Paul V. Sundberg

Project Consultant

10733 Wave Crest Court Stockton, CA 95209 Ph 209-474-3617

July 7, 2015

Mr. Carlton Parker
Division of Environmental Protection
2030 E. Flamingo Road, Suite 230
Las Vegas, NV 89119

Re: Submittal of Revised Data Usability Evaluation
Montrose Henderson, Nevada Program
Closed Ponds Area and Former Tank Farm Site Assessment Areas

Dear Carlton,

On behalf of Montrose Chemical Corporation of California (Montrose), please find enclosed a revised version of the subject data usability evaluation. This document was first submitted to NDEP for review on October 31, 2014. NDEP provided comments in a letter dated March 11, 2015 and requested a revision of the document. Using a response-to-comment format as a foundation for discussions, Montrose consultants and NDEP subsequently developed a plan for the revised content of the DUE document. The revised document along with an annotated Response-to-Comment table are enclosed.

Should you have any questions, do not hesitate to call me or Kyle Gadley at Geosyntec (714-465-1253).

Sincerely yours,

Paul V Sundberg

Paul V. Sundberg
Consultant to Montrose

Cc via e-mail:

Joe Kelly - Montrose - Bainbridge Island - via CD
Kelly Richardson - Latham & Watkins - San Diego - via CD
BMI Compliance Coordinator - NDEP - Las Vegas - via CD and Hardcopy
James Dotchin - NDEP - Las Vegas - via Webste Distribution
BMI Program Interested Parties via Website Distribution

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Attachment A – Comments Received March 11, 2015			
1	DUE, General Overall Comments	*a. The 2010 Guidance for Assessing Data Usability for Environmental Investigations at the BMI Complex and Common Areas in Henderson Nevada, Data Analysis section, states that "NDEP requires preparation of summary statistics tables to include, at a minimum...spatial plots of the data, such as geographic information system (GIS) images with boxes showing raw data, GIS images overlaid by intensity plots (which depict concentration through color intensity of the circle or symbol that represents the sample), bubble plots (which depict concentration through the size of the bubble), or scale plots that use color to depict a range of data for a particular sample (e.g., with cut-offs at the maximum background concentrations or risk thresholds of interest (such as 1/10 of the NCL [sic]))." There were no intensity plots, bubble plots or scale plots included in this report.* *Furthermore, this section of the guidance also states the need to "...use simple exploratory data analysis to compare data to the expectations of the CSM, to determine if the data adequately represent the source terms and exposure areas or evaluation areas". There is no meaningful consideration of the data in this context. That is, no exploratory*	The Deliverable includes GIS images that list the depths and analyses that were performed at each location. The revised Deliverable references figures included in the NDEP-approved CSM, which is included as Appendix A of the DUE. The revised Deliverable presents discussions regarding data usability relative to the CSM.

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		analyses have been substantively discussed in the context of the CSM.	
2	DUE, Section 1.1, Background	*a. Page 1, first paragraph: In the background section for the Closed Ponds Area (CPA) and Former Tank Farm (FTF) Site Assessment Areas (CPA-FTF), please include the total acreage of the CPA-FTF to provide perspective of the area and number of samples. The revised Conceptual Site Model (CSM) for the CPA-FTF in Appendix A also is missing this information.*	The total acreage of the CPA-FTF has been included in Section 1.1. The revised Conceptual Site Model (CSM) for the CPA-FTF in Appendix A has been approved by NDEP. Therefore, no changes have been made to Appendix A.
3	DUE, Section 1.1, General	*a. Section 2.1 - rejected data could also be considered in the DUE. Sometimes data are rejected for data validation reasons, but there is no real effect on the data. Some consideration can be given to including data rejected through data validation only. No need to exclude R data at this point - we have seen R data unrejected at this point in the past - problem is DV does not really address data usability.* *b. Page 3 first paragraph, fourth sentence and also Section 3 page 16, last paragraph, first sentence: In Appendix B, Table B-l specifically, data reported in the SECOR 1997 report is annotated with a footnote (3). This footnote, located on page 3 of Table B-l, states "DVSR is not available for*	a. Analytical data rejected during data validation was evaluated for usability. Data considered not usable is explained in the DUE. b. Although a DVSR was not prepared for data from the SECOR 1997, the SECOR data was included in this Data Usability Evaluation for historical context. b(sic). Comment withdrawn by NDEP during April 23rd conference call.

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		samples collected as part of the Phase II Environmental Conditions Investigation." Additionally, in the notes associated with the References (page 3 Table B-l), the authors note NDEP acceptance status is unknown as regards to the SECOR report. *Based upon these two qualifications of the SECOR data, the usability of this data is unclear with regard to meeting "project objectives." Sample locations FTF-01 through FTF-06 and PSS-03 are included as part of the dataset in the statistical and spatial evaluations (see Tables and Figures B-3a and B-3b).* *It is recommended that Section 2.1 of the Deliverable be revised to elaborate upon the SECOR dataset usability or limitations thereof.* *b(sic). . Page 3 second sentence and Appendix B page 2 Data Usability Criteria IV, second paragraph: Review of Appendix B, Figures B-5 suggests several instances where analytical detection limits exceed screening levels. The report does not appear to acknowledge this issue as part of the usability analysis. For example, of the approximately 33 soil vapor analyses, only two samples were analyzed utilizing Method TO 15 (see Table B-2). This method was designed to lower detection limits for ambient air samples as*	

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		compared to 8260. However, the TO methods require more sampling hardware and are more expensive. It stands to reason (without review of the parent sampling and analysis plan), that sample locations FTF-35 (depth 40 ft bgs) and FTF-36 (depth 10 ft bgs) were analyzed utilizing both 8260 and TO 15 methods in part to evaluate these differences. The DUE provides no analysis of this analytical pair. *Additionally, it is recommended that the revised report further elaborate upon the statement "data quality objectives of the risk assessment were met" to further support the assertion and address the assertion that "soil vapor samples were analyzed using TO 15.*	
4	DUE, Section 2.2, Methodology	*a. Page 3 second paragraph: The Outdoor Industrial Worker BCL for total PCBs is 0.826 mg/kg. For samples where Method 1668 was applied, it is recommended that an additional result field be added to the database, tables, and figures which calculate the sum of all congeners for each sample. The total PCB value can then be compared to the BCL. It should also be noted, that TSCA considerations can come into effect if the summation exceeds 1 mg/kg.*	a. A summation of PCBs congeners were not included in the FBST DUE, which was the approved format accepted by NDEP in 2011. b. Toxic equivalency factors were not applied to dioxin-like congeners in the FBST DUE, which was the approved format accepted by NDEP in 2011.

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		b. Page 4 second paragraph: Review of Figures B4U through B4AG depicts the RSL for each PCB congener as 1 mg/kg. Based upon the Regional Screening Level summary table[1],1 mg/kg is applicable to total PCBs (sum of all congeners). For dioxin-like congeners, RSLs have been generated on a congener specific basis. In addition, it is recommended that the toxic equivalency factors be applied to dioxin- like congeners in order to derive a toxic equivalent (TEQ) value for each sample.	
5	DUE, Section 3, RESULTS	*a. Section 3, General. The DUE fails to satisfy a requirement of the project Data Usability (DU) guidance. Specifically, the DU guidance states: "The DU evaluation should compare data to the CSM to update or modify the CSM as appropriate, and set the stage for determining if there are data gaps that require further sampling. In particular, the CSM is a tool that should be used in the DU evaluation to make sure that the geographic and source term coverage of the sampling program is appropriate and sufficient. Evaluation of the DU criteria combined with the data analysis required by NDEP should fully support comparison with the CSM and identification of data gaps, if any." The Results section of the DUE focuses on identifying values that were considered statistical outliers and does not provide any evaluation of the*	a. The CPA-FTF CSM is included as Appendix A. A summary of the key findings of the CSM was not included in the FBST DUE, which was approved by NDEP in 2011. A discussion of the DQIs of representativeness and comparability and insights based on statistical and graphical data analyses in the DUE is provided in Appendix B. b. The in-text tables are not included in the revised Deliverable and instead, an overall discussion of the data will be included. c. See response to 5b above. d. See response to 5b above. e. Electronic versions of the boxplots were provided to the NDEP. Those versions included the LBCLs and BCLs used. Those LBCLs and BCLs are also included in the tables of the CPA-FTF CSM (Appendix A).

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		sufficiency of the sampling. The findings of the CSM with regard to the nature and extent of contamination and possible data gaps is not referenced or summarized in the DUE and the analyses presented in the DUE are not applied to updating these findings. Please summarize the key findings of the CSM with regard to the nature and extent of contamination, potentially active fate and transport pathways, and data gaps. Please assess the adequacy of the existing data to support the CSM findings, with particular attention to the DQIs of representativeness and comparability and insights based on statistical and graphical data analyses in the DUE.	f. A discussion of BCL and LBCL exceedances was not provided in the text of the FBST DUE, which was approved by NDEP in 2011. In addition, this text is already included in the CPA-FTF CSM (Appendix A). A discussion is included in the revised Deliverable to address elevated detection limits and the potential affects for comparing data to BCLs/LBCLs. g. A discussion of background level exceedances was not provided in the text of the FBST DUE, which was approved by NDEP in 2011. An evaluation was conducted for analytes exceeding BCLs (e.g., suitability of data to assess extent of contamination and potentially complete exposure pathways). h. Outlier tests for datasets greater than two were not performed for the FBST DUE, which was the approved format accepted by NDEP in 2011. Per NDEPs suggestion, only datasets with greater than 10 detections were subjected to outlier tests. i. The phrase has been changed, as requested by NDEP. J, k, l, m. The calculations of summary statistics will be reviewed and revised as necessary for consistency. n. The analyte name has been changed to M-P-Xylene.
		b. Section 3 - All Tables, it is not clear how the mean has been calculated, since it often does not match the summary statistics tables in	

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		Tables B-2 and B-3. However, assuming these means represent all of the data, this comparison of means to maxima is not sufficient. The mean includes the maxima, in which case the maxima appear closer to the rest of the data than they are. It's also not clear why maxima alone have been identified. Outlier tests have apparently been run, but there are no results. This section would be better served by considering potentially suspect values, whether or not identified through Dixon's or Rosner's outlier tests, and then investigating and interpreting those values. For example, are high concentrations often from the same location? Do they have units problems? Are there other chemistry or geology reasons why these results are high? Etc. The intent of the DUE is to determine if the data are usable - that is, are they "correct" or "reasonable" given the other data and what is known about the site (the CSM), and suspect values should be investigated further to demonstrate that they are usable. This analysis does not achieve that. *c. All unnamed tables on Pages 7-16 include the Standard Deviation. These values are not calculated or shown in Tables B-2 or B-3a.*	

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		They should be included with the other summary statistics in Tables B-2 and B-3 a. *d. General, section 3 and Summary Statistics in Appendix B. All unnamed tables on Pages 7-16 include the Mean. Two means are shown in Tables B-2 and B-3a. For the tables on Pages 7-16, please clarify which mean is presented.*	
		e. Page 6 and Appendix B Figures, Box and Wisker [sic] Plots: Section 3 of the DUE discusses the results of comparisons to NDEP Basic Comparison Levels (BCLs) and Leachate BCLs. In addition, the Box and Whisker Plots in Appendix B provide a visualization of site data to BCLs and LBCLs. However, the reviewers were unable to verify that the correct BCLs and LBCLs are being used in these comparisons. In the data statistical summary tables for the site data located in Appendix B (and on the figures), please provide the actual BCLs and LBCLs being used. *f. In addition, a discussion of whether any detection limits were elevated compared to the NDEP BCLs or LBCLs is missing. Please provide a discussion of this comparison as well to determine if there were samples in which elevated detection limits*	

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		may contribute to the overall uncertainty of the data for risk assessment purposes. *g. Page 6, paragraph 2, last sentence states, "At this Site, no maximum concentration of the analytes sampled exceeds the BCL, thus no further evaluation of potential risks for these analytes is warranted." A review of the box-and-whisker plots in Figures B-5 reveals VOCs for which soil vapor concentrations are shown to exceed BCL and RSL values. This is also the case for arsenic (Figure B-4F). Please provide additional evaluation of the analytes for which concentrations exceed BCLs, with a focus on the suitability of available data to assess the vertical and horizontal extent of contamination and potentially complete exposure pathways and associated health risks. A quantitative comparison of arsenic soil concentrations to background levels should be conducted to supplement the qualitative comparison provided in Section 4.3.1 of the CSM.* *h. Page 6, fourth paragraph, last sentence states, "Potential statistical outliers were evaluated in datasets reporting two or more detected values." Performing this analysis does not make sense with this small of a sample size. For example, one cannot meaningfully identify an outlier with three detected values. We suggest a minimum of 10*	

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		samples for the consideration of outliers. In general, the outlier tests are meant to be a tool to assess the usability of the data in the context of the CSM. Outliers can be indicative of a number of potential issues; however, they can also simply be a consequence of natural variability in the underlying distribution. Consequently, the identification of outliers is a means to better understanding the usability of the data in the context of the CSM, not an end to itself.	
		i. Page 6, fifth paragraph, first sentence states, "The potential outliers identified below, while triggering statistical results, were nonetheless deemed plausible environmental concentration data consistent with the CSM and useable for subsequent risk assessment, purposes." The phrase "triggering statistical results" is poorly worded. Perhaps it would be more clear to say "triggering statistically significant results". *j. Page 7, Volatile Organic Compound Soil Vapor Table. There are many discrepancies between the data presented in this table and the summary statistics presented in Table B-2.* *k. Page 8, Pesticide Constituents Soil Samples Table. There are many discrepancies between the data presented in this table and the summary statistics presented Table B-3a.* *1. Page 9, Inorganic Constituents Soil Samples*	

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		Table. There are many discrepancies between the data presented in this table and the summary statistics presented in Table B-3a. *m. Page 10, Volatile Organic Compound Constituents Soil Samples Table. Thirty-seven values, fourteen mean values {1,2,4,5-Tetrachlorobenzene, 2,2'-/4,4'-Dichlorobenzil, 2,4-Dichlorophenol, 2-Chlorophenol, Benzo (b)fluoranthene, Benzoic acid, bis(2-Ethylhexyiy-phthalate, Diethyl phthalate, Di-n-butyl phthalate,4,4'-Dichlorobenzophenone, Hexachlorobenzene, P-Chlorophenyl sulfone, Pentachlorobenzene, Pentachlorophenol) and twenty-three maximum values {1,2,4,5-Tetrachlorobenzene, 1,2,3-Trichlorobenzene, 2,4-Dichlorophenol, 2-Butanone, 2-Chlorophenol, 2-Chlorophenol, 2-Chlorotoluene, Acetone, Benzo (b) fluoranthene, Benzoic acid, bis(2-Ethylhexyl)-phthalate, Chloroethane, Methylene chloride, Diethyl phthalate, Di-n-butyl phthalate, Ethylbenzene, Hexachlorobenzene, P-Chlorophenyl sulfone, 4-Chlorotoluene, M-Xylene, Pentachlorobenzene,Pentachlorophenol,* *Tetrachloroethene, Toluene), in the table do not match the values presented in Table B-3a.* *n. Page 10, Volatile Organic Compound Constituents Soil Samples Table. The compound M-Xylene is listed as M-P-Xylene in Table B-3 a,*	

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		please clarify which is correct.	
6.	DUE, Lack of Conclusions	*a. The DUE does not include a conclusions section that describes the overall uncertainty of the site data including any data gaps that were identified. The Deliverable should be revised to include this section and, at a minimum, summarize the issues with elevated detection limits, rejected data, or other data quality indicator issues that may contribute to the overall uncertainty of the data to be used in risk assessment (e.g., conversion of wet weight to dry weight).*	a. A brief conclusion, including a discussion of uncertainties associated with the evaluation, is included in the revised Deliverable.
7.	DUE, Data Quality Assessment	*a. The DUE does not include a data quality assessment to evaluate whether the number of samples collected is adequate for use in risk assessment.*	a. A qualitative evaluation (e.g., good spatial coverage, data meets DLs/RLs, areas of know/suspected contamination identified in the CSM were sampled, sufficient sample size for statistical evaluation, etc.) is included in the DUE to verify the sample size is adequate for use in the risk assessment.
8.	DUE, Tables	*a. The data tables (B-2 and B-3 for example) are not needed in this document. They can be included electronically. It is very hard to search through massive paper copies of data tables to find anything of interest. However, electronically that is possible. The summary statistics should, however, be provided (as presented is fine)*	a. Paper copies of the data tables are not included in the revised Deliverables.
		b. Table B-3a and Figure B-3A, Asbestos Samples.	b. A discussion of adequacy is included in the revised

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		The summary statistics provided at the close of Table B-3a and the Figure B-3b sampling locations indicate that only three soil samples were analyzed for asbestos. Please discuss the adequacy of the asbestos soil sampling in the context of the DQI 'Representativeness'.	Deliverable.
		c. The approach to field duplicates is not the preference of NDEP as expressed in NDEP s 2008 guidance on field duplicates and field sprits. The preference is that they are treated as separate samples, unless there are obvious reasons to do otherwise (e.g., field duplicates are more highly correlated than other samples). This is also EPA's recommendation in its latest guidance.	c. Comment noted.
		d. Note that Dixon's and Rosner's test assumes normality of the underlying data. For most chemicals here the data do not appear normal. Consequently, these methods should be used with caution, and these limitations should be explained. In general the approach taken has been to identify outliers, but not also suggest that these outliers should be eliminated from the data, so, to some extent the methods for outlier identification are fine - the intent is to investigate and interpret unusual or suspect	d. A discussion of the limitations of the Dixon's and Rosner's tests is included in the revised Deliverable.

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		values. In this context use of Dixon's and Rosner's tests is fine, but some discussion of limitations should be included.	
9.	DUE, Figures	*a. The box plots are reasonable, but there is no interpretation of them. Some box plots show outliers, but there is no interpretation. For example, there appears to be a single high value for PCB congeners. Why? However, such a high value does not appear for Aroclors. Why not? Is this single high value for most congeners from the same sample? What are the attributes of that sample that make that sample exhibit high concentrations (detects or NDs) for most PCB congeners? This is the type of fmd, investigate and interpret that is expected of the DUE. This might simply be interference in the PCB analysis, but it could also be a units issue. Note, this (PCBs) is simply an example.* *b. Figures B-1 and B-3B, Excluded Data. Soil samples referenced to Converse (1988) are shown in Figure 2-6 of the Conceptual Site Model, but the Converse (1988) report is not listed among the previous investigations in Section 1.2 of the CSM and the sample locations are not shown on Figures B-1 and B-3B. The CSM BCL exceedance figures (for example, Figures 4-1 and 4-2) note that these data have "unknown validation status", but that does not prohibit their qualified use in*	a. The DUE includes a holistic discussion of the box plot results. In addition, anomalies will be explored and interpreted in the text. b. The exclusion of data from the Converse 1988 report is discussed in Section 2.1. c. The figure has been edited as appropriate. d. The exclusion of data from the Hargis 2008 report is discussed in Section 2.1.

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		developing a CSM. Please explain why these data were excluded or include them in the DUE. To clarify, including these data in the DUE means (among other things) using exploratory data analysis to compare these data to the expectations of the CSM, and to determine if the data adequately represent the source terms and exposure areas or evaluation areas.	
		c. Figure B-1, The soil vapor sample location FTF-40 is not identified and there are two identification labels for location FTF-41, please correct. *d. Figure B-2 and Table B-2, Excluded Data. Soil vapor samples referenced to Hargis (2008) are shown in Figure 2-8 of the Conceptual Site Model and are applied in a BCL evaluation in Figure 4-19 of the CSM. These soil vapor samples are not summarized in Table B-2 (Summary of Soil Vapor Data) or shown on Figure B-2 of the DUE. Please explain why these data were excluded or include them in the DUE.*	
10.	DUE, Appendix B	*a. Based upon review of Table B-1 (which reports the matrix sampled), Figure B-2, Table B-2 (which report soil vapor results for CPA-14A, CPA-15A, CPA-13, and P28), these locations do not appear to have been sampled for soil vapor.*	a. The figure is edited as appropriate. b. The revised Deliverable includes a discussion addressing this comment relative to the NDEP-approved CSM. c. The table was revised accordingly.

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		Sample P-28 depicted in Figure B-1 is not listed as a sample location for either soil or soil vapor matrices in Table B-1. Please revise accordingly.	d. The data are presented in the CSM attached as Appendix A with exceedances highlighted. e. A discussion is included in the revised Deliverable. f. A discussion is included in the revised Deliverable. g. F A discussion is included in the revised Deliverable. h. The text was revised as appropriate. i. The in-text tables were removed from the DUE. As such, this comment is no longer applicable. j. See response to earlier comment regarding standard deviation calculations. k. Intensity plots were provided with the CSM and are referenced in the DUE. l. As discussed with NDEP on April 23, number of fibers will not be provided in the DUE. m. Congener-specific RSLs will be included where appropriate on the figures. n. A discussion is included in the revised Deliverable. o. The table has been revised.
		b. These tables report the full polychlorinated biphenyl congener (209) results for locations CPA-13 A, CPA-14A, and CPA-15A. Based upon review of the table, other sample locations selected for PCB analysis were analyzed based upon the World Health Organization's (WHO) list of 12 dioxin-	

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		like congeners[2] with the addition of the dichlorobiphenyl homolog (called the short list for purposes herein). This suggests that during SAP development (sample design optimization) a subset of locations were selected for full PCB characterization (EPA method 1668) to support a reduction in the analytical suite (short list) on a site-wide basis. However, there were detectable PCB congeners outside the short list at CPA-13A, CPA-14A, and CPA-15A. The question becomes whether similar detections would have been reported at locations where only the short-list was applied. Implications regarding completeness of site characterization are likely beyond the scope of the DUE; however, according to Data Usability Criteria IV Analytical Methods and Detection Limits, the Deliverable should address the adequacy of the short-list versus the complete 209 congener analysis (Method 1668). *c. Table B-2: There are 35 sample results (33 samples and 2 duplicates) reported for both 1,1,1,2-tetrachloroethaneand 1,1,1-trichloroethane. However, the total number of samples for 1,1,1,2-tetrachloroethane listed in the Frequency of Detection column in Table B-2 is 33 and 31 for 1,1,1-trichloroethane. Please revise accordingly.*	

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		d. Understanding that comparison to screening levels are provided on the box and whisker plots, significant clarity and review would be enhanced by including screening levels on the summary data tables with visual indication for instances where exceedance(s) occur. This would aid in the review and further support the assertion that "no maximum concentration of the analytes sampled exceeds the BCL" as asserted by the Deliverable in Section 3, page 6. *e. "no maximum concentration of the analytes sampled exceeds the BCL", yet arsenic exceeds BCLs, but no interpretation is offered.* *f. Criterion VI. The data usability evaluation refers the reader to the individual data validation summary reports for specifics regarding sample data qualifiers, data quality control (QC) results (e.g., blanks, matrix spike, matrix spike duplicate, etc.). The main text of the report does not synthesize the information in the DVSRs to identify those chemicals and associated data quality indicators that may pose uncertainty in the data for the CPA-FTF. It is noted that overall completeness attained for soil and groundwater samples was >95% and <95% for soil vapor data. The text does not state the specifics of why the overall completeness was not 100%. For example, it was noted that*	

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		rejected data were not included. Please provide a summary of data that were found unacceptable for risk assessment in the main body of the DUE. *g. In this section it is stated, "The representativeness of the data was deemed acceptable as sampling included site-wide locations and locations biased to accommodate known or potential source locations." Please describe in more detail how site-wide locations were determined or cite a reference so acceptability can be verified. Please discuss the implications of the absence of soil and soil vapor samples beneath much of the Closed Ponds Area for representing chemical concentrations in soil and soil vapor within this area.* *h. Criterion VI. The Evaluation Result for this criterion states, "The overall completeness level attained for the soil vapor samples was <95% as described in the reports..." It appears there may be a typo in this statement and that it should say >95%.* *i. Criterion VII. A description of how the two mean values at the end of Table B-2 and B-3a are calculated should be included in this section.*	
		j. Criterion VH. See earlier general comment above regarding standard deviation calculations. *k. Criterion VII. The spatial plots (Figure B-2, B-3A*	

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		and B-3B) are difficult to read and interpret. Some form of spatial plot (e.g. intensity plots) need to be generated for each chemical by depth in order to evaluate spatial patterns in the data. *1. The box plots for asbestos show concentrations. It would also be helpful to see plots of the number of fibers observed by sample.* *m. Figures B-4L through B-4AG, RSLs. An industrial RSL of 1.0 mg/kg, pertaining to certain Aroclor mixtures, is shown for all PCB congeners in these figures. However, specific RSLs are available for the PCB congeners that exhibit dioxin-like properties. Congener-specific RSLs should be shown in these figures when they are available rather than a generic value for Aroclor mixtures.* *n. Tables B-2 - VOCs are presented by more than one method, however, there is no discussion. Please explain?* *o. Table B-3a, Asbestos Results. Cell HU15 has the wrong number entered for protocol chrysotile structures in sample FTF-41. The number should be < 8.91E+06 vs. 3.9E+07 s/gPM1O.*	

[1]http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/Generic_Tables/docs/master_sl_table_01_run_JAN2015.pdf

Prepared for:

Montrose Chemical Corporation of California
Bainbridge Island, Washington

REVISED DATA USABILITY EVALUATION CLOSED PONDS AREA AND FORMER TANK FARM SITE ASSESSMENT AREAS HENDERSON, NEVADA

Prepared by:

Geosyntec consultants

engineers | scientists | innovators

2100 Main Street, Suite 150
Huntington Beach, CA 92648
Telephone: (714) 969-0800
Fax: (714) 969-0820
www.geosyntec.com

Project Number: HW0989J

July 7, 2015

Geosyntec consultants

Revised Data Usability Evaluation
Closed Ponds Area and Former Tank Farm Assessment Areas
Henderson, Nevada

Jurat

July 7, 2015

I hereby certify that I am responsible for the services described in this document and for the preparation of this document. The services described in this document have been provided in a manner consistent with the current standards of the profession, and to the best of my knowledge, comply with all applicable federal, state and local statutes, regulations and ordinances.

Kyle L. Gadley, P.G., C.E.M.
Nevada C.E.M. 2342, Expires 20 September 2016
Project Geologist
Geosyntec Consultants, Inc.

The services provided for this effort included data compilation, data evaluation and preparation of this data usability evaluation.

Geosyntec consultants

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Appendix B: Data Usability Evaluation

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1. INTRODUCTION

In accordance with United States Environmental Protection Agency (EPA) and Nevada Department of Environmental Protection (NDEP) guidance, and to reduce uncertainty associated with the site investigation and risk assessment processes, a Data Usability Evaluation (DUE) was conducted for the analytical data collected at the Closed Ponds Area (CPA) and Former Tank Farm (FTF) Site Assessment Areas (CPA-FTF or Site).

The objective of this assessment was to evaluate whether the type, quantity, and quality of data available are sufficient to support the risk assessment and to evaluate how uncertainties with the data affect the risk characterization. Data are considered usable in the risk assessment process as long as the data are valid and any uncertainty in the data and its potential impact on the risk assessment are explained.

For context, the subsections that follow provide an overview of the Site, including the Conceptual Site Model (CSM). The remainder of this document is organized into the following sections:

- Section 2, Data Usability Evaluation Process, describes the component criteria of a DUE and identifies the available site-specific data use to meet those criteria;
- Section 3, Data Analysis Results, expands upon the analytical data discussion of Section 2 and presents the results in the context of risk-based Basic Concentration Limits (BCLs);
- Section 4, Conclusions, presents conclusions regarding the usability of the data and, if necessary, recommends additional activities.

References, tables, figures, and appendices are included at the end of the text.

1.1 Site Background

The CPA-FTF is approximately 24 acres of land located in an unincorporated area of Clark County and is surrounded by the City of Henderson, Nevada. As shown on **Figure 1**, the area is located in the southwestern portion of the Black Mountain Industrial (BMI) Complex that is currently owned by Pioneer Americas, LLC, d/b/a Olin Chlor Alkali Products (Pioneer).

The original six ponds built in what has now become the CPA operated between 1975 and 1985. Ponds 1 through 4 in the CPA were constructed on property leased from Stauffer Management Company (SMC) to receive acid waste streams from the

dichlorobenzil process washing and product drying steps, and sulfide wastes from the polychlorinated benzenes and chloral processes. Pond 5 was constructed to receive hydrochloric acid wastes previously held in Ponds 1 through 4, and Pond 6 was constructed to receive polychlorinated benzene still-bottom residue from the chlorinated benzene distillation process. There are no precise construction dates available for the FTF, but it is likely that it existed from the onset of the manufacturing operations in the 1940s (Converse, 1993) and evolved to meet manufacturing requirements over time.

As part of the decommissioning process in the 1980s, the CPA was capped with a composite clay, geo-textile, and native soil cap to mitigate rainwater infiltration to the closed ponds and prevent dust dispersion. The graded cap surface is in place to control stormwater runoff, to minimize erosion and eliminate the growth of native plants.

The CPA was also fenced independently from the Pioneer plant site to provide security and protect the cap and is now under surveillance by the Pioneer security staff. Regular inspections of the cap are conducted to monitor and correct erosional effects.

The FTF area consisted of two railcar loading stations for benzene and acetaldehyde and aboveground storage tanks that contained a variety of materials including hydrochloric acid, benzene, chlorobenzene, dichlorobenzene, and acetaldehyde.

As part of the decommissioning process in the mid-1980s, the tanks, concrete foundations, and dikes were removed by mid-1989. The FTF area currently is used by Pioneer as a staging and out-of-service process equipment storage yard. As such, the area experiences infrequent personnel traffic.

1.2 Previous Investigations

Several investigations have been conducted to characterize environmental conditions at the CPA-FTF Site Assessment Area. These investigations include the following:

- *Phase II ECI (SECOR, 1997);*
- *Supplemental Soil Investigation (Hargis, 2008);*
- *Soil Vapor and Soils Investigation (Hargis, 2008);*
- *Closed Pond 6, Soil and Groundwater Investigation (Geosyntec, 2010a); and*
- *Former Tank Farm Site Assessment Area, Soil Vapor, Soil, and Surface Soil Investigation (Geosyntec, 2010b).*

A summary of these investigations is included in the NDEP-approved Revised CSM prepared by Geosyntec Consultants [Geosyntec, 2014; NDEP, 2014], which is included in **Appendix A** of this DUE.

1.3 Conceptual Site Model

The CSM summarizes the environmental conditions of the soil, groundwater, and vadose zone of the Site based on historical information and sampling of environmental media conducted to date. The CSM is maintained and updated throughout the project as new information is collected.

Source

There are 2 potential source areas at the Site, the CPA and the FTF. Contamination in the CPA results from historical use as ponds to receive waste streams and residues from processing. Contamination at the FTF is the result of spills and leaks, overtopping, and leaking liners.

Receiving or Transport Medium

Soil was the primary impacted media, but releases migrated through the vadose zone to the saturated zone as reflected in soil and soil vapor data. Contaminants migrated through the saturated zone laterally downgradient generally to the north along the direction of groundwater flow. Current migration is mitigated through engineered caps preventing rainwater infiltration.

Point of Contact

Receptors may potentially be exposed to contamination in soil, soil vapor, air/dusts, surface water, sediments, and groundwater. Groundwater at the site combines and becomes integrated with other downgradient plumes contributing to the need for a larger site-wide Remedial Alternatives Study. As such, groundwater data is not considered herein.

Route

Direct contact with contaminated media.

Approximately 350 chemicals and compounds have been identified as potential Site-related compounds (SRCs). However, based on preliminary site investigation results, a subset of five volatile organic compounds (VOCs) was identified (indicator compounds) to discuss the extent of contamination (laterally and vertically) and the significance of the contaminant concentrations. These indicator compounds are 1,2-dichlorobenzene, 1,4-dichlorobenzene, benzene, chlorobenzene, and chloroform. Note, however, this DUE is not limited to these indicator compounds, rather the dataset is reviewed holistically to determine whether the type, quantity, and quality of data available are

sufficient to support the risk assessment and to evaluate how uncertainties with the data affect the risk characterization.

2. DATA USABILITY EVALUATION

The 2010 *Supplemental Guidance for Assessing Data Usability for Environmental Investigations at the BMI Complex and Common Areas in Henderson Nevada* provides six component criteria necessary for conducting a DUE. These criteria are based on EPA data usability guidance, but adjusted by NDEP for environmental investigations and risk assessments (NDEP, 2010).

Sections 2.1 through 2.6 summarize the site-specific data relevant to each criterion. For reference, the NDEP criterion is provided in italics at the beginning of each section. Materials referenced in the following subsections are provided in **Appendix B**. The purpose of the DUE is to document how the analysis was conducted, detail the findings of the analysis, and describe what data are deemed usable for risk assessment purposes.

2.1 Reports to Risk Assessors

Data should be reported in a format that provides adequate data and data documentation for the risk assessment.

Detailed reports, work plans, and Standard Operating Procedures (SOPs) reviewed for the DUE are listed in **Appendix B**. Reports and the accompanying laboratory data packages included appropriate data and adequate documentation.

2.2 Documentation

The objective of the documentation review is to ensure that each analytical result can be traced to a sample location and that the procedure(s) used to collect the environmental samples were appropriate.

Documentation is included to trace each sample result to the respective geographic location in three dimensions, to identify the date and time of sample collection, to identify the location and date of laboratory analysis, and reports providing the analytical results. As detailed in **Appendix B**, the reports and database provided adequate information regarding sample results related to geographic location and sampling procedures. Summary statistics were calculated for reported laboratory analytical data to identify potential data quality issues that could introduce additional uncertainty to the risk assessment. Summary statistics, including frequency of detection, range of detection limits, and minimum, median, mean, and maximum detected concentrations, are presented for each constituent.

- Table B-1 – lists the soil and soil vapor samples collected, including depth information, at locations shown in Figure 1, as requested in Criterion II of the DUE guidance.
- Figure B-1 – is a comprehensive sample location figure as requested in Criterion II of the DUE guidance.

Spatial plots of the data (intensity plots) provided in **Appendix A** (CSM Figures). Analytical results presented in the above-referenced tables are discussed in the context of BCLs in Section 3.

2.3 Data Sources

The objective of the data source review is to ensure that the analytical techniques used for the investigation are appropriate to identify Chemicals of Potential Concern (COPCs) for each exposure area and environmental medium of interest.

Analytes were selected based on historical Site use. Analytical techniques used for the investigation were appropriate to identify specific site-related chemicals for each exposure medium (soil, and soil vapor). Soil and soil vapor samples were collected from the source areas identified in the CSM based on site history and deemed representative of conditions at the Site. Data presenting the physical characteristics of the Site (e.g., pH, particle size, soil density, etc.) are provided in the laboratory reports. Intensity plots depicting concentrations exceeding screening levels are provided in the CSM Figures 4-1 through 4-52.

- Table B-2 – is a data summary table for soil vapor. This table provides additional summary statistics in the far right columns as requested on page 11 of the DUE guidance.
- Table B-3a – is a data summary table for soil reported in dry-weight. This table provides additional summary statistics in the far right columns as requested on page 11 of the DUE guidance.
- Table B-3b – is a data summary table for soil presented in wet-weight as it was originally reported by the laboratory.

2.4 Analytical Methods and Detection Limits

For a chemical result to be usable for assessing risks, the analytical method must appropriately identify the chemical form or species, and the sample detection limit must be at or below a concentration that is associated with risk benchmark levels.

Environmental samples were collected and analyzed by a certified analytical laboratory appropriate to the data needs of the risk assessment. Laboratories performing analytical analyses were capable of determining concentrations of the target analytes. As discussed further in Section 3.3, sample detection limits for the majority of target analytes were at or below screening levels; however, in some cases detection limits were elevated relative to screening levels. Laboratory analytical results were subjected to 100 percent data validation.

Multiple sampling events were conducted for most SRCs. Analytical methods were comparable between sampling events with the exception of VOCs and PCBs.

VOCs

Two locations were evaluated for volatile organic compounds (VOCs) in soil vapor using EPA Method 8260 and Method TO-15. The TO-15 Method requires additional sampling hardware and is a more expensive analysis resulting in lower sample quantitation limits (SQLs). The analytical results for detected compounds by each sampling method are provided for comparison purposes in the table below.

		FTF-35-40		**FTF-36-10**	
Analyte	**Units**	**TO-15**	**EPA 8260**	**TO-15**	**EPA 8260**
Benzene	µg/L	190	120	ND	0.75
Carbon Tetrachloride	µg/L	180	210	44	56
Chlorobenzene	µg/L	5700	6300	ND	2.5
Chloroform	µg/L	350	200	290	370
Toluene	µg/L	ND	ND	1.4	2.5

The results show general agreement between methods for detected concentrations of SRCs. In addition, USEPA Method 8260 reported detected concentrations of benzene and chlorobenzene at location FTF-36-10 whereas TO-15 results reported non-detect concentrations. Thus, the use of analytical data derived from EPA Method 8260 is deemed sufficient for characterization of contamination at the Site.

PCBs

The majority of soil sample locations were analyzed for polychlorinated biphenyls (PCBs) based on the World Health Organizations (WHO) ‘short list’ of 12 dioxin-like congeners with the addition of the dichlorobiphenyl homolog. A full PCB characterization was performed in a subset of locations to evaluate the sufficiency of the sampling plan in regards to the use of the short list for site characterization. Detections of PCBs not included in the short list were reported at locations CPA-13A, CPA-14A, and CPA-15A. Detected concentrations of PCB 156 and PCB 157 were also reported at

these sample locations. Detections of PCBs not included in the short list may occur throughout the Site. Uncertainties associated with the use of the short list to characterize contamination at the Site are detailed in Section 4.

PCBs and PCB congener data collected at the Site were limited. It is anticipated that contamination associated with Site-related activities will be characterized by the prevalence of indicator compounds identified in the CSM. Indicator compounds are more mobile, prevalent, have higher volatility, and are considered more toxic (based on relevant exposure pathways) to potential receptors than PCBs.

2.5 Data Review

This step consists of the assessment of the quality of analytical results, performed by a professional knowledgeable in the necessary analytical procedure(s).

The data review step is equivalent to a data validation step, and included evaluation of completeness, laboratory precision, laboratory accuracy and bias, adherence to method specifications and quality control (QC) limits, and method performance for the sample matrix. Laboratory analytical data were reviewed in accordance with the validation criteria specified by the *Quality Assurance Project Plan, Site-Wide Soil and Groundwater Investigations, Former Montrose and Stauffer Sites, Henderson, Nevada* [QAPP] (Hargis, 2006). Reviewer qualifications are provided in **Appendix B**. Analytical errors, potential data gaps, and data limitations are discussed in **Section 3 Data Analysis Results**. Overall, however, the data is considered to be of good quality and usable for risk assessment purposes. Data Validation Summary Reports are provided in **Appendix E**.

- Figure B-2 – is a spatial data plot for soil vapor samples including geographic information system (GIS) images with overlays showing the analyses performed at each sample location and depth as requested on page 12 of the DUE guidance.
- Figure B-3a and Figure B-3b – are spatial data plots for soil samples including GIS images with overlays showing the analyses performed at each sample location and depth as requested on page 12 of the DUE guidance.
- Figure B-4 – presents simple box and whisker plots for soil sample analytical results using different symbols for detected and non-detect outliers as requested on page 12 of the DUE guidance.
- Figure B-5 – presents simple box and whisker plots for soil vapor sample analytical results using different symbols for detected and non-detect outliers as requested on page 12 of the DUE guidance.

Rejected ("R"-qualified) data were evaluated for potential usability in the risk assessment. Rejected data indicate the result is not analytically sound and is generally unusable; however, consideration was given to include data rejected through data validation only. Review of analytical soils data identified one rejected sample, FTF-25D-10. This sample reported a relative percent difference between matrix spike/matrix spike duplicates outside of quality control limits. The reported result is an estimation of the value due to lack of precision from matrix interferences and not reflective actual Site conditions. This sample is deemed unusable for the risk assessment due to this uncertainty. Though this sample is removed from further consideration, samples collected above and below this depth interval are adequate to bound contamination. However, removal of this data introduces potential uncertainty of conditions at depth. No soil vapor data were rejected during data validation. As such, all soil vapor data are deemed usable for the risk assessment.

