



Responses to your commentsPicatinny - Site 78 ROD (UNCLASSIFIED)

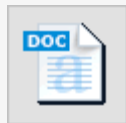
Monday, February 28, 2011 4:31 PM

From: "Gabel, Ted Mr CIV USA IMCOM" <ted.gabel@us.army.mil>

To: Roach.Bill@epamail.epa.gov

Cc: subsurfacesolns@earthlink.net, gzalasku@dep.state.nj.us, JMARCHES@dep.state.nj.us, "Gregory Zalaskus" <Greg.Zalaskus@dep.state.nj.us>, "Michael Glaab" <michaelglaab@worldnet.att.net>

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Site 78 (PIC) Site 78 (PIC)

Classification: UNCLASSIFIED

Caveats: NONE

Bill:

Attached are the response to the comments you provided in January on the draft final ROD for Site 78. Also included are tables and graphs that were discussed as part of the meeting last week that supported the MNA decision for this site. The revised maps will be included in the tracked changed documents

Once the responses are agreed to, we will submit an electronic tracked changed document to you as well for approval. Once you "OK" that I intend to have the ROD signed by the Commander.

Thanks.

Ted Gabel
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From: Roach.Bill@epamail.epa.gov [mailto:Roach.Bill@epamail.epa.gov]

Sent: Wednesday, January 26, 2011 11:40 AM

To: Gabel, Ted Mr CIV USA IMCOM

Cc: subsurfacesolns@earthlink.net; gzalasku@dep.state.nj.us; JMARCHES@dep.state.nj.us

Subject: Picatinny - Site 78 ROD

Ted, attached are EPA comments on the Site 78 ROD (July 2010 version). There were no comments on the vapor intrusion revisions inserted in the January 2011 version. Hard copy to follow. Bill

Classification: UNCLASSIFIED

Caveats: NONE

**Comments and Responses on the Site 78 Draft Final Record of Decision for Groundwater and Surface Water
for U.S. Army Garrison Picatinny Arsenal, New Jersey
Site 78 (PICA 013), Groundwater & Surface Water
Picatinny Arsenal, Morris County, New Jersey
July 2010**

**Commenter: Environmental Protection Agency
Comments Dated: January 26, 2011**

Item No.	Report Reference	Comment	Response
1.	General Comment	It is requested that a figure be added or revised showing the land use control boundaries for Site 78.	<i>A new figure, Figure 5, has been added showing the land use control boundaries for Site 78.</i>

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2.	General Comment	<p>It seems that there is an overall decrease in TCE and daughter products cis- and trans-DCE. These results do point to natural attenuation as possibly playing an ongoing role in the dechlorination and hence degradation of the above mentioned species to VC. EPA's concern is the accumulation of VC in wells 78MW-3 and 78MW-6 (2007 results). It seems that VC dechlorination is rate-limiting and that the degradation of VC to dechlorinated species of ethenes is not favorable under the current conditions.</p> <p>In Figures 3-5 and 3-8 of the Site 78 (PICA 013) FS which are the historical groundwater data trends at well 78MW-3 and 78MW-6, respectively, the increased VC trends seem to coincide with extremely high methane concentrations. It seems possible that these highly methanogenic conditions are inhibiting VC degradation. Figure 3.4 of Piezometer 78PZ-2 appears to show a complete reduction of TCE to ethene and ethane. This figure seems to show the degradation of TCE to DCE to ethene and ethane. Methane concentrations did not reach higher than approximately 150 ug/L during this process. A review of this data suggests that ethane and ethene production peaks at times of lower methane concentration.</p> <p>In a January 1991 EPA Ground Water Issue article (EPA/540/4-90/054) which discussed reductive dechlorination of organic contaminants in soils and ground water it states "Vinyl chloride is the most persistent of the compounds under anaerobic conditions, but can be rapidly degraded under aerobic conditions (Hartsmans et al. 1985, Fogel et al. 1986).</p> <p>From the above stated reasons, EPA has concerns with the selected remedy of MNA unless additional data/monitoring show that VC will degrade under current conditions (and more specifically in wells 78MW-3 and 78MW-6, where increasing trends of VC are apparent). It seems very possible that the groundwater would need to go through anaerobic conditions to allow for reductive dechlorination of TCE to VC, followed by aerobic conditions to further dechlorinate VC. The remedy of monitoring natural attenuation will only seem protective if this process of anaerobic and aerobic degradation is proven to exist at the site. It is recommended that a contingency remedy be added to the ROD to address the VC, in the case that VC is not shown to naturally degrade under the current site conditions.</p> <p>http://www.epa.gov/tio/tsp/download/reddehal.pdf</p> <p>EPA Ground Water Issue. "Reductive Dehalogenation of Organic Contaminants in Soils and Water. EPA/540/4-90/054 January 1991.</p>	<p><i>Cis-1,2-DCE and VC can degrade under either aerobic or anaerobic conditions. As indicated in the attached graphs (Attachment 1), analytical results of samples collected in September and December 2010 show that concentrations of cis-1,2-DCE and VC have decreased at both 78MW-3 and 78-MW6 since 2007, further supporting that the existing environment at the site is conducive to the natural degradation of these constituents.</i></p>

