface water bodies within a similar range of concentrations and does not warrant a figure since copper does not appear to be related to a release from the Site.

Arsenic and zinc concentrations are high frequency detected compounds but do not exceed their respective AWQC (chronic) criteria and do not warrant presentation in a figure.

There is no specific AWQCs for PAHs. PAHs were infrequently detected in surface water samples. PAHs are not detected in South Ditch surface water, and most frequently detected in off-Property West Ditch and East Ditch which are adjacent to railroads which are known to be an anthropogenic source of PAHs (diesel exhaust and creosote treated ties). Based on the obvious association of PAHs with railroad operations a figure for PAHs is also not warranted.

Barium, cobalt, and manganese do not have AWQCs. Although they have high frequency of detections these compounds are common naturally occurring elements (metals) and are also detected in virtually every soil sample collected at the Site and are not associated with environmental releases from operations at the Site. Surface water figures for these metals would not contribute to understanding the nature of releases from the Site.

STAKEHOLDER COMMENTS

GeoInsight Comments (provided to EPA on July 2, 2013)

Comment No. 1: Additional cross-sections would be helpful in demonstrating that the impacts at specific source areas have been adequately defined/delineated (e.g., the extent of trimethylpentene impacts in the vicinity of Plant B production area, and processing oils and associated analytes in the vicinity of the Plant B tank farm) should be depicted on the figures with corresponding analytical results.

EPA Response: *EPA concurs. Olin/AMEC should prepare additional cross-sections aligned through former known source areas.*

Olin Response: It is our understanding that the reviewer intends to see local impacts with depth. Creating the requested cross-sections will be cumbersome and time consuming. We offer the following as a means of providing the requested information in less time. Several plan view figures will be prepared for soils in the area of Lake Poly, Plant B, and TMP area. The figures will focus on chemicals with soil concentrations greater than Industrial RSLs (IRSLs). Each plan view figure will include analytical data in chem-boxes, showing analytical results for multiple samples collected at various depths.

USEPA Reply: EPA disagrees with the suggestion that plan view figures will provide sufficient information. Please prepare cross-sections as requested.

Olin Response to USEPA Reply: *The PRI and draft OU1/OU2 RI, have always summarized data in Plan View Figures (to facilitate presentation of nature and extent). Olin will prepare one representative section through Lake Poly, Plant B and the TMP area.*

Comment No. 8: It appears that several contaminants have not been fully delineated in OU1 (including hexavalent chromium).

EPA Response: *EPA concurs. See Nobis RI comment No. 233a, b and c.*

Olin Response: Although the comment references “several contaminants”, only one (hexavalent chromium) is identified in the comment or in USEPA’s response to the comment. This response addresses the identified chemical. The questions posed by these three comments (233.a, b and c) pertain to the delineation of hexavalent chromium on the western side of the property. The nature and extent of hexavalent chromium in the subject area has been adequately characterized. We have provided our rationale for this conclusion below.

Our rationale is based on a three-pronged weight of evidence:

- **Lack of human health or ecological risk,**
- **Sufficient understanding of site conditions, and**
- **Data suitability with respect to Remedial Decisions**

Each of these lines of evidence is discussed in more detail below.

1. Lack of Human Health Risk.

   The hexavalent chromium concentrations observed in OU1 soils do not pose any unacceptable risk to human health or the environment, especially along the western boundary of the property. The highest concentration of hexavalent chromium in surface soil in that area is 11 mg/kg and in shallow subsurface soil is 28 mg/kg.

   The health risks (ingestion, dermal contact, and inhalation of dust) associated with the maximum existing hexavalent chromium concentrations in surface soil in the subject area are 2×10^{-6} cancer risk and 0.04 non-cancer hazard quotient. The cancer risk is at the low end of the EPA cancer risk range (10^{-6} to 10^{-4}) and the hazard quotient is well below 1. The corresponding health risks for the maximum concentration in shallow subsurface soil are 5×10^{-6} cancer risk and 0.09 non-cancer hazard quotient. These values are also not actionable risks.

   We have reviewed the relative concentrations of total chromium and hexavalent chromium and the result of this assessment arrives at the same point: hexavalent chromium impacts in the subject area pose no unacceptable risk to human health or the environment. Please find attached a marked-up copy of Figure 4.1-5 of the Draft RI Report that shows total chromium concentrations in surface soil as well as the location of SB-506 that was analyzed for hexavalent chromium. Total chromium concentrations in surface soil provide an absolute upper boundary on the potential hexavalent chromium concentrations in soil (hexavalent concentration cannot be greater than total chromium concentration). The area bounded by the red hand-drawn line includes the area west and northwest of the surface soil sample SB-506 that was analyzed for hexavalent chromium. That area has 12 surface soil samples that were analyzed for total chromium. The average total chromium concentration in that area is 18.6 mg/kg, with a range of 6.9 mg/kg to 32 mg/kg (not indicative of any substantial release). For all of the available data for co-located hexavalent chromium and total chromium in OU1 soil samples, the ratio of hexavalent chromium to total chromium ranges from 0.001 to 0.12 with an average ratio of 0.03. This suggests that hexavalent chromium concentrations in surface soil west and northwest of SB-506 likely have a low end of approximately 0.0069 mg/kg to 0.83 mg/kg and a high end of approximately 0.032 mg/kg to 3.84 mg/kg. This indicates that hexavalent chromium concentrations in surface soil west and northwest of SB-506 are likely less than the RSL of 5.7 mg/kg. **Even if all of the reported total chromium in the 12 samples west and northwest of sample SB-506 was hexavalent chromium, the**

estimated cancer risk would be only approximately 3 x 10^{-6} (negligible) and the hazard quotient would be only 0.006 (also negligible).

2. Sufficient Understanding of Site Conditions:

   Hexavalent chromium detections along the western portion of the property are presumed to exist because of past practices during site operation (potentially associated with Lake Poly and the dry storage areas). However, the area west of Lake Poly and the dry storage areas are mainly wetland areas where no past operation was known to exist. Therefore, from a conceptual standpoint, it is presumed that impacts in this area were there due to over-land flow. The topography in this area rises toward the Pan AM Railways tail track west of the property so that there exists a topographical boundary to any surface flow that may have resulted in the impacts that are currently observed. Based on this information, migration of impacts west of current sampling locations is improbable. Additionally, railroad tracks are constructed using wooden cross ties that are typically treated with CCA (chromated copper arsenate), so the closer we get to the railroad tracks, the more likely it is that chromium, if found, would be associated with the railroad cross ties.

3. Data Suitability with Respect to Remedial Decisions:

   As indicated above, the concentrations of chromium along the west portion of the property are well below actionable risks and the distribution of chromium is well documented especially when older remedial delineation and confirmation samples are considered. Fourteen samples, spaced at approximate 25 foot intervals, are located within twenty feet of the property boundary (See attached Figure 1) and clearly define chromium nature and extent To the west of these sample locations, the potential extent of the chromium impacts is also limited by the presence of the railroad spur topographically. Therefore, the existing data is sufficient to characterize risk, to assess the nature and extent of impacts, and to use in remedial decision making as part of the Feasibility Study for OU1 and OU2.

   Specific detailed responses to comments 233 - a., b., and c. of the Nobis comment are presented below.

   a. Please find attached a marked-up copy of Figure 4.1-5 of the Draft RI Report that shows total chromium concentrations in surface soil as well as the location of SB-506 that was analyzed for hexavalent chromium. Total chromium concentrations in surface soil provide an absolute upper boundary on the potential hexavalent chromium concentrations in soil (hexavalent concentration cannot be greater than total chromium concentration). The area bounded by the red hand-drawn line includes the area west and northwest of the surface soil sample SB-506 that was analyzed for hexavalent chromium. That area has 12 surface soil samples that were analyzed for total chromium. The average total chromium concentration in that area is 18.6 mg/kg, with a range of 6.9 mg/kg to 32 mg/kg

(not indicative of any substantial release. For all of the available data for co-located hexavalent chromium and total chromium in OU1 soil samples, the ratio of hexavalent chromium to total chromium ranges from 0.001 to 0.12 with an average ratio of 0.03. This suggests that hexavalent chromium concentrations in surface soil west and northwest of SB-506 likely have a low end of approximately 0.0069 mg/kg to 0.83 mg/kg and a high end of approximately 0.032 mg/kg to 3.84 mg/kg. This indicates that hexavalent chromium concentrations in surface soil west and northwest of SB-506 are likely less than the RSL of 5.7 mg/kg. **Even if all of the reported total chromium in the 12 samples west and northwest of sample SB-506 was hexavalent chromium, the estimated cancer risk would be only approximately 3 x 10^{-6} (negligible) and the hazard quotient would be only 0.006 (also negligible).**

b. Please find attached a marked-up copy of Figure 4.1-6 of the Draft RI Report that shows total chromium concentrations in shallow subsurface soil (1 – 10 ft bgs interval) as well as the locations of SB-509 and SB-510 that were analyzed for hexavalent chromium. The sample from SB-510 (7-9 ft bgs) was collected near the northwest edge of the Lake Poly excavations (upland area). That sample was collected just above the water table (identified at 9 ft bgs). The sample from SB-509 (1 – 3 ft bgs) was collected immediately adjacent to the on-property West Ditch. This sample was collected from the wet area adjacent to the ditch. There are numerous soil samples analyzed for total chromium in the area of Lake Poly and the drum storage area immediately to the west of Lake Poly. Those samples generally have total chromium concentrations indicative of residual Lake Poly impacts. However, the area west of the drum storage area is a wetland (outlined in yellow on the marked-up Figure 4.1-6), and the total chromium concentrations reported for shallow subsurface soil samples collected from the wetland (samples and results outlined in red) are much lower than in the upland area (ranging from 5.8 mg/kg to 39 mg/kg with a mean of 17.2 mg/kg). These concentrations represent theoretical upper limits on hexavalent chromium concentrations.

For all of the available data for co-located hexavalent chromium and total chromium in OU1 soil samples, the ratio of hexavalent chromium to total chromium ranges from 0.001 to 0.12 with an average ratio of 0.03. In the wetland area west of the drum storage area, total concentrations in shallow subsurface soil samples range from 5.8 mg/kg to 39 mg/kg (concentrations are not indicative of any substantial chromium release). Applying the observed ratios of hexavalent chromium to total chromium, the hexavalent chromium concentrations likely range from 0.0058 mg/kg to 0.70 mg/kg on the low end and from 0.039 mg/kg to 4.68 mg/kg. This indicates hexavalent chromium concentrations in shallow subsurface soils are likely below the RSL of 5.6 mg/kg. **Even if all of the reported total chromium in the samples west and northwest of sample SB-506 was hexavalent chromium, the estimated cancer risk would be only approximately 3 x 10^{-6} (negligible) and the hazard quotient would be only 0.0055 (also negligible).** In addition, most of the

shallow subsurface soils in the wetland are within the water table and are included in OU3.

c. The samples identified on Figure 4.1-10 of the Draft RI Report were collected from depths greater than 10 ft bgs and within the water table. Therefore, these samples are related to and will be evaluated in OU3. There is no foreseeable human or ecological receptor exposure associated with those samples.

USEPA Reply: Several other Nobis RI comments discuss questions regarding delineation of areas or contaminants other than hexavalent chromium, specifically, Nobis RI comment Nos. 144, 175, 232b, 234a, 235a, b, c, and 236a and b. Please refer to these comments for further discussion. Regarding hexavalent chromium and the arguments above, delineation should be completed regardless of risk. The purpose of delineation is for determining the nature and extent of contamination. Hexavalent chromium analysis has been extremely limited relative to analysis for other contaminants at the Site as shown on the draft RI figures (soil – Figures 4.1-8 through 4.1-10; surface water – Figure 4.1-31; and sediment – Figure 4.1-39). Because these are RI figures, they do not show exposure areas and may have data that were eliminated from the HHRA. There are no similar figures for just the HHRA samples. See discussion of number of available hexavalent chromium samples by media and exposure areas in Comment No. 233 above.

Olin Response to USEPA Reply: *Please see Olin's response to Comment 233 referenced above.*

CDM Smith Comments (provided to EPA on July 2, 2013)

Specific Comments on the April 19, 2013 draft of the Remedial Investigation Report for Operable Unit 1 and Operable Unit 2

Comment No. 3: Comments on Table 4.1-1 to Table 4.1-3

e. Table 4.1-3 (for soils deeper than 10 feet (ft) in depth) appears to receive no follow-up in the risk assessment document – are these soils being excluded from the risk assessment?

EPA Response: *Soils deeper than 10 feet in depth are excluded from the risk assessment with EPA consent because receptors are not expected to contact soils at these depths. This is standard EPA practice. Interaction between groundwater and soil deeper than 10 feet (or less than 10 feet deep where the water table is shallow) will be considered during the groundwater OU3 risk assessment.*

Olin Response: No response required.

USEPA Reply: Reminder: Although soils deeper than 10 feet in depth are excluded from the risk assessment, soils located above the water table, regardless of depth, need to be (and are) included in the Nature and Extent discussions of the OU1/OU2 RI. EPA recommends discussion of unsaturated soils in the greater than 10 ft depth range separately from saturated soils in this depth range. EPA also recommends discussion of unsaturated soils in the 1-10 ft depth separately from saturated soils in this depth range and exclusion of saturated soils from the HHRA. (Note saturated soils of both depth ranges could be combined.) As noted, soils below the water table will be considered under OU3.

Olin Response to USEPA Reply: *Saturated soils greater than 10 feet (or less than 10 feet where the water table is shallow) will be discussed in OU3. There are no locations where the unsaturated soil thickness is greater than 10 feet. The only exception might be in the immediate vicinity of the extraction wells at Plant B, and the impacts at Plant B will be considered further as part of OU3.*

APPENDIX L

RESPONSE TO COMMENTS DRAFT HHRA
(Provided on CD)

6107140016

March 21, 2014

Mr. James M. DiLorenzo
Remedial Project Manager
USEPA Region 1 - New England
5 Post Office Square
Mailcode: OSRR07-4
Boston, MA 02109-3912

Subject: Response to USEPA's September 30, 2013 Comments Letter Concerning the July 26, 2013 "*Second Interim Deliverable - Human Health Risk Assessment*, *Operable Unit 1 and Operable Unit 2"* for the Olin Chemical Superfund Site, Wilmington, Massachusetts

On behalf of Olin Corporation (Olin), AMEC Environment & Infrastructure, Inc. (AMEC) respectfully submits the following responses to the United States Environmental Protection Agency's (USEPA's) September 30, 2013 comments prepared by Nobis Engineering, Inc. (Nobis) on the "*Second Interim Deliverable - Human Health Risk Assessment*, *Operable Unit 1 and Operable Unit 2"* dated July 26, 2013 for the Olin Chemical Superfund Site in Wilmington, Massachusetts.

Below please find USEPA comments on the Interim Deliverable No. 2 followed by Olin's response. The comments and responses are arranged by section.

HUMAN HEALTH RISK ASSESSMENT GENERAL COMMENTS

Comment No. 1: Olin refers several times to "Site-related" contaminants or parameters and states that some detected analytes are not Site-related (for example, metals data from Ephemeral Drainage sediment samples discussed in Section 2.2.1, arsenic and PAHs at the Pan Am Railway property discussed in Section 2.2.2, and discussion of MMBW and Landfill Brook in Section 2.3). In general, contaminants and/or areas should not be excluded from the HHRA because they are not "Site-related." Sediment data from samples RSD- 11 through RSD-15 collected from the Ephemeral Drainage area were not evaluated in the HHRA because they "do not indicate evidence of any Site-related impacts." EPA agrees to the exclusion of these Ephemeral Drainage sediment samples from the HHRA because of the low concentrations detected. Soil data from the Pan Am Railways property "have not been used in the HHRA because these soils are not impacted by the Site." Both MMBW and Landfill Brook were eliminated from the quantitative risk assessment because selected COPCs (Tables 2.3.4, 2.3.5, 2.3.7, and 2.3.8) were deemed to be not Site-related. Based on detections exceeding COPC selection criteria, these three areas should be retained for quantitative risk assessment. Site–related contaminants have not been defined in the Remedial Investigation (RI) or the HHRA. Defining Site-related contamination in off-property surface water is difficult without first evaluating groundwater. Olin has provided discussion of Site-related contaminants in the FRI (2007) and provides some information in the 2009 RI/FS Work Plan. However, agreement on

these Site-related contaminants has not been sought nor provided. Please provide a brief summary and table of "Site-related" contaminants, including those related to all media, as well as updated to reflect recent groundwater data. This summary may be included in the RI and then referenced with a list of contaminants in the HHRA.

Response No. 1: The RI Report will no longer refer to "Site-related" contaminants. Rather, the RI Report will identify a list of "chemicals of interest" (chemicals that were used, produced, or were contained in waste streams) and in the presentation and discussion of nature and extent, there will be a discussion about whether there is an impact associated with former manufacturing activities to environmental media associated with "chemicals of interest" in addition to discussion of nature and extent for chemicals that are not included in the list of "chemicals of interest". Since the list of "chemicals of interest" contains many naturally-occurring and anthropogenic constituents, it should be noted that detection of "chemicals of interest" does not necessarily mean that the constituent's presence is an impact associated with former manufacturing activities (especially in off-property locations).

MMBW will be included in the quantitative risk assessment. A trespasser will be evaluated in the MMBW for exposure to surface water and sediment using the same exposure scenario as used for South Ditch.

In a meeting with EPA on June 25, 2013 in Boston, it was agreed that the soil samples collected off-property to the west of the Site (Pan AM Railways property) will not be part of the risk assessment, since the analytical data indicate impacts from railroad activity rather than from the Site. It was agreed this would be discussed in the nature and extent section of the RI Report.