The remaining soil and soil vapor results are considered valid and usable as qualified during data validation with the exception of the rejected sample concentrations. Additional details may be reviewed in the relevant Data Validation Reports (DVRs) [Laboratory Data Consultants, 2007, Laboratory Data Consultants, 2009, Geosyntec, 2011, Laboratory Data Consultants, 2010]. Sample results that were found to be estimated ("J"-qualified) are less certain but are considered acceptable for use in risk assessment. The alternative for J-flagged data would be to consider them a non-detect and conduct the risk assessment with an estimate of the concentration between zero and the reporting limit (e.g., ½ the reporting limit). Generally, the J-flagged values are just below the but near the reporting limit for that compound. Therefore, the potential for bias exists if a non-detect were used rather than the estimated concentration. . Final qualified soil and soil vapor data are presented in Table B-2 and Table B-3a.

2.6 Data Quality Indicators

The data quality indicators (DQI) address field and analytical data quality aspects as they relate to uncertainties in selection of COPCs, exposure point concentrations (EPCs), and risk characterization.

Data Quality Indicators (DQI) evaluate field and analytical data quality aspects as related to uncertainties in selection of COPCs, characterization of exposure point concentrations, and risk descriptors. A detailed discussion of the soil and soil vapor data quality can be found in the DVSRs [Laboratory Data Consultants, 2007, Laboratory Data Consultants, 2009, Geosyntec, 2011, Laboratory Data Consultants, 2010]. A brief summary of the data quality indicators (completeness, comparability, representativeness, and precision and accuracy) is provided in **Appendix B**.

3. DATA ANALYSIS RESULTS

NDEP Guidance requires evaluation of the reasonableness of the data in the context of the CSM and risk assessment endpoints. In addition, a data analysis component is added to expand upon the parameters discussed in Section 2 and a holistic view of the data to identify data gaps and potentially problematic data. This section presents the results of these evaluations.

3.1 Comparison to Conceptual Site Model

One objective of the DUE is ensuring geographic and source term coverage of the sampling program was appropriate and sufficient for conducting future risk assessments and informing risk management decisions for the Site.

Because the objective of the investigation process is to define the nature and extent of contamination, samples are not all collected from random locations. In fact, samples tend to be collected in areas of suspected impact. Such directed sampling tends to overestimate constituent concentrations to which receptors may be exposed in the risk assessment. Samples were not collected from beneath former Ponds 1 through 5 in order to maintain the integrity of the engineered cap. Though contamination is anticipated, distribution of soil impacts in the vadose zone is not known. Conditions beneath Pond 6 were evaluated using angled drilling techniques. These results indicate that soils do not represent a significant present-day source of SRCs to groundwater.

The density of soil and soil gas sample locations in and around the vicinity of the CPA-FTF adequately characterized the soil and vadose zone to support further evaluation of potential adverse health effects to receptors and risk management decisions. This is demonstrated by concentrations of analytes attenuating spatially from the former site assessment areas (CPA-FTF) to concentrations below their respective screening levels.

Though these uncertainties are present, the cumulative dataset was determined to be sufficient to characterize the nature and extent of contamination (both lateral and vertical) of SRCs in the vadose zone, as well as the potential fate and transport of SRCs in the vadose zone. This was demonstrated by attenuation of reported concentrations with distance from the source area to concentrations below their respective screening levels.

3.1.1 Nature and Extent of Contamination

The CSM identified approximately 350 chemicals and compounds as potentially Site-related (**Appendix A)** including: aldehydes, asbestos, dioxins/furans, herbicides, inorganics, metals, organic acids, PCBs, pesticides, radionuclides, VOCs, and semi-

volatile organic compounds (SVOCs). A subset of chemicals (1,2-dichlorobenzene, 1,4-dichlorobenzene, benzene, chlorobenzene, and chloroform) were identified as indicator compounds likely to have the most influence on the risk assessment. Two additional compounds, carbon tetrachloride and tetrachloroethene, were found to be Site-wide prevalent compounds. Though data regarding distribution of some contaminants (PCBs, PCB congeners, and inorganics) is more limited than VOC data, use indicator compounds and Site-wide prevalent compounds are considered adequate to characterize contamination at the Site due to their mobility, prevalence, and volatility.

Analytical results for samples collected from suspected source/release areas are elevated relative to BCLs; no additional data points reflected elevated concentrations to indicate a secondary release point. Thus, the results of the DUE support the CSM and indicate that sufficient data has been collected to characterize the nature and extent of contamination at the Site. The data are reliable enough to meet the project objectives.

3.1.2 Contaminant Fate and Transport Pathways

The CSM indicated potential contaminant migration to soil and groundwater during the facilities operational years. Historical releases occurred as a result of leaking liners, overtopping, and spills. Releases migrated through the vadose zone to the saturated zone as reflected in soil and soil vapor data. Contaminants migrated through the saturated zone laterally downgradient generally to the north along the direction of groundwater flow. Receptors may potentially be exposed to contamination in soil, soil vapor, air, surface water, sediment, and groundwater.

Analytical data indicate that concentrations of site-related constituents attenuate with distance (horizontal and vertical) from known source areas, which is in general agreement with the fate and transport model detailed in the CSM. As such, the results of the DUE indicate that fate and transport of contaminants at the Site are well understood and accurately reflected in the CSM.

3.1 Box Plots

Datasets for the constituents are illustrated in box plots which are often used in exploratory data analysis, summarizing a set of data measured on an interval scale. Box plots were created for constituents with at least one detected value. This type of graph shows the shape of the distribution, central value (median), and spread or distribution of the data (interquartile range). Box plots are also useful in representing any unusual observations (outliers) in the dataset.

Overall, the box plots illustrate variability typically observed in environmental datasets; data for most constituents are not symmetric often with skewed results at higher concentrations. This is especially true with identified SRCs (VOCs). Results often show skewed results with higher concentrations. No extreme variances were observed in the box plots illustrating a deficiency in sampling or inconsistency among the analytical results.

The box plots also visually depict potential statistical outliers. Formal statistical outlier tests were conducted using EPA's ProUCL statistical software (Version 5.0, http://www.epa.gov/osp/hstl/tsc/software.htm), which was developed for use on environmental data sets that may include non-detect observations. Potential statistical outliers were evaluated in datasets reporting 10 or more detected values. Datasets containing 25 or fewer data points utilized Dixon's test to detect potential statistical outliers and Rosner's test was applied to datasets containing greater than 25 data points.

Generally, a potential statistical outlier is an unusual or unexpected occurrence in a given dataset. In each case, the underlying dataset was evaluated graphically and consideration given to the magnitude of the potential outlier relative to sampling distributions encountered in environmental datasets. In datasets where greater than 50% of the measurements are non-detects, there is a large degree of uncertainty associated with estimates of the statistical distribution.

The potential outliers, while triggering statistically significant deviation from a hypothesized normal distribution, were nonetheless deemed plausible environmental concentration data consistent with the CSM and usable for subsequent risk assessment purposes. It should be noted that formal statistical procedures often trigger outliers. However, deviation from theoretical or expected distributions is not uncommon with environmental datasets that include biased sampling and non-normal contaminant distributions, especially when the analysis is repeated over a large number of chemicals. In addition, the modification of laboratory results to adjust reported concentrations from wet-weight to dry-weight may have led to higher variability and consequently a higher number of statistical outliers reported using formal statistical tests.

The statistical outliers identified in the box plots are summarized in the table below.

Compound	Value	Non-detect?
PCB 120	1.0E-03	
PCB 141	9.3E-03	
PCB 166	1.2E-01	
PCB 170	2.3E-03	
PCB 19	4.4E-06	

PCB 190	2.3E-03	
PCB 24	6.5E-05	
PCB 25	2.1E-04	
PCB 26	4.8E-03	
PCB 27	6.5E-05	
PCB 40	2.7E-03	
PCB 42	1.1E-03	
PCB 45	1.5E-04	
PCB 53	3.5E-04	
PCB 59	2.9E-04	
PCB 63	5.1E-02	
PCB 82	1.5E-03	
PCB 84	4.2E-04	
PCB 85	1.0E-03	
Radium-228	2.8E+00	
Uranium-235/236	1.9E-01	
1,2,3-Trichlorobenzene	6.6E+01	ND
1,2,4-Trichlorobenzene	1.7E+02	
1,2-Dichlorobenzene	6.3E+03	
1,3-Dichlorobenzene	2.7E+02	
1,4-Dichlorobenzene	7.2E+03	
2,3-DiCB-(5)	1.5E+00	
2,3'-DiCB-(6)	8.8E-01	
2,4'-DDE	3.3E+00	
2,4'-DDT	4.1E+00	
2,4-DiCB-(7)	5.6E-01	
2,4'-DiCB-(8)	1.5E+00	
2,5-DiCB-(9)	2.4E+00	
2,6-DiCB-(10)	4.2E-01	
22'-DiCB-(4)	1.0E+00	
233'44'55'-HeptaCB-(189)	9.7E-03	
233'44'-PentaCB-(105)	1.1E-01	
23'44'55'-HexaCB-(167)	1.9E-02	
2344'5-PentaCB-(114)	7.5E-02	
23'44'5-PentaCB-(118)	3.3E-01	
23'44'5'-PentaCB-(123)	5.2E-03	
2-Butanone (MEK)	8.1E+02	ND
3,3'-DiCB-(11)	3.8E-01	
3,5-DiCB-(14)	2.0E-02	

33'44'55'-HexaCB-(169)	1.4E-03	
33'44'5-PentaCB-(126)	3.5E-03	
33'44'-TetraCB-(77)	9.0E-03	
344'5-TetraCB-(81)	3.3E-03	
4,4' -DDE	1.1E+01	
4,4' -DDT	1.8E+01	
4,4'-DiCB-(15)	1.5E-01	
A-BHC	1.9E+00	
Acetone	1.3E+03	ND
Alkalinity as CaCO3	4.3E+05	
Aluminum	2.5E+04	
Ammonia-N	5.9E+00	
Barium	1.7E+03	
B-BHC	1.1E+01	
Benzene	6.4E+01	ND
Benzoic acid	1.7E+01	ND
Beryllium	1.5E+00	
Bicarbonate Alkalinity as CaCO3	7.4E+04	
Boron	4.7E+01	
Cadmium	5.6E-01	
Calcium	1.6E+05	
Carbon Tetrachloride	3.2E+01	ND
Carbonate Alkalinity as CaCO3	4.1E+04	
Chloride	6.4E+03	
Chlorobenzene	2.4E+04	
Chloroform	7.9E+01	ND
Chromium	4.4E+01	
Cobalt	1.6E+01	
Copper	3.3E+01	
DiCB-(12)+(13)	8.3E-01	
EFH (C8 - C40)	1.5E+03	
Endrin Aldehyde	2.0E-01	ND
Fluoride	9.3E+00	
Formaldehyde	2.9E+00	
GRO (C4 - C12)	4.6E+03	
HexaCB-(156)+(157)	5.6E-02	
Lead	4.7E+01	
Manganese	8.2E+02	
Mercury	4.9E-01	

Molybdenum	2.3E+00	
Nickel	3.5E+01	
Nitrate-N	3.1E+01	
PCB 12	7.2E-01	
PCB 13	7.2E-01	
PCB 156	1.4E-02	
PCB 157	3.4E-03	
Phosphorus	8.4E+07	
Selenium	6.7E-01	ND
Silver	8.5E+00	
Sodium	4.0E+04	
Strontium	6.0E+02	
Sulfate	9.7E+03	
Sulfur	1.8E+04	
Toluene	3.8E+01	ND
Zinc	1.1E+02	

Constituents with non-detect outliers were: 1,2,3-Trichlorobenzene, 2-Butanone, acetone, benzene, benzoic acid, cadmium, carbon tetrachloride, chloroform, endrin aldehyde, selenium, and toluene. The remaining potential statistical outliers were the maximum detected concentration. Review of the potential statistical outliers and the underlying dataset revealed no evidence of a bias that may be introduced in the risk assessment. Data were deemed typical of environmental concentrations at contaminated sites.

3.2 Comparison to Basic Comparison Levels

NDEP BCLs are also presented on the boxplots for comparison of Site data to risk-based comparison values per NDEP's request. The BCL values are developed using human health toxicity values combined with standard exposure factors that estimate contaminant concentrations in soil that are considered by NDEP to be protective of human exposures over a lifetime. Exceedances of BCLs do not in themselves indicate that an unacceptable risk exists. Rather, the exceedance of a BCL indicates the need for further examination. The tables below report concentrations in soil and soil vapor greater than the respective BCLs. However, the compounds listed below are identified in the CSM as indicator compounds and Site-wide prevalent compounds. The results indicate that contamination at the Site is well understood and accurately reflected in the CSM.

Four surface soil sample locations reported detected concentrations of COPCs greater than their respective BCLs and are detailed in the table below. Exceedances were reported for two VOCs and an individual PCB congener.

Sample Location	Analyte	BCL (mg/kg)	Concentration (mg/kg)
FTF-04-5-6	1,4-Dichlorobenzene	1.37E+01	1.07E+02
FTF-04-9-10	1,4-Dichlorobenzene	1.37E+01	2.14E+02
FTF-09D-10	1,2-Dichlorobenzene	3.73E+02	2.14E+03
FTF-09D-10	1,4-Dichlorobenzene	1.37E+01	1.71E+03
FTF-25D-5	Aroclor 1254	3.27E+00	3.96E+00
FTF-27D-10	1,2-Dichlorobenzene	3.73E+02	9.42E+02
FTF-27D-10	1,4-Dichlorobenzene	1.37E+01	1.18E+03
FTF-27D-5	1,4-Dichlorobenzene	1.37E+01	1.61E+02

The three sample locations with VOC concentrations greater than the BCL are in close proximity at the Site and reported detected concentrations of Site-related contaminants. Dichlorobenzene is identified in the CSM as a raw material stored at the FTF. Sample FTF-25D-5 reported a concentration of Aroclor 1254, a common legacy contaminant from electrical equipment, above the BCL. Though this sample location is not bounded by Aroclor concentrations reported below the BCL, it is co-located with samples reporting VOC exceedances that show decreasing concentrations with distance. These exceedances are in agreement with the CSM and indicate that the sampling plan was sufficient to delineate contamination at the Site.

Seventeen shallow soil vapor locations reported concentrations greater than the ambient air BCL and are detailed in the table below. Exceedances were reported for five VOCs.

Location of Exceedance	Group	Analyte	BCL	Concentration ug/L
FTF-28-5	VOCs	Carbon Tetrachloride	4.06E-01	4.30E-01
FTF-28-5	VOCs	Chloroform	1.06E-01	1.30E+00
FTF-29-5	VOCs	Carbon Tetrachloride	4.06E-01	4.10E-01
FTF-29-5	VOCs	Chloroform	1.06E-01	1.60E+00
FTF-30-10	VOCs	Carbon Tetrachloride	4.06E-01	1.70E+00
FTF-30-10	VOCs	Chloroform	1.06E-01	6.60E+01
FTF-30-10	VOCs	Tetrachloroethene	4.12E-01	1.60E+01
FTF-30-5	VOCs	Benzene	3.12E-01	8.80E-01
FTF-30-5	VOCs	Carbon Tetrachloride	4.06E-01	9.20E-01
FTF-30-5	VOCs	Chloroform	1.06E-01	3.60E+01
FTF-30-5	VOCs	Tetrachloroethene	4.12E-01	1.00E+01

FTF-31-5	VOCs	Carbon Tetrachloride	4.06E-01	2.10E+00
FTF-31-5	VOCs	Chloroform	1.06E-01	7.80E+00
FTF-32-5	VOCs	Carbon Tetrachloride	4.06E-01	4.70E-01
FTF-32-5	VOCs	Chloroform	1.06E-01	7.60E+01
FTF-33-10	VOCs	Carbon Tetrachloride	4.06E-01	2.50E+00
FTF-33-10	VOCs	Chloroform	1.06E-01	4.60E+01
FTF-33-5	VOCs	Benzene	3.12E-01	3.90E+00
FTF-33-5	VOCs	Carbon Tetrachloride	4.06E-01	2.10E+00
FTF-33-5	VOCs	Chloroform	1.06E-01	3.00E+01
FTF-33-5	VOCs	Tetrachloroethene	4.12E-01	4.50E+00
FTF-34-10	VOCs	Carbon Tetrachloride	4.06E-01	9.40E-01
FTF-34-10	VOCs	Chloroform	1.06E-01	6.50E+00
FTF-35-10	VOCs	Carbon Tetrachloride	4.06E-01	1.40E+01
FTF-35-10	VOCs	Chloroform	1.06E-01	4.90E+01
FTF-35-5	VOCs	Carbon Tetrachloride	4.06E-01	5.50E+00
FTF-35-5	VOCs	Chloroform	1.06E-01	2.80E+01
FTF-36-10	VOCs	Carbon Tetrachloride	4.06E-01	4.40E+01
FTF-36-10	VOCs	Chloroform	1.06E-01	2.90E+02
FTF-36-5	VOCs	Benzene	3.12E-01	1.00E+00
FTF-36-5	VOCs	Carbon Tetrachloride	4.06E-01	1.70E+01
FTF-36-5	VOCs	Chloroform	1.06E-01	1.40E+02
FTF-36-5	VOCs	Tetrachloroethene	4.12E-01	1.70E+00
FTF-37-5	VOCs	Carbon Tetrachloride	4.06E-01	1.60E+01
FTF-37-5	VOCs	Chloroform	1.06E-01	7.40E+01
FTF-38-5	VOCs	Chloroform	1.06E-01	5.50E+01
FTF-39-10	VOCs	1,4-Dichlorobenzene	2.21E-01	1.60E+00
FTF-39-10	VOCs	Carbon Tetrachloride	4.06E-01	5.50E+00
FTF-39-10	VOCs	Chloroform	1.06E-01	4.40E+01
FTF-39-5	VOCs	1,4-Dichlorobenzene	2.21E-01	2.30E+00
FTF-39-5	VOCs	Carbon Tetrachloride	4.06E-01	4.20E+00
FTF-39-5	VOCs	Chloroform	1.06E-01	3.10E+01
FTF-40-5	VOCs	Carbon Tetrachloride	4.06E-01	1.20E+01
FTF-40-5	VOCs	Chloroform	1.06E-01	5.80E+01
FTF-41-5	VOCs	Carbon Tetrachloride	4.06E-01	7.20E-01
FTF-41-5	VOCs	Chloroform	1.06E-01	5.70E+00
FTF-42-5	VOCs	Chloroform	1.06E-01	2.50E+00
P-29-5	VOCs	Chloroform	1.06E-01	1.70E-01
P-30-5	VOCs	Chloroform	1.06E-01	3.60E+00

The majority of BCL exceedances (benzene, dichlorobenzene, and chloroform) in shallow soil vapor are considered indicator compounds for the Site. In addition, detected concentrations of carbon tetrachloride and tetrachloroethene exceeded the BCL; these VOCs are identified as Site-wide prevalent compounds in the CSM.

Twenty-three (23) deep soil sample locations reported detected concentrations of COPCs greater than the BCL and are detailed in the table below. Exceedances were limited to five VOCs, which are each indicator compounds for the Site.

Sample Location	Analyte	BCL (mg/kg)	Concentration (mg/kg)
CPA-02D-40	Chloroform	1.56E+00	1.74E+00
CPA-04D-40	Chloroform	1.56E+00	2.14E+00
CPA-04D-50	Chloroform	1.56E+00	2.41E+00
CPA-05D-50	Chloroform	1.56E+00	4.29E+00
CPA-06D-50	Chloroform	1.56E+00	2.81E+00
CPA-07D-20	Chloroform	1.56E+00	3.75E+00
CPA-07D-40	Chloroform	1.56E+00	1.61E+01
CPA-07D-50	Chloroform	1.56E+00	1.19E+01
CPA-13A-50	Chloroform	1.56E+00	7.50E+00
CPA-14A-50	Chloroform	1.56E+00	6.57E+00
CPA-15A-50	Chloroform	1.56E+00	2.41E+00
FTF-07D-20	Chlorobenzene	6.95E+02	1.39E+03
FTF-07D-30	Chlorobenzene	6.95E+02	2.41E+04
FTF-07D-40	Chlorobenzene	6.95E+02	2.81E+03
FTF-07D-45	Chloroform	1.56E+00	1.61E+00
FTF-07D-50	Chlorobenzene	6.95E+02	7.50E+03
FTF-08D-50	Chloroform	1.56E+00	4.29E+00
FTF-09D-20	1,2-Dichlorobenzene	3.73E+02	3.64E+03
FTF-09D-20	1,4-Dichlorobenzene	1.37E+01	3.75E+03
FTF-09D-30	1,2-Dichlorobenzene	3.73E+02	6.30E+03
FTF-09D-30	1,4-Dichlorobenzene	1.37E+01	7.24E+03
FTF-09D-30	Chlorobenzene	6.95E+02	8.44E+02
FTF-09D-30	Chloroform	1.56E+00	4.56E+01
FTF-09D-40	1,4-Dichlorobenzene	1.37E+01	3.22E+02
FTF-09D-40	Chloroform	1.56E+00	7.24E+00
FTF-09D-45	1,4-Dichlorobenzene	1.37E+01	3.48E+02
FTF-09D-45	Chloroform	1.56E+00	7.77E+00
FTF-09D-50	1,4-Dichlorobenzene	1.37E+01	3.35E+01
FTF-09D-50	Chloroform	1.56E+00	1.34E+01

FTF-10D-30	Chloroform	1.56E+00	4.56E+00
FTF-10D-40	1,4-Dichlorobenzene	1.37E+01	2.41E+01
FTF-10D-40	Chloroform	1.56E+00	7.10E+01
FTF-10D-45	1,4-Dichlorobenzene	1.37E+01	1.74E+01
FTF-10D-45	Chloroform	1.56E+00	7.91E+01
FTF-10D-50	1,4-Dichlorobenzene	1.37E+01	1.61E+01
FTF-10D-50	Chloroform	1.56E+00	8.58E+00
FTF-11D-40	Chloroform	1.56E+00	2.81E+00
FTF-11D-45	Benzene	4.23E+00	3.89E+01
FTF-11D-45	Chloroform	1.56E+00	4.02E+00
FTF-11D-50	Chloroform	1.56E+00	7.64E+00
FTF-12D-47	Chloroform	1.56E+00	6.57E+00
FTF-13D-50	Chloroform	1.56E+00	3.75E+00
FTF-22D-40	Chloroform	1.56E+00	2.68E+00
FTF-22D-50	Chloroform	1.56E+00	1.25E+01
FTF-23D-50	Chloroform	1.56E+00	1.10E+01
FTF-24D-50	Chloroform	1.56E+00	1.34E+01
FTF-25D-40	Chloroform	1.56E+00	1.74E+00
FTF-25D-50	Chloroform	1.56E+00	3.48E+00
FTF-27D-20	1,2-Dichlorobenzene	3.73E+02	5.67E+02
FTF-27D-20	1,4-Dichlorobenzene	1.37E+01	9.20E+02
FTF-27D-20	Chloroform	1.56E+00	3.64E+00
FTF-27D-30	1,2-Dichlorobenzene	3.73E+02	2.81E+03
FTF-27D-30	1,4-Dichlorobenzene	1.37E+01	4.69E+03
FTF-27D-30	Benzene	4.23E+00	2.41E+01
FTF-27D-30	Chlorobenzene	6.95E+02	2.28E+03
FTF-27D-30	Chloroform	1.56E+00	6.83E+01
FTF-27D-40	1,2-Dichlorobenzene	3.73E+02	1.61E+03
FTF-27D-40	1,4-Dichlorobenzene	1.37E+01	2.55E+03
FTF-27D-40	Benzene	4.23E+00	1.47E+01
FTF-27D-40	Chlorobenzene	6.95E+02	1.29E+03
FTF-27D-40	Chloroform	1.56E+00	5.36E+01
FTF-27D-50	1,4-Dichlorobenzene	1.37E+01	2.81E+02
FTF-27D-50	Chloroform	1.56E+00	2.95E+01
RB-05-60	Chloroform	1.56E+00	5.90E+00
RB-05-70	Chloroform	1.56E+00	2.14E+00
RB-05-80	Chloroform	1.56E+00	2.41E+00
RB-06-100	1,4-Dichlorobenzene	1.37E+01	2.95E+01
RB-06-100	Benzene	4.23E+00	1.03E+01

RB-06-100	Chloroform	1.56E+00	6.70E+00
RB-06-101	1,2-Dichlorobenzene	3.73E+02	4.96E+02
RB-06-101	1,4-Dichlorobenzene	1.37E+01	6.70E+02
RB-06-101	Benzene	4.23E+00	1.61E+01
RB-06-101	Chloroform	1.56E+00	6.30E+00
RB-06-110	1,4-Dichlorobenzene	1.37E+01	6.83E+01
RB-06-110	Benzene	4.23E+00	1.47E+01
RB-06-110	Chloroform	1.56E+00	2.28E+00
RB-06-50	Chloroform	1.56E+00	6.83E+00
RB-06-60	1,4-Dichlorobenzene	1.37E+01	2.14E+01
RB-06-60	Benzene	4.23E+00	4.96E+00
RB-06-60	Chloroform	1.56E+00	4.15E+00
RB-06-70	1,4-Dichlorobenzene	1.37E+01	1.47E+01
RB-06-70	Benzene	4.23E+00	3.48E+01
RB-06-70	Chloroform	1.56E+00	2.95E+01
RB-06-80	1,4-Dichlorobenzene	1.37E+01	1.47E+01
RB-06-80	Benzene	4.23E+00	6.43E+01
RB-06-80	Chloroform	1.56E+00	9.38E+00
RB-06-90	1,4-Dichlorobenzene	1.37E+01	2.95E+01
RB-06-90	Benzene	4.23E+00	3.22E+01
RB-06-90	Chloroform	1.56E+00	1.61E+01
RB-07-100	1,4-Dichlorobenzene	1.37E+01	1.61E+01
RB-07-50	Chloroform	1.56E+00	5.09E+00
RB-07-60	Chloroform	1.56E+00	2.68E+01
RB-07-80	Benzene	4.23E+00	4.29E+00

Deep soil sample locations in the CPA with detected concentrations greater than the BCL were limited to chloroform. Chloroform was identified in the CSM as an organic constituent in waste directed to the ponds. The VOCs exceeding their respective BCLs in the FTF are limited to indicator compounds identified in the CSM. These exceedances are in agreement with the contamination detailed in the CSM and indicate that the sampling plan was sufficient to delineate contamination at the Site.

Six deep soil vapor sample locations reported detected concentrations of COPCs greater than the BCL and are detailed in the table below. Exceedances were limited to VOCs, a known Site-related contaminant.

Location of Exceedance	**Group**	**Analyte**	**BCL**	**Concentration ug/L**
FTF-30-20	VOCs	Carbon Tetrachloride	4.06E-01	2.50E+00
FTF-30-20	VOCs	Chloroform	1.06E-01	1.20E+02

FTF-30-20	VOCs	Tetrachloroethene	4.12E-01	2.30E+01
FTF-30-40	VOCs	Carbon Tetrachloride	4.06E-01	4.30E+00
FTF-30-40	VOCs	Chloroform	1.06E-01	2.00E+02
FTF-30-40	VOCs	Tetrachloroethene	4.12E-01	3.60E+01
FTF-33-20	VOCs	Carbon Tetrachloride	4.06E-01	5.10E+00
FTF-33-20	VOCs	Chloroform	1.06E-01	9.50E+01
FTF-33-33	VOCs	Benzene	3.12E-01	8.80E-01
FTF-33-33	VOCs	Carbon Tetrachloride	4.06E-01	1.00E+01
FTF-33-33	VOCs	Chloroform	1.06E-01	2.30E+02
FTF-33-33	VOCs	Tetrachloroethene	4.12E-01	1.50E+00
FTF-34-20	VOCs	Carbon Tetrachloride	4.06E-01	1.60E+00
FTF-34-20	VOCs	Chloroform	1.06E-01	1.20E+01
FTF-35-20	VOCs	Benzene	3.12E-01	1.30E+00
FTF-35-20	VOCs	Carbon Tetrachloride	4.06E-01	5.60E+01
FTF-35-20	VOCs	Chlorobenzene	5.21E+01	1.60E+02
FTF-35-20	VOCs	Chloroform	1.06E-01	1.60E+02
FTF-35-20	VOCs	Tetrachloroethene	4.12E-01	1.20E+00
FTF-35-40	VOCs	Benzene	3.12E-01	1.90E+02
FTF-35-40	VOCs	Carbon Tetrachloride	4.06E-01	1.80E+02
FTF-35-40	VOCs	Chlorobenzene	5.21E+01	5.70E+03
FTF-35-40	VOCs	Chloroform	1.06E-01	3.50E+02
FTF-36-20	VOCs	Benzene	3.12E-01	1.60E+00
FTF-36-20	VOCs	Carbon Tetrachloride	4.06E-01	2.40E+02
FTF-36-20	VOCs	Chloroform	1.06E-01	1.20E+03
FTF-36-20	VOCs	Tetrachloroethene	4.12E-01	1.20E+01
FTF-39-20	VOCs	Carbon Tetrachloride	4.06E-01	7.80E+00
FTF-39-20	VOCs	Chloroform	1.06E-01	7.00E+01
FTF-39-40	VOCs	Carbon Tetrachloride	4.06E-01	1.30E+00
FTF-39-40	VOCs	Chloroform	1.06E-01	1.00E+01

The majority of BCL exceedances in deep soil vapor are considered indicator compounds for the Site. In addition, carbon tetrachloride and tetrachloroethene exceeded the BCL. However, these VOCs are identified as Site-wide prevalent compounds in the CSM.

Though concentrations were detected in soil and soil vapor greater than the respective BCLs, the compounds are identified in the CSM as indicator compounds and Site-wide prevalent compounds. As such, the results indicate that contamination at the Site is well understood and accurately reflected in the CSM.

3.3 Detection Limits

Review of soil analytical data reveals instances where method detection limits are greater than the BCLs. The range of detection limits, detection frequency, BCL, and maximum detected value are detailed in the table below.

Analyte	Range of Detection Limits	Detection Frequency	BCL	Maximum Detected Value
1,1,1,2-Tetrachloroethane	0.00049-48	1 / 247	1.99E+01	8.44E-03
1,1,2,2-Tetrachloroethane	0.00074-120	0 / 247	2.54E+00	ND
1,1,2-Trichloroethane	0.00075-120	0 / 247	5.51E+00	ND
1,1-Dichloroethane	0.00034-91	0 / 247	2.14E+01	ND
1,2,3-Trichloropropane	0.00087-110	0 / 247	1.91E-01	ND
1,2-Dibromo-3-chloropropane	0.0013-130	0 / 247	5.29E-02	ND
1,2-Dibromoethane (EDB)	0.00068-91	0 / 247	1.77E-01	ND
1,2-Dichloroethane	0.00068-94	0 / 247	2.24E+00	ND
1,2-Dichloropropane	0.0003-79	0 / 247	4.29E+00	ND
1,3-Dichloropropane	0.00055-82	0 / 247	6.46E+01	ND
1,4-Dichlorobenzene	0.00081-78	80 / 247	1.36E+01	7.24E+03
2,3,7,8-TCDD	0.00000003-0.0028	2 / 24	1.00E-03	2.01E-06
3,3'-Dichlorobenzidine	0.16-34	0 / 180	1.27E+01	ND
Aldrin	0.00067-0.4	0 / 214	3.37E-01	ND
Benzene	0.00043-78	77 / 247	4.21E+00	6.43E+01
Benzo (a) pyrene	0.043-7.1	1 / 180	7.84E-01	5.03E-02
bis(2-Chloroethyl) ether	0.064-8	0 / 180	1.50E+00	ND
Bromodichloromethane	0.00036-71	1 / 247	3.36E+00	7.24E-03
Bromomethane	0.00079-100	1 / 247	3.91E+01	7.37E-03
Carbon Tetrachloride	0.00043-64	40 / 247	3.84E+00	2.41E+00
Chloroform	0.00037-100	191 / 247	1.55E+00	7.91E+01
Chloromethane	0.00087-110	0 / 247	8.05E+00	ND
Dibenz (a,h) anthracene	0.11-13	0 / 180	7.84E-01	ND
Dibromochloromethane	0.00048-62	0 / 247	6.03E+00	ND
Dichloromethane [Methylene chloride]	0.0054-980	7 / 247	5.85E+01	9.65E-01
Dieldrin	0.00067-0.4	3 / 214	3.58E-01	2.03E-01
Ethylbenzene	0.00043-62	2 / 247	1.96E+01	1.18E-03
Hexachlorobenzene	0.075-9.4	3 / 180	3.58E+00	3.53E+00
Hexachlorobutadiene	0.00063-88	0 / 247	7.34E+01	ND
Indeno(1,2,3-c,d) pyrene	0.14-17	0 / 180	7.84E+00	ND
Naphthalene	0.00095-190	1 / 247	1.56E+01	2.03E-03

N-Nitrosodimethylamine	0.043-5.4	0 / 167	1.12E-01	ND
N-nitrosodi-n-propylamine	0.075-9.4	0 / 180	8.18E-01	ND
Pentachlorophenol	0.16-34	1 / 180	1.43E+01	6.42E-01
Tetrachloroethene	0.00042-100	9 / 247	4.08E+00	1.02E+00
Toxaphene	0.054-20	0 / 214	5.20E+00	ND
Trichloroethene	0.00032-87	1 / 247	7.54E+00	6.57E-04
Vinyl chloride	0.00078-150	0 / 247	2.12E+00	ND

Thirty-eight (38) soil analytes reported detection limits greater than the BCLs. Carbon tetrachloride, an identified Site-wide prevalent compound, was detected in 16 percent of samples; however, exceedances of the BCL were limited to non-detect results. Benzene, 1,4-dichlorobenzene, and chloroform, which were identified in the CSM as indicator compounds, were frequently detected in soil samples.

Indicator compounds (1,4-dichlorobenzene, benzene, and chloroform) and Site-wide prevalent compounds (carbon tetrachloride) report frequent detections and detection limits greater than the BCL. As stated in the CSM, indicator compounds were identified to address the nature and extent of contamination at the Site. While elevated detection limits add potential uncertainty to the risk assessment, they are unlikely to affect adequate characterization of SRCs. Uses of elevated detection limits will likely overestimate exposure point concentrations calculations. The majority of detected COPCs with detection limits greater than the BCLs are known SRCs. It is possible that in these instances, analytes could be present at concentrations greater than the BCL, but less than the detection limit. Analytes reporting no detected concentrations are unlikely to be present at the Site based on historical Site-use. Infrequently detected compounds (less than 5 percent) not identified as SRCs are also unlikely to be present in concentrations affecting the usability of data in the risk assessment. The impact of an elevated detection limit for an infrequently detected compound is not expected to be significant in the risk assessment.

Elevated detection limits introduce potential uncertainties for the calculation of exposure point concentrations in the risk assessment; however, use of elevated detection limits will likely overestimate exposure point concentration calculations. Thus, the elevated detection limits are not anticipated to affect data usability for risk assessment purposes.

3.4 Additional Data Considerations

Data provided by the laboratory were reported as wet-weight soil concentrations (Table B-2b); however, data were reported in dry-weight in Table B-2a. An NDEP-approved conversion [Geosyntec, 2011; NDEP, 2011] was applied to account for

moisture content in surface and subsurface soils to correct the laboratory reported soil concentration as follows:

- soil concentrations collected from 0 to 20 feet below ground surface (ft bgs) were increased by 7%; and
- soil concentrations collected from greater than 20 ft bgs were increased by 34%.

Contaminant concentrations present in the moisture or other liquid phase of the sample introduces the potential for bias in the results. The use of a default value may not accurately capture the soil moisture content at the Site and introduces uncertainty into the data. The degree of bias is affected by the actual moisture content of the soil (relatively dry samples upon collection may be overestimated by the use of a default factor).

During data collection, field duplicate samples were collected at several of the sampling locations. Before data analysis was conducted, duplicate samples were processed as summarized below.

- If a constituent was detected in both samples, the higher concentration was used;
- If a constituent was detected in one sample but not the other, the detected concentration was used; and
- If a constituent was not detected in either sample, the lowest Sample Quantitation Limit (SQL) was used and appropriate techniques for handling non-detect values were applied in calculating summary statistics in the data evaluation.

3.4.1 Polychlorinated Biphenyls

The sampling strategy assigned a subset of locations to be analyzed for a full PCB characterization (EPA Method 1668): CPA-13A, CPA-14A, and CPA-15A. For the purposes of the HHRA, congener results were summed and evaluated as Total PCBs using EPA's "High Risk and Persistence" cancer potency estimates. Because these congeners differ in terms of potency, the toxicity of environmental mixtures involves the use of Toxic Equivalency Factors (TEFs). The EPA has endorsed the use of TEFs developed by the WHO (2005) to evaluate risks posed by PCB compounds to humans.

PCB Congener	Human TEF
PCB 77	1.00E-04
PCB 81	3.00E-04
PCB 126	1.00E-01
PCB 169	3.00E-02
PCB 105	3.00E-05
PCB 114	3.00E-05
PCB 118	3.00E-05
PCB 123	3.00E-05
PCB 156	3.00E-05
PCB 157	3.00E-05
PCB 167	3.00E-05
PCB 189	3.00E-05

If an individual congener was never detected in a given media (e.g., soil) it was excluded from the summation; otherwise, non-detect results were summed using the SQL. The following table identifies Total PCB (summation) results by sample location. Values exceeding the BCL are highlighted in yellow.

Sample Location	PCB TEQ (mg/kg)	
	Shallow Soil	Deep Soil
CPA-01D	1.09E-05	2.37E-05
CPA-02D	7.60E-06	9.51E-06
CPA-03D	5.09E-06	9.65E-06
CPA-04D	1.43E-04	6.83E-06
CPA-05D	2.34E-03	1.05E-05
CPA-06D	5.77E-05	9.35E-06
CPA-07D	3.72E-05	1.14E-05
CPA-08D	4.39E-06	7.37E-06
CPA-09S	2.25E-03	NS
CPA-10S	1.69E-03	NS
CPA-11S	5.98E-03	NS
CPA-12S	8.35E-06	NS
CPA-13A	1.18E-01	2.18E-03
CPA-14A	7.70E-06	1.11E-05
CPA-15A	3.53E-06	7.45E-06
FTF-07D	1.11E-03	3.90E-01
FTF-08D	2.24E-05	1.17E-04
FTF-09D	5.24E-01	**2.41E+00**

FTF-10D	1.08E-05	1.04E-03
FTF-11D	1.64E-05	8.20E-05
FTF-12D	3.53E-06	6.03E-05
FTF-13D	4.71E-06	6.18E-05
FTF-14S	1.90E-04	NS
FTF-15S	4.35E-02	NS
FTF-16S	3.74E-03	NS
FTF-17S	1.08E-03	NS
FTF-18S	1.38E-04	NS
FTF-19S	1.36E-03	NS
FTF-20S	2.64E-02	NS
FTF-21D	7.06E-06	1.90E-05
FTF-22D	3.03E-05	1.47E-04
FTF-23D	1.71E-04	1.88E-07
FTF-24D	6.96E-04	2.14E-04
FTF-25D	4.79E-03	8.58E-04
FTF-26D	5.99E-05	4.02E-05
FTF-27D	**1.65E+00**	4.29E-01
RB-5	1.41E-03	2.01E-04
RB-6	NS	1.27E-01
RB-7	2.78E-06	2.54E-02
RB-8	8.32E-05	6.54E-05

3.4.2 Dioxins

Polychlorinated dibenzodioxins (PCDDs) and polychlorinated dibenzofurans (PCDFs) are typically found in the environment as mixtures of PCDD or PCDF congeners. Because these congeners differ in terms of potency, the toxicity of environmental mixtures involves the use of TEFs. The EPA has endorsed the use of TEFs developed by the WHO (2005) to evaluate risks posed by PCDD and PCDF compounds to humans.

Within each sample, PCDD and PCDF concentrations were converted to 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) toxic equivalent quotient (TEQ) using the TEF multiplier presented in the table below and summed to calculate a 2,3,7,8-TCDD TEQ. If an individual congener was never detected in a given media (e.g., soil), it was excluded from the summation. Non-detect results were included in this evaluation using the SQL. For the purposes of data usability, dioxin and furan TEQs were evaluated using the 2,3,7,8-TCDD BCL. Note, that for duplicate dioxin and furan samples, individual dioxin and furan TEQs were first calculated for both the parent and

duplicate sample and the resultant dioxin and furan TEQs subsequently processed per to the duplicate handling process described above.