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	Specific Comments		
1.	List of Acronyms and Abbreviations, page iv.	a. Change "Standards" to "Standard" in "New Jersey Groundwater Quality Standard". b. Include New Jersey Surface Water Quality Criteria (NJSWQC) in the list.	<i>Comment noted, the referenced text has been revised as suggested.</i>
2.	Section 1.5, Statutory Determinations, first paragraph, page 1-2.	In the second sentence, change "(NJGWQS)" to "(NJGWQSs)".	<i>Comment noted, the referenced text has been revised as suggested.</i>
3.	Section 1.6, Data Certification Checklist, page 1-2	revise the page numbers as follows and verify they are correct after all revisions have been made: - Contaminants of concern and their respective concentrations: page 2-10 - Cleanup levels established for contaminants of concern and the basis for these levels: page 2-10 - Potential land and groundwater use available as a result of the Selected Response: page 2-17 - Estimated capital, annual operation and maintenance (O&M) and total present worth costs, discount rate, and the number of years over which the Response Action cost estimates are projected: page 2-18 - Key factors leading to selection of Selected Response Action: page 2-17	<i>Comment noted, the referenced data certification checklist will be updated and verified once all RTCs are addressed and changes incorporated into the Final Document.</i>

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4.	Section 1.6, Data Certification Checklist, page 1-2	Revise the last Criterion as follows: "Key factors leading to the selection of the Selected Response Action".	<i>Comment noted, the referenced text has been revised as suggested.</i>
5.	Section 1.7, Authorizing Signature, page 1-3	Insert "Remedial" as in "Emergency and Remedial Response Division" located under the EPA signatory.	<i>Comment noted, the referenced text has been revised as suggested.</i>
6.	Section 2.1, Site Name, Location, and Description, second paragraph, page 2-1	Delete "Figure 1" from the last sentence of the paragraph as the figure does not include a state map. Alternatively, an appropriate map may be added to the figure.	<i>Comment noted, the referenced text has been revised as suggested.</i>
7.	Section 2.1, Site Name, Location, and Description, third paragraph, page 2-1	It is requested that the clause at the end of the third sentence (however, based on previous investigations Site 78 was determined to be the only Site that presented any potential harm to human health and/or the environment) be deleted as this ROD does not address Site 27 and Site 94.	<i>Comment noted, the referenced text has been revised as suggested.</i>
8.	Section 2.2.2, Site 78 (PICA 013) Background, second paragraph, page 2-1	Change "500 ft" to "450 ft" to agree with Section 2.1.	<i>Comment noted, the referenced text has been revised as suggested.</i>
9.	Section 2.4, Scope and Role of Response Action, second paragraph, page 2-3	In the third sentence, remove the apostrophe from "LUC's".	<i>Comment noted, the referenced text has been revised as suggested.</i>

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10.	Section 2.4, Scope and Role of Response Action, third paragraph, page 2-3	In the last sentence, change "beneficial" to "unrestricted".	<i>Comment noted, the referenced text has been revised as suggested.</i>
11.	Section 2.6.1, Physical Characteristics; Size, Topography, and Surface Water Hydrology, first paragraph, page 2-3	Regarding the last sentence of the paragraph, please refer to Specific Comment 7.	<i>Comment noted, the referenced text will be revised as per the response to Specific Comment 7.</i>
12.	Section 2.6.2, Summary and Findings of Site Investigations, Extent of Groundwater Contamination, first paragraph, page 2-4	In the first sentence change "NJGWQS" to "NJGWQs".	<i>Comment noted, the referenced text has been revised as suggested.</i>