A technical discussion will be added to the Draft RI regarding Landfill Brook. The discussion will show that impacts to Landfill Brook are from the Woburn Landfill and adjacent industrial activity. Landfill Brook will not be included in the risk assessments.

Comment No. 2: The deed restriction placed on the property in 2012 is mentioned several times in the risk assessment. Please note that the deed restriction alone is not sufficient basis for eliminating potential exposure pathways and/or receptors.

Response No. 2: Text will be added to state the current and assumed future use of the Site and surrounding area (commercial/industrial), zoning, and other factors have been considered, in addition to the deed restriction , in decisions concerning elimination of potential exposure pathways and receptors.

Comment No. 3: Exposure Area 1 (EA1) includes a large and potentially diverse contaminated area that may need further subdividing. This exposure area needs resolution. Olin has added EA7 in response to comments on HHRA Interim Deliverable #1. However, EPA remains concerned that the former manufacturing area and the former disposal areas are considered a single exposure point. As noted in comments on the HHRA Interim Deliverable #1, it appears several contaminants of concern are more prevalent in the former disposal areas on the west and south portion of the manufacturing area, specifically hexavalent chromium, BEHP, NDPA, and hydrazine. During the June 25, 2013 meeting discussion, Olin offered to provide a

technical memorandum to provide assurance that the treatment of this area as one large area did not make a significant difference to the results. The technical memorandum will become part of the HHRA uncertainty discussion and carried into the HHRA as an appendix. Please provide this memorandum for EPA approval prior to further evaluation of EA1.

Response No. 3: Olin has conducted the evaluation requested by USEPA. At the meeting on November 19, 2013 in USEPA's Boston Office, it was agreed the EA1 evaluation would be forwarded to USEPA and that the evaluation would also be included in the Responses To Comments Letter that addresses USEPA's September 30, 2013 Comments Letter Concerning the July 26, 2013 "Second Interim Deliverable – Human Health Risk Assessment, Operable Unit 1 and Operable Unit 2". That Responses To Comments Letter will be submitted to USEPA simultaneously with the Draft RI Report (including the Draft BHHRA and Draft BERA).

The text in the following paragraphs summarizes the contents of the evaluation that was dated December 20, 2013 and submitted to USEPA on 12/30/13. Subsequent to that submittal there was a January 14, 2014 conference call between USEPA and Olin, in which USEPA requested additional evaluation. On February 11, 2014, Olin submitted to USEPA an additional evaluation. On February 25, 2014 there was a conference call between USEPA and Olin during which USEPA requested additional evaluation. On March 6, 2014, Olin submitted (March 4, 2014 Memorandum) to USEPA the requested information. In a conference call between USEPA and Olin on March 6, 2014, USEPA indicated that the information provided was complete, and all of this evaluation would be submitted as an attachment to the Draft Baseline human health Risk Assessment (BHHRA). Attachment 13 of the Draft BHHRA will contain all of the submittals discussed in this paragraph.

As briefly discussed in the comment above, based on previous USEPA comments, the originally proposed exposure area EA1 has been subdivided into EA7 and EA1. EA7 is the area, located in the northeast corner of the Property, with trimethylpentene detections in soils and associated elevated PID jar headspace readings (primarily subsurface soils in the immediate vicinity of the water table). USEPA had proposed boundaries for the EA7 area. Based on a review of the soil trimethylpentene data and the jar headspace and soil boring screening PID data, Olin proposes to refine the southwestern boundary of EA7 to include some additional soil boring locations that have similar trimethylpentene concentrations and/or PID readings as the rest of EA7. Soil borings SB-420, SB-423 (TMPs) and SB-481 (EPH and elevated PID readings) are now included in EA7 rather than EA1. Figures 1 (subsurface soil sample locations by exposure area) and 2 (surface soil sample locations by exposure area) show the refined boundary between EA7 and EA1.

The evaluation of the proposed subdivision of EA1 included selection of COPCs and calculation of human health risks for three different exposure areas and comparing the cumulative excess lifetime cancer risk (ELCR) and cumulative Hazard Index (HI) among the areas. The three exposure areas evaluated, as shown in Figures 1 and 2 are:

- EA1 Including BEHP/NDPA Area (the Olin-proposed exposure area)
- EA1 Excluding BEHP/NDPA Area (the first of two proposed subdivisions of EA1)
    - BEHP/NDPA Area (the second of two proposed subdivisions of EA1)

EA1 Including BEHP/NDPA Area is EA1 as proposed in the HHRA Second Interim Deliverable. The BEHP/NDPA Area is the area USEPA refers to in Comment No. 3 as "…the former disposal areas on the west and south portion of the manufacturing area…". Surface and subsurface soils for all three of the exposure areas were evaluated separately consistent with the HHRA Second Interim Deliverable.

The following steps were completed for surface and subsurface soil datasets for each exposure area to estimate cancer and non-cancer risks for a commercial/industrial worker:

- Chemicals of Potential Concern (COPCs) were selected separately for each media by exposure area using the Industrial Regional Screening Levels (RSLs) (USEPA, 2013)
    - Industrial RSLs used to select COPCs are based on the lesser of a cancer risk equal to $1x10^{-6}$ or non-cancer risks equal to a HI of 0.1
- If the maximum concentration exceeded the Industrial RSL then the parameter was selected as a COPC
- A parameter was also selected as a COPC if an RSL was not available
- A COPCs a 95% Upper Confidence Limit (UCL) on the arithmetic mean was calculated for parameters selected as COPCs with the exception of COPCs which lack RSLs.
- The 95% UCL was used as the Exposure Point Concentration (EPC) to calculate cancer and non-cancer risks (unless the UCL was higher than the maximum detection, in which case the maximum detection was used as the EPC).
- Cancer and non-cancer risks were calculated for COPCs using a ratio with the cancer and non-cancer based Industrial RSLs
- Cumulative ELCR and cumulative HI were summed for each exposure area

Tables 1 through 6 present the risk evaluation steps as described above. Table 7 presents a summary of cumulative ELCRs and cumulative HIs by exposure area. A summary of conclusions from Table 7 are as follows:

- The cumulative ELCR for both surface and subsurface soil is below $1x10^{-4}$ for all areas ("EA1 Including BEHP/NDPA Area" as well as "the BEHP/NDPA Area" by itself)
    - The maximum ELCR in subsurface soil is $1x10^{-5}$ for BEHP/NDPA Area (Indeno(1,2,3-cd)pyrene has the highest individual ELCR of $4.8x10^{-6}$)

- The maximum ELCR in surface soil is $5x10^{-5}$ for EA1 Excluding BEHP/NDPA Area (Benzo(a)pyrene has the highest individual ELCR of $2.8x10^{-5}$)

- For all areas both surface and subsurface soil cumulative HI are below 1
  - The maximum HI in subsurface soil is 0.4 for the BEHP/NDPA Area (2,4,4-trimethyl-1-pentene has the highest individual HI of 0.2)
  - The maximum HI in surface soil is 0.3 for the BEHP/NDPA Area (Thallium has the highest individual HI of 0.2)

Since all cumulative cancer risks for each area are well below $1x10^{-4}$ there would be no difference in risk management decisions by subdividing EA1 further. Similarly since all cumulative non-cancer risks for each area are well below 1 there would be no difference in risk management decisions. Therefore, based on the evaluation outlined above it is recommended that the EA1 Including BEHP/NDPA Area (EA1 used in the HHRA Second Interim Deliverable) be used as a single exposure area in the HHRA.

SECTION 2.0 SPECIFIC COMMENTS:

Comment No. 4: Section 2.1, Pages 2-1 and 2-2: There is only one "AMEC, 2012" reference listed in Section 5.0, so please change the citations from "AMEC, 2012b" to "AMEC, 2012".

Response No. 4: Text revision will be made in the Draft HHRA.

Comment No. 5: Section 2.1. Page 2-2. In the 6th bullet, please specify the sediment sampling locations – South Ditch, Central Pond, Stormwater Detention Basin, and on-property West Ditch.

Response No. 5: Specific areas will be added to the 6th bullet.

Comment No. 6: Section 2.1. Page 2-2. For the listing of data considered for OU2, please add soils from the off-Property West Ditch/Pan Am Railway.

Response No. 6: The surface soil samples collected from the off-Property West Ditch/Pan Am Railway will be added as data considered for OU2. These samples were considered but have not been included in the risk assessment because they are off-property and are not impacted by the Site.

Comment No. 7: Section 2.1. Page 2-3. Please note that the deed restriction prohibiting use of groundwater at the Site as drinking water will not serve to avoid evaluation of future use of groundwater at the Site as drinking water in OU3.

Response No. 7: The OU3 HHRA will address exposures to groundwater.

Comment No. 8: Section 2.1. Page 2-4. Please specify the surface water bodies in the listing of exposure areas in OU1 (first full paragraph).

Response No. 8: Surface water bodies will be added to the list of exposure areas in OU1 (South Ditch, on-Property West Ditch, Central Pond, and the Storm Water Detention Basin). It should be noted that the surface water in the on-PWD is mostly ephemeral and as such represents a temporary feature at best. Therefore, the on-PWD surface water is not evaluated in the HHRA.

Comment No. 9: Section 2.1. Page 2-4. Please add the Northeast Corner (EA7) to the manufacturing areas excluded from EA1 to the 1st bullet on page 2-4.

Response No. 9: The requested text will be added to the Draft HHRA.

Comment No. 10: Section 2.1. Page 2-4. There is no surface water data for on-PWD/West Ditch Wetland (EA2) evaluated in the HHRA. Please add the statement (provided in your July 26, 2013 response) "The surface water in the on-PWD is mostly ephemeral and as such represents a temporary feature at best. Some surface water in this area is the result of the Plant B discharge line" to the 2nd bullet on page 2-4. Also add this to the ERA and RI documents.

Response No. 10: The requested text will be added to the Draft HHRA.

Comment No. 11: Section 2.1. Pages 2-4 and 2-5. For some of the exposure areas, there is a statement regarding the deed restriction. For consistency, please add a statement regarding the application of the deed restriction to EA2 to the 2nd bullet on page 2-4 and EA6 to the 2nd bullet on page 2-5.

Response No. 11: A statement regarding the deed restriction will be added to each of the bullets for EA2 and EA6.

Comment No. 12: Section 2.1. Page 2-5. The stakeholder's have pointed out that Central Pond and the Stormwater Detention Basin, both within the newly designated EA6 along with South Ditch, should each be handled as separate exposure points. EPA agrees with this request. The HHRA Interim Deliverable #2 Attachment 2 provided separate data tables for each of these surface water bodies. EPA expects risks from each surface water body will be calculated separately. Please add a statement to that effect to the EA6 bullet on page 2-5 and provide separate rows for each of these exposure points on Table 2.1-1. Also please see RI Comments No. 154 and 155 in regard for the need for further surface water and sediment sampling at both these water bodies.

Response No. 12: The South Ditch, Central Pond and Storm water Detention Basin will be evaluated as separate exposure areas. The bullets on page 2-5 will be updated to indicate that each water body will be evaluated as a separate exposure area. Table 2.1.-1 will be revised accordingly. Please see responses to Comments 154 and 155 in a separate document.

Comment No. 13: Section 2.1. Pages 2-5 and 2-6. EPA has requested evaluation of worker exposures to subsurface soils within the containment area. Olin has recently agreed to add worker exposures to surface and subsurface soils in the containment area. HHRA Interim

Deliverable #2 does not yet reflect that agreement and has removed the outdoor worker exposure to surface soils inferred in the HHRA Interim Deliverable #1.

a. Please include evaluation of potential worker exposures to both surface soils and subsurface soils within the containment area.

b. At the end of the 2nd paragraph of the containment area bullet (4th bullet on Page 2- 5), please add the following: "Future exposures to subsurface soils in the absence of a permanent cap are evaluated to aid in determining a permanent remedy."

c. In the 3rd paragraph of the containment area bullet, please delete the following: "and risks to remedial workers are not typically evaluated in a baseline risk assessment." The same phrase is repeated in the next sentence.

d. In the final paragraph of the containment area bullet, please change the first sentence as follows: "This is a surface and subsurface soil exposure area for future trespassers and workers."

e. Addition of these exposure scenarios, affects other areas of the text and tables. Please adjust those accordingly, including but not limited to: Pages 3-1 through 3-7, Page 3-10, Table 2.1-1, and Attachment 8.

Response No. 13:

a. Outdoor workers will be evaluated for exposures to surface and subsurface soil in the containment area.

b. Since these comments have been developed, USEPA and Olin have agreed that a permanent cap will be a component of each remedial action evaluated in the Feasibility Study for OUs 1 and 2. Installation of a permanent cap is a continuation of actions began under the MCP and will be constructed even though a risk evaluation of subsurface soil within the containment area indicated no risk exceeding USEPA recommended excess lifetime cancer risk range. This text will be added to the Draft HHRA.

c. Text will be removed from the Draft HHRA.

d. Requested text will be changed.

e. Changes will be made throughout the Draft HHRA based on the addition of these exposure scenarios.

Comment No. 14: Section 2.1. Page 2-6.

a. In the first bullet under exposure areas for OU2 (EA5), please add the following: "This property is not owned or controlled by Olin and no deed restriction limits future use. Because of the restricted access and surrounding industrial use, future residential use is not considered. However, to be conservative, future outdoor industrial/commercial worker and construction worker exposures are evaluated."

b. In the 2nd bullet under exposure areas for OU2 (off-PWD), please add the following: "No deed restriction limits future use of this property. Only trespasser exposures are evaluated because the media are limited to sediments and surface water."

c. In the 4th bullet under exposure areas for OU2 (MMBW), please add the following: "A qualitative evaluation of potential exposures is included."

d. The 5th bullet under exposure areas for OU2 (Landfill Brook), mentions New Boston Street, the MBTA rail line, and the NSTAR property. Please show these on a figure. Also please replace "ED" in this paragraph with "East Ditch".

Response No. 14:

a. Requested text will be added to the Draft HHRA.

b. Requested text will be added to the Draft HHRA.

c. The following text will be added "This is a sediment and surface water exposure area for trespassers" to be consistent with the other exposure area bullets.

d. New Boston Street, the MBTA rail line and the NSTAR property will be shown on a figure and referenced in the bullet. ED will be replaced with East Ditch.

Comment No. 15: Section 2.1. Page 2-7. Please bullet the background area paragraph.

Response No. 15: The background area paragraph will be bulleted.

Comment No. 16: Sections 2.2.1 and 2.2.2 (Pages 2-8 through 2-11) and Figure 2.3-2. The stakeholder's are concerned about the lack of subsurface soil evaluation (1-10 ft depth) at EA2, EA4, EA5, EA6, and off-PWD. It is EPA's understanding that in each of these areas, intermediate depth soils would fall into the saturated zone, below the water table. Please confirm and if true, clearly state in the HHRA Sections 2.2.1 and 2.2.2 that soils from these depths in EA2, EA4, EA5, EA6, and off-PWD are not evaluated in the OU1/OU2 RI, HHRA, and ERA because they are below the water table and contamination in saturated soils will be addressed under OU3. EPA will be reviewing groundwater sampling under OU3 to be certain it is adequate to evaluate contamination in these areas below the water table. The suggested statement may not be true for the northern half of EA2 and portions of EA6. If that is the case, justification for not sampling 1-10 ft soils in these areas is needed. If unacceptable worker risks to surface soils are found in these areas, EPA may request sampling and evaluation of 1-10 ft soils.

Response No. 16: The HHRA will not evaluate subsurface soils (1-10 ft depth) at EA2, EA4, EA5, EA6, and off-PWD. In EA4, the 2006 Environmental and Open Space Restriction does not allow any activities that would result in exposures to subsurface soils. In the off-PWD, there are no foreseeable exposures to soils beneath the water body. This approach is consistent with risk assessments conducted under CERCLA. Olin will review the depth of the saturated zone in EA2, EA5, EA6 to confirm that shallow subsurface soils are within the saturated zone. If there are areas where this is not confirmed, further discussion of the

potential for human exposure to subsurface soils in wetland areas and in areas immediately adjacent to wetland areas will be conducted. In such areas, any disturbance of soils to construct any buildings would require filling rather than excavation into the subsurface.

Comment No. 17: Section 2.2.1. Page 2-9. In the discussion of the EPH/VPH area:

a. Please refer the reader to the figure showing the area.

b. EPA awaits the RI for the presentation of the data from this area, please present these data separately.

c. Please delete the redundant text within the paragraph regarding the more than 2,000 pounds of TMPs removed…

d. Please correct the typo "boigins" should be "borings".

Response No. 17:

a. A reference to a figure showing the EPH/VPH area will be added.

b. The soil data from the EPH/VPH area will be presented separately in the Draft RI.

c. The redundant text will be removed.

d. Typo will be corrected.

Comment No. 18: Section 2.2.1. Page 2-10. Olin has excluded data from sediment samples collected from an area south of South Ditch including RSD-09 through RSD-15, collected in 2000 from the Ephemeral Drainage area. The 3rd bullet on Page 2-10 refers to Attachment 1 Table 4, but this does not appear to be present. At the request of EPA, Olin has provided the data in an email (June 10, 2013). Based on EPA review of the information provided, EPA requested that Olin include samples RSD-09 and RSD-10 as surface soil samples in the nature and extent, HHRA, and ERA evaluations of EA4 with the explanation that these "sediment" samples are "wetland soils". Olin has responded that the EA4 surface soil set is ample as is and has not added these samples to it. These two samples were collected as "sediment" in 2000, but are more likely representative of wetland soil (Olin concurred with that statement in an email sent on June 10, 2013 and a conference call on June 10, 2013). There are no other soil samples collected at these locations included in the EA4 surface soil dataset. One of these two samples detected TMPs and the other has a detection of BEHP. Olin should include these samples in the EA4 soil dataset, consistent with the site-wide inclusion of older soil data that remains representative of current conditions (has not been removed from the Site).