Dioxin Congeners	Human TEFs
2,3,7,8-TCDD	1.0
1,2,3,7,8-PentaCDD	1.0
1,2,3,4,7,8-HexaCDD	0.1
1,2,3,6,7,8-HexaCDD	0.1
1,2,3,7,8,9-HexaCDD	0.1
1,2,3,4,6,7,8-HeptaCDD	0.01
OctaCDD	0.0003
Furan Congeners	**Human TEFs**
2,3,7,8-TetraCDF	0.1
1,2,3,7,8-PentaCDF	0.03
2,3,4,7,8-PentaCDF	0.3
1,2,3,4,7,8-HexaCDF	0.1
1,2,3,6,7,8-HexaCDF	0.1
1,2,3,7,8,9-HexaCDF	0.1
2,3,4,6,7,8-HexaCDF	0.1
1,2,3,4,6,7,8-HeptaCDF	0.01
1,2,3,4,7,8,9-HeptaCDF	0.01
OctaCDF	0.0003

Non-detect results were included in this evaluation using the SQL. For the purposes of this evaluation, dioxin and furan TEQs were compared to the 2,3,7,8-TCDD BCL. Sample locations with TEQs greater than the BCL for industrial/commercial land use scenarios for indoor workers (1.00E-03 mg/kg) are highlighted in yellow.

Sample Location	2,3,7,8-TCDD TEQ (mg/kg)	
	Shallow Soil	Deep Soil
CPA-05D	4.42E-04	NS
CPA-09S	2.75E-04	NS
CPA-10S	**1.63E-03**	NS
CPA-12S	3.30E-06	NS
FTF-16S	1.85E-04	NS
FTF-20S	**2.88E-03**	NS
FTF-22D	3.35E-05	3.46E-06
FTF-23D	5.71E-06	1.00E-06
FTF-24D	1.32E-06	5.74E-07
FTF-25D	4.09E-05	6.54E-07
FTF-26D	1.53E-06	5.65E-07
FTF-27D	**6.42E-03**	7.64E-04

4. CONCLUSIONS

In accordance with EPA and NDEP guidance, and to reduce uncertainty associated with the site investigation and risk assessment processes, this DUE was conducted for the analytical data collected at the Site. The objective of this assessment was to evaluate whether the type, quality, and quantity of data available are sufficient to support the risk assessment and to evaluate how uncertainties with the data affect the risk characterization. Data are considered usable in the risk assessment process as long as the data are valid and any uncertainty in the data and its potential impact on the risk assessment are explained.

To summarize key findings:

- Soil and soil vapor data were deemed usable for the risk assessment with the exception of one soil sample location, FTF-25D-10;
- Though uncertainties and data gaps are present in the CSM, the cumulative dataset was deemed sufficient to characterize the nature and extent of contamination as well as the potential fate and transport of SRCs;
- Potential statistical outliers were identified in the dataset; however, no evidence of a bias was found to remove these values from the dataset;
- Concentrations of SRCs were detected in soil and soil vapor greater than the respective BCLs indicating that contamination at the Site is well understood and accurately reflected in the CSM; and,
- Elevated detection limits found in the dataset add potential uncertainty to the risk assessment; however, they are unlikely to affect adequate characterization of SRCs.

Based on an evaluation of the analytical methods, laboratory results, internal laboratory Quality Assurance/Quality Control (QA/QC) measures, and Geosyntec's QA/QC measures, it appears that the laboratory data are usable for meeting project objectives. It is noted that qualified data should be considered for use within the limitations of the qualifications detailed in this evaluation.

5. REFERENCES

Converse Consultants (Converse), 1988. Summary Report on Soil Sampling and Analytical Reports for Closure of Ponds No. 2 and 5, Henderson, Nevada. [NDEP acceptance status – Efforts to understand the NDEP acceptance status of this document have been unsuccessful].

Converse Consultants (Converse), 1993. Phase I Environmental Conditions Assessment (ECA) for Montrose Chemical Corporation Facility, Henderson, Nevada. April 15. [NDEP acceptance status – unknown].

Geosyntec Consultants, Inc. (Geosyntec), 2010a. Summary Data Report, Chemical Occurrence and Distribution, Former Closed Pond 6, Closed Pond 6 Area, Henderson, Nevada. May 28 [NDEP acceptance status – Conditional approval on June 10, 2010. Response to comments provided to NDEP on July 30, 2010].

Geosyntec Consultants, Inc. (Geosyntec), 2010b. Summary Data Report, Soil Vapor, Soil, and Surface Soil Sampling, Former Tank Farm Site Assessment Area, Henderson, Nevada. June 25. [NDEP acceptance status – Pending].

Geosyntec Consultants, Inc. (Geosyntec), 2011. Revised Technical Memorandum: Planned Methodology for Wet-to-Dry Weight Conversion, Former Montrose and Stauffer Facilities in Henderson, Nevada. January 7. [NDEP acceptance status – Conditionally approved on February 24].

Geosyntec Consultants, Inc. (Geosyntec), 2014. Revised Conceptual Site Model for the Closed Ponds Area and Former Tank Farm, Site Assessment Areas, Henderson, Nevada. January 17. [NDEP acceptance status – Approved on May 19; Submitted as Appendix A of this Deliverable].

Hargis, 2008. Revision 1.0 Conceptual Site Model, Former Montrose and Stauffer Facilities and Downgradient Areas to Las Vegas Wash, Henderson, Clark County, Nevada. Replacement Pages. July 25. [NDEP acceptance status – Comments addressed November 5, 2008].

Nevada Division of Environmental Protection, 2010. Supplemental Guidance for Assessing Data Usability for Environmental Investigations at the BMI Complex and Common Area in Henderson, Nevada. September 1.

Nevada Division of Environmental Protection, 2011. Nevada Division of Environmental Protection Response to: *Revised Technical Memorandum: Planned*

Methodology for Wet-to-Dry Weight Conversion, Former Montrose and Stauffer Facilities in Henderson, Nevada. February 24.

Nevada Division of Environmental Protection, 2015. Basic Comparison Levels. February, 2015.

Nevada Division of Environmental Protection, 2014. Nevada Division of Environmental Protection Response to: *Revised Conceptual Site Model for the Closed Ponds Area and Former Tank Farm Site Assessment Areas*. May 19.

SECOR, 1997. Draft Phase II Environmental Conditions Investigation, Henderson, Nevada. August 21. [NDEP acceptance status – unknown].

SECOR, 2002. Revised Report of the Investigation of Deeper Water-Bearing Zones at the Closed Ponds and Former Plant Site, Former Montrose Facility, Henderson, Nevada. March 29. [NDEP acceptance status – Efforts to understand the NDEP acceptance status of this document have been unsuccessful].

United States Environmental Protection Agency (EPA), 1989. Risk Assessment Guidance for Superfund. Volume 1: Human Health Evaluation Manual (Part A). Interim Final. Office of Emergency and Remedial Response. EPA-540/1-89/002. Washington, D.C.

United States Environmental Protection Agency (U.S.EPA). 2000. Guidance for Data Quality Assessment: Practical Methods for Data Analysis. EPA QA/G-9, QA0 Update. EPA/600/R-96/084. Washington, DC: Office of Environmental Information. July.

FIGURES

Site Assessment Area
Closed Ponds Area and Former Tank Farm
Henderson, Nevada

200 100 0 200 400 Feet

Legend

Former Tank Farm Site Assessment Area

Closed Ponds Area Site Assessment Area

Geosyntec consultants

Figure 1

Project No: HW0989I

October 2014

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APPENDIX A

REVISED CONCEPTUAL SITE MODEL
CLOSED PONDS AREA AND FORMER TANK FARM
SITE ASSESSMENT AREAS

[GEOSYNTEC, 2014]

Prepared for:

Montrose Chemical Corporation of California

Bainbridge Island, Washington

REVISED CONCEPTUAL SITE MODEL FOR THE CLOSED PONDS AREA AND FORMER TANK FARM SITE ASSESSMENT AREAS

HENDERSON, NEVADA

Prepared by:

Geosyntec consultants

engineers | scientists | innovators

2100 Main Street, Suite 150
Huntington Beach, California 92648
Telephone: (714) 969-0800
Fax (714) 969-0820
www.geosyntec.com

Project Number HW0989I

January 17, 2014

Geosyntec consultants

2100 Main Street
Suite 150
Huntington Beach, CA 92648

PH 714-969-0800
FAX 714-969-0820

www.geosyntec.com

January 17, 2014

Mr. James Dotchin
Bureau of Corrective Actions
Nevada Division of Environmental Protection
2030 E. Flamingo Road, Suite 230
Las Vegas, NV 89119

Subject: Revised Conceptual Site Model for the Closed Ponds Area and the Former Tank Farm Site Assessment Areas, Henderson, Nevada.

Dear Mr. Dotchin:

On behalf of the Montrose Chemical Corporation of California (Montrose), Geosyntec Consultants, Inc. (Geosyntec) is submitting to the Nevada Division of Environmental Protection (NDEP), the above-referenced revised Conceptual Site Model for the Closed Ponds Area and the Former Tank Farm Site Assessment Areas (Report). The latest version of this Report was submitted to NDEP on September 14, 2012. NDEP comments on the Report were received on November 5, 2013. Based on these comments, the Report has been revised and responses to NDEP's specific comments are detailed in the response-to-comments table provided as Attachment A to this letter.

Should you have any questions regarding this deliverable, please do not hesitate to call the undersigned. Thank you.

Sincerely,

Kyle L. Gadley, P.G.,
Nevada C.E.M. 2342
Project Geologist

ATTACHMENTS

Attachment A - Response to NDEP Comments Table

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cc: BMI Compliance Coordinator – Hardcopy
NDEP, c/o McGinley and Associates (Reno, NV) – Hardcopy
NDEP, c/o McGinley and Associates (Las Vegas, NV) – Hardcopy + CD
Montrose, Paul Sundberg – CD + Electronic Mail/Notification
Montrose, Joe Kelly – CD + Electronic Mail/Notification
Latham & Watkins, LLP, Kelly Richardson – CD + Electronic Mail/Notification
Latham & Watkins, LLP, Joel Mack – CD + Electronic Mail/Notification
Basic Remediation Company, Mark Paris – Electronic Mail/Notification
Basic Remediation Company, Ranajit Sahu – Electronic Mail/Notification
de maximis, Ed Modiano – Electronic Mail/Notification
de maximis, Nicole Bradley - Electronic Mail/Notification
AECOM, Brian Dean - Electronic Mail/Notification
Hargis + Associates, Inc., Brian Waggle – Electronic Mail/Notification
GEI Consultants, Kelly McIntosh - Electronic Mail/Notification
Olin Corporation, Curt Richards – Electronic Mail/Notification
Olin Corporation, Dave Share – Electronic Mail/Notification
PES Environmental, Inc., Nicholas Pogoncheff – Electronic Mail/Notification
Edgcomb, Adam Baas - Electronic Mail/Notification
Environ, Chris Richie - Electronic Mail/Notification
Environ, John Pekala - Electronic Mail/Notification
Landwell Co., Lee Farris - Electronic Mail/Notification
City of Henderson, Brenda Pohlman - Electronic Mail/Notification
Converse, Doug Bell - Electronic Mail/Notification
Syngenta Crop Protection, Inc., George Crouse – Electronic Mail/Notification
Tyson Contracting, Victoria Tyson – Electronic Mail/Notification
Astrazeneka, Charles Elmendorf – Electronic Mail/Notification

Geosyntec consultants

ATTACHMENT A
RESPONSE TO NDEP COMMENTS TABLE

Nevada Division of Environmental Protection Response to Comments on the *Revised Conceptual Site Model for the Closed Ponds Area and Former Tank Farm Areas* Henderson, Nevada (Dated September 14, 2013; Received November 5, 2013)

NDEP Comment Number	Location or Drawing No.	NDEP Comment	Response
Attachment A			
1	Response to Previous Comment 14	*Montrose Response: "As noted in the original Deliverable, the first three sampling events for CP-01 showed elevated concentrations of certain compounds, but have declined since… Over time, the groundwater sampling has become more representative of in-situ conditions, which show that the UMCf does not contain MCL exceedances at this location." Herein, Figure 3-3 Idealized Cross-Sections A-A' through C-C shows that DNAPL was encountered in wells CP-01 and RB-06 in the UMCf. Please explain how DNAPL could be present in the UMCf and there not be MCL exceedances.*	Where groundwater flows parallel to bedding planes, dissolved DNAPL may occur in thin beds. Groundwater containing dissolved DNAPL is not denser than surrounding groundwater and will not sink. Since CP-01 is screened below the depth of DNAPL, it is likely not capturing the dissolved DNAPL plume. To resolve uncertainties regarding DNAPL presence in the vicinity of CP-01, an additional well (CP-02) has been installed near CP-01 that is screened across the depth at which DNAPL was observed in CP-01 to capture the dissolved DNAPL plume. The findings from this additional investigation will be discussed in the DNAPL Investigation Summary Report prepared by AECOM and submitted to NDEP in December 2013.
2	Response to Previous Comment 24	*Montrose Response: "Montrose is not aware of a previously accepted HHRA. An HHRA for this area has not been completed by Montrose for this area.[sic] Integral Consulting (2010) prepared a risk assessment work plan for the Former Montrose and Stauffer Facilities that was approved by the NDEP.*	NDEP's previous Comment 24 stated that "Montrose needs to support the text herein with the data and statements in the previously accepted HHRA". Montrose understands that NDEP is referring to the Risk Assessment Work Plan prepared by Integral Consulting (Integral, 2010). The Contaminant Fate and Transport section in the CSM has been revised to include reference to this NDEP-approved RAWP in support of the fate and transport discussion.
3	Response to	*NDEP Comment: "In the case of potential DNAPL, if*	The text has been revised to read "In the case of

Nevada Division of Environmental Protection Response to Comments on the
Revised Conceptual Site Model for the Closed Ponds Area and Former Tank Farm Areas
Henderson, Nevada
(Dated September 14, 2013; Received November 5, 2013)

NDEP Comment Number	Location or Drawing No.	NDEP Comment	Response
	Previous Comment 26	*present, downward vertical migration continued through the Shallow Zone until the DNAPL reached residual saturation levels at which point further migration ceased." NDEP's comment stands, the point was that there was sufficient DNAPL present from the ponds that the DNAPL moved vertically downward to the approximate depth of 99 to 100 feet below ground surface and continued to migrate down dip and/or downgradient as far as MC-MW-18. This is not characteristic of residual saturation. Please revise or remove this sentence.*	potential DNAPL, if present, downward vertical and horizontal migration would continue through the Shallow Zone until the DNAPL reaches residual saturation levels at which point further migration would cease. These pathways will be affected to some degree by anisotropy of the sediment."
4	Response to Previous Comment 27(b)	*Montrose Response: "Montrose states that the CPA-FTF is not a "present-day source." Chloroform concentration in groundwater for MW-2 adjacent to the CPA and reported herein (Appendix E) is at or greater than one percent of solubility which is indicative of DNAPL (U.S. EPA, 2009) and would seem to be a present-day source.*	The CSM text is meant to advise the reader that the CPA-FTF areas are historical source areas and that no aboveground facilities remain from former operations, including the ponds. Past releases from the former facilities continue to be present-day sources.
5	Response to Previous Comment 34.b	*Montrose states that the NDEP will be "informed" if the site is redeveloped in to [sic] a land use other than industrial. Please note that the existing Administrative Order on Consent would require Montrose to "request" a revision to the NFA rather than "inform" the NDEP.*	Comment noted and the text has been revised.

Nevada Division of Environmental Protection Response to Comments on the
Revised Conceptual Site Model for the Closed Ponds Area and Former Tank Farm Areas
Henderson, Nevada
(Dated September 14, 2013; Received November 5, 2013)

NDEP Comment Number	Location or Drawing No.	NDEP Comment	Response
6	Response to Previous Comment 48.a	*Montroses' response is incorrect, there are BCL exceedances shown at three locations on figure 4-1 and it appears that the nature and extent of contamination to the north has not yet been completed. Therefore, Montrose's response is incorrect and non-responsive to the NDEP's comments.*	The Montrose LOU areas were divided up into site assessment areas in the early days of the ECI program on the basis of similar characteristics to facilitate future investigation and risk assessment activities. Montrose's response regarding BCL exceedances was correct in context of the definition of the CPA-FTF area. The exceedances noted to the north are within the Former Plant Site Assessment Area which is being addressed by a separate CSM. Montrose requests NDEP acknowledge that for technical and administrative purposes the former Montrose facility is divided into multiple contiguous and non-contiguous investigative areas and that in the contiguous area characterization is confined to the administrative boundaries. Montrose acknowledges that contamination distribution can and does extend beyond the boundaries of the contiguous area.
7	Response to Previous Comment 59(a)	*The updated "Asbestos Lab Reports.pdf file" needs to be provided to confirm the correction of the Client ID.*	The laboratory reports are included as part of the revised Deliverable.

Nevada Division of Environmental Protection Response to Comments on the
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NDEP Comment Number	Location or Drawing No.	NDEP Comment	Response
8	Section 4.2, Page 20	*Montrose references "Indicator Compounds". NDEP is not aware of any evaluations that have been completed or approved by NDEP to support the selection of Indicator Compounds. Please clarify.*	The original text inadvertently used the term "indicator compounds" in reference to using a set of common and most prevalent VOCs compounds to be used to simplify the discussion of compound presence in the CPA-FTF area. Although the selection of these compounds was thoroughly discussed in the CSM, a specific indicator compound identification process has not been submitted to NDEP for review and approval for this site assessment area. Therefore the text has been revised to eliminate this "term of art" and will instead use the term "prevalent" within the CSM's discussion to avoid further confusion.
9	Section 4.3.1, Page 21	*Montrose references figures, [sic] NDEP notes that these figures do not present any data so it is difficult to impossible to interpret what is going on in terms of fate, transport or risk. This comment applies to numerous sections and figures within the Deliverable. Spider diagrams presenting chemical classes or multiple contaminant-specific figures should be developed to provide the reviewers with an understanding of site conditions. In addition, it appears that the nature and extent of contamination is unbounded to the north.*	The purpose of these figures is to present the aerial distribution and magnitude of the exceedances. Inclusion of spider diagrams would be distracting and defeat the purpose of the figures. The reader is directed to the tables if detailed location-specific information is desired.
10	Page 27, Surface Soil Sampling for Asbestos Section	*It is unclear what the intent of this section is trying to convey. The asbestos portion of the CSM, as currently written, appears to address basic nature and extent issues but nothing beyond this is currently being done (i.e., estimating potential risk, etc.). Given that asbestos data have been collected, it seems beneficial*	A discussion of risk is provided in Section 4.3.1 of the revised Deliverable. A risk assessment for the FTF will consider this issue further.

Nevada Division of Environmental Protection Response to Comments on the
Revised Conceptual Site Model for the Closed Ponds Area and Former Tank Farm Areas
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NDEP Comment Number	Location or Drawing No.	NDEP Comment	Response
		to understand what sort of risk these data would drive. Other Montrose Sites (e.g., Former Benzene Storage Tank area) have included risk information in their CSM and it would provide consistency for a similar presentation in this CSM. Consideration could also be given to the areal extent of asbestos when forming arguments for the risk assessment.	
11	Page 27, Surface Soil Sampling for Asbestos Section, 2nd Paragraph	*It is unclear what the last two sentences in this sentence mean in the context of the NDEP guidance as well as asbestos risk in general. For asbestos, censoring data with detection limits is not appropriate, as described in the NDEP EDD guidance (Unified Chemical Electronic Data Deliverable Format, March 2012). If at least one fiber/structure is observed then asbestos is detected. Only if zero fibers/structures are observed can the sample result be considered a non-detect. That is, asbestos fibers/structures are either observed in a sample or they are not. In this case there are two long protocol structures. Please remove these two sentences from the CSM.*	These two sentences have been removed from the CSM.
12	Section 4.4, Page 36	*Montrose references a soil vapor screening that was done, however, it is not clear that it has been presented to NDEP in this Deliverable or any other. Please clarify.*	A reference to the soil vapor investigation completed by Montrose was clearly referenced in Section 4.4 of the CSM (i.e, Geosyntec, 2010c). This investigation is also summarized in Section C-1.11 of Appendix C of the CSM.

Nevada Division of Environmental Protection Response to Comments on the
Revised Conceptual Site Model for the Closed Ponds Area and Former Tank Farm Areas
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NDEP Comment Number	Location or Drawing No.	NDEP Comment	Response
13	Section 4.5.1, Page 38	*Montrose references well AA-MW-20 for discussion purposes but caveats that it is within the Olin plant site and "subject to influences other than the CPA-FTF" [sic] Please identify, quantify and discuss these influences and/or please select a well that is more appropriate for discussion purposes. This is a global comment that will not be repeated.*	Well AA-MW-20 is subject to influences of inorganic natures (pH, metals, TDS) from the chlor-alkali process. Since these influences do not impact organic chemical evaluations, this text was removed from the CSM to clarify any confusion.
14	Section 4.5.1, Page 41, Pesticides	*Please also indicate in this paragraph if NDEP BCL comparisons were also completed. This is a global comment that will not be repeated.*	A discussion of pesticide exceedances is on Page 24 and a reference has been added to the discussion in section 4.5.1 to assist the reader. This section, along with the other appropriate sections, were revised to differentiate when BCL and/or MCL comparisons were performed.
15	Section 4.5.2, Page 43	*The deliverable states that "At the time of installation, a "slippery orangish-brownish liquid in sandy matrix" that could have been indicative of DNAPL was observed in the soil cuttings at a depth of approximately 99 to 100 ft bgs." Section 4.6 states that the liquid was DNAPL. Please correct the text indicate the liquid was DNAPL. [sic]*	Although the material was not specifically identified as DNAPL at the time of installation, it has since been determined that description was accurate. The text has been changed to: "At the time of installation, a "slippery orangish-brownish liquid in sandy matrix indicative of DNAPL was observed in the soil cuttings at a depth of approximately 99 to 100 ft bgs."
16	No Comment Given	***Blank.*** *No comment given.*	
17	Section 5.2, Page 52	*Please add transport of chemicals from soils to groundwater as a pathway.*	Section 5.2 was revised to include this exposure pathway.
18	Section 7.0	*NDEP provides the following comments:* *a. This section must include a proposed schedule as*	a. The schedule objectives have been added to the text. b. RAS at the CPA is unlikely to be needed as it is a

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NDEP Comment Number	Location or Drawing No.	NDEP Comment	Response
		well. *b. If the proposed final remedy for the CPA will be a deed restriction, this issue will still require discussion with the NDEP and development of a remedial alternative study (RAS).*	closed facility for which the remedial action is already completed.
19	References	*For many of the references listed Montrose states "NDEP acceptance status - Efforts to understand the NDEP acceptance status of this document have been unsuccessful." This is unacceptable for any Deliverable. Montrose needs to review the Administrative Record and resolve this issue.*	Montrose has tried for years to understand the acceptance status of these references but there are gaps in the administrative record that remain. In many cases these are historical documents that contain valuable institutional knowledge of the site but Approval Status is not available in the record. The incomplete administrative record issue has been discussed with NDEP on several occasions as an outcome of these discussions the language included was agreed upon by NDEP. Montrose welcomes the opportunity to work with NDEP to resolve these gaps.
20	Tables	*NDEP provides the following comments:* *a. A vast majority of the tables that have been provided are completely illegible. It is requested that tables be printed at a legible scale or that they provided electronically only.* *b. The symbol"—" is used and states "no data"*	a. Given the amount of rows and columns included on these tables, it is impossible to print them at an appropriate scale. To facilitate better viewing of the data, the tables are included electronically as Excel files to give the reader the ability to split the screen and view the data in the appropriate rows and columns. b. The tables have been revised to correct this

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		whereas it appears that for many of the entries this should actually be a zero.	inconsistency.
21	Table 4-1a	*Please note that for dioxins and furans, total TEQs should be presented and compared to applicable metrics. This is a global comment that will not be repeated.*	The appropriate tables were updated to include TEQs for dioxins and furans.
22	Table 4-10, Summary of Asbestos Results	*Footnote 1 is not accurate and should be changed to reflect the NDEP asbestos guidance. The guidance states, "For the purposes of this guidance, "protocol asbestos structures " will encompass both short and long protocol asbestos structures that are <0.4 um in diameter\ as defined below, but only "long protocol asbestos structures " will be used to calculate asbestos related risk according to NDEP (2011) guidance. Protocol asbestos structures that are >5 um, but < 10 um in length with a < 0.4 um diameter are considered "shortprotocol asbestos structures" for the purpose of this guidance. The short protocol asbestos structures are recorded on the final report for each asbestos sample and are labeled as "asbestos structures >5 um, < 10 um". However, the short protocol asbestos structures are not used for asbestos related risk calculations and are distinguished separately from "long " (> 10 um in length) protocol asbestos structures because the "long " structures are considered to be more potent (Berman and Crump,*	The footnote and table entries have been revised.

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		2003).". Please revise footnote 1 as well as table entries accordingly.	
23	Figure 3-5	*NDEP provides the following comments:* *a. As noted above, the "Remedy" as labeled on this figure has not been proposed by Montrose or approved by NDEP. Please re-label.* *b. This figure does not provide very much detail for the FTF versus the CPA, it is requested that the figure be revised to provide commensurate levels of data for each of the site assessment areas.*	a. The figure has been revised to reference the area as an engineered cap, rather than "Remedy." b. The primary focus of the figure is to provide historical context for the construction, operation and closing/capping of the ponds and the FTF is included as it is located directly north of the ponds and is included as part of this CSM. The level of detail included for the CPA is simply not available for FTF as the history of the FTF is not as dynamic as the CPA.
24	Figure 3-7	*No deep wells are shown on this figure, please clarify if this is an error or if this is a potential data gap.*	Figure 3-7 has been removed from the revised Deliverable.

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25	Figure 4-52 DNAPL Distribution – CPA and FTF Former Montrose Chemical Facility	*The NDEP does not agree with the use of five percent of solubility, the U.S. EPA (2009) recommends one percent of solubility as indicative of DNAPL.*	Montrose concurs that 1% is EPA's standard recommendations for DNAPL solubility and notes that the referenced figure simply shows where solubility has been found above 5%. Because of the long period of time since this CSM was developed and the current date, additional investigation has been completed in the area of CP-01, and updated information is presented in the DNAPL Investigation Data Summary Report submittal in December 2013 [AECOM, 2013]. Hence, rather than revise this figure, which is accurate as presented, Montrose suggests moving forward with the DNAPL investigation based on the updated information presented in the new DNAPL report.
26	Figure E1-7	*This figure uses well AA-MW-05 as the upgradient well for the gradient and flow direction determination. However Figure El-4 Groundwater Elevations in MW-1, MW-2, MW-3, and MW-4 (May 1989 to October 2008) uses well MW-1 for comparison to the downgradient wells. Please provide the rational [sic] for using different wells in these to [sic] figures.*	Contours on Figure E1-7 have been revised to include both MW-01 and AA-MW-24.
27	Appendix A	*Montrose states "A brief summary of the decommissioning of the CPA and FTF areas and associated features is presented in this Appendix, with information taken from the Phase II ECI Report prepared by SECOR (SECOR, 1997) unless specified*	Please see response to Comment No. 19.

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		otherwise." Please note that NDEP has not reviewed this Appendix. Once the acceptance status of the references is resolved this Appendix may warrant additional review.	
28	Appendix A, Section A-3.2, Page A-3	*Montrose references an Appendix I which is not included in the Deliverable, please clarify.*	The text was revised to reference Figure 3-5.
29	Appendix B	*It is NDEP's understanding that the site is inspected at least two times per year. The photographs included are dated 2009, please provide current site conditions in the revised Deliverable.*	The CPA is inspected twice a year and based on these inspections there is no reason to expect that conditions have changed. By nature, the CSM is an evergreen document and it is not reasonable to included updated photographs of the capped ponds with each revision.
30	Appendix C, Section C-1.3, Page C-2	*The validation status of the referenced data is unclear, please clarify. This is a global comment that applies to the entire Deliverable.*	Reference to validation status is included in the notes section of the data tables.
31	Appendix E	*It appears that this Appendix may be a reiteration of an evaluation previously provided to the NDEP in 2009. Please clarify if the data or conclusions have changed. If this is the same evaluation as provided previously please provide the citation and approval status. Please note that NDEP has not reviewed this Appendix. Once the acceptance status of the references is resolved this Appendix may warrant additional review.*	This evaluation has been provided to NDEP as part of previous revisions of the CPA-FTF CSM but not as a stand-alone document.
32	N/A	*There are two references to Neptune and Company documents, which should be referenced to NDEP*	References were corrected to reference NDEP instead of Neptune and Company.

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NDEP Comment Number	Location or Drawing No.	NDEP Comment	Response
		instead. One is the asbestos guidance documents; the other is a reference to Revised Tables for Appendix G of the Background Report, Background Shallow Soil Summary Report: BMI Complex and Common Areas Vicinity. July 22. [NDEP acceptance status - NDEP letter of acceptance; July 26, 2007]	
33	N/A	*Validation of Asbestos Data:* *According to NDEP Asbestos Data Validation Guidance, the blank analysis, which includes filter lot, laboratory, field, method and equipment blanks, should be included in the laboratory report.*	Comment noted. The blank analysis has been included in the laboratory report, which is included as a PDF file on the DVD accompanying this revised Deliverable.

REFERENCES

AECOM, 2013. DNAPL Investigation Summary Report, Montrose Chemical Corporation of California, Environmental Conditions Investugation, Henderson, Nevada. December 31. [NDEP acceptance status – Currently being reviewed by NDEP].

Revised Conceptual Site Model for the Closed Ponds Area and Former Tank Farm Site Assessment Areas Henderson, Nevada

Jurat

January 17, 2014

I hereby certify that I am responsible for the services described in this document and for the preparation of this document. The services described in this document have been provided in a manner consistent with the current standards of the profession, and to the best of my knowledge, comply with all applicable federal, state and local statutes, regulations and ordinances.

Kyle L. Gadley, P.G., C.E.M.
Nevada C.E.M. 2342, Expires 20 September 2014
Project Geologist
Geosyntec Consultants, Inc.

The services provided for this effort included data compilation, data evaluation and preparation of this report.

Revised Conceptual Site Model for the Closed Ponds Area and Former Tank Farm Site Assessment Areas Henderson, Nevada

January 17, 2014

Authors:

Kyle L. Gadley, P.G., C.E.M
Project Geologist
Geosyntec Consultants, Inc.

Andrew J. Barnes, P.G.
Principal
Geosyntec Consultants, Inc.

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LIST OF ACRONYMS AND ABBREVATIONS

AMPAC	American Pacific Corporation
ASTM	American Society for Testing and Materials
ASTs	Aboveground Storage Tanks
atm-m^3/mole	Atmospheres-cubic meters per mole
BCLs	Basic Comparison Levels
bgs	Below Ground Surface
BHC	Hexachlorobenzene (Lindane)
BMI	Black Mountain Industrial
BRC	Basic Remediation Company
CAMU	Corrective Action Management Unit
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
Converse	Converse Consultants, Inc.
COPC	Chemicals of Potential Concern
CPA	Closed Ponds Area
CSM	Conceptual Site Model
DAF	Dilution Attenuation Factor
DCB	Dichlorobenzene
DDE	Dichlorodiphenyldichloroethane
DDT	Dichlorodiphenyltrichloroethane
DNAPL	Dense Non-Aqueous Phase Liquids
DUE	Data Usability Evaluation
ECA	Environmental Conditions Investigations
ENSR	ENSR Corporation
EPA	United States Environmental Protection Agency
^oF	Degrees Fahrenheit
FBR	Fluidized Bed Reactor
FID	Flame Ionization Detector
FLUTe™	Flexible Liner Underground Technologies
foc	Fraction Organic Carbon
FPS	Former Plant Site
FS	Feasibility Study
ft	Foot/Feet
ft^2	Square Foot/Feet
ft^3	Cubic Foot/Feet

LIST OF ACRONYMS AND ABBREVIATIONS (continued)

ft bgs	Feet Below Ground Surface
ft/day	Foot/Feet per Day
FTF	Former Tank Farm
GAC	Granular Activated Carbon
Geosyntec	Geosyntec Consultants, Inc.
GWTS	Groundwater Treatment System
Hargis	Hargis + Associates, Inc.
HCl	Hydrochloric Acid
HHRA	Human Health Risk Assessment
K	Hydraulic Conductivity
Kerr-McGee	Kerr-McGee Chemical LCC
K_H	Henry's Law Constant
LBCLs	Leaching-based Basic Comparison Levels
LOU	Letter of Understanding
MCLs	Maximum Contaminant Levels
mg/kg	Milligrams per Kilogram
mg/L	Milligrams per Liter
mg/m^3	Milligrams per Cubic Meter
mil	One-thousandth of an Inch
mm	Millimeter
Montrose	Montrose Chemical Corporation of California
msl	Mean Sea Level
MWH	MWH Americas, Inc.
NAPL	Non-Aqueous Phase Liquid
NDEP	Nevada Division of Environmental Protection
OCPs	Organochlorine Pesticides
OLIN	Olin Corporation, Inc.
OSSM	Olin, Stauffer, Syngenta, and Montrose
PCB	Polychlorinated Biphenyl
PES	PES Environmental, Inc.
pH	Potential of Hydrogen
PID	Photoionization Detector
PM10	Particulate Matter 10 Micron Size
ppmv	Parts Per Million by Volume
PVC	Polyvinyl Chloride
Qal	Quaternary Alluvium
RAS	Remedial Alternative Study
RCRA	Resource Conservation and Recovery Act

LIST OF ACRONYMS AND ABBREVIATIONS (continued)

RI	Remedial Investigation
SBR	Still-Bottom Residue
SECOR	SECOR International, Inc.
Site	Closed Ponds Area and Former Tank Farm (Site Assessment Areas of the former Montrose facility)
SMC	Stauffer Management Company
SRC	Site-Related Chemical
SVE	Soil Vapor Extraction
SVOCs	Semi-Volatile Organic Compounds
TDS	Total Dissolved Solids
TOC	Total Organic Carbon
µg/L	Micrograms per Liter
µm	Micrometers
$\mu g/m^3$	Micrograms per Cubic Meter
UMCf	Upper Muddy Creek Formation
USCS	Unified Soil Classification System
USTs	Underground Storage Tanks
UV	Ultraviolet
VFs	Volatilization Factors
VOCs	Volatile Organic Compounds
Weston	Weston Solutions, Inc.
xMCf	Transitional Muddy Creek Formation
yd^3	Cubic Yards

1.0 INTRODUCTION AND OVERVIEW

On behalf of Montrose Chemical Corporation of California (Montrose), Geosyntec Consultants, Inc. (Geosyntec) prepared this Conceptual Site Model (CSM) to summarize environmental conditions of the soil, groundwater and vadose zone in the Closed Ponds Area (CPA) Site Assessment Area and the Former Tank Farm (FTF) Site Assessment Area of the former Montrose facility (Site) located in Henderson, Nevada (Figure 1-1).

As discussed in the Sections that follow, these two areas are former Montrose operating areas that have been decommissioned and closed. The CPA and FTF areas were combined in this CSM based on conversations with NDEP regarding the soil gas isopleths included as part of Revision 2 of the CPA CSM. Based on this issue and their proximity, it was decided by NDEP and Montrose that soil gas concentrations to the north of the CPA represented a data gap, which led to the FTF field investigation conducted in Spring 2010 under the NDEP-approved Work Plan [NDEP, 2010]. These two contiguous areas with similar environmental issues are referred to as the CPA-FTF area in this CSM. The following list of documents and investigations outlines the CSM process to date for the CPA-FTF area:

- *Focused Conceptual Site Model and Preliminary Screening of Remedial Alternatives* [Geosyntec, 2008]. This initial version of the CSM included findings that addressed soil and groundwater issues at the CPA, and a preliminary Remedial Alternative Study (RAS) for groundwater at the CPA.
- *NDEP Comments on the Focused Conceptual Site Model and Preliminary Screening of Remedial Alternatives* [NDEP, 2008a].
- *Focused Conceptual Site Model to Address Soils for the Montrose Closed Ponds Site Assessment Area and Response to NDEP Comments to the Focused Conceptual Site Model and Preliminary Screening of Remedial Alternatives* [Geosyntec, 2009a]. Revision 1.
- *NDEP Comments on the Focused Conceptual Site Model to Address Soils for the Montrose Closed Ponds Site Assessment Area* [NDEP, 2009a].
- *Conceptual Site Model for the Montrose Closed Ponds Site Assessment Area and Response to NDEP Comments to the Focused Conceptual Site Model to Address Soils for the Montrose Closed Ponds Site Assessment Area* [Geosyntec, 2009b]. Based on comments and discussions with NDEP, this revised document was intended to provide a comprehensive CSM only for the CPA. Revision 2.

- *NDEP Comments on the Conceptual Site Model for the Montrose Closed Ponds Site Assessment Area* [NDEP, 2009a].
- *Interim Deliverable: Submittal of Response to NDEP's Comments on the Conceptual Site Model for the Montrose Closed Ponds Site Assessment Area* [Geosyntec, 2009c].
- *NDEP Comments on the Interim Deliverable: Submittal of Response to NDEP's Comments on the Conceptual Site Model for the Montrose Closed Ponds Site Assessment Area* [NDEP, 2009c].
- After submittal of the Interim Deliverable and receipt of NDEP comments and subsequent discussions with the NDEP, it was decided to combine the CPA and FTF areas into one CSM due to the reasons stated above. As a result, additional investigations were conducted in and within the vicinity of the CPA and FTF to address data gaps identified in previous versions of the CSM prepared for the CPA. The additional investigations were conducted as per the following NDEP-approved Work Plans:
  - *Work Plan to Assess Shallow Soil at the Former Dichlorobenzil Warehouse Area, Henderson, Nevada* [Geosyntec, 2009d].
  - *Work Plan to Evaluate Chemical Occurrence and Distribution at Closed Pond 6 of the Closed Ponds Area* [Geosyntec, 2009e].
  - *Work Plan to Conduct Supplemental Soil Vapor Sampling at the Former Tank Farm and the Former Benzene Storage Tank Site Assessment Areas* [Geosyntec, 2009f].
- *Conceptual Site Model for the Closed Ponds Are and Former Tank Farm Site Assessment areas* [Geosyntec, 2011a]. Revision 3.
- *NDEP Comments on the Conceptual Site Model for the Closed Ponds Are and Former Tank Farm Site Assessment areas* [NDEP, 2012a].
- *Revised Conceptual Site Model for the Closed Ponds Are and Former Tank Farm Site Assessment areas* [Geosyntec, 2012]. Revision 4.
- *NDEP Comments on the Revised Conceptual Site Model for the Closed Ponds Are and Former Tank Farm Site Assessment areas* [NDEP, 2013a].
- *DNAPL Investigation Summary Report* [AECOM, 2013].

This revised CSM (Revision 5) incorporates information obtained from these additional investigations and addresses outstanding comments from NDEP from previous CSM documents. Information presented herein provides sufficient characterization to support development of an RAS for the combined CPA-FTF Site Assessment Area, if needed.

1.1 CSM Objectives

Consistent with the American Society for Testing and Materials [ASTM, 2008] and the United States Environmental Protection Agency [EPA, 1988] guidance documents, the components of this CSM include:

- A description of the physical, lithologic and hydrostratigraphic setting;
- A summary of the operational history and decommissioning of the two assessment areas;
- A summary of previous environmental investigations including the nature and distribution of contamination, and fate and transport of chemicals;
- A description of current conditions at the two assessment areas;
- An evaluation of the potential exposure pathways and potential receptors;
- An analysis of data gaps; and
- A discussion of the path forward for the combined CPA-FTF Site Assessment Area.

1.2 Intent of CSM

The Phase II Consent Order developed the process that includes the Environmental Conditions Assessment (ECA), Environmental Conditions Investigation (ECI), and Remedial Alternatives Study (RAS), which is generally consistent with the EPA Remedial Investigation/Feasibility Study (RI/FS) process [EPA, 1988]. The CPA and FTF Site Assessment Areas currently are in the ECI phase of the process.

This CSM summarizes environmental conditions in the CPA and FTF based on historical information and sampling of environmental media conducted to date, and in accordance with NDEP-approved work plans. The data and information are presented herein, and are used to develop a qualitative characterization of environmental conditions and chemical fate and transport at the CPA-FTF areas. For the FTF, some or all of these data will be used in a subsequent quantitative human health risk assessment, but only after they are subjected to a more rigorous usability evaluation that will include identification of possible data gaps as part of the NDEP's Data Usability Evaluation (DUE) process. Because the CPA is a closed and secured area with no industrial or

public access, Montrose understands that that there will not be a DUE or HHRA for the CPA data discussed herein. For these reasons, the CSM is considered to be an evergreen document that may require modification if data gaps requiring additional data are identified in the DUE process.