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13.	Section 2.6.2, Summary and Findings of Site Investigations, Extent of Groundwater Contamination, Chlorinated VOCs (CVOCs), second paragraph, page 2-4	The last sentence states: "Groundwater discharge to GPB does not result in surface water VOC concentrations exceeding the applicable LOC levels." However, Table 3 indicates that 3 surface water samples exceeded the LOC for vinyl chloride.	<p><i>Comment noted. The referenced sentence has been revised as follows:</i></p> <p style="text-align: center;"><i>"Groundwater discharge to GPB is not expected to result in long-term surface water VOC concentrations exceeding the applicable LOC levels."</i></p>
14.	Section 2.6.2, Summary and Findings of Site Investigations, Plume Delineation, page 2-5	Since the Army is basing its decision on selecting MNA as a remedy in part due the reduction of groundwater contaminants at Site 78, it is requested that a figure be added that shows the results of the 2007 sampling event.	<p><i>Comment noted. Figures 3 and 4 have been revised to include more recent data collected in 2010. Additionally, trend plots have also been added.</i></p>
15.	Section 2.7, Current and Potential Future Land Use, second paragraph, page 2-6	In the second to last sentence, change "affected" to "effected".	<p><i>Comment noted, the referenced text has been revised as suggested.</i></p>
16.	Section 2.8, Summary of Site Risks, first paragraph, page 2-6	It is requested that the last part of the last sentence be changed to: ".....and this is not expected to change in the future."	<p><i>Comment noted, the referenced text has been revised as suggested.</i></p>

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17.	Section 2.8, Summary of Site Risks, third paragraph, page 2-7	It is requested that the last part of the first sentence "...and exceedances of applicable drinking water standards." be deleted.	<i>Comment noted, the referenced text has been revised as suggested.</i>
18.	Section 2.8.1, Human Health Risk Assessment, third paragraph, page 2-7	Revise that last part of the sentence as follows: "...to re-evaluate the risk for an on-site worker associated with exposure to the 2007 concentrations of VC in groundwater via.....".	<i>Comment noted, the referenced text has been revised as suggested.</i>
19.	Section 2.8.1.1, Contaminants of Potential Concern, first paragraph, page 2-7	In the second sentence, change "NJGWQS" to "NJGWQSS".	<i>Comment noted, the referenced text has been revised as suggested.</i>
20.	Section 2.8.1.1, Contaminants of Potential Concern, fourth paragraph, page 2-7	Benzo(a)pyrene (BaP) is referenced as a COPC in this section. However, it is not listed in Table 3, Contaminants in Surface Water that Exceed LOCs or in Figure 4, Historical Exceedances of Levels of Concern in Surface Water. An explanation should be provided why BaP was selected as a COPC but apparently did not exceed its LOC.	<p><i>During the remedial investigation (RI) phase, Benzo(a)pyrene (BaP) was detected in surface soil and in one instance sediment at concentrations that exceeded the respective LOCs. Although it was not detected in surface water, BaP was initially identified as a surface water COPC in the 2005 Remedial Investigation (RI) Report (Shaw Environmental, Inc. Phase II-1A Sites Remedial Investigation Report. April 2005.) but it was not carried through as a COC.</i></p> <p><i>Based on the RI, BaP was subsequently listed as a surface water COPC in the Feasibility Study and Proposed Plan. Table 3, Figure 4 and the referenced text are accurate as presented.</i></p>