Response No. 18: The sediment data for samples RSD-09 – RSD-15 will be included as Table 4 in Attachment 1. RSD-09 and RSD-10 will be added to the surface soil dataset used to evaluate EA4.

Comment No. 19: Section 2.2.2. Page 2-11. In the final bullet, the 2006 conservation restriction is mentioned as prohibiting hunting, but this bullet refers to EA5. The 2006

conservation restriction does not apply to this off-property location. The sentence should be moved to the final bullet of Section 2.2.1.

Response No. 19: The reference to the 2006 conservation restriction will be moved to the bullets in Section 2.2.1.

Comment No. 20: Section 2.2.4. Page 2-12. In the final sentence of the first paragraph of Section 2.2.4, “unusable” should be “usable”.

Response No. 20: The text change will be made.

Comment No. 21: Section 2.2.6. Page 2-15. Please clarify whether “OPWD SED” refers to On-Property West Ditch or Off-Property West Ditch and please spell out NDMA.

Response No. 21: OPWD SED will be changed to Off-PWD. On page 2-15, the first appearance of “NDMA” will be replaced by “N-nitrosodimethylamine (NDMA)” and the acronym will be used thereafter..

Comment No. 22: Section 2.2.6. Page 2-17. The last two bullets should cite the Final Supplemental Work Plan (AMEC, 2013) and add this to the references (Section 5.0). Since this will be the second “AMEC, 2013” please add letters to distinguish the two and check citations of the Semi-annual Status Report No. 11 in the text.

Response No. 22: The reference will be added to the bullets and Section 5.0 with the appropriate letter.

Comment No. 23: Section 2.3. Page 2-19. EPA concurs with the exclusion of essential nutrients from the HHRA COPC selection. However, EPA also notes that some of these chemicals, sodium for example, may serve as markers for Olin contamination. Please include a discussion of important markers regardless of toxicity in the RI nature and extent discussions.

Response No. 23: Parameters which may serve as markers for the Olin contamination will be discussed in the Draft RI nature and extent sections.

Comment No. 24: Section 2.3. Page 2-19. Please add “minimum and” to the 4th bullet.

Response No. 24: Requested text will be added to the Draft HHRA.

Comment No. 25: Section 2.3. Page 2-21. Please spell out NDPA.

Response No. 25: On page 2-21, the first appearance of “NDPA” will be replaced by “N-nitrosodiphenylamine (NDPA)” and the acronym will be used thereafter.

Comment No. 26: Section 2.3. Page 2-23. Please add discussion of detections of Kempore and hydrazine in MMBW.

Response No. 26: Discussions of detections of Kempore and hydrazine in MMBW will be discussed in the nature and extent sections of the Draft RI.

Comment No. 27: Section 3.0. Pages 3-1 through 3-7. Exposure scenarios.

a. According to the text on page 3-5, EA6 future evaluations include trespasser exposures to subsurface soils. Table 2.1-1 indicates that trespassers at EA6 will not be evaluated for future subsurface soil exposures. Since there are no subsurface soil samples for EA6, please remove "and subsurface soil" from the text.

b. Please add soil vapor intrusion to Table 2.1-1 where appropriate.

c. The outdoor worker exposure to surface soil in the containment area presented in Interim Deliverable #1 is not present in Interim Deliverable #2 Section 3 text or Table 2.1-1. Please add this back into Table 2.1.1 and the text, as well as include on Table 3.2-1.

d. Please evaluate worker exposures to subsurface (and surface) soils in the containment area.

Response No. 27:

a. The text "and subsurface soil" will be removed.

b. Soil vapor intrusion will be added to Table 2.1-1 where appropriate.

c. The outdoor worker will be added to Table 2.1-1 for the containment area for potential exposure to future surface and subsurface soil.

d. The outdoor worker will be added to Table 2.1-1 for the containment area for potential exposure to future surface and subsurface soil.

Comment No. 28: Section 3.0. Page 3-1. Please specify the surface water bodies included in the current and future OU1 trespasser evaluations for surface water and sediment and add the containment area to the future use OU1 outdoor worker (surface and subsurface soil) and trespasser (subsurface soil) scenarios.

Response No. 28: The specific surface water bodies will be included (South Ditch, Central Pond, and the Storm Water Detention Basin). Containment area will be added for the future outdoor worker and trespasser scenarios.

Comment No. 29: Section 3.1.1. Page 3-3. Exposure Area 1 (EA1) includes a large and potentially diverse contaminated area that may need further subdividing. Olin has added EA7 in response to this comment as presented in response to HHRA Interim Deliverable #1. Please provide **justification** for addressing the remainder of the former manufacturing area and the former disposal areas as a single exposure point in both the HHRA (page 3-3) and the RI. See Comment No. 3 above.

Response No. 29: Please see response to Comment 3. above. Based on current and assumed future Site use there is no indication that an industrial/commercial worker would have increased exposure in any portion of the EA1 area.

Text will be added to the uncertainty discussion and Attachment 13 to address concerns about the area west and south of the manufacturing area (as shown in the figure attached to the EPA letter dated May 28, 2013) having elevated concentrations.

Comment No. 30: Section 3.1.1. Page 3-5. Please add an explanation for the lack of an evaluation of inhalation of dust at EA4, similar to the statement for EA6.

Response No. 30: The rationale for not evaluating inhalation of dust used for EA6 will be added to EA4.

Comment No. 31: Section 3.1.1. Page 3-6. Please expand the discussion of the containment area exposures to include future worker exposures to surface and subsurface soils and future trespasser exposures to subsurface soils.

Response No. 31: The containment area exposure discussion will be updated to indicate that risk evaluations requested by USEPA have concluded that no unacceptable risk associated with either surface or subsurface soils exists to either trespassers or industrial workers. The text will indicate that a specific trespasser exposure pathway to subsurface soils within the containment is not a feasible exposure pathway. USEPA and Olin have agreed that a permanent cap will be included as a component of each remedial action evaluated as part of the OU1/2 Feasibility Study.

Comment No. 32: Section 3.1.1. Page 3-7. The text in this section states that "the HHRA will evaluate potential exposure and risk for the currently occupied Plant B Treatment Building and will evaluate, for hypothetical future industrial/commercial buildings that could be constructed, strategies for preventing, controlling, and evaluating potential vapor intrusion"… in areas "EA3, and EA7, and the former Lake Poly". This Interim Deliverable #2 proposes indoor workers as the receptor to evaluate potential vapor intrusion (VI), but only in areas EA3 and EA7. The former Lake Poly, identified as an area of potential VI, is within EA1, yet no indoor worker is proposed for EA1. Attachment 8 indicates PID field screening greater than 1 ppmv and total VOC concentrations in soils greater than 1 mg/kg in the containment area, EA3, EA7, and the former Lake Poly. Based on the Attachment 8, further evaluation of future exposures via the VI pathway in each of these **four** areas is needed in the OU1/OU2 HHRA. Please provide discussion of potential approaches to addressing this concern.

Response No. 32: The HHRA will evaluate potential exposure and risk for the currently occupied Plant B Treatment Building and it will evaluate, for hypothetical future industrial/commercial buildings that could be constructed in EA3, EA7, and the former Lake poly area, strategies for preventing, controlling, and evaluating potential vapor intrusion. It is very difficult to conduct a quantitative health risk assessment for workers in a hypothetical future occupied building with respect to potential vapor intrusion associated with volatiles in vadose zone soil. There are no standard protocols for estimating the magnitude of potential vapor migration and associated exposures to indoor air for this scenario. Therefore, strategies for preventing or controlling vapor intrusion will be identified and discussed.

Comment No. 33: Section 3.2. Page 3-10. 1st bullet.

a. Please add the explanation (provided in your July 26, 2013 response): "The inhalation exposure route will not be evaluated for trespassers. Trespassers are not anticipated to be engaged in activities which would create air-borne dusts. Therefore, this pathway would at best be a minor pathway. In addition, many of the exposure areas contain wetlands soils or have dense vegetative cover which would prevent the creation of dusts." to the text on page 3-10.

b. Based on the adolescent and adult trespassers scenarios selected for the HHRA, please include cumulative trespasser cancer risks for adolescent plus adult years in the HHRA.

c. Please add "or EA5" in the first sentence after "East Ditch" and the specific OU1 surface water bodies in the second sentence.

Response No. 33:

a. The requested text will be added to the first bullet describing the trespasser.

b. Cumulative cancer risks for the adolescent and adult trespasser will be calculated in the HHRA.

c. Requested text will be added to the Draft HHRA.

Comment No. 34: Section 3.2. Page 3-10. 2nd bullet. Please add "or EA5" in the first sentence after "on- Site" and add containment area at the end of the 3rd sentence.

Response No. 34: Requested text will be added to the Draft HHRA.

Comment No. 35: Section 3.2. Page 3-10. The final sentence on the page should reference Tables 3.2-1 through 3.2-5, rather than 3.2-4.

Response No. 35: The table reference will be updated.

Comment No. 36. Section 3.2. Page 3-11. Based on discussion with Olin, CTE will only be evaluated when RME risks exceed EPA target levels. Please add this to text of the HHRA. CTE parameters would need to be agreed to prior to calculation of CTE risks.

Response No. 36: The requested *t*ext will be added to the Draft HHRA.

Comment No. 37: Section 3.2. Page 3-11. The exposure parameter tables reference the 2011 Exposure Factor Handbook, rather than the earlier 1997 version. Please change the citation here and in the reference list in Section 5.0.

Response No. 37: The reference will be changed in Section 3.2 and Section 5.0.

Comment No. 38: Section 4.0. Page 4-1. The "types of" terminology is awkward. Please edit the first sentence of the 3rd paragraph as follows: "The following toxicity values, or dose/response values are used for evaluating health risks:…" In the 4th paragraph, please

delete “types of” (two occurrences) in the 1st sentence. EPA has not developed dermal toxicity values. At the end of the 3rd paragraph, please state this and reference Section 4.3 for the explanation of how dermal toxicity factors were developed from oral toxicity factors.

Response No. 38: The requested text changes will be incorporated.

Comment No. 39: Section 4.1.3. Page 4-5. Please include the equations for evaluation of cancer risks to trespassers for contaminants that act via a mutagenic mode of action in the text and add benzo(k)fluoranthene, chrysene, hexavalent chromium, NDMA, TCE, and vinyl chloride to the list of COPCs with an identified mutagenic mode of action.

Response No. 39: Benzo(k)fluoranthene, chrysene, hexavalent chromium, NDMA, TCE, and vinyl chloride will be added to the list of chemicals, in Section 4.1.3, that act via a mutagenic mode of action. The oral and dermal CSFs will be multiplied by the age dependent adjustment factor of 3 to calculate cancer risks for the trespasser (ages 6 to 16) for COPCs presented in Section 4.1.3 of the Second Interim Deliverable as well as for benzo(k)fluoranthene, chrysene, hexavalent chromium, NDMA and TCE per USEPA guidance (USEPA, 2005). Vinyl chloride will be evaluated using the child specific slope factor for the older child trespasser (the trespasser is the only receptor potentially exposed to vinyl chloride).

Comment No. 40: Section 4.1.3. Page 4-5. Vinyl chloride and TCE were selected as COPCs in surface water. Vinyl chloride specific intake equations for child exposures are different from those for other contaminants. Therefore, separate ingestion and dermal contact intake equations should be used for the assessment of vinyl chloride for the older child trespasser. Similarly, unique equations are used for the evaluation of childhood exposures to TCE. Please add a sub-section to discuss the equations used to evaluate trespasser risks to vinyl chloride and TCE in surface water.

Response No. 40: Vinyl chloride has been selected as a COPC in surface water. The only receptor potentially exposed to surface water is the trespasser (older child and adult). As shown in Table 3.2-4 of the HHRA Second Interim Deliverable the specific age range for the older child trespasser is assumed to be 6 to 16 years old. Therefore no exposure to vinyl chloride for a child 0 to 6 years of age is assumed. Since no exposure is assumed for the child 0 to 6 years old specific intake equations for child exposure are not necessary for vinyl chloride. This approach is the same approach used for the RSL calculator for a recreator (USEPA, 2013).

TCE will be evaluated using an oral slope factor of 4.6E-2 $(mg/kg/day)^{-1}$. As stated in IRIS “USEPA has concluded, by a weight of evidence evaluation, that TCE is a carcinogenic by a mutagenic mode of action for induction of kidney tumors. As a result, increased early-life susceptibility is assumed for kidney cancer and the age-dependent adjustment factors (ADAFs) should be used for the kidney cancer component of the total cancer risk when estimating age-specific cancer risks”. Therefore, for the older child trespasser the kidney portion of the slope factor will be multiplied by the ADAF of 3. This results in an oral cancer slope factor of 6.5E-2 $(mg/kg/day)^{-1}$ for the older child trespasser.

The adult trespasser will be evaluated using an oral cancer slope factor of 4.6E-2 (mg/kg/day)$^{-1}$.

Comment No. 41: Section 4.3. Pages 4-6 and 4-7. Please delete the redundant text within the paragraph regarding dermal dose response values are appropriate for evaluating the absorbed dose… and please define oral absorption factor as (ABS) upon first use (bottom of page 4-6).

Response No. 41: The redundant text will be removed and ABS will be defined.

Comment No. 42: Section 4.4. Page 4-7. Please use the Tier 3 oral CSF from the New Jersey Department of Environmental Protection (NJDEP) for hexavalent chromium.

Response No. 42: It is proposed to use the NJDEP oral CSF in a discussion of uncertainty concerning cancer risk for hexavalent chromium (but to not use it in our calculation of risks). USEPA's IRIS database is the preferred Tier I source of toxicity information for CERCLA. The IRIS database indicates that for hexavalent chromium, "carcinogenicity by the oral route cannot be determined". USEPA proposed to incorporate the NJDEP CSF into IRIS in September 2010 – however, there has been considerable debate about that proposal and the NJDEP CSF has never been added to IRIS.

Comment No. 43: Section 4.5. Page 4-8. The citation for IRIS should be "USEPA, 2013b".

Response No. 43: The reference will be updated.

FIGURES, TABLES, AND ATTACHMENT SPECIFIC COMMENTS:

Comment No. 44: Figure 2.1-1 - The date on the figure should be updated to reflect recent changes.

Response No. 44: The figure will be updated.

Comment No. 45: Figure 2.1-2 – Please delineate the extent of the following surface water/sediment exposure areas: On-Property West Ditch, Off-Property West Ditch, Central Pond, Stormwater Detention Basin, South Ditch, East Ditch, MMBW, and Landfill Brook.

Response No. 45: The extent of the above referenced exposure areas will be shown on Figure 2.1-2.

Comment No. 46: Figure 2.1-3 – Please remove the yellow dots (non-background soil samples) from this figure.

Response No. 46: The yellow dots representing non-background soil samples will be removed.

Comment No. 47: Figure 2.1-5 – Section 2.3 page 2-19 references this figure, but it is not in the document. Please include

Response No. 47: There is no reference to Figure 2.1-5 on page 2-19. There is a reference to Figure 2.3-5.

Comment No. 48: Table 2.1-1. Please add rows for future worker exposures to both surface soils and subsurface soils at the containment area. (See Comment No. 13 above.) Please add rows for trespasser inhalation to Table 2.1-1 with "none" as the type of analysis and the reason for not evaluating in the rationale column, i.e. pavement, vegetative cover, and/or wetland. Similarly, please add rows for workers where inhalation will not be considered with the explanation. Please add rows for qualitative VI evaluations for indoor workers at the four areas discussed in Attachment 8. Note that the former Lake Poly area falls within EA1. Please discuss the possibility of evaluating a future indoor worker for this area.

Response No. 48: Future workers will be added for both surface and subsurface soil at the containment area. Inhalation will be added to trespasser with "none" and a rationale will be added. Indoor worker will be added for qualitative soil VI evaluations in EA1, EA3, EA7 and containment area.

Comment No. 49: Tables 2.3.9 and 2.3.10 and Figure 2.3.5 - The tables listing background surface water and sediment locations (HHRA Tables 2.3.9 and 2.3.10) still list samples from SDBK- 002 as background and HHRA Figure 2.3.5 still shows locations SDREF-012 and SDBK-002. Please remove these samples from the table and figure.

Response No. 49: Tables 2.3.9 and 2.3.10 and Figure 2.3.5 will be removed from the HHRA as surface water and sediment background data are not used in the HHRA.

Comment No. 50: Exposure parameter tables.

a. Tables 3.2-1 through 3.2-3. Please include volatilization factors (VF) in equations for evaluating inhalation intakes from volatile soil contaminants.

b. Tables 3.2-1 through 3.2-5. The values selected for skin surface area available for dermal contact for the older child and adult trespasser should be explained further in the footnotes and cite the 2011 Exposure Factors Handbook as the source of values used to determine the exposed surface areas. Please include supporting documentation of estimation of adolescent and adult trespasser surface areas and reference this material in the footnote.

c. Tables 3.2-2 and 3.2-3. A PEF of 1.36E+08 m3/kg is presented for construction worker inhalation and the reference is cited as an "Assumption". Please calculate a site-specific construction worker PEF value and provide supporting documentation for the calculation.

d. Tables 3.2-2 and 3.2-3. The dermal adherence factor for an indoor worker is presented as a value of 0.07 mg/cm2-event and for an outdoor worker is presented as a value of 0.2 mg/cm2-event in Table 3.2-2 and the reference for these values is cited as Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. Please reference the EPA Dermal guidance (EPA, 2004) dermal adherence factors of 0.2 mg/cm2-event for utility workers for the outdoor worker exposure scenario and 0.07 mg/cm2-event for pipe layers (dry soil) for the indoor worker.

e. Tables 3.2-4 and 3.2-5.

   i. The frequency of trespasser exposures to sediment and surface water - Olin has proposed increasing the trespasser frequency of exposure to sediment and surface water to 12 days per year (1 day per week 3 months/year). WERC has proposed 39 days per year (1 day per week 9 months/year). EPA recommends a compromise at 26 days per year (1 day per week 6 months per year).

   ii. Please specify the on-property surface water bodies to be evaluated.

   iii. Please use the off-PWD and on-PWD abbreviations rather than OPWD for document consistency.