1.3 Summary of Report Findings

As discussed above and in Section 6, recent investigations conducted at the CPA and FTF were designed to address data gaps previously identified by NDEP and Montrose. No additional soil-related data gaps are known at this time, and no further field investigation work is planned or indicated. Future Site-wide RAS activities anticipated for the CPA and FTF are described further in Section 7 of this CSM.

It is important to note that while groundwater investigation findings at the CPA-FTF are discussed in this CSM, the future RAS process for groundwater will be separate from the RAS conducted for soil. Groundwater, as well as non-aqueous phase liquids (NAPL), will be covered by the upcoming Site-wide Groundwater RAS process for the combined former Stauffer and Montrose sites.

1.4 Report Organization

The remainder of this CSM is organized into the following sections:

- Section 2, *Background*;
- Section 3, *Physical Characteristics;*
- Section 4, *Distribution of Contamination*;
- Section 5, *Contaminant Fate and Transport;*
- Section 6, *Data Gap Analysis*; and
- Section 7, *Path Forward*.

References, tables, figures, and appendices are included at the end of the text.

2.0 BACKGROUND

The CPA-FTF area is located in an unincorporated area of Clark County and is surrounded by the City of Henderson, Nevada. As shown on Figure 1-1, the area is located in the southwestern portion of the Black Mountain Industrial (BMI) Complex that is currently owned by the Olin Corporation, Inc. (Olin).

2.1 Development of Site Assessment Areas

NDEP issued a *Phase II Letter of Understanding* to Montrose on August 15, 1994 (NDEP, 1994). This letter recommended 24 study items at the former Montrose leased properties for further review or investigation. During the subsequent investigation activities, it became clear that the Montrose programs could be simplified by combining many similar Letter of Understanding (LOU) areas. Thus, the LOU areas were subsequently organized by Montrose on the basis of common characteristics into five logical groupings called Site Assessment Areas. These Site Assessment Areas and the rationale for them were described in the RAS Process Document [Geosyntec, 2010a]. The CPA and FTF areas include the following LOU study items:

CPA Site Assessment Area:

- LOU Item 6 –Still-Bottom Residue (SBR) Storage Tank Area;
- LOU Item 15 – Ponds 1, 3, and 4 and associated 2-inch Waste Line;
- LOU Item 16 – Ponds 2 and 5; and
- LOU Item 17 – Pond 6.

Subsequent to the LOU letter, the following additional areas were added to the investigation program:

- Non-LOU Item – Former Dichlorobenzil Warehouse;
- Non-LOU Item – Dichlorobenzene (DCB) Storage Tank T-57; and
- Non LOU Item – Granular Activated Carbon (GAC) storage area.

FTF Site Assessment Area:

- LOU Item 18 – Former SBR Drum Storage Area; and
- LOU Item 19 – Former Tank Farm.

These individual LOUs and non-LOUs comprise the combined CPA and FTF areas and are shown on Figure 2-1. The following sections provide an operational history of both areas.

2.2 CPA -FTF Operational History and Decommissioning History

For ease of review, a brief summary of the operational history and decommissioning of the CPA-FTF areas is provided in the table below, while a more detailed summary is presented in **Appendix A** of this report. The information has been excerpted from the Phase II ECI Report prepared by SECOR [SECOR, 1997], unless otherwise specified.

The original six ponds built in what has now become the CPA area were decommissioned in the 1980s. Ponds 1 through 4 in the CPA were constructed on property leased from Stauffer Management Company (SMC) to receive acid waste streams from the dichlorobenzil process washing and product drying steps, and sulfide wastes from the polychlorinated benzenes and chloral processes. Pond 5 was constructed to receive HCl wastes previously held in Ponds 1 through 4 from 1976 to early 1979, and Pond 6 was constructed to receive polychlorinated benzene SBR from the chlorinated benzene distillation process. A detailed description of the ponds' construction, operation, and decommissioning is presented in the *Draft Phase II Environmental Conditions Investigation (ECI) Report, Former Montrose Facility, Henderson, Nevada* [SECOR, 1997].

The FTF area was decommissioned during the period of 1983-1986. There are no precise construction dates available for the FTF, but it is likely that it existed from the onset of the manufacturing operations in the 1940s [Converse, 1993] and evolved to meet manufacturing requirements over time. In its final configuration prior to closure of Montrose operations, the FTF consisted of two railcar loading stations for benzene and acetaldehyde and 17 individual aboveground storage tanks (ASTs) used to store raw materials (Figure 2-2). The tanks ranged in size from 5,200 to 150,000 gallons and contained a variety of materials including hydrochloric acid (HCl), benzene, chlorobenzene, DCB, and acetaldehyde. The tanks and their contents and sizes are summarized on Figure 2-2. There are no reports of underground storage tanks (USTs) in this area [Hargis, 2009].

Area	Years of Operation	Organic Constituents Present in Waste Directed to Pond	Decommissioning History
Pond 1	1975 - 1983	• 1,2-DCB • 1,3-DCB • 1,4-DCB • Chlorobenzene • Chloroform	Completed in 1989 • Evaporated to near dryness; • Residual sludge mixed with limestone to neutralize acid; • Backfilled with native fill to original grade; and • Topped with an engineered cap. • Ongoing RCRA Closure Monitoring by wells MW-1 through MW-4.
Pond 2	1975 – 1985	• 1,2-DCB • 1,3-DCB • 1,4-DCB • Chlorobenzene	Completed in 1989 • Evaporated to near dryness; • Residual sludge mixed with limestone to neutralize acid; • Backfilled with native fill to original grade; and • Topped with an engineered cap. • Ongoing RCRA Closure Monitoring by wells MW-1 through MW-4.
Pond 3	1975 - 1983	• 1,2-DCB • 1,3-DCB • 1,4-DCB • Chlorobenzene • Chloroform	Completed in 1989 • Evaporated to near dryness; • Residual sludge mixed with limestone to neutralize acid; • Backfilled with native fill to original grade; and • Topped with an engineered cap. • Ongoing RCRA Closure Monitoring by wells MW-1 through MW-4.
Pond 4	1975 - 1983	• 1,2-DCB • 1,3-DCB • 1,4-DCB • Chlorobenzene • Chloroform	Completed in 1989 • Evaporated to near dryness; • Residual sludge mixed with; limestone to neutralize acid; • Backfilled with native fill to original grade; and • Topped with an engineered cap. • Ongoing RCRA Closure Monitoring by wells MW-1 through MW-4.

Area	Years of Operation	Organic Constituents Present in Waste Directed to Pond	Decommissioning History
Pond 5	1979 – 1985	• 1,2-DCB • 1,3-DCB • 1,4-DCB • Chlorobenzene	Completed in 1989 • Evaporated to near dryness; • Residual sludge mixed with limestone to neutralize acid; • Backfilled with native fill to original grade; and • Topped with an engineered cap. • Ongoing RCRA Closure Monitoring by wells MW-1 through MW-4.
Pond 6	1976 - 1980	Still-Bottom Residue, including: • Chlorobenzene • Dichlorobenzene • Trichlorobenzene • Polychlorinated Biphenyl (PCB)	Completed in 1981 • Liquid waste removed; • Excavated solids, liner and underlying soils; • Backfilled with soil and layer of clay; and • Topped with an additional layer of soil. • Ongoing RCRA Closure Monitoring by wells MW-1 through MW-4.
Tank Farm	1940s - 1983	• Benzene • Chlorobenzene • Dichlorobenzene • Acetaldehyde	Completed between 1984 – 1989 • Tanks removed and concrete foundations and dikes removed by mid-1989. • Ongoing groundwater monitoring in the FTF area.

2.3 Current Conditions

CPA Area

As part of the decommissioning process, the CPA area was capped with a composite clay, geo-textile, and native soil cap to prevent rainwater infiltration to the closed ponds and prevent dust dispersion. The graded cap surface is in place to control stormwater runoff, to minimize erosion and eliminate the growth of native plants.

The area was also fenced independently from the Pioneer (now Olin) plant site to provide security and protect the cap (Figure 2-3) and is now under surveillance by the Olin security staff. Photographs of the current conditions of the fenced and capped CPA are included in **Appendix B** of this report. Regular inspections of the cap are conducted to monitor and correct erosional effects.

As part of Resource Conservation and Recovery Act (RCRA) closure, four groundwater monitor wells were installed at the CPA: MW-1 is the upgradient well, and MW-2, MW-3, and MW-4 are arrayed along the downgradient side of the capped area (Figure 2-4). These wells are sampled and analyzed, and the results reported to NDEP twice annually. The analytical suite includes seven prevalent compounds defined by the closure monitoring plan that include selected volatile organic compounds (VOCs), pesticides, hydrocarbon compounds and dichlorobenzil. The results have been reported regularly to NDEP since May 1989.

FTF Area

The FTF area is within the Olin manufacturing operational area and currently is used by Olin as a staging and out-of-service process equipment storage yard (Figure 2-3). As such, the area experiences infrequent personnel traffic.

In addition to the above-referenced post-closure monitoring wells focused primarily on the CPA, several other wells also have been installed and sampled in the vicinity and downgradient of the CPA-FTF area, as described in Section 4.5.

2.4 Surrounding Off-Site Areas

There are three off-site areas that may have an environmental relationship to the CPA-FTF area. These areas were requested by NDEP to be included in this CSM during previous review iterations. These areas include the Tronox facility to the east, the American Pacific Corporation (AMPAC) Facility to the west and the Basic Remediation Company (BRC) Corrective Action Management Unit (CAMU) (Figure 2-5).

These are sites of interest because they include property and former operations that are sufficiently south (upgradient) and west/east (cross gradient) to potentially impact the CPA-FTF area. While the CAMU is too far downgradient to be directly impacted by the CPA-FTF area and there are other potential sources in between the two areas, the BRC CAMU has been included at NDEP's request as groundwater flows northward from the CPA-FTF towards the CAMU

2.4.1 Tronox

The Tronox facility, located east of the CPA-FTF, manufactured manganese dioxide, elemental boron, and boron trichloride. Beginning in the early 1950s, previous occupants of the facility also manufactured chlorate- and perchlorate-based compounds including ammonium perchlorate [BRC, 2007a]. In July 1998, perchlorate production was discontinued by the previous owner Kerr-McGee Chemical LLC (Kerr-McGee) at

the facility, and production equipment was subsequently dismantled in March 2002 (BRC, 2007a). More detailed historical information regarding the Tronox facility can be found in the report: Upgradient Investigation Results, Tronox Facility, Henderson, Nevada [ENSR, 2007].

Releases from the facility to groundwater and subsequent dissolved-phase migration have resulted in the distribution of perchlorate extending to the Las Vegas Wash. From the origin of the release, located approximately 1,500 feet east of the former Montrose Site Assessment Areas (Figure 2-5), perchlorate concentrations extend westward towards the northeastern corner of the CPA-FTF. The western extent of this plume is not clear as of the time of this CSM.

Currently, Tronox operates a groundwater treatment system consisting of a two-stage fluidized bed reactor (FBR) biological treatment system. The system, used to treat extracted groundwater for chromium, nitrate, chlorate, perchlorate, and other chemicals, is operated under NDEP requirements. Effluent from the FBR is treated to remove solids and disinfected with an ultraviolet (UV) system prior to being discharged to the Las Vegas Wash via pipeline [BRC, 2007a].

2.4.2 AMPAC

AMPAC manufactured perchlorate at a facility located approximately 4,500 feet west of the CPA-FTF (Figure 2-5). Investigation of the nature and extent of perchlorate in groundwater was conducted by AMPAC prior to installation of remediation systems at the source and northern extent of perchlorate, respectively (BRC, 2007a). A full-scale in-situ bioremediation system was installed and has been operating since 2006 [BRC, 2007a].

2.4.3 BRC CAMU

BRC constructed a CAMU north of the Site boundary just upgradient of the groundwater treatment system (GWTS) (Figure 2-5). The CAMU was constructed in the footprint of the former landfill and Slit Trenches (Landfill) that were used by Basic Management Incorporated and subsequently by the BMI Companies (believed to be Timet, Kerr-McGee, Stauffer, Montrose, and possible other entities). The former Landfill was constructed in early 1942 to 1943, under the direction of the United States Government. From 1942 to 1944 the plant was operated by BMI for the production of magnesium during World War II. From 1945 to 1952, BMI ceased operations at the plant, and several privately owned companies leased and operated the facility in later years [BRC, 2007a]. Operations at BMI included the BMI Landfill (from 1942 to 1980) and ponds, as well as plant effluent and storm drainage systems.

The BMI Landfill was built on two "trade effluent" disposal ponds that received waste from 1942 until 1980. The liquids (waste acids and caustic liquors) placed in the unlined ponds between 1942 and 1944 percolated into the soil [BRC, 2007a]. Approximately 500,000 to 1,000,000 cubic yards (yd^3) of solid material was later disposed in the northern portion of the landfill, and an undetermined volume was disposed in the southern portion of the unlined landfill [BRC, 2007a].

The Slit Trench Area, formerly located within the Landfill, was comprised of trenches that received waste and the undisturbed area between the trenches that span over a total area of approximately 30 acres [BRC, 2007a]. Between 1970 and 1980, undocumented process and office waste is reported to have been periodically disposed of in the Slit Trench Area, although there are no records to precisely document the nature of these wastes [BRC, 2007a].

BRC summarized the CAMU conditions in their CSM document [BRC, 2007a]. This document highlighted data gaps that address groundwater impacts, aquifer characterization, and characterization of the Slit Trench Area within the Landfill. Much investigation and remediation work has taken place in this area, since this BRC CSM was developed [BRC, 2007b]. The CAMU has since been built, and BRC has excavated the Slit Trench Area and interred them in the lined CAMU.

2.5 Site Investigation Summary

A summary of historical investigation programs listed below provides a brief historical background to the progression of activities that have led to the current understanding of the environmental conditions at the CPA and FTF. Details of these investigations are provided in the documents listed below and are summarized briefly in **Appendix C**.

- *Summary Report on Soil Sampling and Analytical Reports for Closure on Ponds No. 2 and 5* [Converse, 1988];
- *The Bi-annual Analytical Results Reports – 1989 through Present* (prepared by Converse);
- *Phase I Environmental Conditions Assessment (ECA)* [Converse, 1993];
- *Phase II ECI Programs:*
  - *Phase II ECI [SECOR, 1997];*
  - *Additional Groundwater Investigation [SECOR, 2000];*
  - *Deep Water-bearing Zone Investigation [SECOR, 2001];*
  - *Supplemental Soil Investigation, reported in [Hargis, 2008a];*
  - *Soil Vapor and Soils Investigation, reported in [Hargis, 2008a];*

- *Dense Non-Aqueous Phase Liquid (DNAPL) Investigation [Hargis, 2008]);*
- *Downgradient CPA and FTF Groundwater Investigation [Hargis, 2008a];*
- *Closed Pond 6, Soil and Groundwater Investigation [Geosyntec, 2010b];*
- *Former Tank Farm Site Assessment Area, Soil Vapor, Soil, and Surface Soil Investigation [Geosyntec, 2010c]; and*
- *DNAPL Investigation Summary Report [AECOM, 2013]*.

These investigations, combined with the physical characteristics and hydrogeology described in Section 3, support the development of the distribution of contamination, fate and transport, data gap analysis and path forward discussed in Sections 4, 5, 6 and 7, respectively.

3.0 PHYSICAL CHARACTERISTICS

The following sections describe the physical characteristics of the CPA-FTF area, including the topography, climate, surface water hydrology, geology, and hydrogeology, which can exert varying influences on the fate and transport of chemicals.

3.1 Topography

The CPA-FTF is located on alluvial fan deposits derived from the McCullough Range located south of the BMI industrial area (Figure 3-1). The natural land surface elevation generally ranges between 1,820 and 1,850 feet above mean sea level (msl), and slopes to the north as shown on Figures 3-1 and 3-2. Although graded for industrial development, the CPA-FTF generally maintains the regional topography. The exception is the area of the closed former ponds where as part of decommissioning activities, a cap was constructed above the surrounding land surface and is crowned to mitigate the accumulation and infiltration of surface water directly above the former ponds.

3.2 Climate

Like much of Nevada, the climate in Henderson is arid and hot with temperatures often exceeding 100 degrees Fahrenheit (^{o}F) during the summer months. The winters are generally short and mild, with daytime highs near 60 °F and night-time lows around 40 °F. The mountains surrounding the CPA-FTF accumulate snow during the winter, but snow is rare at the CPA-FTF itself.

Annual precipitation in the vicinity of the CPA-FTF is approximately 4.5 inches, which mainly occurs during the winter months (December through March), but is not uncommon anytime of the year [NOAA, 2010]. Potential evapotranspiration rates are much greater than precipitation, and range from 60 to 82 inches per year [Southern Nevada Water Authority, 1996].

3.3 Surface Water Hydrology

There are no naturally occurring surface water bodies within the CPA-FTF. Surface water that originates from significant rainfall events is collected by engineered drainage features and is either diverted to the west around the Olin manufacturing facility or is channeled to the Olin facility's stormwater handling system. Drainage of surface water in and in the vicinity of the FTF is controlled by paved areas and berms and is channeled to the Olin facility's stormwater handling system.

3.4 Geology

The CPA-FTF area is located in the Las Vegas Valley, which is a structural trough located within the Basin and Range physiographic province. This province is characterized by alternating upthrown fault blocks that form bounding mountain ranges, and down-dropped blocks that result in sediment-filled valleys. The McCollough Range located over a mile south of the Site is the up-thrown block bounding the Las Vegas Valley and is the principal source of the Tertiary to Recent sediments that underlie the Site. The sediments beneath the CPA-FTF include Quaternary alluvial deposits and the underlying Tertiary Muddy Creek formation [Malmberg, 1965; Plume, 1989].

The geology encountered during investigations in the CPA-FTF area is depicted on several cross-sections illustrated on Figures 3-3 and 3-4. These cross-sections include Unified Soil Classification System (USCS) designation, hydrostratigraphic unit identification, well construction information, and recent groundwater elevation. Boring logs from soil borings installed during the previous investigations were used to construct these cross-sections. The available logs for this area are presented in **Appendix D**. Additionally, a three-dimensional graphic illustrating, among other things, the conceptual geology and hydrostratigraphy is provided as Figure 3-5.

The lithologic units encountered by exploratory borings include the Quaternary Alluvium (Qal), the transitional Muddy Creek formation (xMCf) and the Upper Muddy Creek formation (UMCf) [NDEP, 2009d]. The Qal in the CPA and FTF consists predominantly of unconsolidated silt, sand, gravel, cobbles, and caliche. The xMCf consists of reworked fine-grained facies of the UMCf including clay, silt, and fine-grained sand. The UMCf consists of predominantly low permeability, unconsolidated to semi-consolidated silt and clay; with occasional thin, apparently laterally discontinuous (at the scale of the CPA-FTF) interbeds of fine- to medium-grained sand with silts and gravels.

3.5 Hydrostratigraphy

The local hydrostratigraphy has been the subject of numerous investigations by Montrose and others. NDEP has attempted to reconcile the hydrostratigraphic nomenclature across the BMI area to facilitate construction of an integrated regional conceptual hydrostratigraphic model. In their January 6, 2009 Letter, NDEP describes three regional hydrostratigraphic units: the Shallow, Middle, and Deep Zones [NDEP, 2009d].

The Shallow Zone is the upper-most water bearing unit, the top of which is the water table, and the bottom of which is generally thought to occur at a depth of approximately 90 feet below ground surface (ft bgs) [NDEP, 2009d]. This characterization of the bottom of the Shallow Zone is arbitrary as it depends greatly upon the surface topography and less on the actual hydrostratigraphy. Nonetheless, the Shallow Zone is comprised of sediments of highly variable hydraulic character ranging from the more permeable Quaternary Alluvium to the low permeability UMCf. In the CPA-FTF area the water table intersects both the alluvium and the UMCf. Upgradient (south) of the former ponds, the water table occurs within the UMCf, and downgradient (north) of the CPA boundary and beneath the FTF, the water table occurs in the xMCf and the Qal. This range of hydraulic characteristics creates difficulties in characterizing the flow and transport within the Shallow Zone.

The Middle Zone is defined as the unit below the Shallow Zone and above the Deep Zone and generally extends from a depth of 90 ft bgs to about 275-300 ft bgs [NDEP, 2009d]. This zone includes several fine-grained and coarse-grained zones.

The third hydrostratigraphic unit, the Deep Zone, occurs at depths of approximately 275 – 300 ft bgs. The Deep Zone sediments represent the coarse-grained facies of the Muddy Creek formation, and are generally composed of well-graded sand and clayey sand.

The hydrostratigraphic zones encountered in selected borings are identified on the cross sections presented on Figures 3-3 and 3-4.

3.6 Groundwater Occurrence and Flow

3.6.1 Shallow Zone

The post-closure monitoring wells (MW-1, MW-2, MW-3 and MW-4) around the CPA have the longest history of groundwater level measurements and thus provide the best basis for evaluating changes in water level over time. Depth to water currently varies from about 40 ft bgs beneath the FTF to about 60 ft bgs upgradient of the CPA.

As shown on Figure 3-6 and discussed in **Appendix E**, water levels fluctuated within a range of about three feet from 1989 to 1999, after which the four wells exhibit a consistent rise in water levels. Water levels rose about 14 feet in upgradient Well MW-1 (1.4 ft/yr) and about eight feet in Wells MW-2, MW-3 and MW-4 downgradient of the CPA. The consistency of the temporal trends in the four wells is consistent with the development of Henderson up the alluvial plane of Black Mountain along with a significant increase in irrigated acreage.

In addition to this water level rise, between 1989 and 1998, the flow direction shifted approximately 20 degrees to the west and then shifted 15 degrees back towards the east between 1998 and 2008. Additional discussions of fluctuations in groundwater flow direction are included in **Appendix E**.

Hydraulic properties also were evaluated in the CPA-FTF area. In August 2008, hydraulic conductivity (k) of the Shallow Zone was measured by conducting pneumatic slug testing on monitor wells AA-MW-20 through AA-MW-23 (Figure 2-7). Data recorded during the pneumatic slug tests were evaluated using the Hvorslev Method, which indicate k values of 2.0 ft/day at AA-MW-20 and 8.1 ft/day in AA-MW-21. Graphical outputs from the Hvorslev Method evaluation are included as **Appendix F**.

3.6.2 Middle Zone

Two Middle Zone wells (CP-01 and MC-MW-09) are located in the vicinity of the CPA-FTF area and are completed in the upper portion of the Middle Zone. Depth to groundwater occurs at about 35 and 46 ft bgs in CP-01 and MC-MW-09, respectively [Hargis, 2010]. Based on data generated from the 2010 Site-wide monitoring program, the groundwater flow gradient in the Middle Zone is north to northeast with a magnitude of approximately 0.02 ft/ft to 0.03 ft/ft [Hargis, 2010].

3.6.3 Deep Zone

Two deep zone wells (DMC-MW-27 and DMC-MW-27R), are located in the vicinity of the CPA-FTF (Figure 4-43). It is worthwhile to note that well DMC-MW-27 was scheduled for replacement due to anomalous results of chemical analysis of samples from the well that indicated that the well might not have been providing representative samples from the Deep Zone. With the addition of DMC-MW-27R's sampling results showing only one exceedance of arsenic, this indication appears to be correct.

Based on data from other deep wells in the area (DMC-MW-26, TR-5, TR-7 and TR-9) as described in the Comprehensive Groundwater Monitoring program, the groundwater flow gradient in the Deep Zone is northerly with a magnitude of 0.01 ft/ft [Hargis, 2010].

3.6.4 Vertical Head Potential

There is an upward vertical head between the Shallow Zone and Middle Zone and between the Middle Zone and the Deep Zone [Hargis, 2010]. Based on measurements collected in January 2010, the water level elevation is approximately 13 feet higher in Middle Zone well CP-01 than in Shallow Zone well PW-01, [Hargis, 2010]. While the water level elevation is approximately 23 feet higher in Deep Zone well DMC-MW-27

than Middle Zone well CP-01, which is located adjacent to DMC-MW-27. These upward gradients are important when considering dissolved solute transport within the CPA-FTF area.

4.0 DISTRIBUTION OF CONTAMINATION

4.1 Overview

This Section describes the nature and distribution of chemical occurrence in soil, soil vapor, and groundwater at the CPA-FTF area.

To serve as a basis of comparison, the distribution of contaminants is discussed relative to the following screening levels as appropriate:

- NDEP Basic Comparison Levels (BCLs) for soil for the outdoor industrial/commercial worker scenario [NDEP, 2013b];
- NDEP Leaching-based Basic Comparison Levels (LBCLs) for the soil leaching to groundwater migration pathway [NDEP, 2013b];
- Site-specific soil vapor to outdoor air risk-based concentrations [Geosyntec, 2011b]; and
- EPA Region IX Maximum Contaminant Levels (MCLs) for groundwater (EPA, 2012), and in the absence of an EPA MCL, NDEP BCLs for residential water [NDEP, 2013b].

The discussions in this Section are based on the cumulative data set collected as part of the investigations described in Section 2 and **Appendix C**. To provide context for the analytical results presented herein, NDEP's BCLs are provided in text, tables, and on figures. NDEP guidance states that "The BCL Table contains current human health toxicity values that are combined with standard exposure factors to estimate contaminant concentrations in environmental media…that are considered by NDEP to be protective of human exposures…over a lifetime." However, as also stated in NDEP guidance [NDEP 2012b], "Exceedance of a BCL does not automatically designate the site as needing a response action."

The BCL table is used as a technical screening tool that provides risk-based concentrations that are considered protective of human health, within the limitations described in the guidance [NDEP, 2013b]. The BCLs help to evaluate data usability, determine extent of impacts, identify chemicals of potential concern (COPCs), and identify if further action may be warranted.

LBCLs are another set of values to which soil data (shallow and deep) are compared. These values evaluate the potential for soil concentrations to migrate to groundwater (i.e., the soil leaching-to-groundwater pathway). The main purpose of using LBCLs is to provide a context that helps the reader understand the magnitude of deeper soil concentrations.

The data collected during various sampling events indicate that releases from the former ponds in the CPA occurred during the operational time period of the ponds. Soil and soil vapor data show that the releases would migrate predominantly vertically through the vadose zone to the saturated zone. Once within the saturated zone, contaminant mass migrated laterally downgradient, generally to the north towards the FTF along the direction of groundwater flow (Figure 3-5).

The laboratory analytical results from the various investigations are organized by media and summarized in figures and tables with reference to the applicable NDEP screening levels listed and discussed above.

4.2 Evaluation of Chemical Prevalence in Soil and Groundwater

The amount of data that has been generated to characterize the environmental conditions in the vicinity of the CPA-FTF areas is so voluminous that it precludes practical discussion of each data point. To date, approximately 350 chemicals and compounds have been identified as potential Montrose Site-related compounds (SRCs). These compounds fall into the following analytical groups: aldehydes; asbestos; dioxins/furans; herbicides; inorganics; metals; organic acids; PCBs; pesticides; radionuclides; and VOCs and semi-volatile organic compounds (SVOCs) [Earth Tech, 2006].

To develop a manageable approach to the discussion of these analytes, a thorough evaluation was conducted to identify a subset of chemicals that can be used to discuss the extent of contamination (laterally and vertically) and the significance of the contaminant concentrations. The selection of these prevalent compounds focused on the analytes most likely to add to the overall risk to human health and the environment that might be posed by the Site [EPA, 1988].

According to EPA guidance, when identifying contaminants of concern "It may be useful for some sites to select 'indicator [compounds]' as part of this process. Indicator [compounds] are chosen to represent the most toxic, persistent, and/or mobile substances among those identified that are likely to significantly contribute to the overall risk posed by the site [EPA, 1988]." The use of indicator compounds serves to focus and streamline the assessment of constituent mobility, toxicity and risk for the purposes of this CSM. Montrose acknowledges that this process is not a substitute for as HHRA.

This process, which is described below, identified a group of five VOCs that are well suited to characterize the nature and distribution of VOCs in the CPA-FTF area. Furthermore, it was found that few other analytes from other chemical classifications were detected in exceedance of their NDEP screening values. Based on this, the

discussion of analytical groups other than VOCs presented in the following Sections will be limited to chemicals detected in soil and groundwater at concentrations exceeding their respective NDEP BCLs and/or EPA MCLs. The spatial distribution of exceedances, which is discussed in this section, shows that the distribution of the five VOCs encompasses the distribution of other BCL exceedances.

The methodology for identifying the five VOC prevalent compounds was based on the EPA guidance for selecting chemicals of concern for risk assessment [EPA, 1989]. This guidance had also been utilized in the Site-wide Conceptual Site Model [Hargis, 2008a]. The methodology started by developing a list of the most prevalent chemicals detected at the CPA-FTF. This evaluation included comparison of soil and groundwater data to NDEP BCLs, LBCLs, and EPA MCLs, respectively. As shown in Table 4-1 and 4-13, for both soil and groundwater, the greatest number of chemical compounds in exceedance of screening levels for a given analytical group are VOCs. The chemicals in exceedance of the soil and groundwater screening levels of other analytical groups were not high enough to warrant classification of prevalent compounds. Due to the larger number of VOCs observed at the CPA-FTF at concentrations exceeding the BCLs/MCLs, the prevalence of VOCs was further evaluated based on historic storage area use (for the FTF) or disposal (for the CPA) at the Site and EPA guidance for selecting chemicals of concern for risk assessment [EPA, 1989]. The following criteria were used:

1) Frequency of detections for a given compound, where a greater than or equal to ($\geq$) 5% detection frequency indicated a representative chemical. Based on this criterion, there are 22 VOCs that are determined to be representative (Tables 4-1 and 4-3). The list of VOCs with a $\geq$ 5% frequency of detection limits greater than NDEP BCLs and MCLs was compared to the list of representative VOCs. From this analysis to evaluate the adequacy of the detection limits, it was determined that there are no additional representative VOCs.

2) Relative toxicity includes chemicals detected at concentrations that exceed published MCLs for groundwater and BCLs for soil in $\geq$ 5% of the samples analyzed. Based on this criterion, there are 11 VOCs that are determined to be representative (Tables 4-1 and 4-3). Of note, carbon tetrachloride and tetrachloroethene, which are considered Site-wide VOC prevalent compounds [Hargis, 2008a], did not pass this criterion.

To further define the list of candidate VOCs to be used to discuss the nature and extent of VOCs in soil and groundwater, the 11 remaining VOCs were evaluated using physio-chemical criteria that are representative of their fate and transport characteristics. Those

chemicals with the highest number of criteria met were chosen as prevalent compounds. These criteria, presented in Table 4-8A of the Site-wide CSM [Hargis, 2008a], include molecular weight, density, vapor pressure, Henry's Law Constant (K_h), water solubility, organic carbon and octanol water partitioning coefficient, as described below:

1) Chemicals with a molecular weight greater than 200 grams per mole;
2) Chemicals with density greater than 1 gram per cubic centimeter;
3) Chemicals with vapor pressure greater than 0.01 mm Hg;
4) Chemicals with a published Henry's Law Constant greater than 0.0001 cubic meters per mole;
5) Chemicals with a published water solubility value of greater than 10,000 milligrams per liter; and
6) Chemicals with organic carbon and octanol water partitioning coefficients greater than 3.

If there was more than one chemical that had similar physio-chemical criteria, the chemical with the highest prevalence of screening level exceedances was chosen (Tables 4-1 and 4-3).

Based on the criteria provided above, the following compounds, of which are also Site-wide VOC Prevalent Compounds based on Site-wide CSM [Hargis, 2008a], were determined to be Prevalent Compounds for the CPA and FTF Site Assessment Areas:

- 1,2-DCB;
- 1,4-DCB;
- Benzene;
- Chlorobenzene; and
- Chloroform.

For the purpose of this CSM, these Prevalent Compounds are used to summarize the extent of VOCs in soil and groundwater. Based on this, as well as historical use of the CPA-FTF area, the same Indicator Compounds will be used to characterize soil vapor contamination at the CPA-FTF. As the following sections will show, the distribution of these five compounds encompasses the distribution of other analytes that exceed their respective BCL, MCL, or background concentrations.

4.3 Soil

Several investigations of shallow and deep soil have been conducted at and in the vicinity of the CPA-FTF area as summarized in **Appendix C**. Consistent with human

health exposure pathways (e.g., construction workers potentially exposed to soil from 0 to 10 ft bgs [Integral, 2010]), surface, shallow and deep soils are defined as follows:

- The term "Surface soils" is used to define the soils present from the surface to 0.5 ft bgs;
- The term "shallow soils" is used to describe the soil interval from 0.5 to 10 ft bgs; and
- Deep soils are those that are greater than 10 ft bgs.

The above terminology is used in the tables; however, for the figures and the rest of the text, the term "shallow soils" will include "surface soils." The lateral extent of soil concentrations exceeding their respective BCL and LBCL values in both shallow and deep soil are discussed in the following sections. Soil data presented in the following sections, as well as in the referenced figures and tables, have been converted from a wet-weight basis to a dry-weight basis as per the NDEP-approved [NDEP, 2012b] conversion method, as described in the technical memorandum prepared by Geosyntec (2011c).

4.3.1 Comparison of Soil to Basic Comparison Levels (BCLs)

Exceedances of Volatile Organic Compound BCLs in Shallow Soil

As shown on Figure 4-1 (Tables 4-4, 4-5, 4-6, 4-7 and 4-8), there are no exceedances of VOC BCLs in the surface and shallow soil around and within the CPA. Exceedances in surface and shallow soil in the FTF are limited to three locations (FTF-04, FTF-09D, and FTF-27D) and are limited to two of the Prevalent Compounds discussed in Section 4.2 (1,2-DCB and 1,4-DCB). Detections of Prevalent Compounds are summarized below:

Benzene

A total of 89 samples from shallow soil were analyzed for benzene, with no samples exceeding the BCL of 4.5 milligrams per kilograms (mg/kg) and benzene not detected at concentrations exceeding the laboratory detection limit in 70 of the samples (79%).

Chlorobenzene

A total of 89 samples from shallow soil were analyzed for chlorobenzene, with no samples exceeding the BCL of 695 mg/kg and chlorobenzene not detected at concentrations exceeding the laboratory detection limit in 76 of the samples (85%).

Chloroform

A total of 89 samples from shallow soil were analyzed for chloroform, with no samples exceeding the BCL of 1.71 mg/kg and chloroform not detected at concentrations exceeding the laboratory detection limit in 28 of the samples (31%).

1,2-DCB

A total of 89 samples from shallow soil were analyzed for 1,2-DCB, with five samples (2%) exceeding the BCL of 373 mg/kg. Detected concentrations exceeding the BCL were 941 mg/kg and 2,140 mg/kg. 1,2-DCB was not detected at concentrations exceeding the laboratory detection limit in 66 of the samples (74%).

1,4-DCB

A total of 89 samples from shallow soil were analyzed for 1,4-DCB, with five samples (6%) exceeding the BCL of 14.3 mg/kg. Detected concentrations exceeding the BCL ranged between 107 mg/kg and 1,712 mg/kg. 1,4-DCB was not detected at concentrations exceeding the laboratory detection limit in 60 of the samples (67%).

Exceedances of Volatile Organic Compound BCLs in Deep Soil

Figure 4-2 (Tables 4-5, 4-6, 4-7, 4-8, and 4-9) shows the spatial occurrence of BCL exceedances in deep soils in and around the CPA-FTF area. Detections of the Prevalent Compounds are summarized below:

Benzene

A total of 162 samples from deep soil were analyzed for benzene, with eleven samples (7%) exceeding the BCL of 4.5 mg/kg. Detected concentrations exceeding the BCL ranged between 4.96 mg/kg and 64.3 mg/kg. Benzene was not detected at concentrations exceeding the laboratory detection limit in 100 of the samples (62%).

Chlorobenzene

A total of 162 samples from deep soil were analyzed for chlorobenzene, with nine samples (6%) exceeding the BCL of 695 mg/kg. Detected concentrations exceeding the BCL ranged between 844.2 mg/kg and 24,120 mg/kg. Chlorobenzene was not detected at concentrations exceeding the laboratory detection limit in 108 of the samples (67%).

Chloroform

A total of 162 samples from deep soil were analyzed for chloroform, with 49 samples (30%) exceeding the BCL of 1.7 mg/kg. Detected concentrations exceeding the BCL ranged between 1.7 mg/kg and 79.1 mg/kg. Chloroform was not detected at concentrations exceeding the laboratory detection limit in 28 of the samples (17%).

1,2-DCB

A total of 162 samples from deep soil were analyzed for 1,2-DCB, with eight samples (5%) exceeding the BCL of 373 mg/kg. Concentrations exceeding the BCL ranged between 495.8 mg/kg and 6,298 mg/kg. 1,2-DCB was not detected at concentrations exceeding the laboratory reporting limit in 110 of the samples (68%).

1,4-DCB

A total of 162 samples from deep soil were analyzed for 1,4-DCB, with 22 samples (14%) exceeding the BCL of 14.3 mg/kg. Concentrations exceeding the BCL ranged between 14.74 mg/kg and 7,236 mg/kg. 1,4-DCB was not detected at concentrations exceeding the laboratory limit in 109 of the samples (67%).

The majority of these data were collected around the CPA ponds. Data from this investigation reported chloroform at concentrations exceeding its BCL at 50 ft bgs in each of the three borings (CPA-13, CPA-14A, and CPA-15A), as shown on Figures 4-3 and 4-4. The cross-sections presented as Figure 4-5 show the vertical distribution of the Prevalent Compounds relative to BCLs in the soil borings advanced in the FTF.

Exceedances of Semi-Volatile Organic Compound BCLs in Shallow Soil

As shown on Figure 4-6 (Tables 4-4, 4-5, 4-6, 4-7 and 4-8), one SVOC (hexachlorobenzene) was detected above its respective BCL in two shallow soil borings advanced in the FTF. A summary of the SVOC findings relative to BCLs are as follows with information provided on exceedances:

Hexachlorobenzene

A total of 89 samples from shallow soil were analyzed for hexachlorobenzene, with two samples (2%) exceeding the BCL of 1.2 mg/kg. The concentrations detected exceeding the BCL were 2.46 mg/kg and 3.53 mg/kg. Hexachlorobenzene was not detected at concentrations exceeding the laboratory detection limit in 85 of the samples (96%).

Exceedances of Semi-Volatile Organic Compound BCLs in Deep Soil

As shown in Figure 4-7 (Tables 4-5, 4-6, 4-7, 4-8 and 4-9), one SVOC (hexachlorobenzene) was detected above its respective BCL in one shallow soil boring advanced in the CPA. A summary of the SVOC findings relative to BCLs are as follows with information provided on exceedances:

Hexachlorobenzene

A total of 107 samples from shallow soil were analyzed for hexachlorobenzene, with one samples (1%) exceeding the BCL of 1.2 mg/kg. The concentrations detected exceeding the BCL was 4.8 mg/kg. Hexachlorobenzene was not detected at concentrations exceeding the laboratory detection limit in 106 of the samples (99.9%).

Exceedances of Pesticide BCLs in Shallow Soil

As shown on Figure 4-8 (Tables 4-4, 4-5, 4-6, 4-7 and 4-8), pesticides have not been detected above their BCLs in surface or shallow soil in the vicinity of the CPA. Pesticides have been detected in shallow soil at multiple locations within the FTF at concentrations exceeding their BCLs. These exceedances are summarized below:

4,4- Dichlorodiphenyldichloroethane (DDE)

A total of 77 samples from shallow soil were analyzed for 4,4-DDE, with one sample (1%) exceeding the BCL of 7.81 mg/kg at a concentration of 10.7 mg/kg. 4,4-DDE was not detected at concentrations exceeding the laboratory detection limit in 55 of the samples (71%).

4,4- Dichlorodiphenyltrichloroethane (DDT)

A total of 77 samples from shallow soil were analyzed for 4,4-DDT, with two samples (3%) exceeding the BCL of 7.81 mg/kg. Concentrations exceeding the BCL ranged between 13.9 mg/kg and 18.2 mg/kg. 4,4-DDT was not detected at concentrations exceeding the laboratory detection limit in 53 of the samples (69%).