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21.	Section 2.8.1.2, Exposure Assessment, third paragraph, page 2-8	In the first sentence replace "New Jersey Surface Water Quality Criteria" with "NJSWQC".	<i>Comment noted, the referenced text has been revised as suggested.</i>
22.	Section 2.8.1.3, Risk Characterization, Site 78, page 2-9	<p>a. Future Adult and Child Residents have a cumulative cancer risk greater than the acceptable risk range of 1×10^{-4} (3.1 and 5.6×10^{-4} respectively). The hazard index for a Future Adult Resident is 1.3 which is above the acceptable risk range. LUCs should be protective of human health as long as the definition of industrial land use restrictions includes restrictions of schools, day-cares and residential buildings.</p> <p>b. The calculated cancer risk for Supplemental Future Industrial/Research Worker is above the EPA's acceptable risk range of 1×10^{-4} (4×10^{-4}). This cancer risk was calculated from the increasing VC concentrations found onsite, hypothesized to be due to the natural attenuation of TCE. Although the maximum detected concentration of VC (173 ug/L) was used to calculate the cumulative ELCR for an industrial worker exposed to VC in groundwater via ingestion, dermal contact, and inhalation of indoor air which will yield a highly conservative risk value, it should be noted that the trends of VC in two onsite wells are increasing. These increasing concentrations can drive the cancer risk even higher than the one calculated for the Supplemental Future Industrial/Research Worker.</p>	<p>a. <i>Comment noted, agreed.</i></p> <p>b. <i>Please see response to General Comment 2. The 2007 VC concentrations are temporal and expected fluctuate over time. The concentrations detected during the 2010 sampling events showed an overall decrease in VC concentrations compared to 2007.</i></p> <p><i>As described in Section 2.10.2, the selected Response Action (GW-2: Monitored Natural Attenuation and Land Use Controls) does include long-term monitoring. The detailed monitoring plan will be presented in the Remedial Design.</i></p>

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		To ensure protectiveness, VC concentrations need to be closely monitored (sample number needs to be increased so that the data set can be used to get a true average concentration) and quantification of the cancer risk may need to be revisited. Therefore, the selected remedy should contain long-term monitoring and the five year review should evaluate potential exposure to VC in the groundwater.	
23.	Section 2.8.1.3, Risk Characterization, Site 78, second paragraph, page 2-9	It is requested that the fourth sentence be revised as follows: "As detailed in the FS, the increase of VC concentrations in groundwater is due to the degradation of the more highly chlorinated VOCs that historically exhibited the highest levels of these constituents."	<i>Comment noted, the referenced text has been revised as suggested.</i>
24.	Section 2.8.1.3, Risk Characterization, Site 78, second paragraph, page 2-9	In the last sentence of the paragraph delete the following: ", and therefore is not considered a risk to human health."	<i>Comment noted, the referenced text has been revised as suggested.</i>
25.	Section 2.8.1.3, Risk Characterization, Site 78, third paragraph, page 2-9	It should be noted that constituents in groundwater do not need to pose an unacceptable risk to warrant a response action as this paragraph seems to insinuate.	<i>Noted. The final sentence of the referenced paragraph has been deleted.</i>

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26.	Section 2.8.2, Ecological Risk Assessment, Comparison of Results to Ecological Screening Values, page 2-10	The section regarding the comparison of results to ecological screening values indicated that contaminant concentrations in surface water were below levels of concern. A discussion should be included in this section regarding the potential for pore water contamination. If there were no pore water samples collected, adjacent groundwater samples can represent pore water concentrations.	<i>Historic pore water data from nearby piezometers does exist. A discussion of this data will be included in this section.</i>
27.	Section 2.8.2, Ecological Risk Assessment, Comparison of Results to Ecological Screening Values, first paragraph, page 2-10	A sentence should be added before the last sentence summarizing why an ERA is not recommended for PAH contamination in soil such as: "These areas are not expected to be attractive to ecological receptors."	<i>The following sentence has been inserted before the last sentence:</i> <i>"These areas are not considered a likely habitat for ecological receptors."</i>
28.	Section 2.8.4, Contaminants of Concern and Site Cleanup Levels, second paragraph, page 2-10	The first sentence states: "Site cleanup levels were developed for contaminants identified in groundwater at Site 78 (PICA 013) if the concentrations were a major contributor to human risks or exceeded NJGWQC." a. A more appropriate selection criteria for groundwater COCs would be expressed as follows: "Site cleanup levels were developed for contaminants in groundwater at Site 78 (PICA 013) if the contaminants appeared in a groundwater plume and exceeded SCLs." b. Change "NJGWQC" to "NJGWQs" if it is retained in the text.	<i>Comment noted, the referenced text has been revised as suggested.</i>