Response No. 50:

a. VF will be included for evaluating inhalation intakes form volatile soil contaminants.

b. The skin surface areas used for the trespasser will be clearly defined in the footnotes. If an additional table is need it will be added.

c. A site specific PEF will be calculated and documentation will be provided.

d. The reference will be updated.

e. The exposure frequency for the trespasser will be changed to 26 days per year for surface water and sediment. Specific water bodies (South Ditch, Central Pond, and Storm Water Detention Basin) will be listed in Tables 3.2-4 and 3.2-5. OPWD will be changed to be consistent with the text.

Comment No. 51: 51. Toxicity factor tables.

a. Tables 4.1-1 through 4.2-2. There are several COPCs, including 4-isopropyltoluene, carbazole, dimethylphthalate, diphenyl ether, diphenyl methanone, delta-BHC, 4-nonylphenol, Kempore, urea, bromide, chloride, nitrate, and sulfate, for which there are no non-cancer or cancer toxicity values proposed. As it stands, there will be no quantitative calculations of risk for these COPCs. Please discuss the lack of available toxicity values for these contaminants in the uncertainty section of the HHRA, including a table listing them.

b. Table 4.1-1. The New Jersey Department of Environmental Protection (NJDEP) has derived an oral cancer slope factor (CSF), based on cancer bioassays conducted by the National Toxicology Program (http://www.state.nj.us/dep/dsr/chromium/soilcleanup-derivation.pdf). Please use this Tier 3 oral CSF of 5.0E-1 (mg/kg-d)-1 for hexavalent chromium.

c. Tables 4.1-1 and 4.2-2. Please delete the duplicate vanadium rows.

d. Tables 4.2-1 and 4.2-2: The source “AMEC” listed for the analytes: 2,4,4-trimethyl-1-pentene and 2,4,4-trimethyl-2-pentene should reference Attachment 6.

e. Table 4.1-2. Please clarify the source note "See PCBs" for Aroclor-1260.

f. Table 4.2-2. Please clarify the source "REL" for mercury as mercuric chloride. Also please clarify the source "HEAST 97" for elemental mercury (Please add 1997 to the footnote for HEAST on all four toxicity tables.) Also please add the reference for HEAST to the Section 5.0 reference list.

g. Table 4.2-1. Aroclor-1260's source indicates "Surrogate (2)" referencing the RfD for Aroclor-1254. Please clarify in the footnote the source of the RfD for Aroclor 1254.

h. Tables 4.1-1 through 4.2-2. Please provide the website used to obtain ATSDR MRLs.

Response No. 51:

a. The lack of toxicity values for several COPCs will be discussed in the uncertainty discussion.

b. Based on discussions with USEPA, we will use the NJDEP oral CSF in a discussion of uncertainty concerning cancer risk for hexavalent chromium (but not use it in our calculation of risks). USEPA's IRIS database is the preferred Tier I source of toxicity information for CERCLA. The IRIS database indicates that for hexavalent chromium, "carcinogenicity by the oral route cannot be determined". USEPA proposed to incorporate the NJDEP CSF into IRIS in September 2010 – however, there has been considerable debate about that proposal and the NJDEP CSF has never been added to IRIS.

c. The duplicate row will be removed.

d. A reference to Attachment 6 will be added.

e. Source note will be clarified.

f. Source will be clarified.

g. Source will be clarified.

h. The website citation for ATSDR MRLs will be added to the tables.

Comment No. 52: Attachment 1.

a. Attachment 1 has numerous pieces of supporting information. It would be helpful to subdivide the information, for example, the historical and RI data comparison could be its own attachment or Attachment 1A, the figures and tables from the 2007 FRI could be another attachment, etc. The HHRA text (Section 2.2.1 and 2.2.2) refers to Attachment 1 Tables 4 and 5, but these do not appear to be present. Please arrange items in this attachment in the order referenced in the text: A) the historical and RI data comparison; B) the excavated sample tables and figures from the draft Focused RI; C) the excluded VPH/EPH area samples excluded; D) tables and figures supporting the elimination of the

unusable high detection limit PAH samples; E) the sampling from the ephemeral drainage area; and F) the Pan Am railway samples.

b. Attachment 1 provides a comparison of historical soil data and RI soil data, relying on seven specific contaminants. The explanation of why these seven were selected is needed in the document. Please add the following statement (provided in your July 26, 2013 response): "The seven specific contaminants were selected because they are frequently detected contaminants at the Site and some are signature contaminants for the Site. In addition, the contaminants were selected to represent different classes of contaminants for the Site (e.g. benzo(a)pyrene represents PAHs)." to Attachment 1 of the HHRA. As noted in Comment #1, clarification is needed as to what contaminants are "site-related" [or signature contaminants].

Response No. 52:

a. Attachment 1 will be split into subsections as suggested.

b. The explanation of why the seven specific contaminants were selected will be added to the text.

Comment No. 53: Attachment 2.

a. Both Table 26 and Table 27 are titled the same "Sediment Data - Off-Property West Ditch". Table 27 should be Maple Meadow Brook Wetland.

b. Review of hexavalent chromium data in Attachment 2 tables indicates that some exposure areas have very little or no hexavalent chromium sampling (see RI Comment No. 233), notably soil exposure areas EA2, EA3, EA4, and EA7, and sediment in all areas except South Ditch. Surface water analysis for hexavalent chromium is also limited. EPA recommends the application of hexavalent chromium toxicity values and COPC selection criteria to the HHRA evaluation of total chromium data for all datasets with fewer than 8 samples analyzed for hexavalent chromium.

Response No. 53:

a. The title for Table 27 will be changed.

b. Attachment 7 of the HHRA Second Interim Deliverable contains a discussion regarding the relationship of hexavalent chromium to total chromium in soil. The discussion concluded that hexavalent chromium is a relatively small percentage of the total chromium detected in soil at OU1 and OU2. Hexavalent chromium is often non-detect in samples for which total chromium is relatively elevated or the ratio of hexavalent chromium to total chromium is often quite low for the higher detections of total chromium. Box plots included in Attachment 7 indicate, the spread of total chromium and hexavalent chromium are not consistent. These findings indicate a general lack of correlation between total chromium and hexavalent chromium concentrations in soil for OU1 and OU2. Surrogate hexavalent chromium concentrations derived for the higher detected total chromium concentrations, using

the ratio derived, would result in surrogate hexavalent chromium concentrations that are not likely representative of actual hexavalent chromium concentrations at the Site. Therefore, it would not be appropriate to convert total chromium data to hexavalent chromium concentrations in soil at OU1 and OU2 for purposes of the HHRA. Total chromium soil concentrations should be evaluated as trivalent chromium based on the analysis.

As discussed at the November 19, 2013 meeting at USEPA it was agreed for the HHRA, for a given medium, at any exposure point with fewer than three hexavalent chromium results, an estimate of the hexavalent chromium concentration will be calculated. The estimated hexavalent chromium concentration will be calculated by applying a ratio to each total chromium result for a specific exposure point and medium. The ratio will be the 95% UCL on the mean for the ratio of hexavalent chromium to total chromium for all samples in that medium that have both total chromium and hexavalent chromium results. This estimated hexavalent chromium concentrations will be used to calculate EPCs for those scenarios that have fewer than 3 measured hexavalent chromium concentrations at an exposure point.

Comment No. 54: Attachment 8.

a. A figure showing the locations listed on Table 1 with the maximum PID screening results for each location would be helpful.

b. Tables 4 through 9 have shading. Please add a footnote explaining what the shading indicates. Attachment 8 text indicates the purpose of shading for Tables 6 and 7. Please add an explanation in the text for shading on Tables 4, 5, 8, and 9.

c. Page 4 of 8 final bullet references tables in the Preliminary Draft RI. Please reference tables in the RI; if these tables are not in the Draft RI, then please provide within Interim Deliverable #2.

d. This attachment uses 1 ppmv PID readings and 1 mg/kg total VOC concentrations in soils as means of identifying areas/samples of potential VI concern. Please provide the basis of selection of these comparison levels.

e. This attachment indicates the vapor intrusion pathway is precluded at the occupied work trailer because the trailer is elevated off the ground surface. Is there a skirt on this trailer? If so, potential for VI does exist.

Response No. 54:

a. A figure with the PID screening results will be added.

b. A footnote will be added to the tables to indicate the purpose of the shading.

c. The reference to the Preliminary Draft RI will be updated with a reference to the RI.

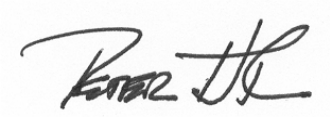
d. The basis of the comparison levels will be provided in the Draft HHRA.

e. The skirt does not create an air tight enclosed space similar to a basement or crawl space. Therefore, VI will not be evaluated for the trailer.

If you have any questions concerning this letter, please feel free to contact James Cashwell at (423) 336-4012.

Sincerely,

AMEC Environment & Infrastructure, Inc.



Peter H. Thompson
Project Manager

Michael J. Murphy
Project Principal

cc: James Cashwell, Olin
Joe Coyne, MassDEP
AMEC Project File

Project File: \\PLD2-FS1\Project\Projects\olinwilm\Olin Wilmington CSS 2014\4.0_Deliverables\4.1_Reports\OU1 OU2 RI\RTC Letters\2014 03 21 Wilmington - OU1 OU2 HHRA_No.2_RTC.docx

APPENDIX L

RESPONSE TO COMMENTS DRAFT BERA
(Provided on CD)

6107130016

March 21, 2014

Mr. James M. DiLorenzo
Remedial Project Manager
USEPA Region 1 - New England
5 Post Office Square
Mailcode: OSRR07-4
Boston, MA 02109-3912

Subject: Response to USEPA's October 1, 2013 Comments Letter Concerning the July 26, 2013 "*Second Interim Deliverable – Baseline Ecological Risk Assessment*, *Operable Unit 1 and Operable Unit 2"* for the Olin Chemical Superfund Site, Wilmington, Massachusetts

On behalf of Olin Corporation (Olin), AMEC Environment & Infrastructure, Inc. (AMEC) respectfully submits the following responses United States Environmental Protection Agency's (USEPA's) October 1, 2013 comments prepared by Nobis Engineering, Inc. (Nobis) on the *"Second Interim Deliverable – Baseline Ecological Risk Assessment, Operable Unit 1 and Operable Unit 2"*, dated July 26, 2013 for the Olin Chemical Superfund Site in Wilmington, Massachusetts.

Below please find USEPA comments on the Interim Deliverable No. 2 followed by Olin's response. The comments and responses are arranged by section.

BASELINE ECOLOGICAL RISK ASSESSMENT GENERAL COMMENTS

Comment No. 1: The majority of the BERA comments provided by EPA for Interim Deliverable #1 were addressed. The only exception being comment #12 (see AMEC 26 July 2013 letter to James DiLorenzo, subject: Response to USEPA Comments, Draft Remedial Investigation Report for Operable Unit 1 and Operable Unit 2: Baseline Ecological Risk Assessment – Interim Deliverable No.1), no additional discussion of the source(s) of water or amphibian use was provided.

> ***Response No. 1***: The primary source of water in the Off-Property West Ditch (Off-PWD) is stormwater runoff from the Jewel Drive area. The installation of the weir resulted in suppression of groundwater and dramatic reduction/elimination of groundwater discharge to the Off-PWD. As noted in Table 3.5-1, frogs inhabit the Off-PWD. Frogs have been encountered in Off-PWD in the springtime (after winter thaw) until the Off-PWD dries out, often in early summer. Salamanders, salamander egg masses, or salamander larvae have not been observed in the Off-PWD.

Comment No. 2: The Baseline Exposure Assessment and Effects Estimate not only provided exposure assessment and toxicity information, but also present preliminary calculations of risk that are typically reserved for the Risk Characterization portion of the BERA

(i.e., risk results). It would have been a more efficient use of time to save the calculation of risk until after receiving comments on the exposure and effects approach, since numerous comments have been provided that directly impact risk results.

Response No. 2: No response required

Comment No. 3: This review focused on key components of the Exposure and Effects Estimate, but did not include a detailed review of most of the calculations provided. Given the nature and detail of the recommended changes it was decided to reserve detailed evaluation of risk calculations for the Interim Deliverable #3.

Response No. 3: No response required

Comment No. 4: It appears that COPECs are being selected based on no-effect screening benchmarks, consistent with a SLERA; however, it is unclear whether the benchmark comparisons in the BERA are based on no effect benchmarks or effect benchmarks. For instance, in Section 3.9, the measurement endpoints 1A, 2A, 3A, 4A, 7A, 8A are for "effects" benchmarks. Please clarify throughout the document whether benchmarks are no-effect benchmarks (e.g. Criterion Continuous Concentrations (chronic value), NOAEL-based EcoSSLs, NOAEL-based TRVs) or effect benchmarks (e.g. Criterion Maximum Concentrations (acute value), LOAEL-based EcoSSLs, LOAEL-based TRVs). While the SLERA should use conservative (e.g., NOAEL–based) values, where possible, the BERA should include LOAEL-based (less conservative) values so that a range of potential ecological risks can be identified. Included with these comments is an example of LOAEL-based soil benchmarks developed by the EPA Region 1 ESAT contractor (see Attachment 1).

Response No. 4: COPECs were selected using "no-effect" screening benchmarks based on NOECs/NOAELs. The effects assessment relies on "effects" benchmarks/TRVs based on LOECs/LOAELs so that a range of potential ecological risks can be identified. The BERA also incorporates LOAELs calculated from data presented in the USEPA Eco-SSL documents. The text will be revised to clarify when "effects" benchmarks are used.

SECTION 2.0 SPECIFIC COMMENTS:

Comment No. 5: Section 2.1. Page 2-1. Was MassDEP in agreement with the results presented in the 1997 Stage II ERC? If not, please provide information on any areas of disagreement.

Response No. 5: The 1997 Stage II ERC is approximately 16 years old, and a substantial amount of investigation has been performed at and around the site since then. Any of DEP's perspective on that historical MCP document are not necessary for, or relevant to, the preparation of the present CERCLA BERA program.

Comment No. 6: Section 2.2. Page 2-2. Did MassDEP agree with the conclusions Olin presents for the FRA? If not, please provide information on areas of disagreement.

Response No. 6: The 1997 Stage II ERC is approximately 16 years old, and a substantial amount of investigation has been performed at and around the site since then. Any of DEP's perspectives on that historical MCP document are not necessary for, or relevant to, the preparation of the present CERCLA BERA program.

Comment No. 7: Section 2.3. Page 2-3. This section seems out of place in a Section titled Previous Ecological Risk Assessments. This subsection might work better in Section 4.0 Baseline Exposure and Effects Estimate.

Response No. 7: The section 2.3 text concerning previous evaluations of ammonia in surface water has been retained and additional discussion of potential impacts of ammonia in surface water is included in the RI report itself and in the remainder of the BERA.

Comment No. 8: Section 2.3. Page 2-3. While the benchmarks previously used for ammonia may not be appropriate given existing Site conditions, there is no information presented to justify the claim that risks were overestimated as a result of its use. Please provide justification.

Response No. 8: Table 4 of the 2013 AWQC decision document for ammonia shows the ranked genus mean chronic values (GMCV) in terms of total available nitrogen (TAN) per liter. The most ammonia-sensitive species include species that are not native to Massachusetts (*e.g.* freshwater mussels indigenous to the Mid-West) or have never been observed in the waterbodies being evaluated (*e.g.* fish, freshwater mussels). The first non-fish/non-mussel taxon listed in Table 4 that could inhabit the ditch system is the amphipod. The corresponding GMCV is 29.17 mg TAN/L, a concentration nine times higher than the AWQC, thus using the AWQC over-estimates risk at the Site. The absence of fish is due to physical habitat restrictions (*e.g.* ephemeral hydrology) rather than ammonia toxicity. The absence of mussels is also therefore expected since they require fish hosts to disperse. The text will be revised to include this discussion.

SECTION 3.0 SPECIFIC COMMENTS:

Comment No. 9: Section 3.5.1. Page 3-5. *Thsuga* is correctly spelled *Tsuga*.

Response No. 9: Text will be revised as noted.

Comment No. 10: Section 3.5.1. Page 3-6. Olin should include wildlife likely (based on habitat conditions) to occur for each exposure area in Table 3.5-1, not just those species observed during weir inspection.

Response No. 10: The list of wildlife was compiled from many years of weekly inspections, and observations made during other field activities, and should be a sufficient indicator of which species are likely to inhabit the site over time. Also, USEPA 1997 Appendix B provides an example checklist for conducting a habitat assessment and identifying site-specific receptors. That check list does not include compiling a list of all wildlife likely to occur. The list was prepared consistent with available guidance. No revisions to the list are planned.

Comment No. 11: Section 3.5.9. Page 3-8. Olin had agreed to provide additional information on the source(s) of water for the Off-Property West Ditch (BERA comment #12). No such information has been added to this section.

Response No. 11: See response to General Comment No. 1.

Comment No. 12: Section 3.5.10. Page 3-8. Figure 1.0-2 is not provided in the BERA SID, Olin should consider changing this reference to Figure 3.2-2.