Dieldrin

A total of 77 samples from shallow soil were analyzed for dieldrin, with one sample (1%) exceeding the BCL of 0.12 mg/kg. The concentration detected at a concentration exceeding the BCL was 0.2 mg/kg. Dieldrin was not detected at concentrations exceeding the laboratory detection limit in 75 of the samples (97%).

Exceedances of Pesticide BCLs in Deep Soil

As shown on Figures 4-9 (Tables 4-5, 4-6, 4-7, 4-8 and 4-9), pesticides have not been detected in deep soil above their BCLs at and in the vicinity of the CPA, but have been detected in deep soil within the FTF at a concentration exceeding its BCLs. This exceedance is summarized below:

4,4-DDE

A total of 137 samples from deep soil were analyzed for 4,4-DDE, with one sample (1%) exceeding the BCL of 7.81 mg/kg. The concentration detected at a concentration exceeding the BCL was 9.25 mg/kg. 4,4-DDE was not detected at concentrations exceeding the laboratory detection limit in 129 of the samples (94%).

Exceedances of PCB BCLs in Shallow Soils

As shown on Figure 4-10 (Tables 4-4, 4-5, 4-6, 4-7 and 4-8), PCBs have been detected above their BCLs at two locations in the FTF (FTF-16S and FTF-25D) and at one location in the CPA (CPA-10S). These exceedances are summarized below:

Aroclor-1254

A total of 76 samples from shallow soil were analyzed for Aroclor-1254, with two samples (3%) exceeding the BCL of 0.826 mg/kg. Concentrations exceeding the BCL ranged between 1.07 mg/kg and 3.96 mg/kg. Aroclor-1254 was not detected at concentrations exceeding the laboratory detection limit in 73 of the samples (96%).

Aroclor-1260

A total of 76 samples from shallow soil were analyzed for Aroclor-1260, with one samples (1%) exceeding the BCL of 0.826 mg/kg. The concentration detected at a concentration exceeding the BCL was 1.07 mg/kg. Aroclor-1260 was not detected at concentrations exceeding the laboratory detection limit in 75 of the samples (99%).

Exceedances of PCB BCLs in Deep Soils

As shown on Figure 4-11 (Tables 4-5, 4-6, 4-7 and 4-8), out of a total of 107 samples analyzed, PCBs were not detected at concentrations above BCLs in deep soil within or in the vicinity of the CPA or FTF.

PCB Congeners

A total of 17 soil samples (16 primary samples and one duplicate sample) were collected from approximate 10-ft intervals in the vadose zone beneath former Pond 6 within the CPA during the recent investigation [Geosyntec, 2010b]. In accordance with comments received from NDEP on the above-referenced NDEP-approved report [NDEP, 2010b], and in the absence of promulgated congener-specific BCLs, individual PCB congener results from this investigation have been compared to 1/10th of the Total PCB BCL for: (i) an indoor industrial/commercial worker; and (ii) an outdoor industrial/commercial worker.

None of the 17 soil samples reported individual PCB congener results above 1/10th of the Total PCBs BCL for an indoor industrial/commercial worker (maximum individual concentrations were 1/26th of the BCL). Only one of the 17 soil samples analyzed (the duplicate sample collected at CPA-13 at 10 ft bgs) reported individual PCB congeners at levels just above 1/10th (up to 1/8th) of the Total PCBs BCL for an outdoor industrial/commercial worker, including: PCB 37, 86, 87, 97, 111, 115, 116, 117, 125, and 166.

A marked difference was noted between the PCB congener results reported between the primary and duplicate samples collected at CPA-13 at 10 ft bgs, with relative percent differences ranging between 134% and 199%. It is likely that this poor agreement between primary and duplicate sample is a function of heterogeneous PCB distribution in soil. Based on the limited number of detections of PCB congeners in the soil samples analyzed and at the low concentrations summarized above, the presence of PCB congeners at levels above 1/10th the outdoor industrial/commercial worker Total PCB BCL is isolated to one sample location (CPA-13) at 10 ft bgs.

Exceedances of Inorganic BCLs in Shallow and Deep Soil

As shown on Figures 4-12 and 4-13 (Tables 4-4, 4-5, 4-7 and 4-8), the majority of soil boring locations at the CPA-FTF area reported a BCL exceedance of arsenic, which is the only inorganic compound detected at concentrations above its BCL (1.77 mg/kg) in shallow and deep soil within the CPA and FTF. These exceedances are summarized below:

Arsenic in Shallow Soil

A total of 70 samples from shallow soil were analyzed for arsenic, with 63 samples (90%) exceeding the BCL of 1.77 mg/kg. Concentrations exceeding the BCL ranged between 1.8 mg/kg and 13.9 mg/kg. Arsenic was not detected at concentrations exceeding the laboratory detection limit in just one of the samples (1%).

Arsenic in Deep Soil

A total of 47 samples from deep soil were analyzed for arsenic, with 47 samples (100%) exceeding the BCL of 1.77 mg/kg. Concentrations exceeding the BCL ranged between 2.1 mg/kg and 32.2 mg/kg.

As noted above, arsenic has been detected in and around the CPA and FTF at concentrations exceeding the BCL of 1.77 mg/kg; however, regional background levels for arsenic in Qal soils from the McCullough Range have been reported up to 7.2 mg/kg for shallow soil and up to 13.1 mg/kg for soil deeper than 10 ft bgs [ERM-West, 2010]. With the exception of one boring location (FTF-07D), the range of reported arsenic concentrations in shallow soil at the CPA and FTF are within the McCullough Range concentrations as shown on Figure 4-14. Arsenic concentrations in the deep soils in the vicinity of the CPA and FTF exceed the Qal McCullough Range background values at several locations as shown on Figure 4-15.

Surface Soil Sampling for Asbestos

Former Tank Farm

A total of four surface soil samples (three primary samples, one duplicate sample) at the Former Tank Farm area were analyzed for the presence of asbestos structures by USEPA Method 540-R-97-028, as presented in Table 4-10. Total protocol asbestos structures were detected in two of the four surface soil samples analyzed, at FTF-38 and FTF-41 (Figure 4-16).

In surface sample FTF-38, two “long” chrysotile-like structures were observed that were within the NDEP protocol dimensions of less than (<) 0.4 micrometers (μm) in diameter and greater than (>) 10 μm in length (NDEP, 2011). The asbestos concentration for long structures (5.98E+06 structures per gram of particulate matter 10 micron size) in this sample was derived by multiplying the number of “long” fibers (or structures) observed (unitless) by the sample analytical sensitivity (2.99E+06 structures/g PM10).

In surface sample FTF-41, ten “long” amphibole structures were observed that were within the NDEP protocol dimensions of <0.4 μm in diameter and >10 μm in length (NDEP, 2011) out of the 13 total protocol asbestos structures that were observed in this sample. The other three structures detected in sample FTF-41 were within the protocol dimensions of <0.4 μm in diameter and were >5 μm but <10 μm in length. The asbestos concentration for long structures in sample FTF-41 is 2.98E+07 structures/g PM10.

The number of structures and the analytical sensitivities were used as input into the NDEP asbestos calculation spreadsheet (Appendix I). The estimated cancer risks from potential exposure to the two "long" chrysotile-like structures observed in sample FTF-38 were 2E-08 for an outdoor industrial/commercial worker and 7E-09 for an indoor industrial/commercial worker. These risk estimates were below the target risk management range of 1E-06 to 1E-04. The estimated cancer risks from potential exposure to the ten "long" amphibole structures observed in sample FTF-41 were 5E-06 for an outdoor industrial/commercial worker and 2E-06 for an indoor industrial/commercial worker. These risk estimates were within the target risk management range of 1E-06 to 1E-04.

Former Plant Site and Dichlorobenzil Warehouse

No detections of asbestos were observed in four soil samples collected from the Former Plant Site area (Figure 4-16). In the Dichlorobenzil Warehouse area to the east of the CPA area, no detections were observed in the 17 soil samples analyzed for asbestos (Figure 4-16). These data from the nearby areas are provided in Table 4-10.

Nature and Extent of Asbestos in Surface Soil

Detections of asbestos in surface soil appear to be isolated to the eastern portion of the FTF. Asbestos was detected in two of 25 samples at concentrations ranging from 5.98E+06 structures/g PM10 in FTF-38 and 2.98E+07 structures/g PM10 in FTF-41.

As discussed above, the cancer risk estimates from potential exposures to asbestos detected in soil were within the target risk management range of 1E-06 to 1E-04. Therefore, asbestos detected in soil at the Site do not appear to pose a human health risk for industrial/commercial workers.

4.3.2 Comparison of Soil to Leaching Basic Comparison Levels (LBCLs)

In addition to characterizing the vadose zone through field observations and the comparison of soil sample results with BCLs, concentrations of chemicals detected in soil were compared to LBCLs to evaluate potential soil leaching to the groundwater migration pathway. In accordance with NDEP guidance, the LBCLs were based on a default dilution attenuation factor (DAF) of 20, which is appropriate given the size of the CPA-FTF and the depth to groundwater which is approximately 40 - 60 ft bgs. A default DAF of 20 was selected as protective for contaminated soil sources based on the modeling and weight-of-evidence approach discussed in the EPA Soil Screening Guidance [EPA, 1996]. This DAF was based on a methodology that only accounts for the physical process of contaminant leachate dilution in groundwater and does not account for other attenuation processes such as biological or chemical degradation

during transport through the unsaturated soil zone [EPA, 1996]. Additionally, DAF20 is an appropriate metric given the absence of utilities within and in the vicinity of the CPA-FTF, which would provide a source of infiltrating water. In addition, the observation that rising groundwater levels are observed in MW-1, the well upgradient of the CPA, supports the hypothesis that groundwater recharge and presumably infiltration occurs upgradient of the CPA. As a result, it is unlikely that there is an anthropogenic source of infiltrating water in the CPA Area that would justify a higher leaching factor.

Exceedances of Volatile Organic Compound LBCLs in Shallow Soil

As shown on Figure 4-17 (and in Tables 4-4, 4-5, 4-6, 4-7 and 4-8), there are no VOCs that were detected in exceedance of their respective LBCLs in the shallow soil around and within the CPA. LBCL exceedances are present in shallow soil in the northern extent of the FTF at eight locations. The cross sections presented on Figure 4-5 show the vertical distribution of the Prevalent Compounds relative to LBCLs in the soil borings advanced in the FTF. Detections of the Prevalent Compounds are summarized below:

Benzene

A total of 89 samples from shallow soil were analyzed for benzene, with no samples exceeding the LBCL of 0.04 mg/kg and benzene not detected at concentrations exceeding the laboratory detection limit in 70 of the samples (79%).

Chlorobenzene

A total of 89 samples from shallow soil were analyzed for chlorobenzene, with five samples (6%) exceeding the LBCL of 1.4 mg/kg. Detected concentrations exceeding the LBCL ranged between 1.82 mg/kg and 66.3 mg/kg. Chlorobenzene was not detected at concentrations exceeding the laboratory detection limit in 76 of the samples (86%).

Chloroform

A total of 89 samples from shallow soil were analyzed for chloroform, with one sample (1%) exceeding the LBCL of 0.6 mg/kg. The concentration detected at a level exceeding the LBCL was 0.77 mg/kg. Chloroform was not detected at concentrations exceeding the laboratory detection limit in 28 of the samples (31%).

1,2-DCB

A total of 89 samples from shallow soil were analyzed for 1,2-DCB, with five samples (6%) exceeding the LBCL of 18 mg/kg. Detected concentrations exceeding the LBCL ranged between 117.7 mg/kg and 2,140 mg/kg. 1,2-DCB was not detected at concentrations exceeding the laboratory detection limit in 66 of the samples (74%).

1,4-DCB

A total of 89 samples from shallow soil were analyzed for 1,4-DCB, with eight samples (9%) exceeding the LBCL of 2 mg/kg. Detected concentrations exceeding the LBCL ranged between 2.89 mg/kg and 1,712 mg/kg. 1,4-DCB was not detected at concentrations exceeding the laboratory detection limit in 60 of the samples (67%).

Exceedances of Volatile Organic Compound LBCLs in Deep Soil

As shown on Figure 4-18 (and in Tables 4-5, 4-6, 4-7, 4-8 and 4-9), LBCL exceedances are present in deep soil at several locations from the southern boundary of the CPA to the northern extent of the FTF. Exceedances of the Prevalent Compounds are summarized below:

Benzene

A total of 162 samples from deep soil were analyzed for benzene, with 36 samples (22%) exceeding the LBCL of 0.04 mg/kg. Detected concentrations exceeding the LBCL ranged between 0.06 mg/kg and 64.3 mg/kg. Benzene was not detected at concentrations exceeding the laboratory detection limit in 100 of the samples (64%).

Chlorobenzene

A total of 162 samples from deep soil were analyzed for chlorobenzene, with 36 samples (22%) exceeding the LBCL of 1.4 mg/kg. Detected concentrations exceeding the LBCL ranged between 1.61 mg/kg and 24,120 mg/kg. Chlorobenzene was not detected at concentrations exceeding the laboratory detection limit in 108 of the samples (67%).

Chloroform

A total of 162 samples from deep soil were analyzed for chloroform, with 71 samples (45%) exceeding the LBCL of 0.6 mg/kg. Detected concentrations exceeding the LBCL ranged between 0.6 mg/kg and 79.1 mg/kg. Chloroform was not detected at concentrations exceeding the laboratory detection limit in 28 of the samples (17%).

During the most recent soil investigation conducted in the vicinity of Pond 6 [Geosyntec, 2010b], chloroform was reported at concentrations exceeding the LBCL at 50 ft bgs (which is below the water table) in CPA-13 and CPA-14A, and 40 ft bgs and 50 ft bgs in CPA-15A, as shown on Figures 4-3 and 4-4. The cross sections presented as Figure 4-5 show the vertical distribution of the Prevalent Compounds relative to LBCLs in the soil borings advanced in the FTF.

1,2-DCB

A total of 162 samples from deep soil were analyzed for 1,2-DCB, with 18 samples (11%) exceeding the LBCL of 18 mg/kg. Concentrations exceeding the LBCL ranged between 18.8 mg/kg and 6,298 mg/kg. 1,2-DCB was not detected at concentrations exceeding the laboratory reporting limit in 109 of the samples (69%).

1,4-DCB

A total of 162 samples from deep soil were analyzed for 1,4-DCB, with 27 samples (17%) exceeding the LBCL of 2 mg/kg. Concentrations exceeding the LBCL ranged between 2.55 mg/kg and 7,236 mg/kg. 1,4-DCB was not detected at concentrations exceeding the laboratory limit in 107 of the samples (68%).

Exceedances of Semi-Volatile Organic Compound LBCLs in Shallow Soil

As shown on Figure 4-19 (and Tables 4-4, 4-5, 4-6, 4-7 and 4-8), SVOC concentrations exceeded their respective LBCL values in shallow soil in soil borings located within and in the vicinity of the CPA-FTF. These exceedances are summarized below:

2,2-/4,4-Dichlorobenzil

A total of 76 samples from shallow soil were analyzed for 2,2-/4,4-dichlorobenzil, with seven samples (9%) exceeding the LBCL of 0.006 mg/kg. Concentrations exceeding the LBCL ranged between 0.26 mg/kg and 7.6 mg/kg. 2,2-/4,4-dichlorobenzil was not detected at concentrations exceeding the laboratory limit in 70 of the samples (92%).

Hexachlorobenzene

A total of 89 samples from shallow soil were analyzed for hexachlorobenzene, with two samples (2%) exceeding the LBCL of 2 mg/kg. Concentrations for the two samples exceeding the LBCL were 2.46 mg/kg and 3.53 mg/kg. Hexachlorobenzene was not detected at concentrations exceeding the laboratory limit in 85 of the samples (96%).

Pentachlorophenol

A total of 89 samples from shallow soil were analyzed for pentachlorophenol, with two samples (2%) exceeding the LBCL of 0.02 mg/kg. Concentrations for the two samples exceeding the LBCL were 0.59 mg/kg and 0.64 mg/kg. Pentachlorophenol was not detected at concentrations exceeding the laboratory limit in 87 of the samples (98%).

Exceedances of Semi-Volatile Organic Compound LBCLs in Deep Soil

As shown on Figure 4-20 (and in Tables 4-5, 4-6, 4-7, 4-8 and 4-9), out of samples analyzed, SVOCs were only detected once in deep soil at concentrations greater than their respective LBCLs as summarized below.

Hexachlorobenzene

A total of 107 samples from deep soil were analyzed for hexachlorobenzene, with one samples (0.9%) exceeding the LBCL of 2 mg/kg. The concentration for the sample exceeding the LBCL was 4.8 mg/kg. Hexachlorobenzene was not detected at concentrations exceeding the laboratory limit in 106 of the samples (99%).

Exceedances of Pesticide LBCLs in Shallow Soil

As shown on Figure 4-21 (Tables 4-4, 4-5, 4-6, 4-7 and 4-8), pesticide LBCL exceedances are present in shallow soil at multiple locations within the CPA and FTF. These exceedances are summarized below:

Alpha-BHC

A total of 77 samples from shallow soil were analyzed for alpha-BHC, with 12 samples (16%) exceeding the LBCL of 0.0006 mg/kg. Concentrations exceeding the LBCL ranged between 0.002 mg/kg and 1.07 mg/kg. Alpha-BHC was not detected at concentrations exceeding the laboratory detection limit in 66 of the samples (86%).

Beta-BHC

A total of 77 samples from shallow soil were analyzed for beta-BHC, with 21 samples (27%) exceeding the LBCL of 0.002 mg/kg. Concentrations exceeding the LBCL ranged between 0.003 mg/kg and 10.7 mg/kg. Beta-BHC was not detected at concentrations exceeding the laboratory detection limit in 57 of the samples (74%).

Dieldrin

A total of 77 samples from shallow soil were analyzed for dieldrin, with two samples (3%) exceeding the LBCL of 0.004 mg/kg and dieldrin not detected at concentrations exceeding the laboratory detection limit in 75 of the samples (97%). Concentrations exceeding the LBCL ranged between 0.02 mg/kg and 0.2 mg/kg.

Gamma-BHC (Lindane)

A total of 77 samples from shallow soil were analyzed for lindane, with two samples (3%) exceeding the LBCL of 0.01 mg/kg. Concentrations exceeding the LBCL ranged between 0.09 mg/kg and 0.3 mg/kg. Lindane not detected at concentrations exceeding the laboratory detection limit in 75 of the samples (97%).

Exceedances of Pesticide LBCLs in Deep Soil

As shown on Figure 4-22 (and in Tables 4-5, 4-6, 4-7, 4-8 and 4-9), pesticides have been detected in deep soil within the FTF and CPA at concentrations greater than the LBCLs. These exceedances are summarized below:

Alpha-BHC

A total of 141 samples from deep soil were analyzed for alpha-BHC, with 23 samples (16%) exceeding the LBCL of 0.0006 mg/kg. Concentrations exceeding the LBCL ranged between 0.001 mg/kg and 2.3 mg/kg. Alpha-BHC was not detected at concentrations exceeding the laboratory detection limit in 119 of the samples (84%).

Beta-BHC

A total of 137 samples from deep soil were analyzed for beta-BHC, with ten samples (7%) exceeding the LBCL of 0.002 mg/kg. Concentrations exceeding the LBCL ranged between 0.004 mg/kg and 0.25 mg/kg. Beta-BHC was not detected at concentrations exceeding the laboratory detection limit in 128 of the samples (93%).

Gamma-BHC (Lindane)

A total of 141 samples from deep soil were analyzed for lindane, with six samples (4%) exceeding the LBCL of 0.01 mg/kg. Concentrations exceeding the LBCL ranged between 0.02 mg/kg and 1.5 mg/kg. Lindane was not detected at concentrations exceeding the laboratory detection limit in 136 of the samples (96%).

Dieldrin

A total of 137 samples from deep soil were analyzed for dieldrin, with one sample (1%) exceeding the LBCL of 0.004 mg/kg. The concentration detected at a level exceeding the LBCL was 0.007 mg/kg. Dieldrin not detected at concentrations exceeding the laboratory detection limit in 136 of the samples (99%).

Exceedances of Inorganic LBCLs in Shallow Soil

Inorganics have been detected in shallow soil at concentrations greater than the LBCLs in soil samples collected from multiple locations within the CPA and FTF (Figure 4-23). In addition, the LBCLs were also compared to their corresponding McCullough Range regional background levels [NDEP, 2007]. Aluminum, iron, magnesium, and manganese had regional background levels greater than the LBCLs. As shown in Figure 4-25 and Tables 4-4, 4-5, 4-7, and 4-8, these are the same metals that are detected above their LBCLs. These exceedances and their comparisons to the regional background levels are summarized below:

Aluminum

A total of 70 samples from shallow soil were analyzed for aluminum, with each sample exceeding the LBCL of 1,500 mg/kg. Concentrations exceeding the LBCL ranged between 4,922 mg/kg and 24,610 mg/kg. It should be noted that, with the exception of three soil samples (FTF-19S at 0.5 and 5 ft bgs and FTF-26D at 5 ft bgs), the range of reported aluminum concentrations for the CPA-FTF are within the general range of regional background levels [NDEP, 2007]. The findings of Neptune's study suggest aluminum background levels up to 15,300 mg/kg.

Iron

A total of 70 samples from shallow soil were analyzed for iron, with each sample exceeding the LBCL of 151 mg/kg. Concentrations exceeding the LBCL ranged between 6,420 mg/kg and 25,680 mg/kg. It should be noted that, with the exception of two locations (FTF-26D at 5 ft bgs and CPA-13 at 10 ft bgs), the range of reported iron concentrations for the CPA-FTF are within the general range of regional background levels, which suggest iron background levels up to 22,500 mg/kg [NDEP, 2007].

Magnesium

A total of 70 samples from shallow soil were analyzed for magnesium, with detections in each sample, including four samples (6%) exceeding the LBCL of 13,000 mg/kg. Concentrations exceeding the LBCL ranged between 13,910 mg/kg and 16,050 mg/kg.

It should be noted that the range of reported magnesium concentrations for the CPA-FTF are within the general range of regional background levels, which suggest magnesium background levels up to 17,500 mg/kg [NDEP, 2007].

Manganese

A total of 70 samples from shallow soil were analyzed for manganese, with each sample exceeding the LBCL of 65.2 mg/kg. Concentrations exceeding the LBCL ranged between 160 mg/kg and 824 mg/kg. The range of reported manganese concentrations are within the general range of regional background levels for the CPA-FTF, which suggests manganese background levels up to 863 mg/kg [NDEP, 2007].

Exceedances of Inorganic LBCLs in Deep Soil

Inorganics have also been detected in deep soil at concentrations greater than the LBCLs in soil samples collected from multiple locations within the CPA and FTF (Figure 4-24 and in Tables 4-5, 4-7, and 4-8). The LBCLs were also compared to their corresponding McCullough Range regional background levels [NDEP, 2007]. Aluminum, iron, magnesium and manganese had regional background levels greater than the LBCLs. The concentrations of those inorganics were compared to the regional background levels in Figure 4-25. These exceedances are summarized below:

Aluminum

A total of 47 samples from deep soil were analyzed for aluminum, with each sample exceeding the LBCL of 1,500 mg/kg. Concentrations exceeding the LBCL ranged between 6,432 mg/kg and 22,780 mg/kg. It should be noted that, with the exception of nine locations (CPA-07D, CPA-15A, FTF-12D, FTF-21D, FTF-22D, FTF-23D, FTF-24D, FTF-26D, and FTF-27D), the range of reported aluminum concentrations are within the general range of regional background levels for the CPA-FTF, which suggest aluminum background levels up to 15,300 mg/kg [NDEP, 2007].

Arsenic

A total of 47 samples from deep soil were analyzed for arsenic with detections in each sample, including 11 samples (23%) exceeding the LBCL of 20 mg/kg. Concentrations exceeding the LBCL ranged between 20.1 mg/kg and 32.2 mg/kg.

Barium

A total of 47 samples from deep soil were analyzed for barium, with detections in each sample, including one sample (2%) exceeding the LBCL of 1640 mg/kg. The concentration that exceeded the LBCL was 1,742 mg/kg.

Iron

A total of 47 samples from deep soil were analyzed for iron, with each sample exceeding the LBCL of 151 mg/kg. Concentrations exceeding the LBCL ranged between 6,030 mg/kg and 23,540 mg/kg. It should be noted that, with the exception of three locations (CPA-13, FTF-26D, and CPA-15A), the range of reported iron concentrations for the CPA-FTF are within the general range of regional background levels, which suggest iron background levels up to 19,700 mg/kg [NDEP, 2007].

Magnesium

A total of 47 samples from deep soil were analyzed for magnesium, with detections in each sample, including 39 samples (83%) exceeding the LBCL of 13,000 mg/kg. Concentrations exceeding the LBCL ranged between 14,740 mg/kg and 33,500 mg/kg. It should be noted that, with the exception of fourteen locations (CPA-01D, CPA-03D, CPA-05D, CPA-07D, CPA-15A, FTF-07D, FTF-09D, FTF-10D, FTF-12D, FTF-21D, FTF-23D, FTF-24D, FTF-26D, and FTF-27D), the range of reported magnesium concentrations for the CPA-FTF are within the general range of regional background levels, which suggest magnesium background levels up to 17,500 mg/kg [NDEP, 2007].

Manganese

A total of 47 samples from deep soil were analyzed for manganese, with each sample exceeding the LBCL of 65.2 mg/kg. Concentrations exceeding the LBCL ranged between 91.1 mg/kg and 616 mg/kg. The range of reported manganese concentrations for the CPA-FTF are within the general range of regional background levels, which suggests manganese background levels up to 863 mg/kg [NDEP, 2007].

4.4 Soil Vapor

A soil vapor investigation was conducted in 2010 to evaluate the lateral and vertical distribution of VOCs in soil vapor in the vicinity of the FTF and to assess whether VOCs, if present, are migrating via vapor from groundwater or from a potential source in the vadose zone [Geosyntec, 2010c]. A summary of the soil vapor investigation is included in Appendix C.

No structures/buildings are currently located within the CPA-FTF area. Therefore, under current conditions, the indoor air exposure pathway for industrial/commercial workers is not considered a complete exposure pathway at the FTF and CPA. If, however, under future conditions, the Site were to be redeveloped with construction of buildings, then the indoor air exposure pathway for industrial/commercial workers may be considered a complete exposure pathway. In a future human health risk assessment for the CPA and FTF areas, soil vapor data will be evaluated for the vapor intrusion pathway. Current industrial/commercial workers are assumed to occasionally conduct activities outdoors (e.g., well monitoring and cap maintenance) within the CPA or FTF areas and are assumed to infrequently traverse the FTF to access adjacent areas. Therefore, the outdoor air exposure pathway was evaluated for this outdoor worker using the soil vapor concentration data collected from FTF and CPA. Because NDEP BCLs do not exist for the soil vapor to outdoor air pathway, soil vapor screening levels were developed for this pathway [Geosyntec, 2011b] and were used for comparison to CPA-FTF soil vapor data.

A series of vertical soil vapor profiles was collected at the locations shown on Figure 4-26. At these locations soil vapor samples were collected at depths of 5, 10 ft, 20 ft, and approximately 30 ft (Table 4-11). At each of these locations, soil vapor concentrations increased with increasing depth, with the highest concentrations detected at the sample location closest to groundwater. These data indicate that off-gassing from groundwater contributes to soil vapor concentrations.

4.5 Groundwater

Groundwater beneath the CPA-FTF area merges with and become integrated with groundwater flowing beneath the entire western portion of the BMI complex. Chemical transport from the CPA-FTF area combines with impacts from other downgradient sources, giving rise to a Site-wide groundwater plume that is currently being captured and treated at the downgradient GWTS [Hargis, 2010]. A plume capture analysis for the GWTS is currently ongoing and included in the quarterly groundwater reports for the Site.

Because Site-wide groundwater issues for the former Stauffer and Montrose sites are collectively being addressed in the Site-wide groundwater RAS process, the following discussion is limited to provide the reader with an overview of groundwater conditions in the immediate area of the CPA-FTF. Discussion and evaluation of Site-wide migration downgradient will be subsequently provided by larger groundwater RAS process.

The following sections describe the groundwater conditions beneath and in the near vicinity of the CPA-FTF area, and focus on groundwater occurrence, water levels and

contaminant concentrations. Because there are a limited number of wells within the CPA-FTF boundary, the following discussion of groundwater uses an expanded distribution of wells including several wells that are either downgradient or cross-gradient from the CPA-FTF. This expanded distribution provides additional information that helps to better characterize the groundwater conditions within the CPA-FTF area.

4.5.1 Shallow Zone

The water table, which defines the top of the Shallow Zone, intersects the contact between the coarse-grained alluvial sediments and the underlying fine grained lacustrine sediments of the UMCf at the CPA and FTF. As depicted on Figures 3-3 and 3-4, the water table occurs in the UMCf south of the CPA, and within the alluvium/transition zone north of the FTF.

There are 16 monitor wells within the vicinity of the CPA-FTF area that characterize conditions in the Shallow Zone (Figure 4-26). Groundwater monitor wells MW-2, MW-3, MW-4 and PW-01 are the nearest wells downgradient of the CPA, and thus are most representative of conditions associated with releases from the CPA. Wells AA-MW-21, AA-MW-22 and EC-05 are downgradient of both the CPA and FTF, thus conditions characterized by these wells are indicative of the integrated impact of the CPA and FTF.

In the following sections, groundwater analytical data are compared to EPA groundwater MCLs to provide an understanding of the nature and extent of groundwater impacts. For compounds that do not have an MCL, but do have a NDEP BCL, the BCL is used for comparison. The following summaries are organized by analyte group with MCL/BCL exceedances highlighted in Table 4-12 and depicted spatially on the figures that are referenced in the subsections that follow.

<u>VOCs</u>

A limited number of VOCs (20) have been detected at concentrations above their respective MCL/BCL in groundwater samples collected from the CPA-FTF area monitoring wells (Table 4-12). However, the elevated concentrations of the Prevalent Compounds (having been quantified at up to 1% of their aqueous solubility at some locations) have resulted in elevated detection limits for some of the other compounds. Nonetheless, the occurrence and distribution of Prevalent Compounds provides an appropriate basis for characterizing VOC impacts in the CPA-FTF and its vicinity.

As shown on Figure 4-26, the Prevalent Compounds have been detected at concentrations exceeding their respective MCL/BCLs in groundwater monitor wells and

the grab samples. Concentrations beneath the northern boundary show that dissolved phase concentrations continue to migrate downgradient beyond the FTF. Specific information for the Prevalent Compounds (benzene, chlorobenzene, 1,2-DCB, 1,4-DCB and chloroform) is provided below:

Benzene

As shown on Figure 4-28, since 2006 benzene has consistently been detected at concentrations exceeding its MCL of 5 micrograms per liter (µg/L) in wells MW-2, MW-3, and MW-4 located downgradient of the CPA. As noted earlier, these three wells and MW-1 are part of the ongoing RCRA post-closure monitoring program. Concentrations of benzene detected in these wells have remained relatively constant since at least April 2003.

Benzene has not been detected in upgradient well MW-1 since September 2004 and has not exceeded its MCL since June of 2004 and has never been detected at a concentration exceeding its MCL in upgradient well H-11 (Figure 4-28 and Table 4-12). Benzene was not detected in the groundwater grab sample collected from boring CPA-13 advanced adjacent to the northern edge of Pond 6 (Figure 4-28). Benzene has been detected in downgradient well AA-MW-20 at concentrations ranging between 94,000 µg/L in 2008 (first sampling event) and 45,000 µg/L when it was sampled in May 2010. During the most recent sampling events conducted in 2010, benzene was detected in downgradient monitor wells at concentrations ranging between 740 µg/L in MW-3 to 45,000 µg/L in AA-MW-20.

Chlorobenzene

Chlorobenzene concentrations detected since 2006 are presented on Figure 4-29. Chlorobenzene has not been detected in upgradient wells AA-MW-24, MW-1 and H-11 at concentrations exceeding its MCL of 100 µg/L (Figure 4-29 and Table 4-12). Chlorobenzene was not detected in the groundwater grab sample collected from boring CPA-13, advanced adjacent to the northern edge of Pond 6 (Figure 4-29). The spatial trend of chlorobenzene concentrations is similar to benzene concentrations discussed above, with the highest concentrations detected in AA-MW-20, AA-MW-21 and MW-3, which are located downgradient of the CPA. During the sampling events conducted in 2010, chlorobenzene was detected in downgradient monitor wells at concentrations ranging between 1,700 µg/L in MW-2 to 29,000 µg/L in AA-MW-20.

Chloroform

Chloroform concentrations detected since 2006 are presented on Figure 4-30. The spatial trend of chloroform concentrations is similar to benzene and chlorobenzene

concentrations discussed above; however, detections in compliance monitor well MW-2 tend to be higher than the remaining monitor well network. During the most recent sampling events conducted in, chloroform was detected in downgradient wells at concentrations ranging between 3,100 µg/L in MW-4 to 97,000 µg/L in MW-2. Chloroform has not exceeded its MCL of 80 µg/L in upgradient compliance monitor well MW-1 since April 2004 and has never been detected in upgradient well H-11 (Figure 4-30 and Table 4-12). Chloroform was detected at a concentration of 1,200 µg/L in the groundwater grab sample collected from boring CPA-13 advanced adjacent to the northern edge of Pond 6.

1,2-DCB

1,2-DCB concentrations detected since 2006 are presented on Figure 4-31. 1,2-DCB has not been detected at concentrations exceeding its MCL of 600 µg/L in upgradient compliance monitor well MW-1 and groundwater monitor wells H-11 and AA-MW-24 (Figure 4-31 and Table 4-12) and it was not detected in the groundwater grab sample collected from boring CPA-13 advanced adjacent to the northern edge of Pond 6. 1,2-DCB concentrations do not exhibit increasing or decreasing trends, but fluctuate in various concentration ranges (Figure 4-31) with the highest concentrations detected in MW-3. During the sampling events conducted in 2010, 1,2-DCB was detected in downgradient wells at concentrations ranging between 1,200 µg/L in AA-MW-20 to 29,000 µg/L in MW-3 and PW-01.

1,4-DCB

1,4-DCB concentrations detected since 2006 are presented on Figure 4-32. 1,4-DCB has not exceeded its MCL of 75 µg/L in upgradient compliance monitor well MW-1 since June 2004 and has never been detected in upgradient well H-11 (Figure 4-32 and Table 4-12). 1,4-DCB was not detected in the groundwater grab sample collected from boring CPA-13 advanced adjacent to the northern edge of Pond 6. The trend of 1,4-DCB concentrations is similar to that of 1,2-DCB as described above, with the highest concentrations detected in MW-3 and PW-01. During the sampling events conducted in 2010, 1,4-DCB was detected in downgradient wells at concentrations ranging between 1,100 µg/L in AA-MW-20 to 29,000 µg/L in MW-3 and PW-01.

Temporal Trends of VOC Prevalent Compounds

Temporal VOC concentration trends are discussed relative to wells MW-1, MW-2, MW-3, and MW-4 in the Shallow Zone, because these wells have the longest sampling history. These wells have been monitored at least semi-annually since May 1989 as part of the CPA RCRA post-closure activities and reported regularly.

A complete evaluation of chloroform trends within MW-1 through MW-4 relative to groundwater flow direction is included in **Appendix E**. Most of the Indicator Compound concentrations show stable trends over time within varying ranges (Table 4-12 and Figures 4-33 through 4-37). The exceptions are benzene, which exhibits decreasing trends (Figure 4-33), and chloroform (Figure 4-35), which exhibits a decreasing trend in MW-4 and an increasing trend in MW-2. The increasing trend in MW-2 appears to have stabilized in 2006, when concentrations reached similar levels as historically observed in MW-4, fluctuating between 80,000 and 120,000 µg/L (Figure 4-35).

The chloroform trends (**Appendix E)**, although different from other Prevalent Compounds, are consistent with changes in groundwater elevation and flow direction over the same time period (1989 to 1999). Although the primary groundwater flow direction through the CPA is south to north, variations in a westward or eastward flow component have been observed. Groundwater elevations were relatively stable within the CPA during the period from May 1989, when the monitoring program began, to November 1998. However, from November 1998 to October 2007 groundwater elevations increased approximately 8 feet in downgradient compliance wells MW-2, MW-3 and MW-4 and approximately 10 feet in MW-1, the upgradient compliance well. If chloroform residues (e.g., DNAPL residual) were present, then the rise in water levels and subsequent change in groundwater flow direction could explain the increase in chloroform concentrations in the samples from Well MW-3 and MW-2. The observation that chloroform is the only Indicator Compound that shows spatial-temporal trends that are coincident with changes in groundwater elevation and flow direction could be an indication that there is a discrete (smaller) high concentration source of chloroform closer to wells MW-2 and MW-4 than the source of other Prevalent Compounds which may be more broadly distributed and farther from wells MW-2 and MW-4.

Non-Prevalent VOCs

For comparative purposes, the distribution and frequency with which non-Prevalent Compounds have been detected in the Shallow Zone at concentrations above their respective MCL/BCL are presented on Figure 4-38. There are no non-Indicator Compound VOC exceedances in wells without Indicator Compound exceedances.

Most of these other VOC MCL/BCL exceedances have been detected in wells MW-2, MW-3, and MW-4. Figures 4-38 and 4-26 show that the distribution of Prevalent Compounds VOC exceedances encompasses broader coverage than non-Indicator VOC exceedances in the vicinity of the CPA-FTF. For example, there are no non-Indicator VOCs detected in groundwater monitor wells AA-MW-05 and AA-MW-22 or the

groundwater sample collected from CPA-13; however, there are Indicator Compound exceedances at these locations.

SVOCs

As shown on Figure 4-39 and in Table 4-12, SVOC exceedances are limited to two groundwater monitor well locations in the Shallow Zone (MW-3 and AA-MW-24). Results of two sampling events indicate the one exceedance each of 2-chloronapthalene, n-nitrosodimethlamine and n-nitroso-di-n-propylamine in MW-3. Results of three sampling events indicated one exceedance of bis(2-ethylhexyl)phthalate in AA-MW-24) SVOCs were not detected at concentrations above their respective MCLs in other Shallow Zone wells.

Pesticides

The distribution of pesticide MCL/BCL exceedances is presented on Figure 4-40 and in Table 4-12. Pesticides have been consistently detected in wells MW-1, MW-2, MW-3, and MW-4. Pesticide exceedances were observed in MW-01 (5 exceedances), MW-02 (2 exceedances), and MW-03 (6 exceedances). The most prevalent pesticide exceedances detected were b-BHC (3 BCL exceedances in MW-01) and chlordane (6 MCL exceedances in MW-03). BCL exceedances of 4,4-DDE were observed once each in MW-01 and MW-02 out of 32 and 23 sampling events, respectively. Aldrin exceeded its BCL once in MW-02 and a-BHC exceeded its BCL once in MW-01. With the exception of the pesticides mentioned above, no other pesticides exceeded their respective MCL/BCL. The distribution of pesticide exceedances occurs within the distribution of Indicator Compound exceedances; however, pesticide exceedances have been more frequently detected in upgradient well MW-1 than Prevalent Compounds.

Inorganic Parameters

Arsenic

The most prevalent inorganic analyte detected in exceedance of the MCL is arsenic. Arsenic has been detected above its MCL of 0.01 milligrams per liter (mg/L) in 12 of the groundwater wells at and within the vicinity of the CPA-FTF (Figure 4-41 and Table 4-12). It should be noted that upgradient and background groundwater concentrations of arsenic are not known for this region.

TDS

Although TDS has neither an MCL nor a BCL, it will be considered in the Site-wide groundwater process. The distribution of TDS concentrations in the Shallow Zone is

shown on Figure 4-42. TDS increases from less than 1,000 mg/L south of the CPA (MW-1 and H-11) to as high as 16,000 mg/L north of the FTF in groundwater monitor well EC-05. It should be noted that upgradient and background groundwater concentrations of TDS are not known for this region.

Other Inorganics

Other inorganic compounds detected at concentrations exceeding their respective MCLs/BCLs include ammonia (one location), iron (one location), lithium (eight locations), magnesium (four locations), nitrate (one location), perchlorate (ten locations), sulfate (eleven locations), uranium (three locations) and vanadium (one location).

4.5.2 Middle Zone

The following subsections present a comparison of the groundwater data collected from Middle Zone well CP-01 with EPA Region IX groundwater MCLs. MC-MW-09 (located to the east) is not used in this summary, because it is located within the FPS Site Assessment Area. However, MC-MW-09 data are shown in Table-13 and in Figures 4-43 to 4-51.