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29.	Section 2.8.4, Contaminants of Concern and Site Cleanup Levels, page 2-10	<p>a. The first paragraph addresses COCs in groundwater but also references NJDEP Surface Water Quality Criteria in item number 2 as a criteria for selecting COCs. Therefore, the second sentence should also include surface water in addition to groundwater.</p> <p>b. The third paragraph states that surface water will be monitored for the duration of groundwater response action. If COCs have been identified in surface water, then there should be a table listing them similar to Table 8 for groundwater. On the other hand, if COCs have not been identified in surface water, this should be stated. Otherwise, Table 3 or some other table should be referenced as listing the contaminants that will be monitored in surface water.</p>	<p>a. <i>Comment noted. The referenced text was previously decided and agreed upon as part of the resolution to the Mid-Valley dispute. The language is consistent with that agreement and with other RODs recently completed including the Group 3 Sites (PICA 008).</i></p> <p>b. <i>Comment noted. Table 8 does include a listing for surface water as well as groundwater.</i></p>
30.	Section 2.8.4, Contaminants of Concern and Site Cleanup Levels, second paragraph, page 2-10	In the second sentence, change "NJGWQS" to "NJGWQSS".	<i>Comment noted, the referenced text has been revised as suggested.</i>
31.	Section 2.8.4, Contaminants of Concern and Site Cleanup Levels, third paragraph, page 2-10	Revise the first sentence to state: "Four groundwater contaminants (1,1,1-TCA, TCE, cDCE and VC) were identified during the FS in a groundwater plume and above applicable standards."	<i>Comment noted, the referenced text has been revised as suggested.</i>

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32.	Section 2.9, Remedial Action Objectives, page 2-10	The document indicates that the Remedial Action Objectives (RAOs) have been developed in a way that attainment of these goals will result in protection of human health and ecological receptors. However, the specific bulleted list of the RAOs does not include ecological receptors. This discrepancy should be corrected.	<i>Comment noted. "ecological receptors" has been removed from the first sentence of paragraph 2 in Section 2.9.</i>
33.	Section 2.9, Remedial Action Objectives, second paragraph, page 2-10	In the second bullet, change "NJGWQS" to "NJGWQSs".	<i>Comment noted, the referenced text has been revised as suggested.</i>
34.	Section 2.10.2, Response Action GW-2: Monitored Natural Attenuation and Land Use Controls, second paragraph, page 2-12	In the fourth bullet, change "NJGWQS" to "NJGWQSs".	<i>Comment noted, the referenced text has been revised as suggested.</i>
35.	Section 2.10.2, Response Action GW-2: Monitored Natural Attenuation and Land Use Controls, Land Use Controls, page 2-12	Revise the fourth sentence to read: "Land use controls will be maintained until the concentration of contaminants in groundwater are at such levels to allow unrestricted use and exposure."	<i>Comment noted, the referenced text has been revised as suggested.</i>

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36.	Section 2.14.1, Summary of the Rationale for the Selected Response Action, second paragraph, page 2-17	Add the following phrase to end of the sentence "...and the observed degradation of CVOC degradation."	<i>Comment noted, the referenced text has been revised as suggested.</i>
37.	Section 2.14.3, Land Use Controls, second paragraph, page 2-17	It is requested that the third sentence be deleted as the duration language for LUCs is addressed in the first sentence of the third paragraph.	<i>Comment noted, the referenced text has been revised as suggested.</i>
38.	Section 2.14.3, Land Use Controls, page 2-17	<p>It is requested that the following text be added to Section 2.14.3, Land Use Controls, page 17 – 18 -</p> <p>"The LUC objectives for Site 78 groundwater and surface water are as follows:</p> <ul style="list-style-type: none"> - Prevent access or use of the groundwater and surface water until cleanup levels are met. - Prevent the potential intrusion of plume vapors within future buildings. - Maintain the integrity of any current or future remedial monitoring system, such as monitoring wells. - Maintain the existing CEA. - Prohibit excavation without safeguards in all areas below the water table where groundwater contaminants exceed SCLs." 	<i>Comment noted, the referenced text has been revised as suggested.</i>

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39.	Section 2.14.3, Land Use Controls, page 2-17	It is requested that the following language be added to this section: "A LUC Remedial Design will be prepared as the land use component of the Remedial Design. Within 90 days of ROD signature, the Army shall prepare and submit to EPA for review and approval a LUC remedial design that shall contain implementation and maintenance actions, including periodic inspections."	<i>Comment noted, the referenced text has been revised as suggested.</i>
40.	Section 2.15.2, Compliance with Applicable or Relevant and Appropriate Requirements, page 2-19	It is requested that the end of the first sentence be revised from ".....complies with all ARARs." to ".....is expected to comply with all ARARs."	<i>Comment noted, the referenced text has been revised as suggested.</i>
41.	Section 2.15.4, Utilization of Permanent Solutions and Response Action Treatment Technologies (or Resource Recovery Technologies) to the Maximum Extent Possible, page 2-19	It is requested that the first sentence be revised as follows: "The Selected RA employs permanent solutions to passively treat and reduce..."	<i>Comment noted, the referenced text has been revised as suggested.</i>