Response No. 12: The text will be revised to reference Figure 3.2-2.

Comment No. 13: Section 3.5.11. Page 3-9. A reference to Figure 3.2-2 would be helpful in this section.

Response No. 13: Text will be revised to reference Figure 3.2-2.

Comment No. 14: Section 3.9. Page 3-13. Table reference to Table 5.9-2 should be 3.9-2.

Response No. 14: Text will be revised as noted.

Comment No. 15: Section 3.9. Page 3-15. General. The 10/11 attributes from Menzie et al. (1997) were condensed to 5 attributes. In general, the approach is fine as there tends to be overlap between/among the attributes, particularly when there are not many measurement endpoints as at this Site. One attribute seemingly not accounted for was "Quantitative Measure" or "Quantitativeness." It would be helpful to the reader if for example, within the bullet list on 3-15, the Menzie et al. attribute terminology was included parenthetically to easily facilitate recognizing which attributes were combined in this approach.

Response No. 15: "Quantitativeness" is identified in Menzie *et al.* (1997) as a component of study design and execution. In the BERA, "study design and execution" is a component of the "data quality and study design" attribute. The Menzie *et al.* terminology will be added to the bullet list for clarification.

Comment No. 16: Section 3.11.1. Page 3-19. Please confirm that all South Ditch sediment samples used in the BERA are post remediation samples.

Response No. 16: Yes, South Ditch sediment samples used in the BERA were collected after the remediation. South Ditch was remediated in 2000. The samples used in the BERA date from 2005 to present.

Comment No. 17: Section 3.12.1. Page 3-22. Please provide the criteria used to select which study result (i.e., LC50 value) was selected from the ECOSAR database to be used to develop the chemical-specific benchmark. Was the lowest LC50 value used or were other criteria employed? Was any consideration given to matching the ECOSAR organism with conditions with the water body?

Response No. 17: ECOSAR predicts toxicity values for a substance based on molecular structure and empirical toxicity data for similar chemicals. ECOSAR provides only one value

for each available effect type; for example ECOSAR provides only one LC50 value. There is no opportunity to select the lowest LC50 value as only one will be presented. Aquatic organisms for which ECOSAR values are available are limited to three generic receptors: green algae, daphnids, and fish. Although fish have not been observed in the on property ditch system, the ECOSAR values for fish are generally the most conservative. Fish are suitable surrogates for amphibians, which do inhabit the site.

Comment No. 18: Section 3.13: there is additional aquatic and terrestrial toxicity information for hydrazine (CAS 302-01-2), technical 4-nonylphenol (CAS 84852-15-3), and Kempore (CAS 123-77-3) in the REACH database (http://echa.europa.eu/web/guest/information-onchemicals/registered-substances). These include Probable No Effect Concentrations (PNEC) in freshwater that are usable as no-effect benchmarks and toxicity data. In addition, there is a finch TRV for hydrazine in soil. Please incorporate these data as appropriate in the SLERA and BERA.

Response No. 18: We will review the suggested database and select a benchmark from applicable data.

Comment No. 19: Section 3.13: Add ammonia as a COPEC to MMB Wetland-Surface Water. Chemicals should not be eliminated as COPECs based on background.

Response No. 19: Table 3.13-8 screens Maple Meadow Brook Wetland surface water. Table 3.13-8 indicates that nitrogen (as ammonia) was not selected as a COPEC because the maximum detected concentration was below the screening benchmark, not based on background.

Comment No. 20: Section 3.14. Page 3-29. *CERA* should be changed to *BERA*.

Response No. 20: Text will be revised as noted.

Comment No. 21: Section 3.14. Page 3-29. The ammonia environmental chemistry discussion is very good and helpful; however, in prior meetings between Olin and EPA the discussion included the possibility of trying to identify naturally occurring levels of ammonia associated with wetland sediments (e.g., peat dominated wetlands like those found in the MMB drainage) via a literature search, since the demonstration that observed levels are similar to naturally occurring levels would be a compelling argument for eliminating ammonia as a COPEC. Was this literature search ever attempted? Please provide this information on literature search or justification for chemistry discussion.

Response No. 21: The scientific literature was searched for naturally occurring ammonia concentrations in similar wetland sediment, and found a range so wide that it did not add value to the discussion. Documentation of the search can be provided upon request.

Comment No. 22: Section 3.14: EPA disagrees with the statement on page 3-29 that it is unlikely that ammonia detected in surface water at the site is Site-related because ammonia is a component of the DAPL and other components of the DAPL have been measured in South Ditch. EPA makes the rebuttable presumption that ammonia in South Ditch is Site-related,

which can be rebutted by demonstration that ammonia is not present in groundwater entering South Ditch, by means of piezometers or pore water measurement.

Response No. 22: The conceptual site model, presented in previous reports, indicates that concentrations of ammonia in the South Ditch are impacted by DAPL constituents in groundwater. Text will be revised to clarify that the discussion in Section 3.14 does not apply to South Ditch.

Comment No. 23: Table 3.8-1 is confusing; it might be helpful if the lines in the **Receptors** box for both the Terrestrial Exposure Areas and Aquatic Exposure Areas were removed.

Response No. 23: Table 3.8-1 will be revised to be less confusing.

Comment No. 24: Table 3.9-1: The BCMOE (2010) reference does not appear to be listed in Section 6.0.

Response No. 24: The source will be referenced as:

Science Advisory Board for Contaminated Sites in British Columbia (SABCS). 2010. Guidance for a Weight of Evidence Approach in Conducting Detailed Ecological Risk Assessments (DERA) in British Columbia. Submitted to BC Ministry of the Environment, October 2010.

Comment No. 25: Table 3.9-1. First Column. Typographical error in column heading. Should be “of” instead of “off.”

Response No. 25: Text will be revised as noted.

Comment No. 26: Table 3.9-1. Strength of Association/Description of Attribute notes “Site-specificity and relevance of LOE to assessment endpoint…” According to Menzie et al., the strength of association deals only with the measurement endpoint as it relates to the assessment endpoint and does not consider site-specific information. Site specificity is accounted for in the second attribute “Sensitivity and Specificity.” It is possible that the BCMOE (2010) document noted above makes a good argument for considering it in the “Strength of Association” also, but without seeing that reference, please remove the site-specificity from “Strength of Association” in Table 3.9-1 and cascade the change throughout the report.

Response No. 26: The table will be revised by striking “specificity” from the first column of the second row, as the information in the remainder of the row applies to LOE sensitivity. “Site-specificity” is already discussed in the first row where it has already been identified as an attribute of “strength of association.”

Comment No. 27: Table 3.9-2. Typographical error in column heading. Should be “Rationale” instead of “Rational.”

Response No. 27: Text will be revised at noted.

Comment No. 28: Table 3.9-2. It appears as though a 5-point scale is being used to determine an "inference weight." Either in text or in a footnote, please explain to what categories ranges of average LOE Ranks will be assigned. For example, Average LOE Rank 1 to <2 = "Low."

Response No. 28: A footnote will be added to explain the rankings.

Comment No. 29: Table 3.9-2. Screening benchmark comparisons for the robin and shrew along with food chain modeling are not really independent or separate lines of evidence. Please eliminate the former as there is generally greater uncertainty associated with the benchmark comparisons than with the food-chain modeling.

Response No. 29: USEPA and other regulatory stakeholders often prefer to see the benchmark comparison. Nevertheless, the benchmark comparison will be removed to minimize uncertainty.

Comment No. 30: Table 3.9-2. It seems inconsistent that for Measurement Endpoints1A, 2A, 3A, and 4A, an Average LOE Rank of 2.5 has an inference weight of "Low;" whereas for Measurement Endpoint 3B an Average LOE Rank of 4 has an inference weight of "Medium/High." The suggested explanation of categories noted above may clarify this.

Response No. 30: A footnote will be added to explain the rankings, as noted above.

Comment No. 31: Table 3.9-2. Footnote [a] indicates that the strength of association score is counted twice to double-weight this attribute to account for its importance. It appears that the Average LOE Rank was obtained by dividing the Scores by 5. Please divide the Scores by 6, else values are being moved out of a 5-point scale and do not make intuitive sense. See following hypothetical example:

Attribute	**Score**	
	w/o doubling	**With doubling**
Strength of Association	4	8
Sensitivity and Specificity	5	5
Data Quality and Study Design	5	5
Representativeness	5	5
Correlation/Causation/Consistency	4	4
Average LOE Rank by dividing by 5	4.6	5.4
Average LOE Rank by dividing by 6	NA	4.5

In this example, one would expect that double-counting the Strength of Association Score would decrease the Average LOE Rank as its Score is lower than that for three of the other four Attributes. However, dividing by 5 makes the Rank higher.

Response No. 31: The calculation will be revised to divide by six.

Comment No. 32: Table 3.9-2. Although there can be disagreement regarding the actual Score/Rationale given to an Attribute, it is important that the Rationale column give justification for the score using the "Decision Rules" on Table 3.9-1. For example, "There is a high level of

uncertainty associated with the use of benchmarks" is often noted as the rationale for a "Low" Score. Although the low score or the statement itself may not be in dispute, the Rationale does not provide the necessary justification.

Response No. 32: Additional discussion will be provided.

Comment No. 33: Table 3.9-2. Strength of Association. Rationale. "Site-specific conditions…" should not be considered for this attribute (see Comment 22).

Response No. 33: Text will be revised as noted above in the response to Comment No. 22.

Comment No. 34: Table 3.9-2. Data Quality and Study Design. Rationale. "Data used represents numerous years of sampling" is not a rationale for a high score for this attribute. Emphasis should be placed on the fact that sample results used in this BERA followed an approach procedures reviewed and approved by EPA and other stakeholders.

Response No. 34: Text will be revised to emphasize that the sample results used in the BERA followed an approach reviewed and approved by USEPA and other stakeholders. The revision will also emphasize the large number of samples used to characterize site conditions.

Comment No. 35: Table 3.9-2. Correlation/Causation/Consistency. Food chain modeling pages. "Use of TRVs based on specific classes of receptors allows for ability to correlate effects with receptor-specific exposures." This may be true, but there are other issues to consider for this attribute. How well does the observed effect in the study used as the TRV basis correlate with population-level effects? How closely related is the species used in the TRV derivation with the site-specific receptors? Etc. The rationale presented does not match the Decision Rules on Table 3.9-1. (See Comment 28).

Response No. 35: The decision rules are generic, and some interpretation is required to apply them to specific measurement endpoints. The attribute score of 4 for correlation, causation and consistency for food chain modeling measurement endpoints corresponds to the following decision rule:

"LOE response is quantitatively correlated with magnitude of exposure, but correlation is not statistically significant (or data are insufficient to test for statistical relationships); mechanistic linkage inferred, but not definitive."

This decision rule was interpreted to apply to food chain modeling endpoints. TRVs allow for a quantitative measure of effects associated with the magnitude of exposure (*i.e*. a receptors' modeled chemical daily dose), but cannot be tested for statistical relationships. TRVs are typically not available for the specific receptor species, so linkage is inferred, there is some underlying uncertainty. Therefore, the decision rules were followed.

Comment No. 36. Table 3.9-2. Measurement Endpoint 7B. Scores/Rationale appears to be cut and pasted from food chain modeling and are not appropriate for the sediment toxicity test endpoint.

Response No. 36: The text will be revised as noted.

SECTION 4.0 SPECIFIC COMMENTS

Comment No. 37: Section 4.0. Page 4-1. Given the limited reference dataset for surface water and sediment, special care needs to be given when trying to interpret results based on comparisons to reference data.

Response No. 37: This comment applies only to East Ditch (considered separately) and Maple Meadow Brook. Care will be given when interpreting results based on the one reference point approved by USEPA for each water body.

Comment No. 38: Section 4.0. Page 4-1. First set of bullets. Please explain why sediment toxicity testing conducted in South Ditch is not provided as a line of evidence in this section.

Response No. 38: A discussion of toxicity test results conducted in South Ditch will be added to the text.

Comment No. 39: Section 4.1. Page 4-1. RME exposure point calculation using ProUCL should only be attempted with datasets of 8 samples and greater than 50% detected values. Data sets with more than 8-10 samples but <50% detects need special consideration.

Response No. 39: The ProUCL output will be reviewed to confirm that the appropriate statistic was used. Additional discussion will be added to address the uncertainty associated with use of a 95% UCL as an EPC when there are fewer than 50% detects.

Comment No. 40: Section 4.2.1. Page 4-2. 1st Paragraph. Statement “Effects benchmarks represent concentrations at or above which adverse effects are likely to occur.” This is not necessarily true. Effects-based benchmarks are generally LOAELs – doses/concentrations at which effects are noted. The value at which the effect is first seen would lie somewhere between the NOAEL and LOAEL value.

Response No. 40: The statement quoted is directly from MacDonald *et al*, 2000. The nuances between “noted” versus “seen” are unclear in the comment as presented, and any difference are unlikely to affect the outcome of the BERA. No further response is required.

Comment No. 41: Surface Water Effects Benchmarks. Page 4-4. Acute values are not appropriate to use as the only non-screening surface water benchmarks. Acute values may be used to describe site conditions, but they cannot be the only regulations evaluated. Federal criteria and generally state guidelines indicate both chronic and acute values must not be exceeded for particular time periods. This may be addressed in the interpretation of risks but it is not indicated within Section 4.0.

Response No. 41: Acute AWQC are appropriate for use as effects benchmarks in ecological risk assessment because they are based on LC50 and other acute toxicity test endpoints. No changes to the text will be made.

Comment No. 42: Section 4.1 Tables and Attachment 2: There is a 95% ProUCL output provided for Surface Water – Landfill Brook EPC selection (Section 4.0 of Attachment 2), but no associated results table provided in the Section 4.1 Tables.

Response No. 42: Maximum detected concentrations were used to select Landfill Brook COPECs. The ProUCL output was not used to select COPECs in Landfill Brook. The ProUCL output was provided in error. The exposure assessment for Landfill Brook will be removed from the risk assessment because the nature and extent evaluation has concluded that Landfill Brook is impacted by the Woburn Landfill and other industrial properties nearby and not by the OCSS.

Comment No. 43: Table 4.2-1: The Eco-SSL-Mammals for hexavalent chromium is 132 mg/kg rather than 81 mg/kg. Please revise.

Response No. 43: Text will be revised as noted.

Comment No. 44: Tables 4.3-1 through 4.3-15. It is not appropriate to compare plant or invertebrate benchmarks with EPCs. These receptors are sessile or relatively sessile and are not exposed to an average concentration. Sample by sample comparisons are more appropriate.

Response No. 44: Though plants and some invertebrates are sessile, the BERA evaluates risks at the population level, not the individual level. Populations are exposed to concentrations across the spatial extent of the exposure area and over time, conditions best estimated with EPCs based on average concentrations.

Comment No. 45: Tables 4.3-1 through 4.3-15. It is not appropriate to compare acute water quality values with EPCs. Acute benchmarks are maximum concentrations with a not-to-exceed timeframe, which is less than one day.

Response No. 45: Acute AWQC are appropriate for use in ecological risk assessment because they are based on LC50 and other acute toxicity test endpoints. No changes to the text will be made.

ATTACHMENT 5.0 SPECIFIC COMMENTS:

Comment No. 46: Attachment 5. Section 2.0. Page 1. Semi-aquatic wildlife receptors do not include the raccoon, which is listed as measurement endpoint 10B (p 3-17) and on Tables 3.8-1 and 3.9-2. Please include the raccoon food chain modeling estimations.

Response No. 46: The raccoon food chain model will be added.

Comment No. 47: Attachment 5. Section 3.0. Page 2. Equation missing a division sign.

Response No. 47: The text will be revised as noted.

Comment No. 48: Attachment 5. Section 3.0. Page 3. Presentation regarding BAFs is not clear. The hierarchy for selecting literature-based BAFs is not presented. In addition, the bullet list that is meant to describe how BAFs were formulated, when not found in the literature, includes sources for literature-based BAFs (e.g., Baes et al. 1984).

Response No. 48: The text will be revised to clarify how BAFs were derived and selected.

Comment No. 49: Attachment 5. Section 3.0. Page 3. First bullet. Please provide a reference for assuming organic compounds with a Log Kow <3.0 do not significantly bioaccumulate. This type of parameter is generally based on the dataset for a particular study and can vary. For example, the Eco SSL guidance indicates the earthworm regression dataset includes chemicals with Log Kow from 2 to 8. Using both methodologies in the risk assessment is inconsistent. Selection of one methodology over another should be discussed.

Response No. 49: USEPA guidance (USPEA, 2000) states:

"Chemicals with a Log Kow greater than 3.5 are considered to be bioaccumulative, that is, they are likely to partition into organic material, including lipids of organisms and predicted and measured BAFs are correlated within the range of Log Kow 3.5 to 6.5." A lower bound of 3.0 was used to provide a small measure of conservatism. Chemicals with a Log Kow less than 3.0 are not bioaccumulative, even if USEPA included them in the Eco-SSL.

Reference: USEPA. 2000. Bioaccumulation Testing and Interpretation for the Purpose of Sediment Quality Assessment: Status and Needs. Offices of Water and Solid Waste. EPA-823-R-00-001. February.

Comment No. 50: Attachment 5. Section 3.0. Page 3. Second bullet. EPA does not agree with always using Bv values from Baes. Different receptors consume different portions of plants. If the receptor is consuming a reproductive portion (i.e., roots, fruits, seeds), then the Br is a more appropriate value to use.

Response No. 50: Dietary information for receptors is generally not specific enough to justify the use of Br values over Bv values. This uncertainty will be addressed in the text.