The following discussion is organized by analyte group with MCL exceedances highlighted in Table 4-13. Figures 4-43 through 4-46 show the occurrence of MCL exceedances in CP-01 over its sampling history. Specific information of the Prevalent Compounds is provided below and shown on Figures 4-47 through 4-51.

Indicator VOC Compounds

Benzene

Benzene concentrations detected since 2004 are presented on Figure 4-47. Benzene has not been detected in well CP-01 since December 2006, and the detection limits are below the MCL. During the most recent sampling event conducted in April 2011, benzene was not detected in CP-01 in the Middle Zone.

Chlorobenzene

Chlorobenzene concentrations detected since 2004 are presented on Figure 4-48. During the sampling event conducted in April 2011, chlorobenzene was detected at a concentration of 2.4 µg/L in CP-01 in the Middle Zone.

Chloroform

Chloroform concentrations detected since 2004 are presented on Figure 4-49. Chloroform was not detected in Well CP-01 from July 2007 to May 2010. During the sampling event conducted in April 2011, chloroform was detected at a concentration of 5 µg/L in CP-01 in the Middle Zone.

1,2-DCB

1,2 -DCB concentrations detected since 2004 are presented on Figure 4-50. During this period, 1,2-DCB has not been detected in Well CP-01 at concentrations exceeding its MCL of 600 µg/L. During the sampling event conducted in April 2011, 1,2-DCB was detected at concentrations of 17 µg/L in CP-01 in the Middle Zone.

1,4-DCB

1,4-DCB concentrations detected since 2004 are presented on Figure 4-51. During this period 1,4-DCB has not been detected in monitor well CP-01 at concentrations exceeding its MCL of 75 µg/L. During the sampling event conducted in April/May 2010, 1,4-DCB was detected at a concentration of 5.4 µg/L in CP-01 in the Middle Zone.

Temporal Trends of Prevalent Compounds

As discussed above, Prevalent Compounds were detected at concentrations exceeding their respective MCLs in CP-01, located in the vicinity of the FTF, approximately 70 feet downgradient of the CPA (Figures 4-43, and 4-47 through 4-51). Well CP-01 was installed in September 2000. At the time of installation, a "slippery orangish-brownish liquid in sandy matrix" indicative of DNAPL was observed in the soil cuttings at a depth of approximately 99 to 100 ft bgs. The screened interval of CP-01 was set at 115 to 125 ft bgs.

As shown in Table 4-13, there have been no MCL exceedances at CP-01 since April 2007. However, the first three sampling events for CP-01 (September 21, 2000; October 2, 2000; and October 24, 2000) showed elevated concentrations of certain compounds, but have declined since then, with the following observations:

- Initially, concentrations of 1,4-DCB and 1,2-DCB were above the MCL; however, they have not exceeded the MCL since October 2000.
- Benzene concentrations have remained below the MCL since January 2007 (Table 4-13).

- Detection limits were elevated through the first three sampling events for CP-01; however, chloroform has not been detected at concentrations exceeding the MCL since October 2004 when detection limits were below the MCL of 80 µg/L (Table 4-13).

The likely explanation is that the initially high concentrations of dichlorobenzenes resulted from cross contamination during drilling, where soil cuttings from higher in the soil column were dragged down into the screened section during drilling. Over time, the groundwater sampling has become more representative of in-situ conditions, which show that the UMCf does not contain MCL exceedances at this location.

Although DNAPL was encountered in CP-01 at a depth of approximately 99 ft bgs (**Appendix D**), the screened interval of CP-01 was constructed below the depth of the observed DNAPL. When groundwater flows parallel to bedding planes, dissolved DNAPL will occur in thin lenses parallel to the bedding planes. Since groundwater containing dissolved DNAPL is not denser than surrounding groundwater it will not sink like DNAPL [Fetter, 1993]. Thus, it is possible for low VOC concentrations to be detected in groundwater samples collected from CP-01 even though DNAPL was observed in this boring.

As a follow-up to this issue, Montrose installed a well (CP-02) in the vicinity of CP-01 (Figure 2-9) that is screened at the depth where DNAPL was noted during the drilling of CP-01 [AECOM, 2013]. The boring for well CP-02 was advanced to a total depth of 115 ft bgs, and the well is constructed with a screened interval from 92 to 102 ft bgs. During advancement of the CP-02 boring, lithology was screened for the presence of VOCs using a FID, and the interval from 83 to 115 ft bgs was screened with FLUTe™ for the presence of DNAPL. No DNAPL was visually observed in the lithologic core recovered from CP-02, and there were no reactions observed on the FLUTE™ ribbon. Subsequent groundwater sampling of well CP-02 detected concentrations of benzene at 0.4% and 0.6% solubility and chloroform at 0.02% and 0.03% solubility. In addition to benzene and chloroform, 1,4-DCB and 1,2-DCB were detected at concentrations ranging from 4% to 5% solubility and 2% to 3% solubility, respectively (AECOM, 2013). A complete summary of the installation and sampling of CP-02 is included in the *DNAPL Investigation Summary Report* prepared by AECOM and submitted to NDEP on December 31, 2013.

<u>Non-Indicator VOCs</u>

For comparative purposes, Non-Indicator VOC Compounds are presented on Figure 4-44. Concentrations of 1,3-DCB (in 2000) and carbon tetrachloride (in 2007)

were each detected at concentrations exceeding their MCLs only once out of the 14 sampling events at CP-01.

SVOCs

There have been no SVOCs detected at concentrations greater than their respective MCLs/BCLs in CP-01 during any of the 8 sampling events.

Pesticides

The frequency of pesticide MCL/BCL exceedances is presented on Figure 4-45. With the exception of one detection of g-BHC out of 12 sampling events in CP-01, no pesticides have been detected at concentrations exceeding their respective MCL/BCL.

Inorganic Parameters

As shown on Figure 4-46, arsenic and lithium are the only inorganic compounds detected above their respective MCL/BCL. Arsenic has been detected consistently above its MCL of 0.01 mg/L (nine out of ten sampling events). Lithium was detected above its BCL during the only sampling event for which it was analyzed.

4.5.3 Deep Zone

Two deep zone wells, DMC-MW-27 and DMC-MW-27R, are located within the CPA-FTF area adjacent to CP-01. The finding that VOCs have been detected in Deep Zone well DMC-MW-27 at concentrations above their respective MCL was unexpected and has led to further evaluations of the integrity of the well and the representativeness of the samples obtained from the Deep Zone. These evaluations concluded that the well construction is suspected of providing a conduit between lithologic zones. The OSSM companies and NDEP agreed to abandon the well and built a replacement well DMC-MW-27R. Therefore, only data from MC-MW-27R is provided in this report. However, Table 4-13 and Figures 4-43 to 4-51 include data from MC-MW-27.

The following discussion is organized by analyte group with MCL exceedances highlighted in Table 4-13. Figures 4-43 through 4-46 show the occurrence of MCL exceedances in DMC-MW-27R over its sampling history. Specific information of the Prevalent Compounds is provided below and shown on Figures 4-47 through 4-51.

Indicator VOC Compounds

Benzene

During the sampling event conducted in December 2011, benzene was not detected in DMC-MW-27R and the detection limit is below the MCL (Figure 4-47).

Chlorobenzene

During the sampling event conducted in December 2011, chlorobenzene was not detected in DMC-MW-27R and the detection limit is below the MCL (Figure 4-48).

Chloroform

During the sampling event conducted in December 2011, chloroform was not detected in DMC-MW-27R and the detection limit is below the MCL (Figure 4-49).

1,2-DCB

During the sampling event conducted in December 2011, 1,2-DCB was not detected in DMC-MW-27R and the detection limit is below the MCL (Figure 4-50).

1,4-DCB

During the sampling event conducted in December 2011, 1,4-DCB was not detected in DMC-MW-27R and the detection limit is below the MCL (Figure 4-51).

Non-Indicator VOCs

For comparative purposes, Non-Prevalent Compounds are presented on Figure 4-44. During the sampling event conducted in December 2011, non-prevalent VOCs were not detected in DMC-MW-27R.

SVOCs

During the sampling event conducted in December 2011, SVOCs were not detected in DMC-MW-27R.

Pesticides

During the sampling event conducted in December 2011, pesticides were not detected in DMC-MW-27R (Figure 4-45).

Inorganic Parameters

A shown on Figure 4-46, arsenic is the only inorganic compounds detected above its respective MCL during the only sampling event for which it was analyzed.

4.6 DNAPL

Several investigations have been conducted to evaluate the presence and distribution of DNAPL within and in the vicinity of the CPA-FTF area. The presence of DNAPL was first observed at approximately 99 ft bgs during the drilling and construction of monitor well CP-01 (SECOR, 2002). Since that time, approximately 40 additional borings have been advanced in the vicinity of the CPA-FTF and field screened for the presence of DNAPL. Additional DNAPL investigations conducted since encountering the limited DNAPL in CP-01 include:

- DNAPL reconnaissance borings RB-01 through RB-08 (Figure 2-6; Hargis, 2008a);
- Field screening for the presence of DNAPL during installation of groundwater monitor wells AA-MW-20 through AA-MW-24 (Figure 2-7, Hargis, 2008b);
- DNAPL reconnaissance borings CPA-13, CPA-14A and CPA-15A (Figure 2-6; Geosyntec, 2010b);
- Field Screening for the presence of DNAPL during installation of soil vapor probes at locations FTF-29 through FTF-42 (Figure 2-8, Geosyntec, 2010c); and
- Field screening for the presence of DNAPL in groundwater wells within and in the vicinity of the CPA-FTF during the DNAPL and Salinity Investigation (Geosyntec, 2011f).
- DNAPL reconnaissance boring CP-02 [AECOM, 2013];

Results of these investigations are summarized in the following sections.

4.6.1 Field Screening of Soil for DNAPL

Approximately 40 borings were screened in the field for the presence of soil contamination and only three borings (CP-01, RB-06 and FTF-35) showed direct evidence of DNAPL. Screening included visual observation, olfactory indications, PID/FID readings (using a 10.6 eV and/or 11.2eV lamp), and exposing the soil core to FLUTe^{TM} ribbon (dye-impregnated fabric) which reacts to separate phase hydrocarbons. The following observations were made.

The borings completed within and north of the CPA show low PID and FID readings (generally less than 10 parts per million by volume [ppmv]) as shown on boring logs (**Appendix D**) and cross sections A-A' through F-F' included in **Appendix G** and low concentrations of SRCs (Tables 4-4 through 4-9) in the vadose zone, indicating that any potential releases of DNAPL from the ponds have not impacted the vadose zone beyond the footprint of the CPA-FTF area.

Direct visual observations of DNAPL in CP-01, RB-06 and FTF-35 are summarized below:

- During construction of monitor well CP-01 a "slippery orangish-brownish liquid in sandy matrix" was observed at a proximately 99 ft bgs (**Appendix D**). The screened interval of CP-01 is constructed from 115 to 125 ft bgs, which is below the depth of the observed DNAPL. No additional indications of DNAPL have been observed in groundwater samples collected from CP-01 and while the well yielded moderate concentrations of VOCs in the first three sampling events (September 21, 2000; October 3, 2000; and October 24, 2000), these VOCs, with the exception benzene detected in 2006, have not been detected at concentrations exceeding their respective BCLs in subsequent sampling events. As noted above, no direct evidence of DNAPL was observed in boring CP-02, which is located adjacent to CP-01 (Figure 2-9). Based on these observations, DNAPL does not appear to be migrating vertically at this time and CP-01 is an effective sentinel well to monitor for vertical migration during subsequent groundwater sampling events.
- Field screening of the continuous soil core at boring RB-06 (Figure 4-26) with a PID indicated the presence of elevated VOCs via headspace readings, including sustained readings above 500 ppmv from 75 ft bgs to approximately 100 ft bgs. A positive FLUTe™ ribbon reaction was approximately 101 ft bgs in RB-06, indicating the presence of DNAPL.
- Regarding FTF-35 (Figure 4-26), soil contamination was inferred when a small reaction was observed (i.e., less than 5 millimeters [mm]) to the dyes impregnated in the FLUTe™ ribbon over the 38 to 40 ft bgs interval (note: groundwater encountered at 35 ft bgs). Such a small and isolated reaction is an indication of residual NAPL saturation levels, and not indicative of pooled NAPL. This reaction coincides with elevated PID readings from headspace screening, including sustained readings above 10,000 ppmv over the interval 30 to 40 ft bgs.

These investigative findings are consistent with the vertical transport of liquids through the vadose zone beneath the footprint of the CPA-FTF, and do not support the presence of DNAPL beyond the pond footprints within the vadose zone. The magnitude and

distribution of soil impacts in the vadose zone directly beneath Ponds 1-5 is not known, largely due to the infeasibility of drilling through the engineered cap. However, conditions beneath Pond 6 (the most likely area where DNAPL would have been found if present) were evaluated using angle drilling techniques. Results of soil data collected from the vadose zone beneath Pond 6 suggest that soils do not represent a significant present-day source of contaminants to groundwater, and there was no indication of residual DNAPL in the three borings that were advanced as part of the Pond 6 investigation (Geosyntec, 2010b).

4.6.2 Nature and Distribution

This section provides a summary of the nature and distribution of DNAPL at the CPA-FTF area based on lines of direct and indirect evidence. Direct evidence includes visual observation of DNAPL in soil core, positive reactions with FLUTe™ ribbon and/or samples collected from wells. Indirect evidence includes FID or PID readings greater than 1,000 ppmv, positive reaction using an optical liquid interface probe, and dissolved phase concentrations greater than five percent of a compound's aqueous solubility.

As described below, DNAPL was observed in limited areas both the vadose zone and in the saturated zone in the vicinity of the CPA-FTF.

Direct Evidence

Direct evidence of DNAPL was observed and included the following:

- Visual observation of DNAPL in soil core from Boring CP-01 at a depth of approximately 99 ft bgs in the saturated zone;
- Positive reaction with FLUTe™ ribbon in Boring FTF-35. The reaction was observed at a depth interval from 38 to 40 ft bgs, which is below the groundwater table that was encountered at a depth of about 35 ft bgs at the time of drilling. The reaction was very small, about one to two millimeters (the size of the tip of a ballpoint pen); and
- Positive reaction with FLUTe™ ribbon in Boring RB-06 at a depth of approximately 101 ft bgs in the saturated zone.

These small and isolated observations are indications of residual DNAPL saturation, and not indicative of pooled DNAPL.

Indirect Evidence

Indirect evidence of DNAPL was observed, and included the following:

- The DNAPL observation in RB-06 coincides with elevated PID readings from headspace screening, including sustained readings above 10,000 ppmv over the interval 30 to 40 ft bgs;
- Field screening of the soil core at boring FTF-07 with a PID indicated the presence of elevated VOCs via headspace readings, including sustained readings greater than 10,000 ppmv from 20 to 50 ft bgs; and
- Field screening of the continuous soil core at boring FTF-36 with a PID indicated the presence of elevated VOCs via headspace readings, including sustained readings above 400 ppmv at 40 ft bgs (note: groundwater was encountered at 38 ft bgs at FTF-36).

As to DNAPL in the downgradient vicinity of the CPA-FTF area, only three of nine wells (CP-01, FTF-35 and RB-06) or DNAPL reconnaissance borings have exhibited direct evidence of DNAPL (Figure 4-52). However, given sufficient chemical mass, DNAPL may have migrated to the more impermeable lithologic zones, as observed in boring CP-01. The degree of migration would have been a function of the density, volume of the release, and the intrinsic properties of the soil.

DNAPL and Salinity Field Screening

In April 2011, Geosyntec conducted a DNAPL and salinity field program designed to produce additional data to augment the current understanding of the occurrence, migration, and fate of DNAPL including the nature and distribution of groundwater salinity. As part of this investigation, groundwater monitor wells located within and in the vicinity of the CPA-FTF area (Figure 4-52) were field screened for the presence of DNAPL using an interface probe and hydrocarbon-reactive paste as described in the NDEP-approved work plan [Geosyntec, 2011d,e]. None of the wells screened within the CPA-FTF area during this investigation showed any evidence of DNAPL [Geosyntec, 2011f].

Based on these results, there is no evidence suggesting the presence of pooled DNAPL within either the CPA or the FTF.

5.0 CONTAMINANT FATE AND TRANSPORT

This Section discusses the fate and transport of contaminants at the CPA-FTF area. While groundwater is discussed in the context of the CPA-FTF area as one of the pathways, broader groundwater issues will be addressed in the upcoming Site-wide Groundwater RAS (e.g., how and where groundwater is migrating downgradient of the CPA-FTF, and how the large upward gradients between the Deep, Middle and Shallow Zones affect contaminant transport).

As a result, the following contaminant fate and transport issues are discussed in this Section for the CPA-FTF area:

- Potential historic release mechanisms at the CPA and FTF;
- Potential transport pathways (i.e., air, soil, soil vapor, groundwater, surface water and sediment pathways); and
- Potential receptors and their exposure pathways.

Figure 5-1 summarizes the CSM for the CPA-FTF area and describes the potential chemical source, primary release mechanism, primary impacted medium, transport mechanism, secondary impacted medium, exposure route and receptors. These are described in the sections that follow. It should be noted however, that while this discussion includes the CPA, it is unlikely that the CPA will undergo a HHRA (or DUE) due to its current and anticipated future land use. NDEP acknowledged this issue in their comments to Revision 3 of the CSM [NDEP, 2012a].

5.1 Potential Release Mechanisms

5.1.1 CPA

Prior investigations at the CPA indicate that contents of the former ponds migrated to soils and/or groundwater during the CPA's operating years between 1975 and 1983. As described in Section 2.2, Ponds 1, 3, and 4 were decommissioned between 1983 and 1989; Ponds 2 and 5 were decommissioned in 1989; and Pond 6 was decommissioned in 1981. The Phase I ECA Report states that pond contents for former Ponds 1, 3, and 4 may have accidentally migrated to soils and groundwater, as a result of lining damage or overflow [Converse, 1993].

In addition, findings from a document review conducted by SECOR in April 1999 indicate that several of the ponds were overfilled above their freeboard levels during the early years of operation, and seeps of pond-like liquids were observed outside the berms of Ponds 3 and 4. In addition, pond-like liquids were noted in several of the leachate

collection wells and a liquid collection trench that was constructed during decommissioning activities for Ponds 2 and 5 [SECOR, 1999]. These observations represent locations of releases within the CPA during its operational period, before it was decommissioned and capped in the 1980s.

Further, findings from SECOR's 1999 document review indicate the presence of chloride and sulfate pond liquids in lysimeters and piezometers installed in the vicinity of Ponds 1, 2, and 3. SECOR also noted that pond contents collected in the liquid collection trench (sump) (Figure 2-1) diminished significantly after pond decommissioning. Finally, historic damage (which was subsequently repaired) to the southwest corner of former Pond 2 during off-loading of liquids from a vacuum truck also could have contributed to overflow during its operational history prior to its decommissioning in 1989 [SECOR, 1999].

In addition to the ponds, the former SBR storage tanks also were located within the CPA east of Pond 5 and held the same substances stored in Pond 6. One minor release was documented at this storage area in 1981 prior to cessation of operation and the subsequent decommissioning and capping of the CPA. This release consisted of a small spill of approximately 20 gallons adjacent to the 26,000 gallon storage tank. Given that SBR is a heavy tar-like material, it is unlikely that this small release left remaining environmental impact after its removal. Therefore this spill is not considered further as a source of environmental impacts.

During decommissioning procedures in the 1980s, Ponds 1-5 were first allowed to dry. The remaining solids then were treated with crushed limestone to raise pH, and the ponds were backfilled and capped with clean fill and a geotextile membrane (Section 2.2 and **Appendix A**).

Pond 6, designed to hold SBR wastes, was decommissioned by a different method (total excavation of contents, liner and surrounding soils) than Ponds 1 through 5, which were evaporated, treated and then backfilled as described above. However, its total removal from service eliminated future migration of the pond contents, as discussed above.

To summarize, historical releases from the ponds occurred during the operational time period (1976 – 1983) as a result of leaking liners and overtopping. Soil and soil vapor data show that liquid releases migrated predominantly vertically through the vadose zone to the saturated zone. Once within the saturated zone, contaminant mass migrated laterally downgradient generally to the north towards the FTF along the direction of groundwater flow (Figure 3-5). In the case of potential DNAPL, if present, downward vertical and horizontal migration would continue through the Shallow Zone until the DNAPL reaches residual saturation levels at which point further migration would cease.

These pathways will be affected to some degree by anisotropy of the sediment. If DNAPL reaches an aquitard and the head of DNAPL cannot overcome the capillary pressure of the fine-grained matrix, DNAPL will accumulate on top of the aquitard and migrate laterally, predominantly in the down-dip direction, until residual saturation levels are reached.

One additional release mechanism that is important in the CPA, but is not associated with former CPA activities, is windborne particulate transport. Surface soils in the CPA-FTF vicinity may potentially be affected by windborne dust from soils containing lindane (BHC), asbestos, radionuclides, and arsenic.

5.1.2 FTF

Available historical documents indicate that two minor spills of hydrochloric acid (HCL) occurred within the boundary of the FTF during its operational history. The releases reportedly occurred in February 1975 from a 100,000 gallon HCL tank and July 3, 1980 from HCL storage tank No. 11 (Figure 2-2). Both leaks resulted from the failure of the lining in the respective tanks (Converse, 1993). The amount of HCL released during the spill is unknown, but both releases were noted as being "minor." Released liquids could have migrated following the process outlined above for the CPA.

5.2 Fate and Transport Pathways

Evaluating the fate and transport pathways helps to understand how chemicals move through the environment from impacted media – contaminated soil and soil vapor – to points of potential human exposure. The following are some of the distinct transport mechanisms for which fate and transport modeling is typically employed in a risk assessment:

- Transport of particulate-phase chemicals from soil to outdoor air (i.e., windblown dust and/or fugitive dust emissions);
- Transport of vapor-phase chemicals from soil to outdoor air;
- Transport of vapor-phase chemicals from soil vapor to outdoor air;
- Transport of vapor-phase chemicals from soil vapor to indoor air (vapor intrusion pathway);
- Transport of vapor-phase chemicals from groundwater to indoor air (vapor intrusion pathway); and
- Transport of chemicals from soil to groundwater.

These transport mechanisms will be evaluated in the HHRA per guidelines discussed in the Risk Assessment Work Plan [RAWP; Integral, 2010]. Transport of chemicals via stormwater runoff, as well as via fugitive dust emissions generated by vehicles traveling on unpaved roads, are other potential transport mechanisms. However, stormwater runoff is unlikely to be a significant issue since surface water is collected by engineered drainage features that either divert runoff away from the CPA-FTF areas or channels it to Olin facility's stormwater handling system. Additionally, the graded cap surface at the CPA helps to control stormwater runoff. Further discussion of surface water runoff is presented in Section 5.2.5. Track-out of dust from vehicles is discussed further in Section 5.2.1. Figure 5-1 provides a graphical representation of the potential pathways and potential receptors for the various media, and supports the following discussion for the air, soil, soil vapor, groundwater, surface water and sediment pathways. The potential transport pathways are discussed in more detail in the following sections.

5.2.1 Air Pathway

Air dispersion of SRCs as a result of dust generation or volatilization could have potentially impacted shallow soils at the CPA-FTF. The soil cap covering the CPA precludes further transport of dust-borne CPA contaminants. However, surface soils could be affected by volatilization emanating from the subsurface or could be impacted from dust-borne SRCs. Specifically, surface soils at the CPA-FTF may have been exposed to chemicals such as the BHC isomers, asbestos, arsenic, and/or radionuclides that originated from source areas outside of the CPA-FTF. Discussion of the air pathway is provided below.

Contaminant transport can occur through the air pathway via three mechanisms: 1) windborne particulates; 2) volatilization of contaminants into ambient air; and 3) volatilization into indoor air. Windborne particulate transport can occur when contaminated surface soils are present and particulates are mobilized and carried by wind. The first mechanism, generation of dust resulting from wind erosion, depends on the surface roughness, soil moisture, vegetative cover, wind velocity, and the amount of the exposed soil surface. An individual may also disturb surface soil and create airborne dust during work activities (such as construction), by walking over the surface, or track-out from vehicles. These types of activities are more transient in nature and they likely do not result in significant impacts. This air pathway and mechanism also can transport contaminants from subsurface soils if they are excavated, or grading exposes them to the effects of wind.

The second mechanism by which contaminants can be transported via the air pathway is the migration of volatile compounds through soil pore space to ambient air. Volatile compounds can migrate into the atmosphere or can be transported deeper into the

vadose zone and potentially impact groundwater. The third mechanism by which contaminants can be transported via the air pathway is the potential volatilization of compounds from the subsurface into indoor air. Fate and transport models, such as the Johnson and Ettinger (J&E) subsurface vapor intrusion model [Johnson and Ettinger, 1991] accounts for the diffusion of chemicals through the subsurface, the advection of chemicals through soil and concrete slabs due to pressure differentials between the soil and buildings, and the mixing in indoor air caused by heating and ventilation systems.

Regarding the second and third mechanisms, air transport of contaminants depends primarily on the volatility of the compound, and also on molecular weight, the carbon content and physical properties of the soil matrix (porosity, grain size distribution, and moisture content), and temperature gradients. The volatility of a chemical compound increases as its vapor pressure increases. Vapor pressures greater than 1 mm of mercury are considered highly volatile, vapor pressures in the range of 0.001 to 0.1 mm of mercury are considered semi-volatile and vapor pressures less than 0.001 mm of mercury are non-volatile under normal conditions. Due to the high summer temperatures in Henderson and specifically at the CPA-FTF, the volatile and semi-volatile compounds in the surface or near surface are susceptible to being volatized and released to the atmosphere.

VOCs dissolved in soil moisture and groundwater can volatilize and be released to the atmosphere via soil vapor respiration. The potential for these compounds to volatilize from the vadose zone soil moisture and groundwater is defined by the Henry's Law Constant (K_H), for that compound. K_H provides a measure of the extent of chemical partitioning between air and water at equilibrium. The higher the K_H, the more likely a chemical is to volatilize than to remain in water. A K_H exceeding 10^{-3} atmospheres-cubic meters per mole (atm-m^3/mole) indicates a compound that is readily volatilized from a dilute aqueous solution. Compounds that have a K_H of less than 10^{-7} atm-m^3/mol are considered to have a low volatility.

The potential volatility of the SRCs range from volatile to highly volatile based on their vapor pressure and K_H [Hargis, 2008]. These data indicate that the SRCs of benzene, chlorobenzene, 1,2-DCB, 1,4-DCB, 1,2,4-trichlorobenzene, and chloroform are volatile and that there is a potential for these compounds to be transported as vapor to the atmosphere at the CPA-FTF.

5.2.2 Soil Pathway

Contaminants may be transported in soil by several mechanisms including vapor transport, dissolved-phase transport in soil moisture, and NAPL migration from sources to the soil and/or groundwater.

At the CPA-FTF, there are minimal human exposure pathways for soil contaminants, as these areas are not in regular use. There are occasional activities conducted at or near the CPA for groundwater well monitoring and cap maintenance to prevent erosion from wind or rainfall. The former pond areas are covered with an engineered cap that was installed as part of the pond decommissioning activities. The CPA's maintenance, fenced access and monitoring is expected to proceed indefinitely. Additionally, a deed restriction is being developed by Montrose and Olin and is expected to be in place for the CPA by the end of 2012. Depending on the results of the HRRA for the FTF that will be completed upon approval of this CSM and DUE, a deed restriction may be developed for the FTF as well. The FTF presents a potential for human exposures to soil impacts, as it is used as a temporary storage area, where workers occasionally may access this area.

As discussed, surface soil may potentially be impacted from asbestos, arsenic, radionuclides, and BHC isomers by wind-blown means from other source areas resulting in possible exposure to the occasional CPA-FTF worker and/or trespasser. Outdoor workers (e.g., maintenance workers) can potentially come into contact with surface soils via dermal absorption, incidental ingestion and/or outdoor inhalation, while infrequently traversing the FTF to access adjacent areas, or those who infrequently access the current temporary storage containers at the CPA. The potential risk from surface soil exposures will be addressed in detail during the HHRA for Site-wide surface soils.

Based on the current conditions at the CPA, liquids that were released from the ponds have migrated, and may continue to migrate, under their own driving forces until they reach residual saturation. Due to low regional rainfall and the presence of the maintained engineered cap over the CPA, infiltration of surface water is not an expected driver. The only other soil transport mechanisms, air dispersion (volatilization of VOC SRCs into ambient air) and windborne particulates are addressed previously in Section 5.2.1. Outdoor air inhalation of SRCs, that have either volatilized from soil or have been disturbed and carried by wind from surface soil, is considered a complete pathway for the CPA-FTF.

5.2.3 Soil Vapor Pathway

Volatile SRCs were detected in soil vapor samples collected at the CPA-FTF. Because these compounds are volatile, humans could potentially be exposed to vapors migrating through the soil to the surface. Therefore, potential exposures could occur via indoor and outdoor air inhalation of volatile SRCs. Exposures to these volatile SRCs in ambient air is likely negligible because of significant outdoor air dilution and, outdoor workers are only infrequently traversing the FTF to access adjacent areas, or

infrequently accessing the CPA. However, the potential health risks from outdoor air exposures will be addressed in detail during the HHRA for soil vapor. Air dispersion (volatilization of volatile SRCs into ambient air) was addressed previously in Section 5.2.1.

Potential migration of vapors from the subsurface into indoor air is not considered a complete pathway at the CPA-FTF under current conditions, since no structures/ buildings are located within these two Site Assessment Areas. However, under future Site conditions, if redevelopment of the FTF occurs, buildings could be constructed with future occupants potentially exposed to volatiles emanating from the subsurface via indoor air inhalation. No buildings are anticipated to be built at the CPA because of the presence of an engineered cap and the planned deed restrictions. The potential health risks from hypothetical future indoor air exposures will be addressed in detail during the HHRA for soil vapor. Volatilization of SRCs into indoor air were addressed previously in Section 5.2.1.

5.2.4 Groundwater Pathway

Potentially complete exposure pathways for SRCs in groundwater via ingestion and dermal contact were not identified, because groundwater is not used for industrial purposes, domestic consumption, or irrigation in the vicinity of the FTF and CPA (or the entire OSSM Site). However, to support management decisions regarding remedial actions, groundwater quality data will be compared with chemical-specific standards that define acceptable risk levels for consumptive use. Additionally, in order to characterize potential impacts of soils on groundwater quality, soil data (0-10 ft bgs) will be compared will be compared to NDEP BCLs for leaching [Integral, 2010]. As stated in the NDEP-approved RAWP [Integral, 2010], groundwater will be addressed from a non-degradation standpoint and in the HHRA, indirect exposures related to inhalation of volatiles released from groundwater beneath the Site will be evaluated.

5.2.5 Surface Water and Sediment Pathway

In general, contaminants can be transported in a dissolved phase in the surface water runoff or adsorbed onto the sediment load in the runoff. Soluble contaminants can be dissolved and transported across the land surface and/or infiltrate into the subsurface, contaminating the vadose zone and potentially migrating to the groundwater. Surface water can also accumulate in topographic low areas after precipitation events and deposit dissolved contaminants through evaporation.

After decommissioning, which included removal of liquids from the ponds, neutralizing the sediments then evaporating the liquids to near dryness (or in the case of Pond 6, excavation), back-filling the ponds with dry soil to grade, and the construction and

maintenance of an engineered cap, chemicals from the former CPA operations may have been buried and potentially protected from the surface water and sediment transport pathway. However, the surface water and sediment pathway is considered potentially complete, despite the presence of the engineered cap and future deed restrictions.

5.3 Exposure Pathways

There are limited potential exposure pathways and potential receptors at the CPA-FTF, as summarized on Figure 5-1 and discussed below.

An exposure pathway describes a specific environmental pathway by which an individual (receptor) can be exposed to SRCs present at or originating from a source. EPA (1989) has defined the following five elements that must exist for an exposure pathway to be considered complete:

- A source of chemical;
- A mechanism of chemical release to the environment (discussed in Section 5.2);
- A retention or transport media (e.g., soil or air);
- A point of potential contact by receptors with the medium (discussed in this section); and
- A means of entry (i.e., intake route) at the contact point (e.g., ingestion).

There must be a complete exposure pathway from the source (i.e., from soil, soil vapor, groundwater, surface water, or sediment) to receptors for chemical intake to occur. If any one of these elements is missing, then the exposure pathway is considered incomplete. For example, if human activity patterns and/or the location of potentially exposed individuals prevent contact with the impacted media, then no completed pathways can exist.

This section addresses potential human and environmental receptors for the CPA-FTF, with a focus on potentially complete exposure pathways that are relevant for the sources and transport mechanisms previously discussed in Section 5.2 (Figure 5-1). Potential exposure routes to be considered include both direct and indirect contact with CPA-FTF media (e.g., soil, soil vapor, groundwater, surface water, or sediment). If VOCs are detected in soil, indirect exposures from vapors migrating from the subsurface may occur. If metals or SVOCs are detected, the direct contact routes of exposure, such as incidental ingestion or dermal contact, are the most potentially relevant. Potentially

complete exposure pathways associated with these media are discussed within this section and summarized on Figure 5-1, with the following context:

- Exposure to surface water on site is not considered a complete exposure pathway, since no permanent surface water bodies exist at the CPA-FTF. Surface water is collected by engineered drainage features and is either diverted to the west around the Olin manufacturing facility or is channeled to the Olin facility's stormwater handling system. Drainage of surface water in and in the vicinity of the FTF is controlled by paved areas and berms and is channeled to the Olin facility's stormwater handling system. The graded cap surface is in place to control stormwater runoff at the CPA.
- Exposure to SRCs in downgradient groundwater has been described in the Site-Wide CSM [Hargis, 2008] and will be discussed in the upcoming Site-Wide Groundwater RAS document.
- In some cases, an exposure pathway may be complete, but is not significant, because: 1) the exposure may be two or more orders of magnitude less than by other pathways involving the same medium at the same exposure point for the same receptor; 2) the magnitude of exposure has low toxicological significance; and/or 3) the probability of exposure is low and potential risks associated with the pathway are not high [EPA, 1989]. Potential health risks from exposure pathways considered complete will be addressed in detail during the HHRA process.
- Further, as stated in the RAWP [Integral, 2010], exposures to SRCs in groundwater via direct consumptive uses (e.g., ingestion) were not considered a potentially complete exposure pathway, because groundwater is not used for industrial purposes, domestic consumption, or irrigation in the vicinity of the CPA-FTF. However, there may be potential for dermal contact by onsite workers conducting groundwater monitoring and related sampling, including workers at the GWTS. The Site-specific Health and Safety Plan addresses procedures to minimize potential dermal contact during groundwater sampling.

The remainder of this section first describes the human receptor populations and their related exposure pathways, followed by a discussion of the ecological receptors and pathways.

5.3.1 Identification of Potential Human Receptors and Complete Exposure Pathways

The FTF and CPA have been used exclusively for industrial purposes and will continue as such into the future. In addition, the CPA is capped, fenced with locked gates and access controls. Land use immediately and further downgradient of the CPA-FTF area is currently exclusively industrial. In fact, land use north of the FTF and CPA to the GWTS, a distance of 3.5 miles is currently industrial. Communication with current land owners indicates that it will remain industrial for the foreseeable future. Therefore, the HHRA will address potential exposures and risks assuming that the overall site will remain an industrial property after closure. As such, the assessment assumes that deed restrictions and institutional controls that limit the use of the site to industrial activity will be put in place as part of remedial actions [Integral, 2010]. A deed restriction is being developed by Montrose and Olin and is expected to be in place for the CPA by the end of 2012. Depending on the results of the HHRA that will be completed upon approval of this CSM and DUE, a deed restriction may be developed for the FTF as well. However, if the CPA-FTF were to ever be redeveloped into some land use other than industrial, Montrose will request a revision to the deed restriction.

As a result and as shown on Figure 5-1, the only potential human exposure pathways that are complete are associated with potential onsite workers and trespassers. These pathways are discussed below.

<u>Workers</u>

For the industrial/commercial workers at the FTF, CPA, and adjacent areas within the Henderson Site, the following potential exposure scenarios have been identified, as summarized on Figure 5-1:

- Outdoor workers (e.g., maintenance workers) who are assumed to contact shallow soils while infrequently traversing the FTF to access adjacent areas, or who infrequently access the temporary containers (being used for the Former Plant Site soil vapor extraction program) at the CPA. These short-term (or transient) outdoor workers could potentially be exposed via inhalation to fugitive dust containing non-volatile SRCs as well as volatile SRCs that volatilize from soils or groundwater to ambient air. They can also be exposed via direct contact (incidental ingestion and dermal contact) with surface soils under current Site conditions;
- Future outdoor workers considered long-term, full-time employees who spend most of the day working outdoors. This receptor is assumed to participate in relatively low - intensity activities such as building maintenance, unloading

and loading materials and supplies, or occasional digging. Soil exposure for this receptor group is limited to surface soils; therefore, these workers may potentially be exposed via incidental ingestion, dermal contact, and outdoor inhalation of vapors as well as fugitive dust generated by wind erosion [Integral, 2010];

- Indoor workers who are assumed to spend most, if not all, of the workday indoors if the FTF were to be redeveloped in the future with new building construction. Therefore, these workers may be potentially exposed via inhalation of contaminants present in indoor air as a result of vapor intrusion. Additionally, indoor workers may be exposed via inhalation of indoor dust as well as incidental ingestion of surface soil that has been tracked indoors [Integral, 2010]; however, these exposures are likely not significant compared to outdoor worker exposures. Default and Site-specific exposure parameters, such as exposure time, will be addressed in detail during the HHRA process;
- Construction workers who are assumed to contact surface and subsurface soils via incidental ingestion, dermal contact with soil, and outdoor inhalation of vapors/fugitive dust while engaged in potential future redevelopment activities that could occur within the FTF; and
- Groundwater sampling contractors monitoring downgradient compliance wells at the FTF and CPA who could potentially contact groundwater extracted from the monitor wells during sampling events.

While there may be potential for dermal contact by onsite workers conducting monitoring and sampling, the Site-specific Health and Safety Plan addresses procedures to minimize potential for dermal contact during groundwater sampling.

Trespassers and Residents

Non-occupational exposures at the CPA-FTF could occur on site as a result of trespassing or potentially off site in the adjacent residential areas. The trespasser scenario is assumed to involve adolescent and teenage children who live in the residential areas in proximity to the CPA-FTF. Trespassers could potentially be exposed to soils infrequently and for a short duration at the Site via incidental ingestion, dermal contact, and outdoor air inhalation. However, trespasser exposures are considered insignificant as compared to a higher exposure potential for an industrial worker, because they spend more time at the Site [Integral, 2010]. Moreover, as indicated in the Risk Assessment Work Plan [Integral, 2010], evaluation of exposures to the public under a non-residential land use scenario is not warranted since access is generally restricted at industrial sites. The CPA is fenced and access to the FTF is controlled by security.

These potential receptors and exposure pathways will be considered in the upcoming HHRA for the CPA-FTF (whether separate or combined). Other residential scenarios are assumed to take place in the offsite and downgradient portions of the Site-wide CSM study area, and as such will be discussed as part of the Site-wide analysis.

5.3.2 Ecological Receptors and Pathways

No natural habitats exist on site given the developed and industrial manufacturing operations at the CPA-FTF. Therefore, by agreement with NDEP, potential ecological receptors and exposure pathways can occur potentially only in the downgradient area and through potential exposures to groundwater. Groundwater pathways have been described and discussed in the Site-wide CSM [Hargis, 2008].

6.0 DATA GAP ANALYSIS

The more recent investigations conducted at the CPA-FTF were specifically designed to address data gaps identified by NDEP and Montrose in recent years. The cumulative data set is sufficient to characterize the nature and distribution (both lateral and vertical) of SRCs in the vadose zone, as well as the potential fate and transport of SRCs in the vadose zone. The adequacy of the characterization is demonstrated by sampling locations that show the concentration of analytes attenuate spatially from the former site assessment facilities (CPA-FTF areas) to concentrations below their respective screening levels (MCLs, BCLs, LBCLs, risk-based soil vapor screening levels and background concentrations).

Groundwater quality and flow also have been evaluated upgradient, beneath, and downgradient of the CPA-FTF. These groundwater data and the aquifer properties presented for the Shallow, Middle and Deep Zones are sufficient to support future evaluation of conditions in these areas, as part of the Site-wide Groundwater RAS process. However, groundwater is being addressed by the Site-wide groundwater RAS that currently is being prepared. No additional data gaps are known at this time, and no further field investigation work is planned.