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42.	Section 2.15.5, Preference for Treatment as a Principle Element, page 2-19	Revise the second sentence to read: "An active treatment technology was not considered necessary because the selected Response Action is protective of human health and the environment, is expected to comply with ARARs in a timeframe comparable with active treatment technologies and is more cost effective."	<i>Comment noted, the referenced text has been revised as suggested.</i>
43.	Section 3.0, Part 3: Responsiveness Summary, fourth paragraph, page 3-1	Revise the last part of the first sentence as follows: "...and is in favor of remediating groundwater contamination located at Site 78."	<i>Comment noted, the referenced text has been revised as suggested.</i>
44.	Section 3.1.1, Summary of Written Comments Received during the Public Comment Period, response to second comment, third paragraph, page 3-2	Revise the first sentence to state: "In addition, land use controls (LUCs) incorporated into the selected remedy will prevent the use of groundwater for drinking water at the Site and as a result, the exposure assumptions within the risk assessment are not likely to occur."	<i>Comment noted, the referenced text has been revised as suggested.</i>
45.	Section 3.1.1, Summary of Written Comments Received during the Public Comment Period, response to third comment, page 3-3	<p>a. Revise the third sentence as follows: "Past natural degradation and prior pilot testing, utilizing innovative in-situ treatment technology, has effectively reduced groundwater contamination thereby enabling the suitability of an MNA approach at this time."</p> <p>b. Revise the last sentence as follows: "It should be noted that MNA utilizes natural degradation processes to reduce contaminant concentrations over time and passively "treats" contamination by breaking it down to harmless end products."</p>	<i>Comment noted, the referenced text has been revised as suggested.</i>

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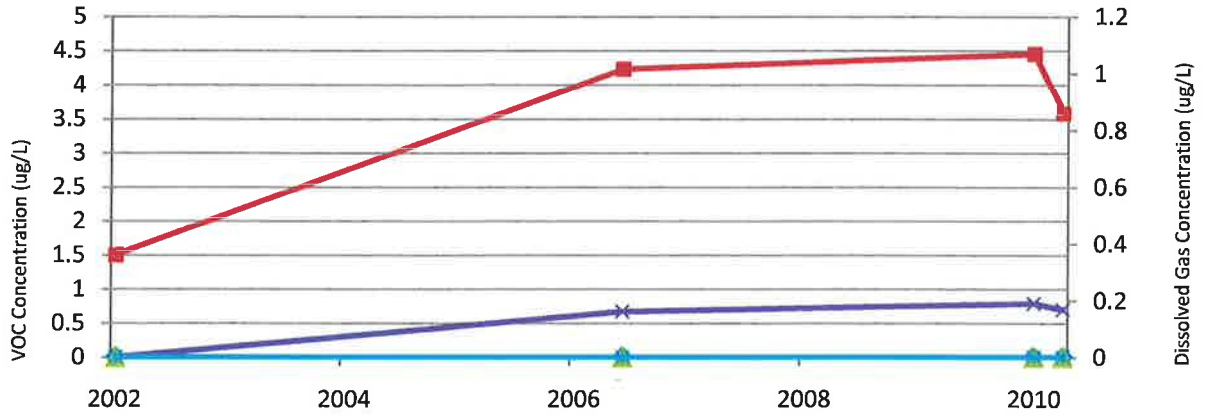
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46.	Section 3.1.2, Summary of Comments Received during the Public Meeting on the Proposed Plan and Agency Responses, Comment 6, page 3-4	Revise the second sentence as follows: "The only notice we saw was in the community bulletin."	<i>Comment noted, the referenced text has been revised as suggested.</i>