Comment No. 51: Attachment 5. Section 3.0. Page 3. Last bullet. Although it may be appropriate to use the same BAFs to estimate terrestrial and aquatic invertebrate tissue concentrations, it is not appropriate to use terrestrial invertebrate soil to tissue BAFs to estimate bioaccumulation from sediment into amphibians or fish. Because the BSAF databases are limited, water concentrations are generally used to estimate tissue concentrations in these receptors. BAFs for such can be found in *Screening Level Ecological Risk Assessment Protocol for* Hazardous *Waste Combustion Facilities* (EPA, 1999) or using EPA's EPISUITE.

Response No. 51: Fish- and amphibian-specific BSAFs were preferentially selected from the literature and were used, when available (approximately 75% of COPECs). BSAFs for

aquatic invertebrates were used as surrogates for fish and amphibians only where BSAFs for fish and amphibians were unavailable. BSAFs for aquatic invertebrates used as surrogates for fish and amphibians were based on soil water to invertebrate tissue equilibrium partitioning models obtained from Jager (1998). Equilibrium partitioning models account for the thermodynamic partitioning of organic chemicals between soil solids, porewater and resident organisms tissues. Jager (1998) uses equilibrium partitioning models to estimate the bioconcentration of organic chemicals from soil water to invertebrate tissue. The partitioning of organic chemicals between soil and soil water in terrestrial systems was assumed to be roughly analogous to partitioning between sediment and porewater in aquatic systems. The Combustion Facilities guidance will be consulted in the preparation of the draft BERA.

Comment No. 52: Attachment 5. Section 3.3. Page 4. 3rd bullet. It is not appropriate to use mammal toxicity data as surrogate data for birds. The differences between the taxa are too great.

Response No. 52: Mammal TRVs were extrapolated to birds (when bird values were not available) based on historical precedent in USEPA Region I, so that there would be a number to evaluate. The BERA will be revised to exclude these extrapolations.

Comment No. 53: Attachment 5. Section 3.3. Page 4. 4th bullet. It is not recommended to use inhalation data to extrapolate oral toxicity to ecological receptors.

Response No. 53: Inhalation exposures were included only where oral toxicity values were not available so as to provide a number to evaluate. The BERA will be revised to exclude TRVs extrapolated from inhalation studies.

Comment No. 54: Attachment 5-1. Dietary intake missing Dosebird.

Response No. 54: The Dosebird value will be shown.

Comment No. 55: Attachments 5-1 and 5-2. Exposure frequency is generally not used in ecological risk assessments. Most toxicity values are based on chronic exposures <1 year or during critical time periods (e.g., reproduction) and would be comparable to the exposure time on-site. If these time periods do not overlap, then the receptor being evaluated is likely not the most appropriate. Any exposure frequency issues are better left to the uncertainty discussion and not dealt with in a quantitative fashion. In addition, if the EF were to be used, the units within these tables do not agree; the definition indicates days/year and the units indicate unitless. The value would have to be a fraction (unitless) for the dimensional analysis to work. Attachments 5-3 through 5-9 indicate units as days/year, so please justify.

1. ***Response No. 55***: The exposure frequency term will be removed from the food chain models. However, Olin would like to reserve the right review the underlying studies and discuss uncertainties of not using an exposure frequency term if the models are showing risk for an analyte when the model is using a TRV based on a longer-term study.

Comment No. 56: Attachments 5-1 and 5-2. Please indicate whether the IR values are in wet or dry weight.

Response No. 56: Ingestion rate (IR) values are in units of grams wet weight per day (g ww/day) as presented in the exposure parameters tables in Attachment 5-3 through 5-9. IR values were obtained from Nagy (2001).

Comment No. 57: Attachment 5-1. Footnote [d]. Assuming the chemical concentration of small mammal and small bird prey is based on ingesting 50% soil invertebrates and 50% plant tissue does not account for the soil ingestion exposure pathway for the prey.

Response No. 57: Body burdens for small mammal and bird prey in carnivore food chain models (*e.g.* hawk, fox) were calculated using a combination of published, peer reviewed, and widely accepted sources available in the scientific literature, including:

- Travis & Arms (1988) to predict uptake body burdens from organic COPECs (*i.e.* B_b) ;
- Baes *et al.* (1984) to predict inorganic body burdens from inorganic COPECs (*i.e.*, F_f); and
- Sample, Beauchamp, Efroymsom, & Suter (1998) to predict inorganic body burdens.

The source used for a given COPEC depends on several factors including medium, receptor, and chemical. Sample *et al.* provides soil-to-tissue uptake factors and so would include incidental soil ingestion of prey species. It is recognized that values from Travis & Arms and Baes *et al*. were developed for agricultural applications for feed ingestion and do not account for soil intake so may underestimate tissue body burdens. Therefore, this under-estimation will be discussed in the uncertainty section. This underestimation is expected to be very minor, because for carnivores, other variables such as site foraging frequency, ingestion rate, and incidental soil ingestion are far more influential to the overall dose calculations than the incidental soil ingestion of prey species.

Olin is not aware of a comprehensive, published, peer reviewed model that includes soil ingestion as a parameter for estimating prey body burdens for all COPECs.

Comment No. 58: Attachment 5-1. Footnotes for water units (e.g., mg/L and L/day) not appropriate to table.

Response No. 58: Text will be revised as noted.

Comment No. 59: Attachment 5-2. Dietary intake missing Doseamphibian.

Response No. 59: Text will be revised as noted.

Comment No. 60: Attachment 5-2. Dosewater has the wrong units and should be in mg/kg-day.

Response No. 60: Text will be revised as noted.

Comment No. 61: Attachments 5-3 through 5-9. Only one site foraging frequency (SFF) is presented. For many of the receptors the SFF will vary per exposure area.

Response No. 61: Calculated SFF values vary by receptor and exposure area. All SFF values are presented in Attachment 5-15. Footnotes will be added to Attachments 5-3 through 5-9 to direct the reader to Attachment 5-15.

Comment No. 62: Attachments 5-3 through 5-9. Exposure duration is listed as a parameter instead of exposure frequency.

Response No. 62: The terminology will be standardized so that all attachments reference exposure frequency.

Comment No. 63: Attachments 5-3 through 5-9. Many of the food ingestion equations are not presented properly as the "b" parameter should be a power (i.e., superscripted).

Response No. 63: Text will be revised as noted.

Comment No. 64: Attachments 5-3 through 5-9. Soil ingestion rates appear to be calculated based on wet weight ingestion rates mostly using data from Beyer et al. This is incorrect as Beyer et al. based their % on dry weight ingestion rates and soil concentrations are in dry weight. Please correct.

Response No. 64: Soil ingestion rates calculated per Beyes *et al.* (1994) will be based on dry weight food ingestion rate. The following example is provided to show how the values from Beyes will be used. These equations will be shown in the revised food chain modeling Attachment 5 to be provided in the next deliverable.

Example 3. Calculating the soil ingestion rate for the American robin.

Beyes reports that robins ingest soil at a rate 10% of the daily food ingestion rate, on a dry weight basis:

$$IR_{soil} = 10\% * IR_{food} \qquad \text{(Equation 4)}$$

Where:

IR_{soil} = Soil ingestion rate (kg/day dry-weight)
IR_{food} = daily food ingestion rate (kg/day dry-weight)

For the robin, the food ingestion rate was calculated using a regression equation for insectivorous birds (Nagy, 2001), which provides a food ingestion rate in terms of wet weight:

$$IR_{food} = 1.633 * BW^{0.705} \qquad \text{(Equation 5)}$$

Where:

IR_{food} = daily food ingestion rate (g/day wet-weight)
BW = body weight (g).

Substituting a value of 82 g for the weight of the robin (Attachment 5-3),

IR_{food} = 37 g/day wet-weight = <u>0.037 kg/day wet-weight.</u>

Next, IR_{food} must be converted from wet weight to dry weight. To do so, the dietary composition and water content of each dietary item must be considered:

IR_{food} (dry weight) = IR_{food} (wet weight) * P_{invert}*(1-WC_{invert}) + IR_{food}*P_{veg}*(1-WC_{veg}) (Equation 6)

Where:

IR_{food} = daily food ingestion rate (kg/day dry-weight)
IR_{food} = daily food ingestion rate (kg/day wet-weight)
P_{invert} = Proportion of invertebrates in diet (unitless)
WC_{invert} = water content of invertebrates (unitless)
P_{veg}= Proportion of vegetation in diet (unitless)
WC_{veg} = water content of vegetation (unitless)

Substituting:

- dietary composition values provided in Attachment 5-3:
  P_{invert} = 0.85 (85% invertebrates)
  P_{veg} = 0.15 (15% vegetation)

- water content values from USEPA (2005) "*Attachment 4-1: Guidance for Developing Ecological Soil Screening Levels (Eco-SSLs) Exposure Factors and Bioaccumulation Models for the Derivation of Wildlife Eco-SSLs*":
  WC_{invert} = 0.85 (85% water)
  WC_{veg} = 0.84 (85% water)

- and IR_{food} = 0.037 kg/day wet-weight (from Equation 5),

IR_{food} = 0.0058 kg/day dry-weight.

Finally, substituting the IR_{food} (dry-weight) value of 0.0058 into equation 4 yields the dry weight soil ingestion rate:

IR_{soil} = 0.00058 kg/day dry-weight.

Table 1 (attached) summarizes dietary composition, corresponding water content, receptor body weight, equations to calculate food ingestion rates (wet weight), and calculated soil ingestion rates for all food chain model receptors considered in the BERA. Table 1 also provides justification and sources for those values.

Comment No. 65: Attachment 5-3. Dietary composition text indicates that the robin consumes only invertebrates yet the dietary fractions in the model included 32% vegetation. Please fix inconsistency.

Response No. 65: The text will be revised so that the text and the model agree.

Comment No. 66: Attachment 5-3. The 10 % soil ingestion rate seems reasonable, please reference the woodcock value provided in Beyer et al 1994.

Response No. 66: The *Beyer et al.* (1994) reference for woodcock will be provided as a surrogate for the robin.

Comment No. 67: Attachments 5-4 and 5-6. Site foraging frequency. If a receptor is obtaining only 1,000th of its diet from the Site, it is not an appropriate receptor to be evaluating.

Response No. 67: Receptors were selected to cover the full range of trophic classes of organisms that may use site exposure areas. Higher tropic level animals such as the red-tailed hawk and red fox require large home ranges for hunting prey. Although a larger home range limits the exposure of higher tropic level organisms to site, risks to these organisms are still relevant to the ecological risk assessment and to future risk management activities.

Comment No. 68: Attachment 5-4. Home range (red-tailed hawk). Appears to have been calculated using data from the four different seasons; however, the exposure duration indicates most adult pairs in New England migrate south during October/November and returning in February/March. If this is the case, then the home range data should not account for times the animal is not there. This would effectively cut the home range in half.

Response No. 68: "Exposure Duration (or Frequency)" is the parameter which accounts for time spent in New England. As shown in Attachment 5-4, the food chain model assumes that red-tailed hawks in New England begin the southern migration in mid-October and return in mid-March, spending approximately 210 days per year (approximately 7 months) around the site.

"Home Range" describes the extent of the nesting and foraging territory. The home range value was calculated as the average of values published for breeding pairs of red-tailed hawk in USEPA's Wildlife Exposure Factors Handbook. As home range is independent of exposure duration, it is not necessary to divide the calculated home range value to account for migration.

Comment No. 69: Attachment 5-3. Please provide some rationale beyond "assumption" for the hawk soil ingestion rate.

Response No. 69: A reference will be provided.

Comment No. 70: Attachment 5-4. Food ingestion rate for the shrew is based on a regression equation for insectivorous mammals; however, the dietary compositions used in the modeling are 14% plant and 9% mammal. The omnivore equation may be more appropriate.

Response No. 70: Since invertebrates were assumed to comprise the vast majority of the shrew's diet (77%), the insectivorous mammal equation is more appropriate than the omnivore equation.

Comment No. 71: Attachment 5-4. Beyer et al., 1993 is cited as the reference yet the footnotes indicate Beyer et al., 1994. The 1993 document is the pre-publication copy. Please reconcile.

Response No. 71: The reference will be revised to Beyer *et al*. (1994).

Comment No. 72: Attachment 5-7. Site foraging frequency value is zero. Please correct.

Response No. 72: SFFs vary by exposure area and are presented in Attachment 5-15. A footnote will be added to Attachment 5-7 to direct the reader to Attachment 5-15.

Comment No. 73: Attachment 5-7. Food ingestion rate for the marsh wren is based on a regression equation for omnivorous birds; however, the dietary composition used in the modeling is 100% invertebrates. Please reconcile.

Response No. 73: Revising the food ingestion rate for the marsh wren from the equation for omnivorous birds to insectivorous birds would change the ingestion rate from 0.0092 kg/day to 0.0086 kg/day. After accounting for rounding, both are essentially equal at 0.009 kg/day. There is essentially no difference between the two equations, and changing the equation would result in a negligible change to risk calculations. The food chain model will continue to use the incumbent value.

Comment No. 74: Attachment 5-7. EPA recommends the using a soil ingestion rate of 10% for the marsh wren based on information provided in EPA's *Screening Level Ecological Risk Assessment Protocol for Hazardous Waste Combustion Facilities, Volumes 1, 2 & 3. Peer Review Draft*. (EPA530-D-99-001A)

Response No. 74: The food chain model assumes a 9% soil ingestion rate, as cited in Beyer *et al.* (1994). USEPA has accepted this source for other receptors. The food chain model will continue to use the incumbent value.

Comment No. 75: Attachment 5-7. Body weight. The actual value looks to be in the correct range; however, the notes indicate that the value is the average adult value for studies done in freshwater habitats when it appears to be the average for GA salt marsh dwellers.

Response No. 75: The values are for studies done in GA salt marshes the reference notes will be revised accordingly.

Comment No. 76: Attachment 5-8. Home range. Please use real data and not assumptions without any rationale for the calculation of the green heron's home range.

Response No. 76: The reference for home range will be provided in the draft BERA

Comment No. 77: Attachment 5-8. Food Ingestion Rate. The omnivorous bird calculation use seems inappropriate given the all animal-based diet. In addition, EPA references indicate ingestion rates of approximately 0.243 kg/day, which is substantially higher than the calculated 0.06 kg/day.

Response No. 77: Olin will review the ingestion rate for the green heron. The source of the 0.243 kg/day value is not provided in EPAs comment, and therefore the value cannot be evaluated or confirmed at this time.

Comment No. 78: Attachment 5-8. EPA recommends using the mallard soil ingestion rate of 3.3% as provided in Beyer et al 1994, as a substitute value for the green heron.

Response No. 78: The green heron incidental soil ingestion rate will be revised from 9% to 3.3%..

Comment No. 79: Attachment 5-9. Please include a reference and/or notes for the dietary composition percentages. Values not clearly from EPA, 1993. Please reconcile.

Response No. 79: Additional notes will be provided regarding the selection of dietary composition percentages for the muskrat.

Comment No. 80: Attachment 5-9. Food ingestion rate. Please indicate which equation is being presented.

Response No. 80: Additional notes will identify which equation is used.

Comment No. 81: Attachment 5-9. EPA recommends using a soil ingestion rate of 2.2% for the muskrat based on information provided in EPA's *Screening Level Ecological Risk Assessment Protocol for Hazardous Waste Combustion Facilities, Volumes 1, 2 & 3. Peer Review Draft*. (EPA 530-D-99-001A). .

Response No. 81: The muskrat incidental soil ingestion rate will be revised from 9.8% to 2.2%.

Comment No. 82: Attachment 5-9. Inhalation rate and surface area rows should be removed.

Response No. 82: These rows will be removed. Inhalation rate and surface area were not used in the food chain modeling equations.

Comment No. 83: Attachment 5-10. The chemical list is in no apparent order and it is difficult to locate individual chemicals. Please alphabetize in some fashion.

Response No. 83: The chemical list was arranged by CAS Number. The table will be revised to a more "user-friendly" format.

Comment No. 84: Attachment 5-10. Please provide missing references for values (e.g., terrestrial invertebrate values for thallium and antimony).

Response No. 84: The missing values will be provided.

Comment No. 85: Attachment 5-10. Please explain why there is no terrestrial plant BAF for mercury.

Response No. 85: The scientific literature was reviewed but an appropriate value could not be located.

Comment No. 86: Attachment 5-10. Small mammal, small bird, and fish/amphibian BAFs could not be verified as the footnotes do not provide sufficient information to recreate values.

Response No. 86: Footnotes will be revised to provide additional information.

Comment No. 87: Attachment 5-10. Notes. 3rd line. Something appears to be missing. Incomplete thought.

Response No. 87: Text will be revised.

Comment No. 88: Attachment 5-10. Notes. [b].2. It appears that plant BAFs for organics were calculated using the Travis and Arms, 1988 equation. More updated methods are available for estimating plant concentrations. The Eco-SSL derivation documents should be referred to for guidance; for example the Eco-SSL guidance has regression equations specifically for estimating plant concentrations of PAHs.

Response No. 88: Olin will review the Eco-SSL guidance and revise as appropriate.

Comment No. 89: Attachment 5-10. Notes. [b].2. Please provide a reference for assuming forage is 80% water.

Response No. 89: Footnotes will be revised to provide additional information.

Comment No. 90: Attachment 5-10. Notes. [b].3. Please split this footnote into two to elucidate when Sample et al., 1988 versus Baes et al., 1984 is used for the BAF derivation.

Response No. 90: The footnote will be revised.

Comment No. 91: Attachment 5-10. Notes. [b].3. Because of the unclear footnoting, it was not possible to easily check where this may be an issue; however, it should be noted that if "preference was given to recommended regression estimates," the Bechtel Jacobs regression estimates result in concentrations in plants and not plant BAFs. Concentrations would be calculated on an exposure area-specific basis and no BAF would be presented.