General Observations Regarding Data Coverage and Distribution in the CPA-FTF

There are a few observations regarding the distribution of data that have been discussed in this report, but are worth repeating here. These are:

- Contaminant data are not available from directly beneath former Ponds 1-5 due to the need to maintain integrity of the engineered cap that was designed to mitigate infiltration of precipitation. The cap is engineered to deflect surface runoff beyond the footprint of the former ponds. However, due to the location and size of former Pond 6 in the southwest corner of the CPA and NDEP's concurrence that this would be the most likely place to detect DNAPL, angle borings were able to be installed so that soils beneath the pond could be evaluated and tested. No indications of DNAPL and/or soil staining were detected in these borings, and results of soil data collected from the vadose zone beneath Pond 6 [Geosyntec, 2010a] suggest that soils do not represent a significant present-day source of contaminants to groundwater beneath Pond 6.
- Given the density of soil borings and monitoring wells installed in and around the vicinity of the CPA-FTF, VOCs, SVOCs and pesticide SRCs are adequately characterized in the vadose zone and groundwater to support the future RAS process.

- The distribution of PCBs, PCB congeners, and inorganic data are more limited than VOC data. However, VOCs, specifically the five Prevalent Compounds used for discussion within this document, can be used to characterize the distribution of SRCs because of the following combined characteristics, which were discussed in Section 4.2: they are more mobile, prevalent, higher volatility, and are considered relatively more toxic[1] than other compounds.

  There is only one location where a sample with a PCB concentration greater than the BCL is not bounded by a location where PCBs are below the BCL. Yet, that location is coincident with VOC exceedances which are bounded by locations where VOC concentrations are below the NDEP designated screening levels.

- Concentrations of inorganics in exceedance of BCL and LBCLs were compared to background concentrations. From this analysis, most of the arsenic, aluminum, magnesium, and manganese concentrations that were characterized as BCL or LBCL exceedances were determined to be below background concentrations. Inorganic compounds with BCL or LBCL exceedances in shallow soil that exceed the background concentrations include an arsenic sample at FTF-07D, aluminum and iron samples at FTF-26D, aluminum samples at FTF-19S, and an iron sample at CPA-13. Several inorganics in deep soils exceed background concentrations; however, these samples are located in contact with groundwater. Hence the elevated concentrations are a groundwater-related issue that will be addressed as part of the groundwater RAS process.

- The downgradient migration and distribution of groundwater impacts that originate from the CPA-FTF area are beyond the scope of this CSM, because these impacts merge with impacts that originate from other areas downgradient of the CPA-FTF. However, there is an actively monitored network of existing groundwater monitor wells that provides downgradient coverage between the CPA-FTF and the GWTS. Data developed as part of those monitoring programs will be evaluated in the upcoming Site-wide groundwater RAS to arrive at a final remedial plan for the combined former Stauffer and Montrose sites.

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[1] Relative toxicity refers to chemicals detected at concentrations that exceeded MCLs for groundwater and BCLs for soil in $\geq$ 5% of the samples analyzed (see Section 4.2).

7.0 PATH FORWARD

This CSM provides a qualitative characterization of environmental conditions and fate and transport of the SRCs. Data presented herein have been collected, in part, to support a quantitative human health risk assessment. However, prior to their regulatory acceptance for use in a risk-related context (this includes comparison to risk-based screening levels) they must undergo a rigorous usability evaluation as part of NDEP's DUE process. The DUE includes a CSM, and is intended, in part, to identify possible data gaps. This CSM is considered to be an evergreen document that may require modification if data gaps are identified in the DUE process and additional data are required; however, the conclusion of this CSM is that additional data are not needed prior to a DUE.

In addition, based on NDEP's comments [NDEP, 2012a] it is assumed that the CPA will not require a DUE or HHRA, due to its current and future status as well as the pending deed restrictions, but the FTF will require these items. However, if the proposed final remedy for the CPA is a deed restriction, the NDEP will require development of an RAS [NDEP, 2013a]. So, in general, future RAS activities anticipated for the CPA and FTF areas are summarized below in sequence:

- Perform a DUE for the FTF;
- Conduct a HHRA evaluation for the FTF per the RAS Guideline memorandum [NDEP, 2008b];
- Develop Soil RAS for the FTF per the RAS Guideline memorandum [NDEP, 2008b];
- Initiate discussion with NDEP regarding the final remedy and potential deed restriction for CPA and develop RAS, if necessary; and
- Continue groundwater evaluation under the ongoing Site-wide Groundwater RAS process.

7.1 Schedule

The following is a proposed schedule for the Site:

- DUE: First Quarter 2014;
- FTF Risk Assessment: Third Quarter 2014; and
- Soil RAS for FTF Fourth Quarter 2014.

8.0 REFERENCES

AECOM, 2013. DNAPL Investigation Summary Report, Montrose Chemical Corporation of California, Environmental Conditions Investugation, Henderson, Nevada. December 31. [NDEP acceptance status – Currently being reviewed by NDEP]

American Society of Testing and Materials (ASTM), 2008. Standard Guide for Developing Conceptual Site Models for Contaminated Sites, E 1689-95 (Reapproved 2008).

Basic Remediation Company (BRC), 2007a. Conceptual Site Model, Proposed CAMU Site, Henderson, Nevada. February 16. [NDEP acceptance status – Efforts to understand the NDEP acceptance status of this document have been unsuccessful].

Basic Remediation Company (BRC), 2007b; Environmental Resources Management; and Daniel B. Stephens & Associates, Inc. BRC Closure Plan, BMI Common Areas, Clark County, Nevada. May. [NDEP acceptance status – Efforts to understand the NDEP acceptance status of this document have been unsuccessful].

Berman, D. Wayne (Berman), 2003. Analysis and Interpretation of Measurements for the Determination of Asbestos in Core Samples Collected at the Southdown Quarry in Sparta, New Jersey. November 12.

Converse Consultants (Converse), 1988. Summary Report on Soil Sampling and Analytical Reports for Closure of Ponds No. 2 and 5, Henderson, Nevada. [NDEP acceptance status – Efforts to understand the NDEP acceptance status of this document have been unsuccessful].

Converse Consultants (Converse), 1992. Annual Report for Amended Closure/Post-Closure Plan 1992, RCRA Pond Nos. 2 and 5, Montrose Facility, Henderson, Nevada. [NDEP acceptance status – Efforts to understand the NDEP acceptance status of this document have been unsuccessful].

Converse Consultants (Converse), 1993. Phase I Environmental Conditions Assessment for Montrose Chemical Corporation Facility, Henderson, Nevada. April 15. [NDEP acceptance status – Efforts to understand the NDEP acceptance status of this document have been unsuccessful].

Earth Tech, 2006. Revised Evaluation of Site-Related Chemicals, Montrose Chemical Corporation, Henderson, Nevada. May 20, 2006. [NDEP acceptance status – Conditional approval June 17, 2006].

ENSR Corporation (ENSR), 2007. Upgradient Investigation Results, Tronox Facility, Henderson, Nevada. September 27. [NDEP acceptance status – Efforts to understand the NDEP acceptance status of this document have been unsuccessful].

Environmental Protection Agency (EPA). 1986. "Superfund Public Health Evaluation Manual." Office of Emergency and Remedial Response, Washington, DC. October.

Environmental Protection Agency (EPA), 1988. Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA, OSWER Directive 9355.3-01, Interim Final. October.

Environmental Protection Agency (EPA), 1989. Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (Part A). December.

Environmental Protection Agency (EPA), 1996. Soil Screening Guidance: Technical Background Document. Second Edition. USEPA Office of Solid Waste and Emergency Response. Washington, D.C. EPA 540/R95/128. May.

Environmental Protection Agency (EPA), 2009. National Primary Drinking Water Regulations, Maximum Contaminant Levels (MCLs) EPA 816-F-09-0004. May.

ERM-West, Inc., 2010. Background Soil Compilation Report, BMI Complex and Common Areas, Clark County, Nevada. January. [NDEP acceptance status – Revision 1 of this document (dated April 2010) was approved on April 30, 2010].

Geosyntec Consultants, Inc. (Geosyntec), 2008. Focused Conceptual Site Model and Preliminary Screening of Remedial Alternatives, Henderson, Nevada. April 11. [NDEP acceptance status – Comments received May 22, 2008].

Geosyntec Consultants, Inc. (Geosyntec), 2009a. Focused Conceptual Site Model to Address Soils for the Montrose Closed Ponds Site Assessment Area and Response to NDEP Comments to the Focused Conceptual Site Model and Preliminary Screening of Remedial Alternatives, Henderson, Nevada. January 16. [NDEP acceptance status – Superseded by Conceptual Site Model for the Montrose Closed Ponds Site Assessment Area dated April 24, 2009].

Geosyntec Consultants, Inc. (Geosyntec), 2009b. Conceptual Site Model for the Montrose Closed Ponds Site Assessment Area and Response to NDEP Comments to the Focused Conceptual Site Model to Address Soils for the Montrose Closed Ponds Site Assessment Area, Henderson, Nevada. April 24. [NDEP acceptance status – Superseded by Interim Deliverable dated July 29, 2009].

Geosyntec Consultants, Inc. (Geosyntec), 2009c. Interim Deliverable: Submittal of Response to NDEP's Comments on the Conceptual Site Model for the Montrose Closed Ponds Site Assessment Area, Henderson, Nevada. July 29. [NDEP acceptance status – Comments received on August 27, 2009; Superseded by this document].

Geosyntec Consultants, Inc. (Geosyntec), 2009d. Work Plan to Assess Shallow Soil at the Former Dichlorobenzil Warehouse Area, Henderson, Nevada. November 13. [NDEP acceptance status – Approved November 16, 2009].

Geosyntec Consultants, Inc. (Geosyntec), 2009e. Work Plan to Evaluate Chemical Occurrence and Distribution at Closed Pond 6 of the Closed Ponds Area. November 25. [NDEP acceptance status – Conditional Approval November 28, 2009].

Geosyntec Consultants, Inc. (Geosyntec), 2009f. Work Plan to Conduct Supplemental Soil Vapor Sampling at the Former Tank Farm and the Former Benzene Storage Tank Site Assessment Areas, Henderson, Nevada. December 11. [NDEP acceptance status – Conditional approval on January 15, 2010].

Geosyntec Consultants, Inc. (Geosyntec), 2010a. Remedial Alternative Study Process Document for the former Stauffer Chemical Company/former Pioneer/current Olin (former Stauffer) and Montrose Chemical Corporation of California (former Montrose) Facilities, Revision 3, Henderson, Nevada. February 12 [NDEP acceptance status – Comments received on April 13, 2010].

Geosyntec Consultants, Inc. (Geosyntec), 2010b. Summary Data Report, Chemical Occurrence and Distribution, Former Closed Pond 6, Closed Pond 6 Area, Henderson, Nevada. May 28 [NDEP acceptance status – Conditional approval on June 10, 2010. Response to comments provided to NDEP on July 30, 2010].

Geosyntec Consultants, Inc. (Geosyntec), 2010c. Summary Data Report, Soil Vapor, Soil, and Surface Soil Sampling, Former Tank Farm Site Assessment Area, Henderson, Nevada. June 25. [NDEP acceptance status – Pending].

Geosyntec Consultants, Inc. (Geosyntec), 2011a. Conceptual Site Model for the Closed Ponds Area and Former Tank Farm Site Assessment Areas, Henderson, Nevada. September 26. [NDEP acceptance status – Comments received on June 8, 2012].

Geosyntec Consultants, Inc. (Geosyntec), 2011b. Revised Technical Memorandum: Methodology for Deriving Risk-Based Concentrations for the Soil Vapor to Outdoor Air Pathway, Former Montrose Facilities in Henderson, Nevada. December 29. [NDEP acceptance status – Conditionally Approved on March 26, 2012].

Geosyntec Consultants, Inc. (Geosyntec), 2011c. Revised Technical Memorandum: Planned Methodology for Wet-to-Dry Weight Conversion, Former Montrose and Stauffer Facilities in Henderson, Nevada. January 7. [NDEP acceptance status – Conditionally approved on February 24, 2011].

Geosyntec Consultants, Inc. (Geosyntec), 2011d. Revised Work Plan DNAPL and Salinity Field Investigation, Henderson Nevada. March 23. [NDEP acceptance status – Comments received on March 28, 2011].

Geosyntec Consultants, Inc. (Geosyntec), 2011e. Submittal of Response to NDEP Comments on the Revised Work Plan DNAPL and Salinity Field Investigation, Henderson Nevada. March 23. [NDEP acceptance status – Approved].

Geosyntec Consultants, Inc. (Geosyntec), 2011f. Summary Data Report DNAPL and Salinity Field Investigation, Henderson Nevada. June 16. [NDEP acceptance status – Comments received August 18, 2011].

Geosyntec Consultants, Inc. (Geosyntec), 2012. Revised Conceptual Site Model for the Closed Ponds Area and Former Tank Farm Site Assessment Areas, Henderson, Nevada. September 14. [NDEP acceptance status – Comments received on November 15, 2013].

Hargis + Associates, Inc. (Hargis), 2008a. Revision 1.0 Conceptual Site Model, Former Montrose and Stauffer Facilities and Downgradient Areas to Las Vegas Wash, Henderson, Clark County, Nevada. Replacement Pages. July 25. [NDEP acceptance status – Unknown].

Hargis + Associates, Inc. (Hargis), 2008b. Additional DNAPL Reconnaissance Borings, Data Submittal Report, Former Montrose Facility, Montrose Chemical Corporation of California, Henderson, Nevada. October 9. [NDEP acceptance status – Unknown].

Hargis + Associates, Inc. (Hargis), 2009. Former Tank Farm Conceptual Site Model/Sampling and Analysis Plan, Henderson, Nevada. January 15. [NDEP acceptance status – Comments Received; February 13, 2009].

Hargis + Associates, Inc. (Hargis), 2010. 2010 Comprehensive Groundwater Data Evaluation Report, Former Montrose and Stauffer Facilities, Henderson, Nevada. September 21. [NDEP acceptance status – Pending].

Integral Consulting Inc., 2010. Revised Risk Assessment Work Plan. Former Montrose and Stauffer Facilities. Henderson, Nevada. June. [NDEP acceptance status – Conditionally approved on July 27, 2010].

Johnson, P.C., and R.A. Ettinger. 1991. Heuristic Model for Predicting the Intrusion Rate of Contaminant Vapors into Buildings. Environmental Science Technology, Vol. 25. pp. 1445-1452.

Kerr-McGee, 2005. Conceptual Site Model, Kerr-McGee Facility, Henderson, Nevada, February. [NDEP acceptance status – Efforts to understand the NDEP acceptance status of this document have been unsuccessful].

Malmberg, G.T., 1965. Available Water Supply of the Las Vegas Groundwater Basin, Nevada. United States Geological Water-Supply Paper 1780.

Montrose Chemical Company of California (Montrose), 1987. Amended Closure / Post Closure Plan, Henderson Facility Ponds #2 & #5. September 28. [NDEP acceptance status – Efforts to understand the NDEP acceptance status of this document have been unsuccessful].

National Oceanic and Atmospheric Administration (NOAA), 2010. http://www.wrh.noaa.gov/vef/climate/Las%20Vegas%20Climate%20Book.pdf

Nevada Division of Environmental Protection (NDEP), 1981. Letter from Mr. W. Marvin Tebeau to Mr. H.J. Wurzer. April 14.

Nevada Division of Environmental Protection (NDEP), 1987. Letter from Mr. Thomas J. Fronapfel, P.E. (NDEP) to Mr. D.M. Greeno (Montrose Chemical Corporation of California). May 5.

Nevada Division of Environmental Protection (NDEP), 1994. Phase II Letter of Understanding Between NDEP and Montrose Chemical Corporation of California, Regarding the Former Montrose Facility, Henderson, Nevada. August 15.

Nevada Division of Environmental Protection (NDEP), 2007. Revised Tables for Appendix G of the Background Report, Background Shallow Soil Summary Report: BMI Complex and Common Areas Vicinity. July 22. [NDEP acceptance status - NDEP letter of acceptance; July 26, 2007].

Nevada Division of Environmental Protection (NDEP), 2008a. NDEP Comments on the Focused Conceptual Site Model and Preliminary Screening of Remedial Alternatives, Henderson, Nevada. May 22.

Nevada Division of Environmental Protection (NDEP), 2008b. RAS Process Guideline Document. October 7.

Nevada Division of Environmental Protection (NDEP), 2009a. NDEP Comments on the Focused Conceptual Site Model to Address Soils for the Montrose Closed Ponds Site Assessment Area. March 11.

Nevada Division of Environmental Protection (NDEP), 2009b. NDEP Comments on the Conceptual Site Model for the Montrose Closed Ponds Site Assessment Area. May 26.

Nevada Division of Environmental Protection (NDEP), 2009c. NDEP Comments on the Interim Deliverable: Submittal of Response to NDEP's Comments on the Conceptual Site Model for the Montrose Closed Ponds Site Assessment Area. August 27.

Nevada Division of Environmental Protection (NDEP), 2009d. BMI Plant Sites and Common Areas Projects, Henderson, Nevada, Hydrogeologic and Lithologic Nomenclature Unification. January 6.

Nevada Division of Environmental Protection (NDEP), 2009e. NDEP Response to: Former Tank Farm Conceptual Model/Sampling and Analysis Plan, Henderson, Nevada. February 13.

Nevada Division of Environmental Protection (NDEP), 2010. NDEP Response to: Deliverable: Response to NDEP's Comments on Work Plan to Conduct Supplemental Soil Vapor Sampling at the Former Tank Farm and the Former

Benzene Storage Tank Site Assessment Areas dated December 17, 2009. January 15.

Nevada Division of Environmental Protection (NDEP), 2011. Technical Guidance for the Calculation of Asbestos Related Risk in Soils for the Basic Management Incorporated (BMI) Complex and Common Areas. Prepared for NDEP. February 2011.

Nevada Division of Environmental Protection (NDEP), 2012a. NDEP Comments on the Conceptual Site Model for the Closed Ponds Area and Former Tank Farm Site Assessment Areas, Henderson, Nevada. June 8.

Nevada Division of Environmental Protection (NDEP), 2013a. NDEP Comments on the Revised Conceptual Site Model for the Closed Ponds Area and Former Tank Farm Site Assessment Areas, Henderson, Nevada. November 14.

Nevada Division of Environmental Protection (NDEP), 2013b. User's Guide and Background Technical Document for Nevada Department of Environmental Protection (NDEP) Basic Comparison Levels (BCLs) for Human Health for the BMI Complex and Common Areas. Revision 12 – August 2013. Bureau of Corrective Actions, Special Projects Branch, Las Vegas, NV. August.

Nevada Division of Environmental Protection (NDEP), 2012b. NDEP Comments on the Revised Technical Memorandum: Methodology for Deriving Risk-Based Concentrations for the Soil Vapor to Outdoor Air Pathway, Former Montrose Facilities in Henderson, Nevada. March 26.

Nevada Division of Environmental Protection (NDEP), 2013a. NDEP Comments on the Conceptual Site Model for the Closed Ponds Area and Former Tank Farm Site Assessment Areas, Henderson, Nevada. September 14.

Nevada Division of Environmental Protection (NDEP), 2013b. User's Guide and Background Technical Document for Nevada Department of Environmental Protection (NDEP) Basic Comparison Levels (BCLs) for Human Health for the BMI Complex and Common Areas. Revision 12 – August 2013. Bureau of Corrective Actions, Special Projects Branch, Las Vegas, NV. August.

PES Environmental, Inc. (PES), 2006. Evaluation of Site-Related Chemicals, Former Stauffer Chemical Company Facility, Henderson, Nevada. June 1, 2006. [NDEP acceptance status – Approved June 5, 2006].

Plume, Russell W., 1989. Ground-Water Conditions in Las Vegas Valley, Nevada, part 1, Hydrogeologic Framework. United States Geological Survey Water-Supply Paper 2320-A.

SECOR, 1997. Phase II Environmental Conditions Investigation, Henderson, Nevada. [NDEP acceptance status – Efforts to understand the NDEP acceptance status of this document have been unsuccessful].

SECOR, 1999. Results of Review of Remaining Category II Comments, Former Montrose Facility, Henderson, Nevada. May 3. [NDEP acceptance status – Efforts to understand the NDEP acceptance status of this document have been unsuccessful].

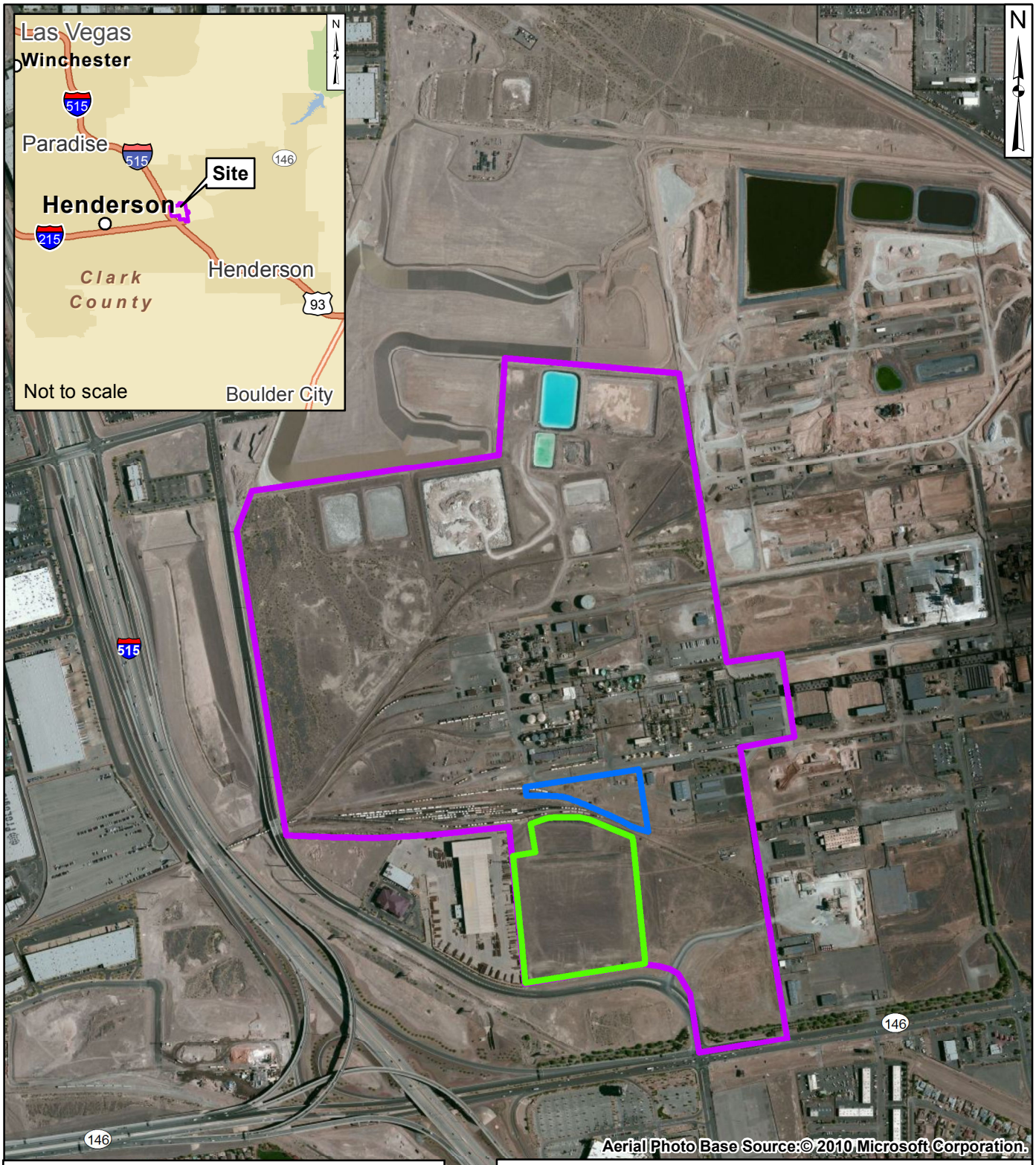
SECOR, 2000. Additional Groundwater Investigation Report, Montrose Closed Ponds Area, Henderson, Nevada. [NDEP acceptance status – Efforts to understand the NDEP acceptance status of this document have been unsuccessful].

SECOR, 2001. Limited Assessment/Characterization of Unknown Material, Former Montrose Facility, East-Northeast of Closed Ponds, Henderson, Nevada. March 29. [NDEP acceptance status – Efforts to understand the NDEP acceptance status of this document have been unsuccessful].

SECOR, 2002. Revised Report of the Investigation of Deeper Water-Bearing Zones at the Closed Ponds and Former Plant Site. March 29. [NDEP acceptance status – Efforts to understand the NDEP acceptance status of this document have been unsuccessful].

Southern Nevada Water Authority, 1996. Extent and Potential Use of the Shallow Aquifer and Wash Flow in Las Vegas, Nevada. 1996.

FIGURES



Legend

- Former Tank Farm Site Assessment Area
- Closed Ponds Area Site Assesment Area
- Former Montrose Facility and Former Stauffer Chemical Company/Former Pioneer/Current Olin Facility

Site Location Map

Henderson, Nevada

1,000 500 0 1,000 2,000 Feet

Geosyntec consultants

Figure 1-1

Project No: HW0989H

January 2014

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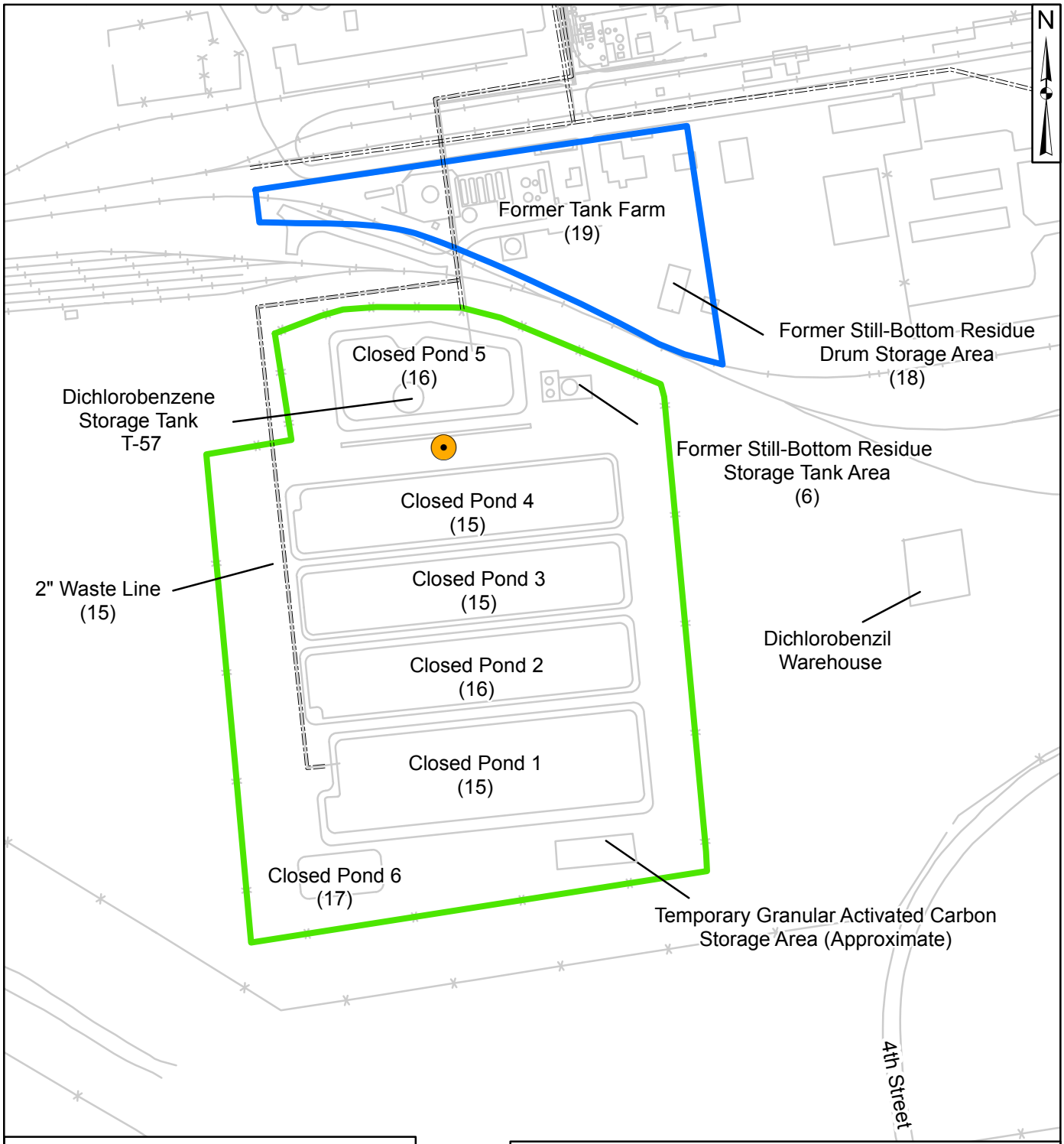

Legend

- Sump for Measuring Fluid Levels
- Process Piping and Storm Sewer System Routes
- Closed Ponds Area Site Assessment Area
- Former Tank Farm Site Assessment Area
- (6) Letter of Understanding (LOU) Item Number

Site Assessment Area Map
Closed Ponds Area and Former Tank Farm Area
Henderson, Nevada

300 150 0 300 600 Feet

Geosyntec consultants

Project No: HW0989H | January 2014

Figure **2-1**

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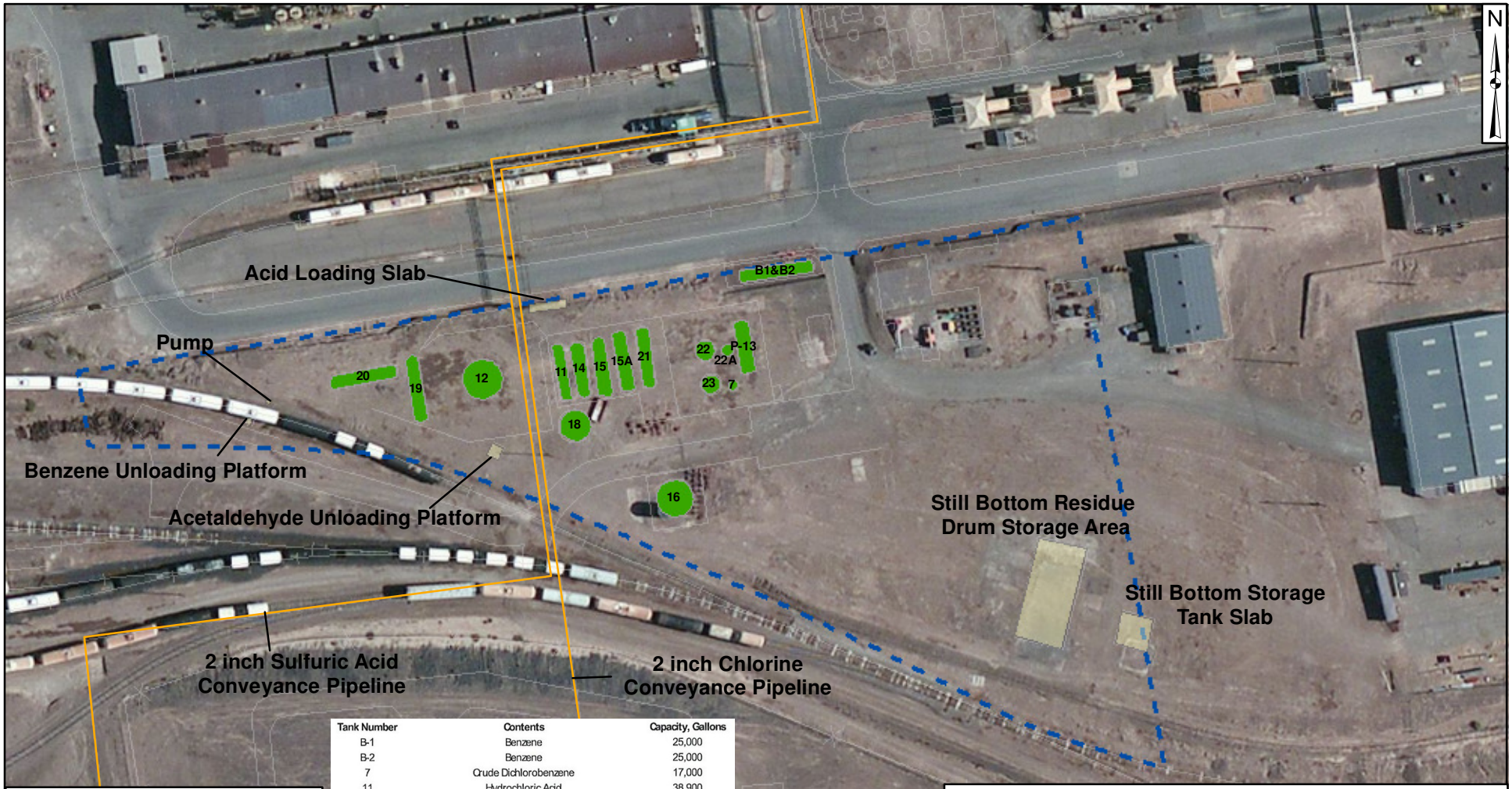

Tank Number	Contents	Capacity, Gallons
B-1	Benzene	25,000
B-2	Benzene	25,000
7	Crude Dichlorobenzene	17,000
11	Hydrochloric Acid	38,900
12	Chlorobenzene	150,000
P-13	"Water White Poly" (indicated as usually containing "regular hydrochloric acid")	30,400
14	Hydrochloric Acid	38,900
15	Hydrochloric Acid	38,900
15A	Hydrochloric Acid	38,900
16	Benzene	80,000
18	Hydrochloric Acid	88,100
19	Hydrochloric Acid	38,900
20	Hydrochloric Acid	38,900
21	Acetaldehyde	38,900
22	Chloral/Chlorobenzene	47,500
22A	"Black Poly" ("crude dichlorobenzenes")	14,200
23	Crude Dichlorobenzene	26,400
Monosphere 1	Chlorobenzene	5,200
Monosphere 3	Chlorobenzene	7,600

Legend

- Pipelines
- Storage Tanks
- Other
- Former Tank Farm Site Assessment Area

Source: Hargis, 2008

Aerial Photo Base Source:© 2010 Microsoft Corporation.

Historic Tank Locations
Former Tank Farm
Former Montrose Chemical Facility
Henderson, Nevada

100 50 0 100 200 Feet

Geosyntec consultants

Project No: HW0989H

January 2014

Figure **2-2**

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2010 Aerial Photograph
Closed Ponds Area and Former Tank Farm
Henderson, Nevada

300 150 0 300 600 Feet

Geosyntec consultants

Project No: HW0989H

January 2014

Figure 2-3

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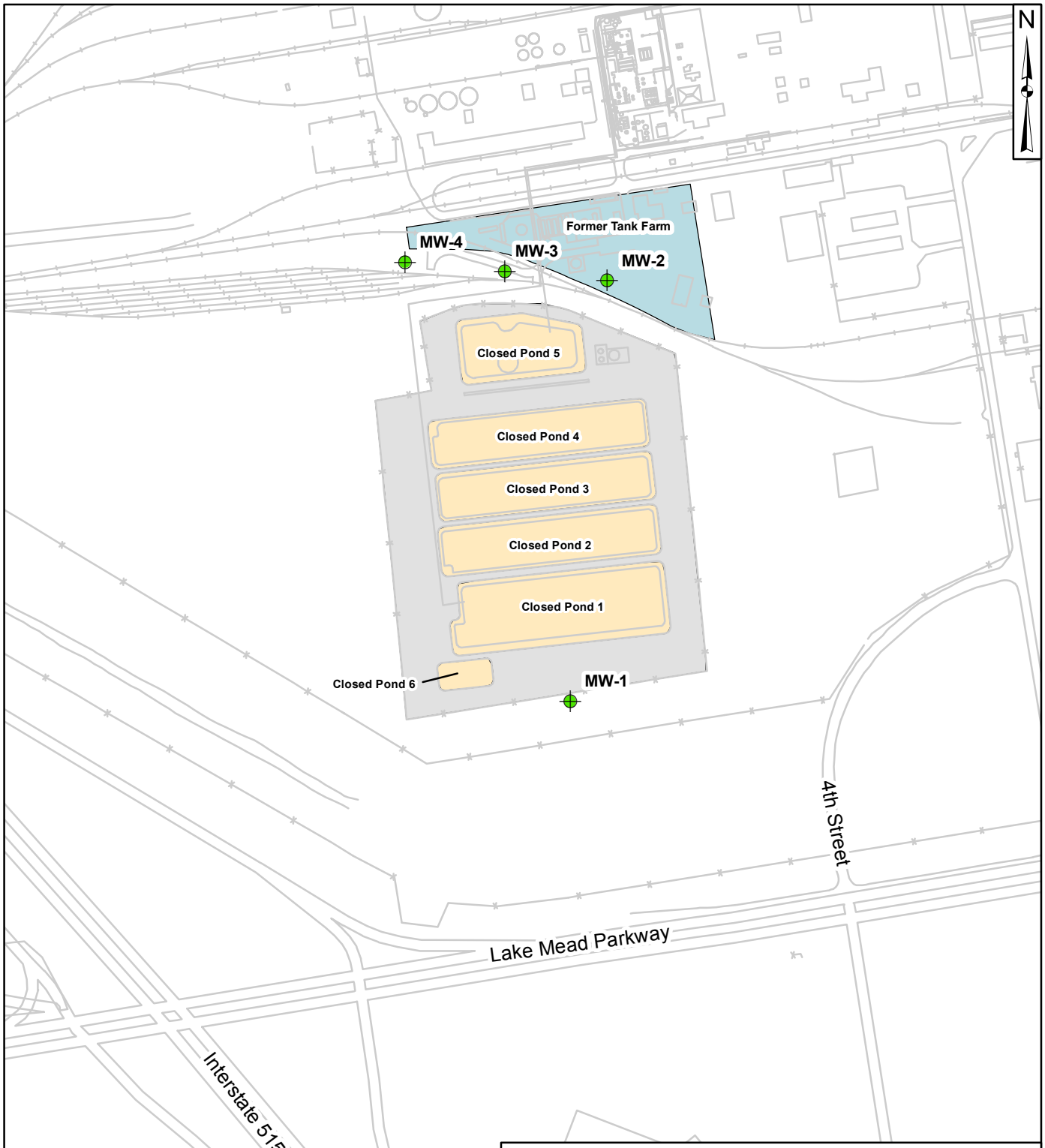

CPA Post-Closure Monitor Well Location Map
Former Montrose Chemical Facility

Henderson, Nevada

400 200 0 400 800 Feet

Geosyntec consultants

Project No: HW0989H | January 2014

Figure 2-4

Legend

Post-Closure Monitor Well

Note: Additional groundwater sample locations shown on Figure 2-7.