Attachment 1

Site 78 (PICA 013) – Trend Plots for Groundwater and Surface Water

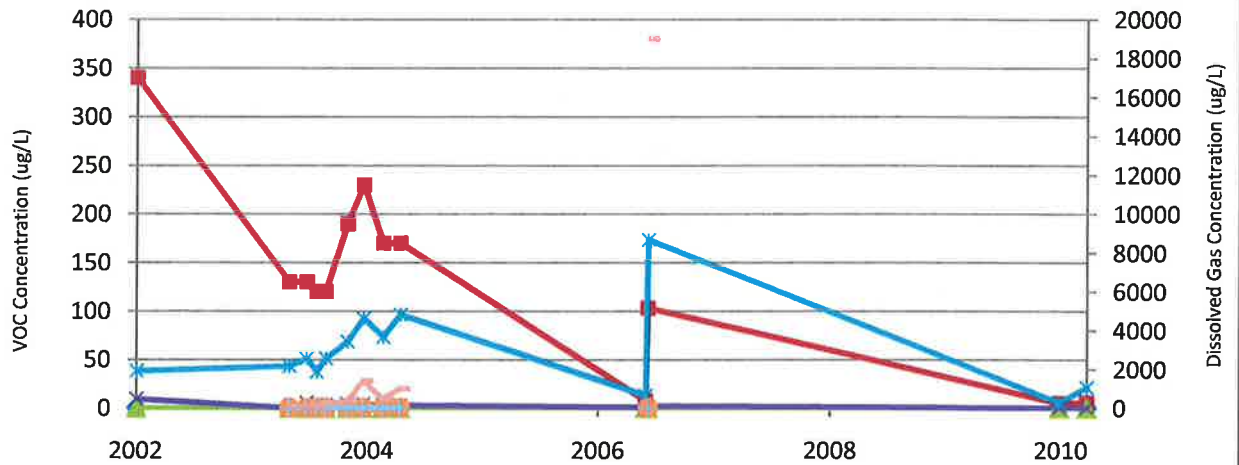
Trend Plots of Select VOC and Dissolved Gases Data
Site 78 (PICA 013) Groundwater

Groundwater Trend Plot For 78-MW-001



	9/26/2002	2/27/2007	9/27/2010	12/22/2010
1,1-Dichloroethene	0	0	0	0
cis-1,2-Dichloroethene	1.5	4.23	4.45	3.58
Tetrachloroethene	0	0	0	0
Trichloroethene	0	0.669	0.787	0.697
Vinyl chloride	0	0	0	0
Ethane				
Ethene				
Methane				