Response No. 91: The footnote will be revised to clarify the method used.

Comment No. 92: Attachment 5-10. Notes. [c].2. and [e].2. Please clarify these footnotes. It is not possible to calculate the terrestrial/aquatic invertebrate BAFs based on the information given herein. In addition, footnote [c].1/[e].1. where it is indicated that bioaccumulation is

assumed to be 0 for organic analytes with log Kow <3.0 appears to be in conflict with that in [c].2. that indicates that BSAF are not estimated for analytes with log Kow <1.

Response No. 92: The footnotes will be clarified.

Comment No. 93: Attachment 5-10. Notes. [c].3/[e].3/[e].4. Terrestrial/aquatic invertebrate BAFs could not be verified. As for plants, please note that if Sample et al., 1998 regression equations are used, the result is concentration in soil invertebrates, not invertebrate BAFs. Concentrations would be calculated on an exposure area-specific basis and no BAF would be presented.

Response No. 93: The footnotes will be revised to clarify the method used.

Comment No. 94: Attachment 5-1. Note [d].3. Refers to Sample et al., 1998 for BAFs for small mammal and birds. The reference for Sample et al. included in the table is only for soil to plants.

Response No. 94: The footnote will be clarified.

Comment No. 95: Attachment 5-10. Notes. [e].3. Does not seem to make sense. Please rephrase.

Response No. 95: The footnotes will be clarified.

Comment No. 96: Attachment 5-10. References. Please correct. Sample et al, 1998 is noted as “Empirical Models for the Uptake of Inorganic Chemicals from Soil to plants… BJC/OR-133.” The reference of this title is a Bechtel Jacobs publication. Sample, B. E., J. J. Beauchamp, R. Efroymson, G. W. Suter II, and T. L. Ashwood. 1998 may refer to two different documents: 1) Development and validation of bioaccumulation models for earthworms. ES/ER/TM-220. U.S. Department of Energy; or 2) Development and validation of bioaccumulation models for small mammals. ES/ER/TM-219. U. S. Department of Energy.

Response No. 96: The footnote will be clarified.

Comment No. 97: Attachments 5-11 through 5-14. Because of the issues noted below for Attachments 5- 11 through 5-14, it was not attempted to verify individual TRVs.

Response No. 97: No response required.

Comment No. 98: Attachments 5-11 through 5-14. Please explain why different TRVs were selected for small versus large receptors and what the differences in the selection processes were between them.

Response No. 98: Text will be revised to provide the rationale.

Comment No. 99: Attachment 5-12. The marsh wren is not a large bird. Toxicity values for such are not appropriate. Olin should use the small bird TRVs presented in Table 5-11 for assessing risk to the marsh wren.

Response No. 99: Olin will review the TRVs in Table 5-1.

Comment No. 100: Attachment 5-13. The muskrat should probably not be considered a small mammal. It weighs >100 times that of the "small" short-tailed shrew and less than 4 times that of the "large" fox.

Response No. 100: Large mammal TRVs will be used for the muskrat.

Comment No. 101: Attachment 5-15. Exposure area in hectares for EA-2 and EA-5 are not consistent with those presented on pages 3-5 and 3-8, respectively.

Response No. 101: Text will be revised so that exposure areas are consistent.

Comment No. 102: Attachment 5-15. Calculations of American robin and red fox SFFs for EA-5 are incorrect.

Response No. 102: SFFs will be reviewed and corrected if necessary.

Comment No. 103: Attachment 5-15. Exposure media indicates "no" for invertebrates for the red fox whereas Attachment 5-6 indicates soil invertebrates are 5% of the diet.

Response No. 103: Text will be revised so that "exposure media" are consistent.

Comment No. 104: Attachment 5-15. How the exposure areas for semi-aquatic species are calculated needs further consideration. Species such as the marsh wren forage in wetlands and calculating the exposure area based on the waterbody itself would not be correct. Species such as the green heron and muskrat home ranges are not equivalent to waterbody area. A home range is based on how far an animal will travel and oftentimes semi-aquatic species need to have the shoreline foraging length considered. Neither is equivalent to the size of the waterbody. Data to estimate more accurate SFFs may not be available; however, uncertainty discussions should be added to account for the lack of data and the potential effect on the risk estimate.

Response No. 104: Olin will evaluate how exposure areas are calculated based on EPA's comments and will provide a discussion of the associated uncertainties.

Comment No. 105: Attachment 5-15. This table should include exposure area information for the terrestrial and MMB background locations.

Response No. 105: The requested information will be provided.

Comment No. 106: Calculated Exposure Point Concentration Tables. For the most part, the calculations in these tables were not checked because of the issues noted regarding life history exposure parameters and BAFs noted above. However, it was noted that some estimations appear to be incorrect. For example on Table EA-4 RME Red-Tailed Hawk – 1, Concentrations calculated for Cbird and Cmammal are different even though the soil concentrations and BAFs

are the same. In addition, neither of the concentrations appear correct for many of the chemicals.

Response No. 106: Values presented in the tables will be reviewed.

EAST DITCH SCREENING LEVEL ECOLOGICAL RISK ASSESSMENT

Comment No. 107: List of Figures, TOC ii: There is no Figure 1.0-1 provided in report.

Response No. 107: The Site Locus Figure 1.0-1 will be provided in the report.

Comment No. 108: Section 1.0, Page 1-1. Change "The East Ditch is a portion OU2" to "The East Ditch is a portion of OU2".

Response No. 108: The text will be revised.

Comment No. 109: Section 1.0, Page 1-1. Change "in order refine" to "in order to refine".

Response No. 109: The text will be revised.

Comment No. 110: Section 3.2, Page 3-1: Change "Phase II Focused Environmental Risk Characterization Addendum East Ditch and Downstream Areas, 51 Eames Street, Wilmington Massachusetts, RTN 3-0471 (MACTEC, 2004)." To Phase II Focused Environmental Risk Characterization Addendum East Ditch and Downstream Areas, 51 Eames Street, Wilmington Massachusetts, RTN 3-0471 (MACTEC, 2004), hereafter referred to as Focused ERC.

Response No. 110: The text will be revised.

Comment No. 111: Change "The 2013 environmental characterization included" to "The 2013 Focused ERC included".

Response No. 111: The text will be revised.

Comment No. 112: Section 3.2.1, Page 3-2: Change the sentence from: "The absence of deposited sediment forming islands or point bars throughout the ditch resulted in an optimal sediment deposition score." to: "The absence of deposited sediment forming islands or point bars throughout the ditch resulted in a marginal or poor sediment deposition score." Since the sediment score was always poor or marginal.

Response No. 112: The text will be revised.

Comment No. 113: Table 3.2-1 Habitat Assessment Summary. Sediment deposition should be poor for: north of Eames St. overpass, South of Eames St. overpass, and 1,000 ft south of Eames St. overpass and marginal for: 200 ft south of south ditch outfall and 500 ft north of Anderson Station.

Response No. 113: The text will be revised.

Comment No. 114: Attachment 2 and Section 3.3, Page 3-4: MassDEP endangered species review provides a satellite image of the area but please be more specific about what is being shown on the satellite image from the MassDEP TES results even if there are no endangered species.

Response No. 114: The purpose of Section 3.3 and Attachment 2 is to document the that protected species have not historically been observed and no priority habitats have been mapped. Additional discussion of what is shown on the satellite image is beyond this intended purpose of the discussion.

Comment No.115: Attachment 3-3: no page numbers.

Response No. 115: Page numbers will be added to Attachment 3-3.

Comment No. 116: Attachment 3-4: no page numbers.

Response No. 116: Page Number will be added to Attachment 3-4.

Comment No. 117: Table 4.1-2: Check calculated values – the wrong numbers are being reported.

For example (if using a hardness value of 106):

Copper CCC=0.013 mg/L should be changed to 0.015 mg/L (or 14.8 µg/L).

Copper CMC=0.016 mg/L should be changed to 0.0098 mg/L (or 9.8 µg/L).

Also, equations should account for conversions from µg/L to mg/L. Equations for dissolved metals should be provided in addition to the equation for total metals; e.g., CMC=exp{mA [ln(hardness)]+bA}*Freshwater Conversion Factor.

Response No. 117: Olin will review the calculations and make any necessary revisions. Olin will also provide the equations for dissolved metals showing how the conversion factor is applied and will show unit conversions.

Comment No. 118: For COPEC selection, the minimum and not the average hardness should be used to calculate hardness-based criteria as this will provide more conservative criteria values. Sample-specific hardness can be used to further refine the risk estimate.

Response No. 118: Using average hardness to calculate hardness-based criteria provides values that are appropriate to assess the prevailing conditions within a given exposure area. Furthermore, risk estimate refinements and the risk characterization assess the average condition over time and across the full spatial extent of the exposure area and at the population level. It is therefore not necessary to characterize risk on a point by point basis.

Comment No. 119: The new benchmark values calculated should then be carried through the rest of the COPEC selection and refinement of COPECs.

Response No. 119: See response to Comment No. 118.

Comment No. 120: Table 4.1-2: In the Notes section, [a] change "expressed at mg/L" to "expressed as mg/L"

Response No. 120: The footnote will be revised.

Comment No. 121: Section 4.3.1, Page 4-3 and Table 4.3-1: Acetone is listed as a COPEC but should be deleted based on results in Table 4.3-1.

Response No. 121: The text will be revised. Acetone is not a COPEC in East Ditch surface water.

Comment No. 122: Section 5.3, Page 5-4. Acetone should be deleted from this surface water COPEC list, as it was eliminated based on Table 4.3-1 in the 1st COPEC screening level effects evaluation.

Response No. 122: The text will be revised. Acetone is not a COPEC in East Ditch surface water.

Comment No. 123: Section 5.3: It is stated that there is no benchmark for iron in surface water; however, there is a water quality criterion for iron (1000 ug/L). Please revise as appropriate.

Response No. 123: Text will be revised.

Comment No. 124: Section 5.3, Page 5-3. Change "…iron or bromide therefore" to "…iron or bromide and therefore". Change "…respectively), therefore iron and bromide in can…" to "…respectively), and therefore iron and bromide can…".

Response No. 124: Text will be revised.

Comment No. 125: Section 5.3, Page 5-4: Chloroethane should be added as a COPEC for surface water in the Effects level screening refinement of COPECs. It is included in section 6.1.

Response No. 125: Text will be revised to include chloroethane.

Comment No. 126: Section 5.4, Page 5-4 Sediment COPEC refinement and Table 5.4-1: It is not appropriate to eliminate Chromium and Nickel from the list of sediment COPECs given that the site sediment HQs are only being compared to one sediment reference HQ.

Response No. 126: The East Ditch and reference sediment datasets are limited for several reasons. First, very little sediment has deposited in the railroad ballast that forms the bottom and banks of East Ditch limiting the amount of sediment available to sample. Second, USEPA agreed to only one reference location. One sample may not rise to a strict definition of "reference", but it does provide some local context. Considering that chromium and nickel in East Ditch sediment are only marginally higher than their respective effects benchmarks (average HQs are 1.1 and 1.0, respectively), and considering the very poor habitat quality of the East Ditch, adverse population level effects to ecological receptors

from concentrations of chromium and nickel in the East Ditch are unlikely to occur. The one reference sample provides an additional line of evidence that chromium and nickel concentrations are consistent with off-Site conditions. Olin will provide this discussion in the risk characterization of the SLERA.

Comment No. 127: Section 6.1.2: The chemical n-nitrosoid-n-propylamine is mentioned in several places. Please confirm the name of this chemical.

Response No. 127: The text will be revised to state the correct name of the chemical as n-nitrosodi-n-propylamine.

Comment No. 128: Section 6.1.3: Please provide the reference for Uniroyal (1992) in the response to these comments. There is additional aquatic toxicity information for Kempore which does not change the conclusions of the SLERA. There is now a completed dossier for Kempore (C, C'-azodi(formamide, CAS no. 123-77-3) in REACH (http://echa.europa.eu/web/guest/information-on-chemicals/registered-substances). The Probable No Effect Concentration is 0.289 mg/L which is lower than the average concentration of Kempore in surface water (1.0 mg/L); however, the NOEC for fathead minnows is 50 mg/L, the solubility limit, and the NOEC for 21-day Daphnia magna reproduction is 2.89 mg/L (affects on reproduction occurred at 9.19 mg/L). Based on the approach used in the SLERA, the refinement step would reach the same conclusion as is presented in this section. Please add this information and the Uniroyal (1992) reference if the SLERA is going to be revised.

Response No. 128: The reference for Uniroyal (1992) is:

Uniroyal (1992) Unpublished report from the Uniroyal Chemical Company Inc., Middlebury, CN. As cited in: World Health Organization (WHO), 1999. Concise International Chemical Assessment Document 16: Azodicarbonamide. World Health Organization. Geneva, 1999. Available at:

http://www.inchem.org/documents/cicads/cicads/cicad16.htm#SectionNumber:6.1

Olin will add this citation and will review the information from the REACH dossier for Kempore.

Comment No. 129: Section 6.2.1, Page 6-3: Change "ecological receptors from theses COPECs" to "ecological receptors from these COPECs".

Response No. 129: Text will be revised.

Comment No. 130: Section 6.2.1, Page 6-3: Change "man-made channel runs parallel" to man-made channel that runs parallel". Change "East Ditch is convey" to "East Ditch is to convey".

Response No. 130: Text will be revised.

Comment No. 131: Section 6.2.3, Page 6-3: "Although HQs for metals in East Ditch sediment were > 1, average HQs from metals in East Ditch were all <1, indicating that exposure of benthic and amphibian populations across the entire exposure area and over time is unlikely to result in adverse effects." The first half of the sentence is true but the second half of the sentence should be altered to be more specific about the individual samples rather than lumping all 13 metals across all of the samples.

Response No. 131: HQs based on average concentrations were used to characterize effects that occur over time and across the full spatial extent of a given exposure area, and at the population level. It is therefore not necessary to alter the second half of the sentence to consider risk on a point by point basis. The average condition is a sufficient basis upon which to characterize population level risk.

Comment No. 132: Section 6.2.5, Page 6-4: Delete "is unlikely" at the end of the sentence. Last sentence: change "Risk are likely" to "Risk is likely".

Response No. 132: Text will be revised.

Comment No. 133: Please see comment on BERA report on OU1 and OU2 Section 3.12.1 regarding selection criteria for choosing an LC50 from ECOSAR and possibility of consideration of receptors other than fish. The same comment/question applies to this East Ditch SLERA for surface water.

Response No. 133: See response to comment 17.

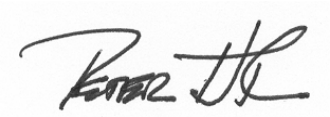
Comment No. 134: Attachment 4: Footnote [f] of the ECOSAR Surface Water Screening Benchmarks Calculations indicates that aquatic effects benchmarks are calculated by applying a multiple of 10 to calculated screening benchmarks. Please confirm that this procedure is provided in the TNRCC,2000b methodology and that the benchmarks represent a loweffect benchmark, rather than a no-effect benchmark.

Response No. 134: The methodology is consistent with the TNRCC guidance. The effects benchmarks are low effect benchmarks (LOAELs). Equation 2 shows the wrong operator and should correctly appear as: NOAEL = LC50 / f. Equation 2 will be revised to show the NOAEL divided by the conversion factor (f), not multiplied currently shown. The same correction applies to the corresponding equation in the BERA (Equation 1).

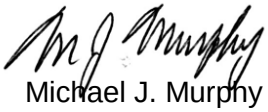
If you have any questions concerning this letter, please feel free to contact James Cashwell at (423) 336-4012.

Sincerely,

AMEC Environment & Infrastructure, Inc.



Peter H. Thompson
Project Manager



Michael J. Murphy
Project Principal

cc: James Cashwell, Olin
Joe Coyne, MassDEP
AMEC Project File

Project File \\PLD2-FS1\Project\Projects\olinwilm\Olin Wilmington CSS 2014\4.0_Deliverables\4.1_Reports\OU1 OU2 RI\RTC Letters\2014 03 21 Wilmington - OU1 OU2 BERA_No.2_RTC.docx

APPENDIX L
RESPONSE TO GEOINSIGHT, INC.'S COMMENTS
DRAFT HHRA AND BERA – INTERIM DELIVERABLE NO. 2
(Provided on CD)

6107140016

March 25, 2014

Mr. James M. DiLorenzo
Remedial Project Manager
USEPA Region 1 - New England
5 Post Office Square
Mailcode: OSRR07-4
Boston, MA 02109-3912

Subject: Response to GeoInsight, Inc. Comments
Draft Remedial Investigation Report for Operable Unit 1 and Operable Unit 2
Human Health Risk Assessment and
Baseline Ecological Risk Assessment - Interim Deliverable No. 2
Olin Chemical Superfund Site, Wilmington, Massachusetts

This letter provides responses to GeoInsight, Inc.'s (GeoInsight's) November 18, 2013 comments on the OU1/OU2 RI - Second Interim Deliverable Human Health Risk Assessment (HHRA) and Baseline Ecological Risk Assessment (BERA) Reports dated July 26, 2013 associated for the site referenced above.

GeoInsight's comments and Olin's responses are provided below in the order they appeared in the original November 18th communication.

HHRA Comment No. 7: Olin/AMEC was only partially responsive to Comment #7, in that they subdivided exposure area EA1 by assigning a separate exposure area (EA7) to the trimethylpentene (TMP) area. Exposure area EA1 should be further evaluated with regard to identifying and establishing additional exposure areas that correspond to specific release areas/manufacturing operations and contaminants of potential concern (COPC; i.e., hexavalent chromium, BEHP, NDPA, and hydrazine).

Response: Olin has evaluated EA1 with regards to potential additional exposure areas that correspond to specific release and/or manufacturing areas in several different ways according to many discussions with USEPA.

After receiving comments from USEPA and GeoInsight in November 2013, Olin conducted three separate evaluations for EA1 and EA2 from December 2013 to March 2014 to ensure USEPA that the delineation/extent of EA1 as defined in the draft RI report was appropriate for properly documenting potential human health risk issues at the site. The overall evaluation indicated that there is no significant risk associated with these areas regardless of how we subdivide them. USEPA concurred with this conclusion during a conference call held between Olin and USEPA on March 6, 2014. These evaluations are summarized below.

The originally proposed exposure area EA1 has been subdivided into EA7 and EA1 based on previous USEPA comments. EA7 is located in the northeast corner of the Property and captures soil sample locations with trimethylpentene detections and associated elevated PID jar headspace readings (primarily subsurface soils in the immediate vicinity of the water table). Based on a review of the soil trimethylpentene data and the jar headspace and soil boring screening PID data, Olin proposes to expand the southwestern boundary of EA7 to include some additional soil boring locations that have similar trimethylpentene concentrations and/or PID readings as the rest of EA7. Soil borings SB-420, SB-423 (TMPs) and SB-481 (EPH and elevated PID readings) are now included in EA7 rather than EA1. Figures 1 (subsurface soil sample locations by exposure area) and 2 (surface soil sample locations by exposure area) show the refined boundary between EA7 and EA1.

The evaluations of the proposed subdivision of EA1 included selection of COPCs and calculation of human health risks for three different exposure areas and comparing the cumulative excess lifetime cancer risk (ELCR) and cumulative Hazard Index (HI) among the areas. The three exposure areas evaluated, as shown in Figures 1 and 2 are:

- EA1 Including BEHP/NDPA Area (the Olin-proposed exposure area)
- EA1 Excluding BEHP/NDPA Area (the first of two proposed subdivisions of EA1)
- BEHP/NDPA Area (the second of two proposed subdivisions of EA1)

EA1 as proposed in the HHRA Second Interim Deliverable included the BEHP/NDPA Area . The BEHP/NDPA Area is the area USEPA refers to in Comment No. 3 as "…the former disposal areas on the west and south portion of the manufacturing area…". Surface and subsurface soils for all three of the exposure areas were evaluated separately consistent with the HHRA Second Interim Deliverable.

The following steps were completed for surface and subsurface soil datasets for each exposure area to estimate cancer and non-cancer risks for a commercial/industrial worker:

- Chemicals of Potential Concern (COPCs) were selected separately for each media by exposure area using the Industrial Regional Screening Levels (RSLs) (USEPA, 2013)
    - Industrial RSLs used to select COPCs are based on the lesser of a cancer risk equal to $1x10^{-6}$ or non-cancer risks equal to a HI of 0.1
- If the maximum concentration exceeded the Industrial RSL then the parameter was selected as a COPC
- A parameter was also selected as a COPC if an RSL was not available
- A 95% Upper Confidence Limit (UCL) on the arithmetic mean was calculated for parameters selected as COPCs with the exception of COPCs which lack RSLs.

- The 95% UCL was used as the Exposure Point Concentration (EPC) to calculate cancer and non-cancer risks (unless the UCL was higher than the maximum detection, in which case the maximum detection was used as the EPC).
- Cancer and non-cancer risks were calculated for COPCs using a ratio with the cancer and non-cancer-based Industrial RSLs
- Cumulative ELCR and cumulative HI were summed for each exposure area

Tables 1 through 6 present the risk evaluation steps as described above. Table 7 presents a summary of cumulative ELCRs and cumulative HIs by exposure area. A summary of conclusions from Table 7 are as follows:

- The cumulative ELCR for both surface and subsurface soil is well below $1x10^{-4}$ for all areas ("EA1 Including BEHP/NDPA Area" as well as "the BEHP/NDPA Area" by itself)
    - The maximum ELCR in subsurface soil is $1x10^{-5}$ for BEHP/NDPA Area (Indeno(1,2,3-cd)pyrene has the highest individual ELCR of $4.8x10^{-6}$)
    - The maximum ELCR in surface soil is $5x10^{-5}$ for EA1 Excluding BEHP/NDPA Area (Benzo(a)pyrene has the highest individual ELCR of $2.8x10^{-5}$)
- For all areas both surface and subsurface soil cumulative HI are below 1
    - The maximum HI in subsurface soil is 0.4 for the BEHP/NDPA Area (2,4,4-trimethyl-1-pentene has the highest individual HI of 0.2)
    - The maximum HI in surface soil is 0.3 for the BEHP/NDPA Area (Thallium has the highest individual HI of 0.2)

Since all cumulative cancer risks for each area are well below $1x10^{-4}$ there would be no difference in risk management decisions by subdividing EA1 further. Similarly since all cumulative non-cancer risks for each area are well below 1 there would be no difference in risk management decisions. Therefore, based on the evaluation outlined above, EA1 Including BEHP/NDPA Area (EA1 used in the HHRA Second Interim Deliverable) will be used as a single exposure area in the HHRA.

HHRA Comment No. 8: Olin/AMEC indicated that the HHRA will evaluate trespassers, outdoor workers, and construction workers exposed to surface soil via incidental ingestion and dermal contact in EA2. Olin/AMEC also indicated that dust inhalation is not a complete exposure pathway because the exposure area is covered with wetland soil or covered with vegetation. Construction activities that involve heavy equipment and/or excavation by their very nature produce dust. Dust inhalation is a common exposure pathway for construction workers scenarios and should be evaluated in EA2.

Response: Consistent with the approach agreed to between Olin and USEPA at the June 25, 2013, generation of dust in exposure area EA2 is not expected due to the wet nature of this area and will not be evaluated in the HHRA.

HHRA Comment No. 27: Olin is proposing only evaluation of reasonable maximum exposure (RME), and no central tendency exposure (CTE) evaluation. GeoInsight concurs with USEPA/Nobis's position that the CTE evaluation is an integral part of the HHRA process and should be conducted. It will be important to have an understanding of those compounds that are "close" to the USEPA Superfund risk range of 10 x 10-4 cancer risk or Hazard Index (HI) of 1 to better evaluate cumulative exposure and to aid in decision making/risk management evaluation.

Response: Based on discussions between USEPA and Olin, CTE will only be evaluated when RME risks exceed EPA target levels.

HHRA Vapor Intrusion (VI) Evaluation: GeoInsight reviewed Attachment 8 of the HHRA titled Vapor Intrusion Evaluation and offer the following comments:

- Olin/AMEC indicated that the Plant B treatment building is the only occupied on-site structure with potential for vapor intrusion associated with vapor-generating substances in the vadose zone. Olin/AMEC further indicated that a soil vapor extraction (SVE) system was operated around the perimeter of the building for several years. Operation of the system was terminated after extraction of volatiles (TMP in particular) from the subsurface had been reduced substantially to asymptotic levels.

  This information seems to be subjective and does not account for potential re-bound effects and/or accumulation of vapors below the floor of the building. Additionally, it is unclear what the dates of operation of the SVE system were? Also, based upon a review of Figure 1, several soil samples collected from beneath the Plant B building contained VOCs at concentrations ranging from 18 to 550 milligrams per kilogram (mg/kg).

- Under current site conditions several of the buildings are unoccupied and Olin/AMEC indicated that there are no specific plans to re-occupy the structures; however, it is conceivable that these buildings could be occupied in the future.

- A review of Table 2.2-4 indicated that several soil borings (SB432, SB-459, SB-466, SB-483 and SB-491) with PID measurements ranging from 110 to 3,226 parts per million (ppm) are not identified on Figure 1, presumably because corresponding analytical data for total VOCs were below 1 mg/kg. How do the elevated PID measurements correlate with analytical data?

Response: The conclusions provided for the AS/SVE system are strictly based on data generated during and after operation of the system. USEPA concurred with shutdown of the system due to the fact that the system was no longer removing substantive quantities of VOCs from the vadose zone in the subject area. The AS/SVE system operated in the EPH/VPH area west of Plant B Treatment Building from 2000 to 2005 and at the perimeter of the Plant B Treatment Building from 2000 to 2012.

There are no plans to reoccupy the unoccupied buildings at the property. The buildings are not served by any active utilities. Occupation of those building s is not foreseeable.

Several soil borings were a component of the investigation to delineate the boundary of soils impacted by TMPs in the area of SB-405. PID readings were collected from multiple depths in each of the borings during that investigation. For borings that were clearly impacted by volatiles (based on PID readings >= 20 ppmv) soil samples were not collected and submitted to a laboratory for analysis. For soil borings at the horizontal boundary of soil impacts (PID readings < 20 ppmv) soil samples were collected and submitted to a laboratory for analysis of TMPs in order to document appropriate lateral delineation of the impacted area. Samples were not collected for laboratory analysis from SB-491, SB-483, SB-486 due to the elevated PID readings. Total VOC concentrations were less than 1 mg/kg in soil samples collected in the 1 – 10 ft bgs interval for borings SB-432, SB-459, and SB-466. A detailed correlation analysis has not been conducted for the PID measurements and the soil analytical data. However, the soil analytical data for boring SB-405 (1,510 mg/kg VOCs) and the corresponding PID reading of 3,000 ppmv are consistent. In general, for borings with both PID readings and soil analytical data, the locations with the highest PID readings also have higher total VOC soil concentrations.

BERA Comments No. 2 and 4: Information requested by USEPA regarding additional discussion of the hydrology and hydrogeology of the area at and upgradient of Landfill Brook was not included in the Second Interim Deliverable. Olin/AMEC indicated that "*Landfill Brook is currently under further evaluation with respect to hydrology, hydrogeology, and the historical information concerning the impacts of the Woburn Landfill on Landfill Brook. Pending the results of that evaluation, Landfill Brook is evaluated only through COPEC selection. Once a determination has been made concerning potential Site impacts on Landfill Brook, a decision will be made concerning the need to further evaluate the ecological risks for that area.*"

Response: Section 4.3.2 of the RI Report summarizes the physical, hydrologic and geochemical setting of Landfill Brook; all of which are contributing factors to surface water and sediment impacts that have been characterized from its headwaters to its confluence with East Ditch. The conclusions of Section 4.3.2 are as follows. Surface water quality within Landfill Brook is primarily affected by groundwater discharge from the Woburn Sanitary Landfill (WSL), and possibly other source areas comprised of the automotive businesses just north of Landfill Brook's headwater, and the former Merrimac Chemical Company facility which was located along the southeastern portion of the WSL. Both geochemical and specific analyte distributions in surface water, sediment and groundwater indicate that the Olin Site is not a source of impacts measured at Landfill Brook. Therefore, Landfill Brook will not be considered further in the OU1/OU2 HHRA or BERA risk assessments

BERA Comment No.5: GeoInsight concurs with USEPA/Nobis that a discussion of previous ecological risk assessments is valuable for development of the Conceptual Site Model and should be included in the BERA as opposed to a reference. The RI should be a standalone document.

Response: The BERA includes Section 2.0 Previous Ecological Risk Assessments. This section summarizes and discusses the previous ecological risk assessments.

BERA Comment No.25: Comparing the average total organic carbon content in each sediment dataset to USEPA recommended benchmarks is reasonable providing that the range in concentrations is narrow enough to support using an average.

Response: There are no USEPA benchmarks for total organic carbon.

RI Comment No. 3: Olin/AMEC was not responsive to USEPA/Nobis Comment No. 3. To reemphasize our concern and to reiterate previous GeoInsight comments, the Conceptual Site Model (CSM) is an important and integral component of the RI process and, therefore, should present a complete picture of site processes. GeoInsight anticipates a discussion and evaluation of bedrock hydrogeology and its interaction with groundwater and surface water will be provided in the OU1 and OU2 RI.

Response: Sections 5.0, 5.1, and 5.2 of the DRAFT Final RI Report will include a detailed discussion of sources and migration pathways related to groundwater and impacts to surface water and sediment of OU1 and OU2.

RI Comment No. 4: GeoInsight concurs with USEPA/Nobis that all groundwater including DAPL should be considered drinking water. Substantial areas of DAPL extend beyond Olin's property or property not directly controlled by Olin. It is conceivable that potential future exposure to DAPL could occur via a drinking water exposure pathway.

Response: DAPL is denser than groundwater and is a separate aqueous phase and therefore cannot be considered groundwater. Issues surrounding DAPL and the Groundwater Use and Value Determination for the Site are topics of ongoing discussion that will be completed as part of the OU3 reporting process.

RI Comment No. 6: GeoInsight concurs with USEPA/Nobis that potential exposures should be correlated with specific site areas such as manufacturing areas or historic disposal areas. This would allow the reader to better understand/visualize the source and cause associated with impacted media as opposed to reviewing impacts by soil depth and RSL exceedances with no direct representation of the suspected source.

Response: USEPA and Olin conducted an extended discussion of the exposure areas (for soil as well as for surface water and sediment) that will be evaluated in the HHRA. The exposure areas include past, current, and future industrial/commercial areas (generally associated with former source areas and manufacturing areas) as well other areas where manufacturing activities did not take place historically. Section 5.0 of the RI Report includes a detailed discussion of the conceptual site model, including sources, migration pathways, and receiving media.

RI Comment No. 29: Section 5.1 should include a discussion of all chemicals that exceed screening criteria and have not been ruled out in Section 4.0. Olin's response that the fate and transport section will focus only on chemicals that are site-related and important relative to risk is subjective. Additionally, Olin/AMEC do not appear to consider the cumulative effect of these compounds as part of the risk assessment process.

> ***Response***: Section 5.0 will include a discussion that addresses the chemicals that have concentrations above RSLs, but that are not associated with releases at or from the property.includes the CSM and it discusses sources, migration pathways, and receiving media. The main focus of the CSM discussion is on chemicals of interest that are known to have been released at the Property. The discussion also addresses In terms of risk assessment, all chemicals selected as chemicals of potential concern per USEPA guidance (whether they are known to have been released at or from the Property or not) have been carried through the risk assessments and are included in calculated cumulative risk estimates. The risk assessments do, of course, discuss individual chemicals, and as appropriate, point out which chemicals are known to have been released at or from the Property and those that are not associated with releases at or from the Property.

RI Comment No. 47: The RI for OU1 and OU2 should also include a discussion regarding the construction and "keyed" in feature of the containment slurry wall. This is important in understanding and evaluating groundwater discharge to surface water and shallow groundwater in the area south-southwest of the slurry wall containment area. It is GeoInsight's understanding that persistent concentrations of site-related contaminants in this area may be ultimately related to residual DAPL not otherwise contained within the slurry wall and/or potential leakage from the containment area.

> ***Response***: This topic will be discussed in the OU3 investigation and RI Report.

RI Comment No. 145: Olin/AMEC did not provide a response to this comment.

> ***Response***: The response to this comment was inadvertently omitted from the previous submittal. The Property-specific background information for soils has been considered in the evaluation of COI nature and extent and in the evaluation of bounding on the perimeter of the Property. The comparison of soil concentrations of metals/inorganics and PAHs to Property-specific and published background values is useful in these evaluations. A separate evaluation of the distribution of arsenic concentrations in soils for OU1 and OU2 has been conducted and it concluded that concentrations in soil samples collected from off-Property locations (PanAm Property to the west of the Property and the exposure area EA5 to the east of the Property) are higher than those at the Property (OU1).

RI Comments No.182, 187, and 192: Olin/AMEC is unresponsive in their insistence that detected concentrations of formaldehyde in site media is naturally occurring. Section 1.4 of the RI report clearly documents the storage and use of formaldehyde at the Olin site. Also, as stated in USEPA/Nobis Comment No. 192 "Formaldehyde was detected in 49 of 50 OU1 surface soil samples, 16 of 26 OU1 shallow subsurface samples, and 43 of 45 OU1 deep

subsurface soil samples. It was also detected in surface water and on-site sediment." These data suggest a site connection.

Response: Olin/AMEC has not been unresponsive in discussions concerning formaldehyde in environmental media at OU1 and OU2. The RI Report also documents the historical storage and use of formaldehyde at the Property. The RI Report (Section 4.1.2) contains the following language with respect to surface soils.

Among specialty compounds, formaldehyde was the most frequently detected, being detected in a narrow range of very low concentrations in 98% of the samples collected. The maximum concentration detected was 5 orders of magnitude lower than the Industrial RSL. The high frequency of detection and extremely low concentrations suggests formaldehyde is widely distributed in the environment and it presence is likely due to anthropogenic sources. The USEPA Air Toxics Program fact sheet on formaldehyde reports it is detected in ambient air in urban areas nationwide from anthropogenic sources that include power plants and automobile exhaust.

If a substance is released to the environment from a specific local source, there is typically a distribution of concentrations that is indicative of the location of the release, the extent of the release, and decreasing concentration gradients from the point of release to other points distant from the release point. The analytical data for formaldehyde do not show evidence of any specific release points, any concentration gradients, and all of the formaldehyde concentrations in soil samples are orders of magnitude below the corresponding USEPA RSLs for soil.

RI Comment No. 189: Olin/AMEC was not responsive. Further discussion regarding the relationship between Industriplex and the Woburn Landfill with regard to sediments in the East Ditch impacted with ammonia, chromium, and hexavalent chromium is anticipated.

Response: Additional discussion of inputs of COIs to the East Ditch, including Landfill Brook will be included in sections 4.2.5.4 and 5.2.2 of the RI report.

If you have any questions concerning this letter, please feel free to contact James Cashwell at (423) 336-4012.

Sincerely,

AMEC Environment & Infrastructure, Inc.

Peter H. Thompson
Project Manager

Michael J. Murphy
Project Principal

cc: James Cashwell, Olin
Joe Coyne, MassDEP
AMEC Project File

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