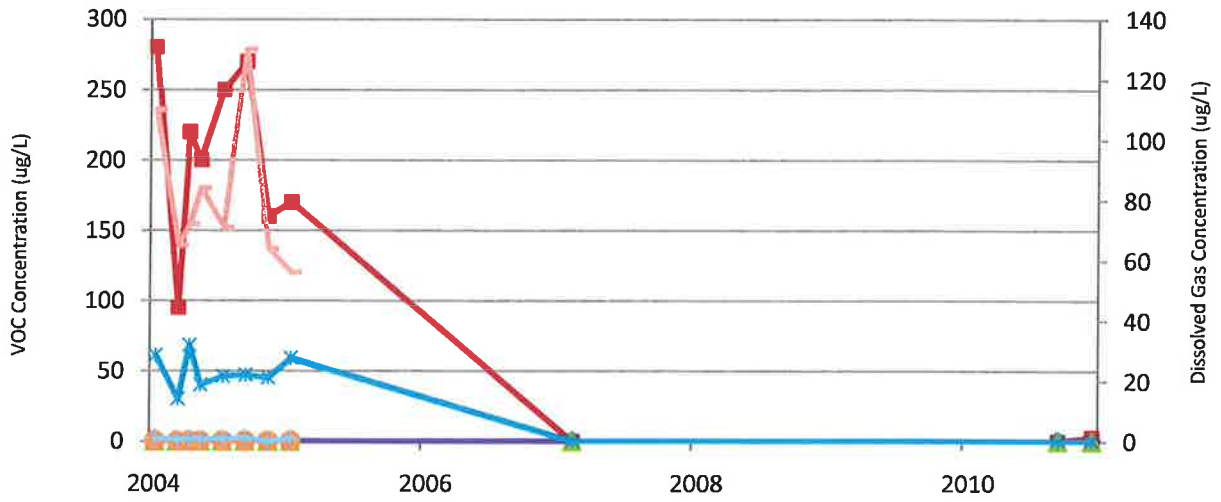
Groundwater Trend Plot For 78-MW-003



	9/30/2002	1/26/2004	3/22/2004	4/22/2004	5/21/2004	7/29/2004	9/17/2004	11/18/2004	1/11/2005	2/26/2007	3/5/2007	9/27/2010	12/22/2010
1,1-Dichloroethene	0	0	0	0	0	0	0	0	0	0	0	0	0
cis-1,2-Dichloroethene	340	130	130	120	120	190	230	170	170	7.54	103	4.82	5.48
Tetrachloroethene	0	0	0	0	0	0	0	0	0	0	0	0	0
Trichloroethene	9.1	0	5.3	3.8	3.3	3.8	4	2.6	2.5	0.5	1.83	0	0
Vinyl chloride	38	43	51	37	51	68	92	73	96	12.7	173	5.21	20.8
Ethane		0	0.2	0.39	0.69	0	0	0.29	0		1.2		
Ethene		0.56	0	0.46	0.96	0	0	0	0.92		5.5		
Methane		120	69	93	250	320	1400	460	1000		19000		

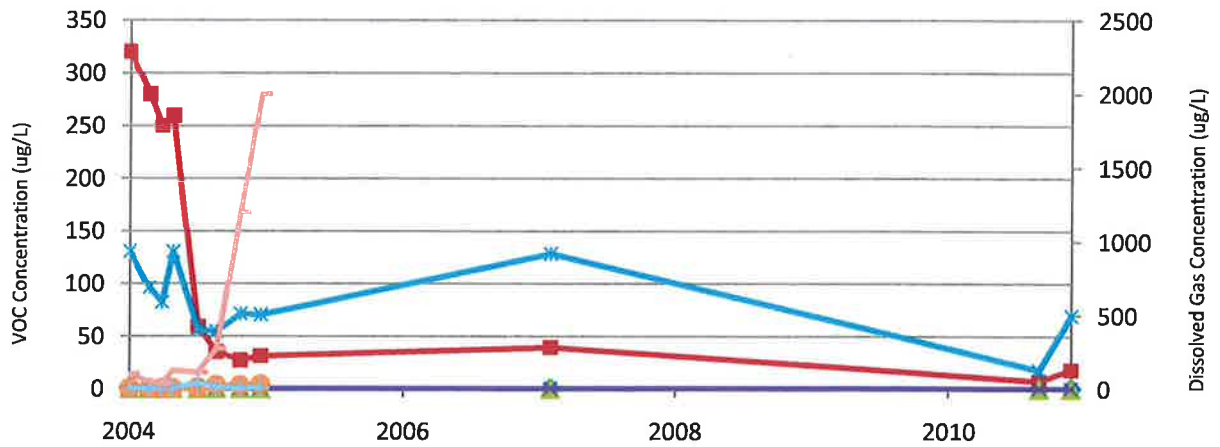
Trend Plots of Select VOC and Dissolved Gases Data
Site 78 (PICA 013) Groundwater

Groundwater Trend Plot For 78-MW-004



	1/26/2004	3/22/2004	4/22/2004	5/21/2004	7/28/2004	9/17/2004	11/18/2004	1/11/2005	2/26/2007	9/27/2010	12/22/2010
1,1-Dichloroethene	0	0	0	0	0	0	0	0	0	0	0
cis-1,2-Dichloroethene	280	95	220	200	250	270	160	170	0	0	2.9
Tetrachloroethene	0	0	0	0	0	0	0	0	0	0	0
Trichloroethene	0	0	0	0	0	0	0	0	0	0	0.497
Vinyl chloride	61	30	68	40	46	47	45	59	0	0	0
Ethane	0	0	0	0	0	0	0	0			
Ethene	1	0.46	0.81	0.7	0.78	1.1	0	0.92			
Methane	110	65	72	84	71	130	64	56			

Groundwater Trend Plot For 78-MW-006



	1/26/2004	3/18/2004	4/21/2004	5/20/2004	7/27/2004	9/14/2004	11/17/2004	1/10/2005	2/26/2007	9/27/2010	12/22/2010
1,1-Dichloroethene	0	0	0	0	0	0	0	0	0	0	0
cis-1,2-Dichloroethene	320	280	250	260	59	35	27	31	39.2	7.01	18
Tetrachloroethene	0	0	0	0	0	0	0	0	0	0	0
Trichloroethene	0	0	0	0	0	0	0	0	0	0	0
Vinyl chloride	130	96	82	130	56	54	71	70	128	17.2	69.2
Ethane	0	0	0	0	5.1	21	20	28			
Ethene	1.3	0.54	0.43	2.9	35	7	4.1	8.3			
Methane	100	45	25	120	110	270	1200	2000			