Source: Montrose, 1987

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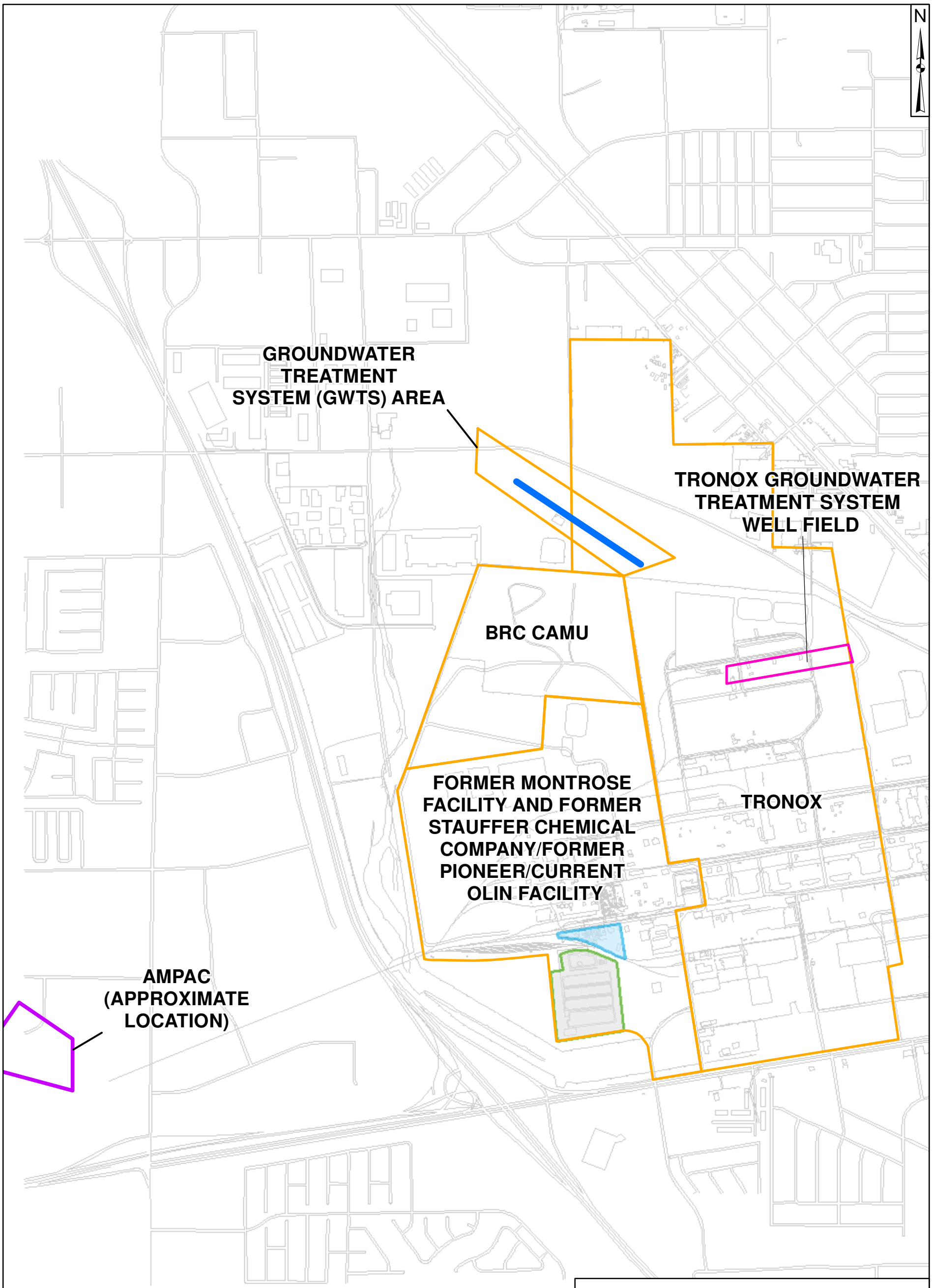

Legend

- Groundwater Treatment System (GWTS)
- Approximate Boundary of Designated Area
- Closed Pond Area Site Assessment Area
- Former Tank Farm Site Assessment Area

Offsite Areas of Interest

Henderson, Nevada

1,000 500 0 1,000 2,000 Feet

Geosyntec consultants

Figure 2-5

Project No: HW0989H

January 2014

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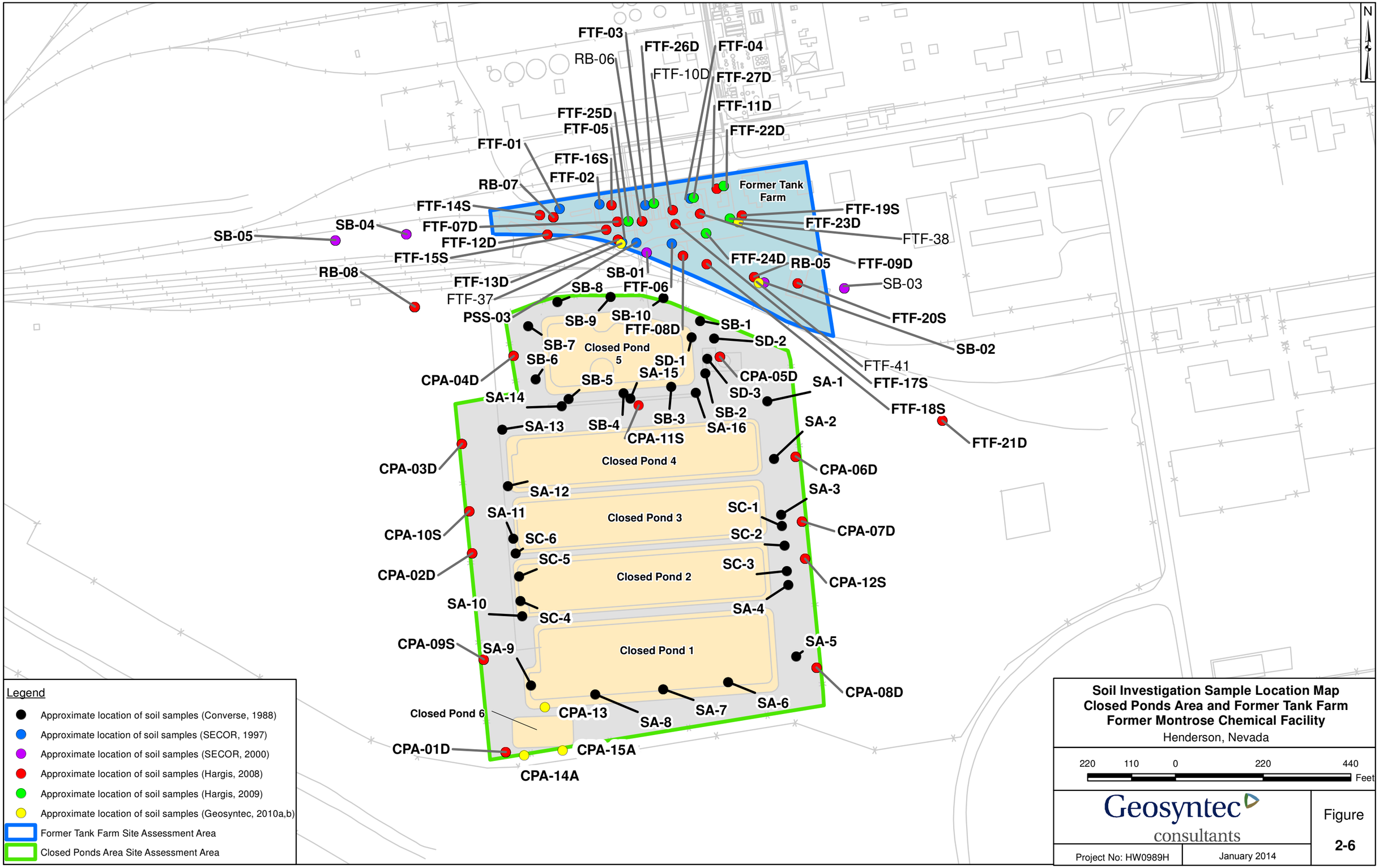

Soil Investigation Sample Location Map
Closed Ponds Area and Former Tank Farm
Former Montrose Chemical Facility
Henderson, Nevada

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Project No: HW0989H

January 2014

Figure **2-6**

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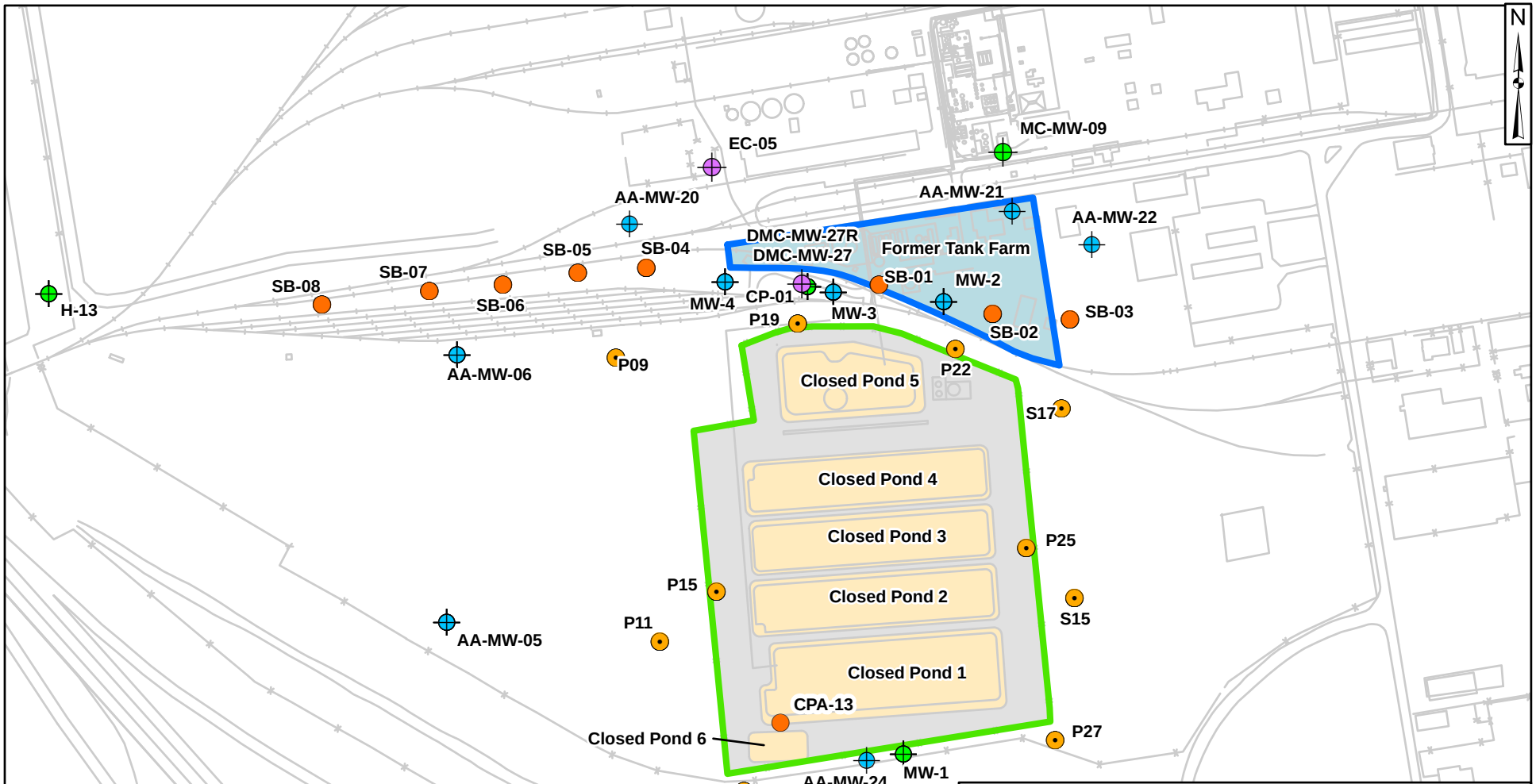

Legend

- Deep Zone Monitor Well
- Shallow Zone Monitor Well
- Middle Zone Monitor Well
- Groundwater Grab Sample/Soil Boring Location
- Groundwater Grab Sample/Soil Gas Location
- Former Tank Farm Site Assessment Area
- Closed Ponds Area Site Assessment Area

Groundwater Investigation
Sample Location Map
Closed Ponds Area and Former Tank Farm
Former Montrose Chemical Facility
Henderson, Nevada

390 195 0 390 780 Feet

Geosyntec consultants

Project No: HW0989H

January 2014

Figure **2-7**

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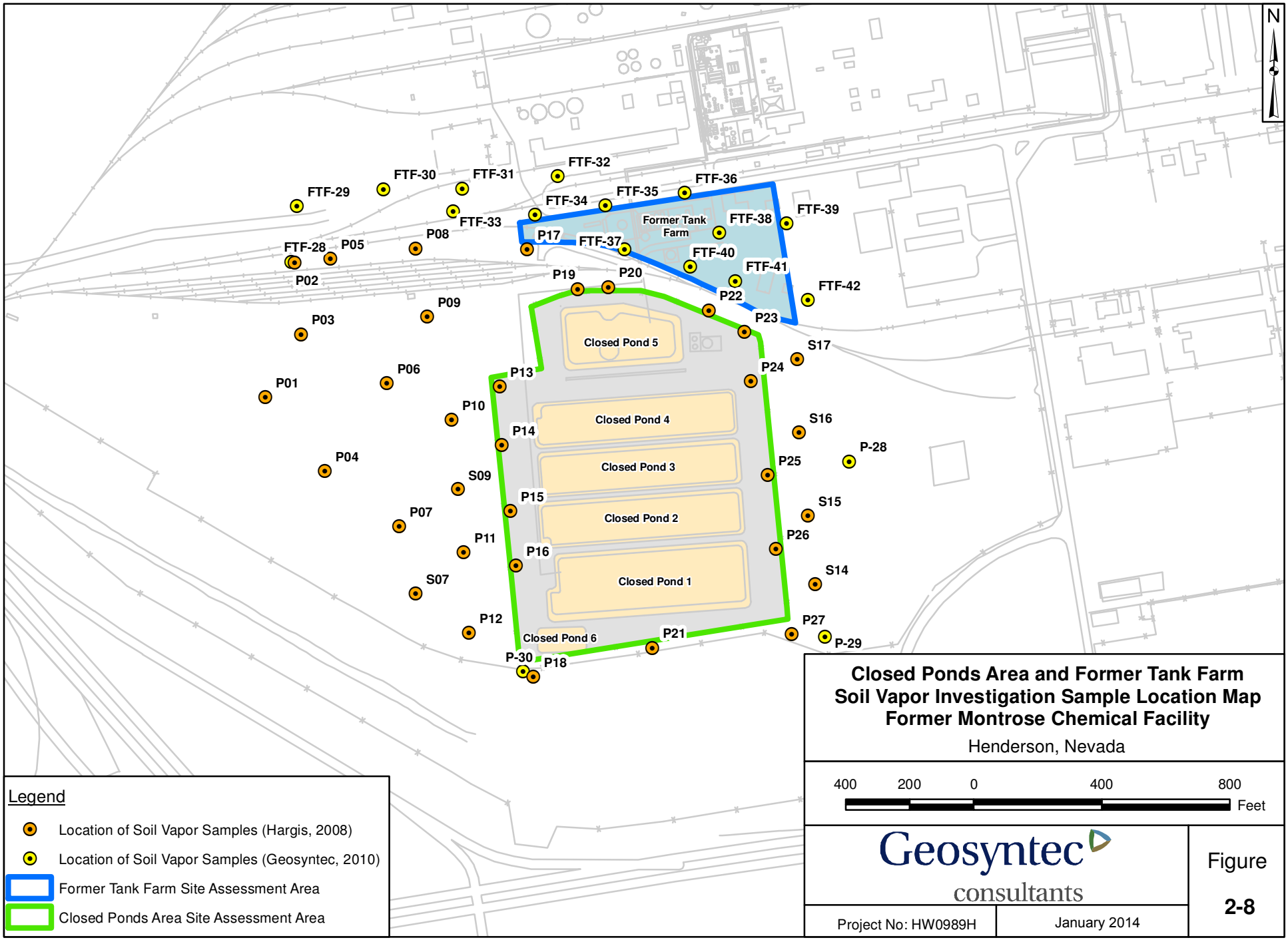

Closed Ponds Area and Former Tank Farm
Soil Vapor Investigation Sample Location Map
Former Montrose Chemical Facility

Henderson, Nevada

Geosyntec consultants

Project No: HW0989H

January 2014

Figure

2-8

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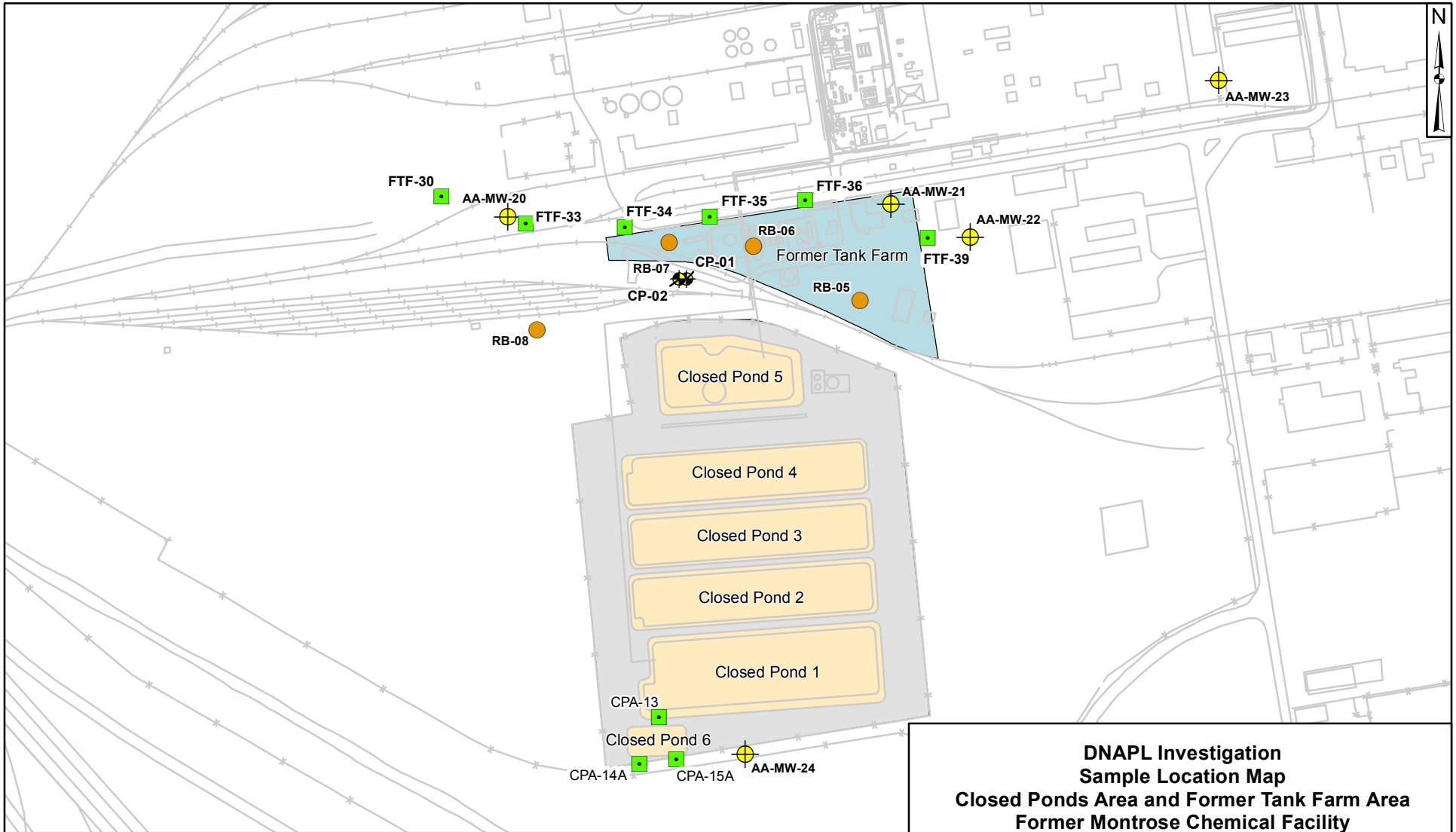

DNAPL Investigation
Sample Location Map
Closed Ponds Area and Former Tank Farm Area
Former Montrose Chemical Facility
Henderson, Nevada

400 200 0 400 800 Feet

Geosyntec consultants

Project No: HW0989H

January 2014

Figure **2-9**

Legend

- Middle Zone Monitor Well (SECOR, 2001; AECOM, 2013)
- Deep DNAPL Investigation Boring Location (Hargis, 2006)
- Shallow Zone Monitor Well (Geosyntec, 2008)
- Soil and DNAPL Investigation Boring Location (Geosyntec, 2010a,b)

DNAPL - Dense Non-Aqueous Phase Liquids

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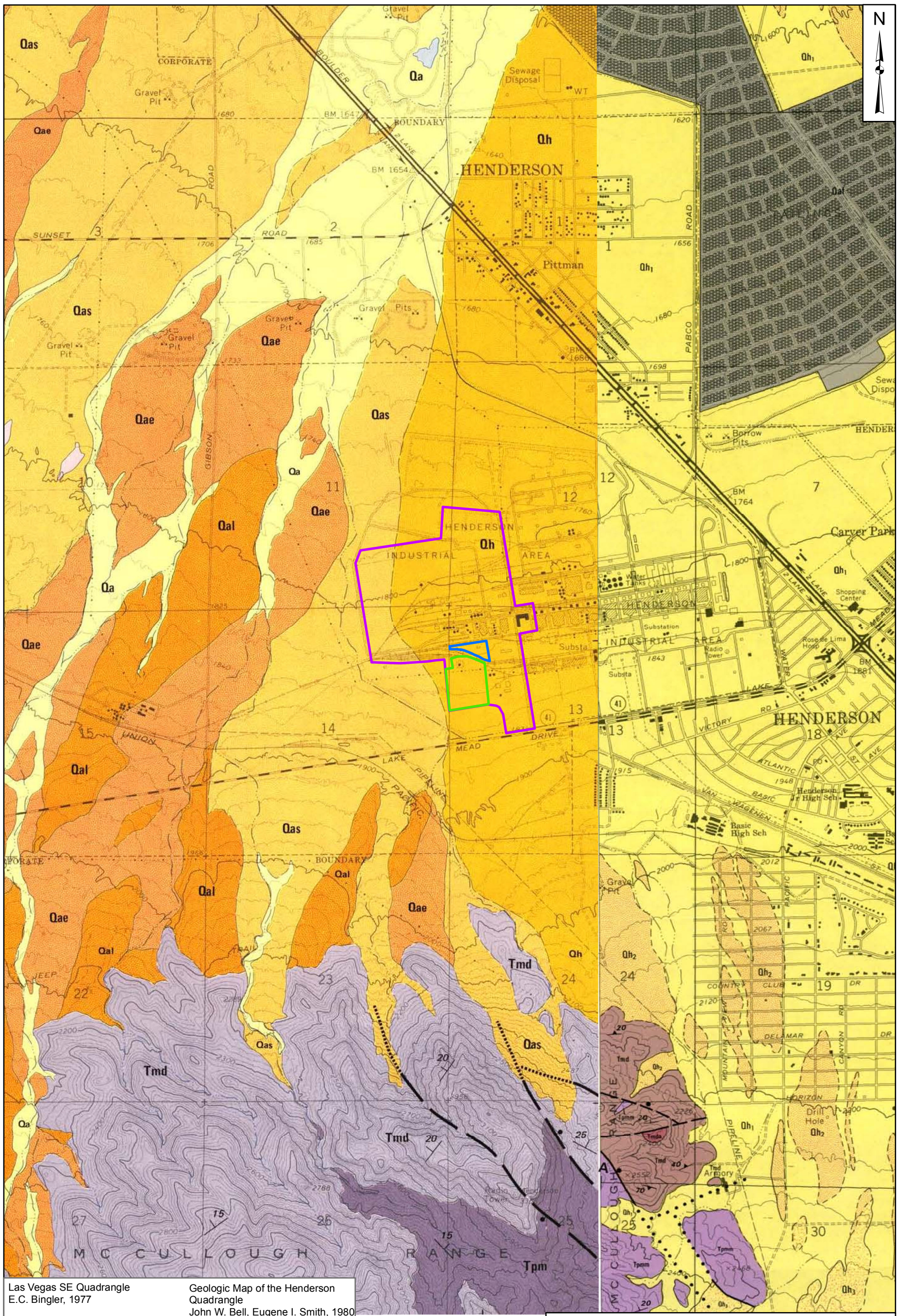


Las Vegas SE Quadrangle
E.C. Bingler, 1977

Qa	Alluvium
Qas	Alluvium Deposits of Sunset Road
Qae	Alluvial Deposits of Eastern Avenue
Qh	Henderson Fan Deposits
Qal	Alluvial Deposits of Lamb Boulevard
QTss	Plio-Pleistocene Silty Sand
Tmd	Mount Davis Volcanics
Tpm	Patsy Mine Volcanics

Geologic Map of the Henderson Quadrangle
John W. Bell, Eugene I. Smith, 1980

Qh1	Pediment and fan deposits of Henderson
Qh2	Pediment and fan deposits of Henderson
Qh3	Pediment and fan deposits of Henderson
Qaf	Artificial fill
Tmd	Volcanic Rocks of the McCullough Range
Tmda	Volcanic Rocks of the McCullough Range
Tpmm	Volcanic Rocks of the McCullough Range

Legend

- Former Tank Farm Site Assessment Area
- Closed Ponds Area Site Assessment Area
- Former Montrose Facility and Former Stauffer Chemical Company/Former Pioneer/Current Olin Facility

Regional Geology Map
Henderson, Nevada

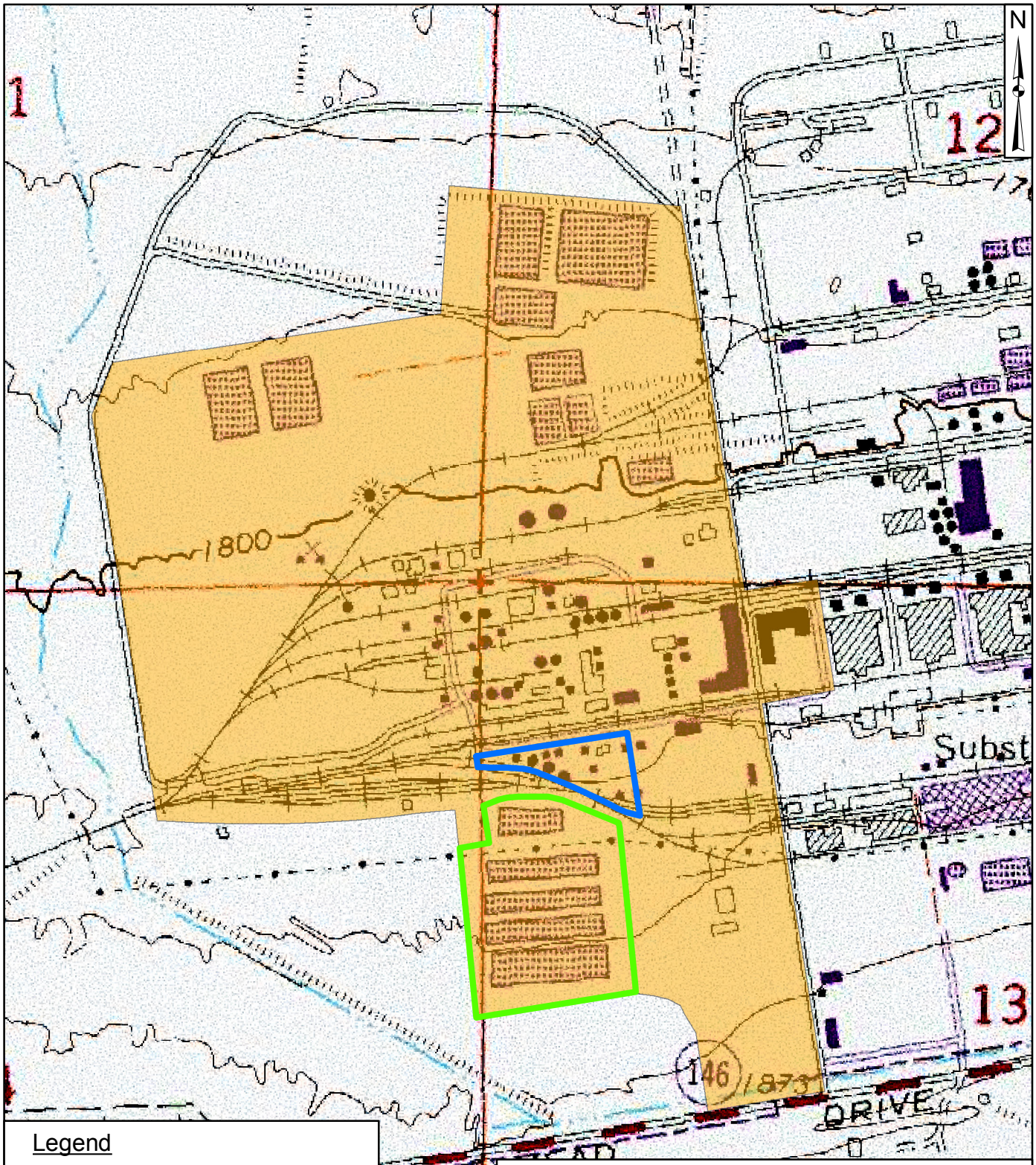
3,000 1,500 0 3,000 Feet

Geosyntec consultants

Project No: HW0989H | January 2014

Figure 3-1

G:\GIS\HW0934\Projects\CPA_FTF\RegionalGeology_20100917.mxd cc 7/20/2012



Legend

- Former Tank Farm Site Assessment Area
- Closed Ponds Area Site Assessment Area
- Former Montrose Facility and Former Stauffer Chemical Company/Former Pioneer/Current Olin Facility

Source: USGS Topographic Map, 2000
Contour Interval 20 feet

Topographic Setting
Henderson, Nevada

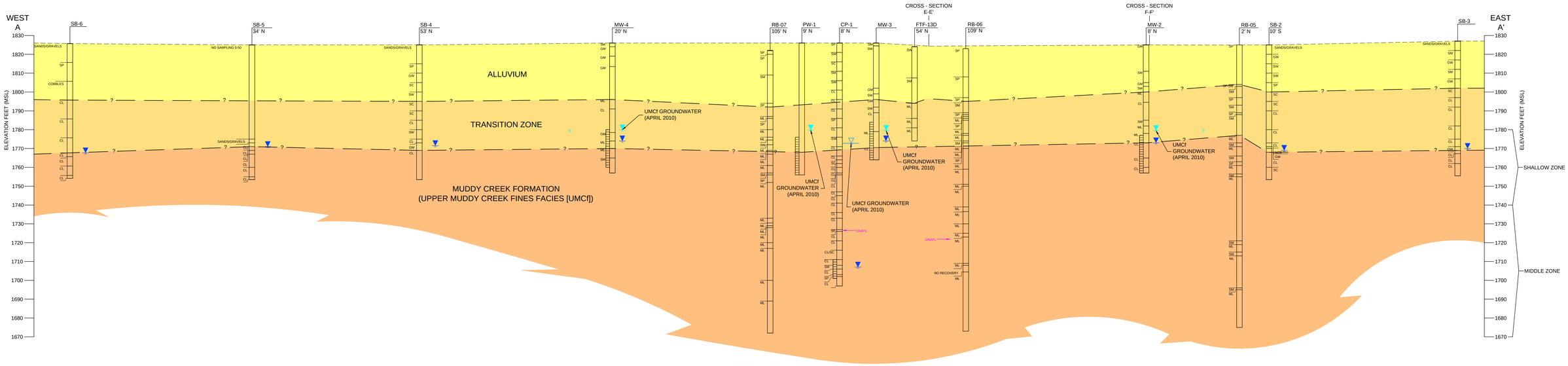
800 400 0 800 1,600 Feet

Geosyntec consultants

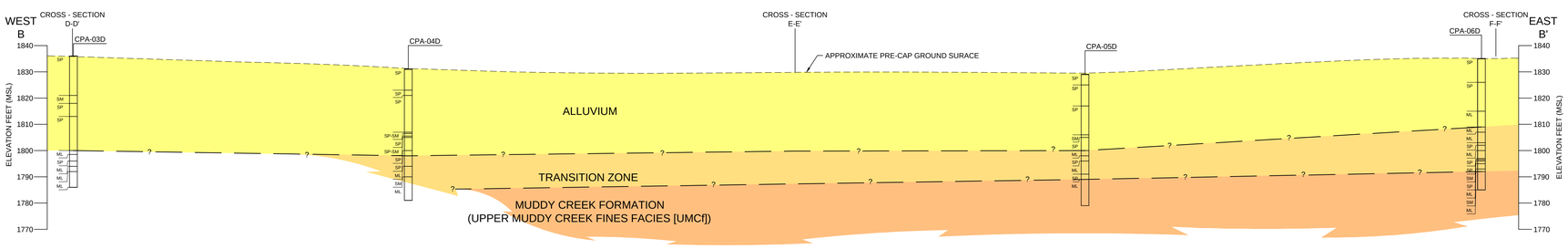
Project No: HW0989H | January 2014

Figure 3-2

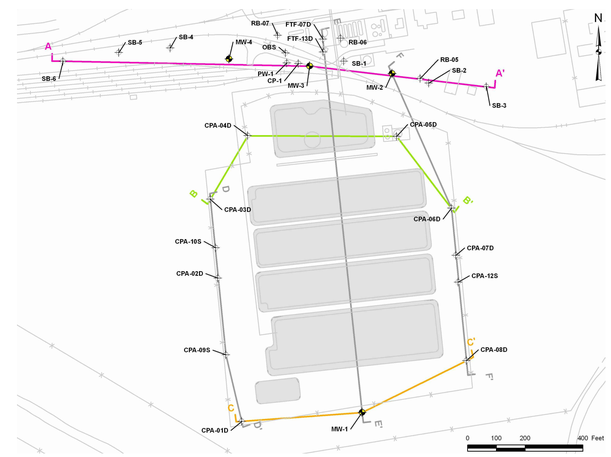
G:\GIS\HW0934\Projects\CPA_FTF\Topography_083110.mxd cc 7/20/2012



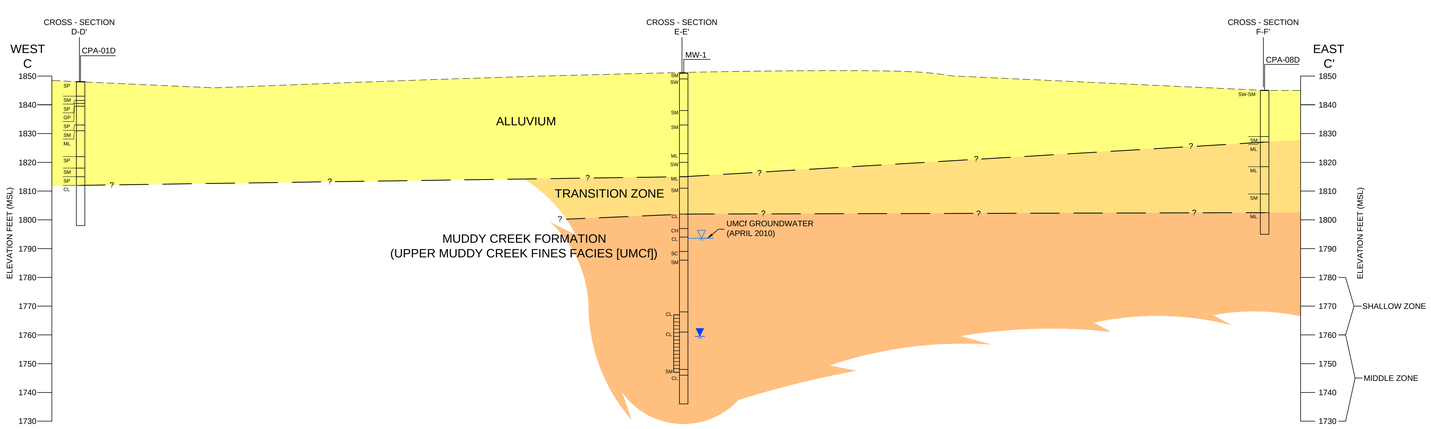
CROSS - SECTION A-A'



CROSS - SECTION B-B'

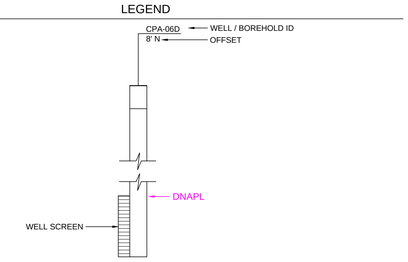


PLAN VIEW



CROSS - SECTION C-C'

LEGEND



	STATIC WATER TABLE AT TIME OF DRILLING
	DEEP GROUNDWATER
	SHALLOW GROUNDWATER
NCR	NO CORE RECOVERY
MSL	MEAN SEA LEVEL

VERTICAL SCALE IN FEET: 40, 20, 0, 10, 20

HORIZONTAL SCALE IN FEET: 40, 20, 0, 40, 80

NOTES:

1. SUBSURFACE CONDITIONS MAY VARY AWAY FROM BORING LOCATIONS AND WITH THE PASSAGE OF TIME.
2. CROSS - SECTIONS ARE 2X VERTICALLY EXAGGERRATED.

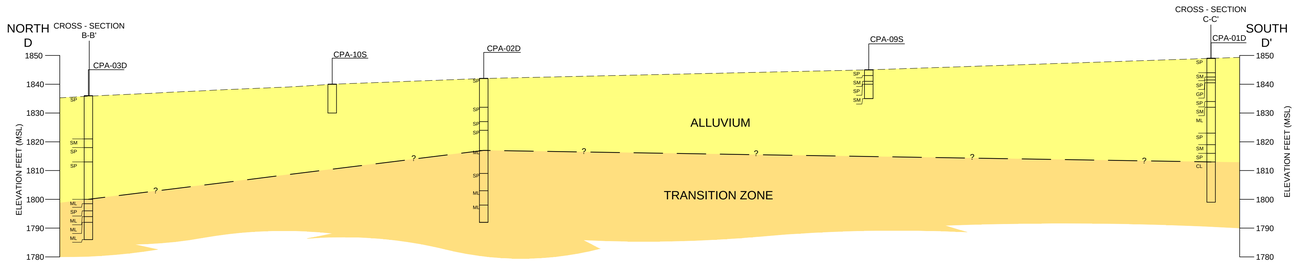
IDEALIZED CROSS-SECTIONS A-A' THROUGH C-C' CLOSED PONDS AREA AND FORMER TANK FARM, CONCEPTUAL SITE MODEL FORMER MONTROSE FACILITY - HENDERSON, NEVADA

Geosyntec consultants

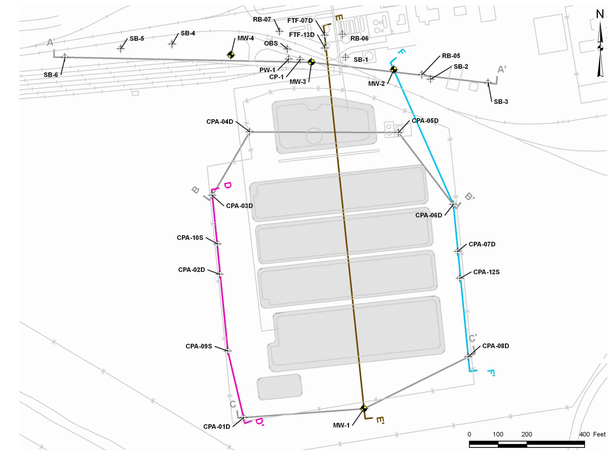
FIGURE 3-3

PROJECT NO: HW0989H | JANUARY 2014

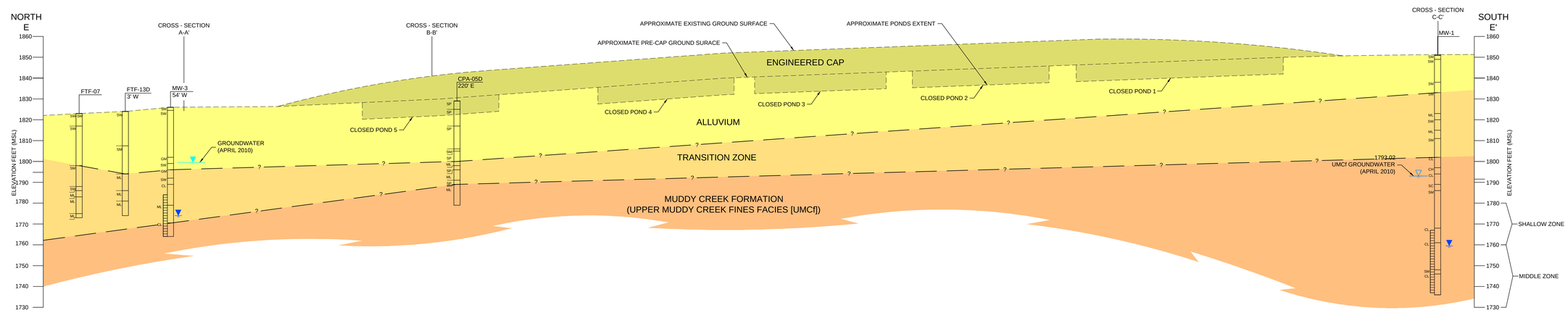
Y:\CAD\DRAWINGS\TOSC CHEMICAL SITE\TFMONTROSE CHEMICAL SITE\TFMONTROSE CHEMICAL SITE\HW0989\FIGURE\HW0989FIG03.DWG



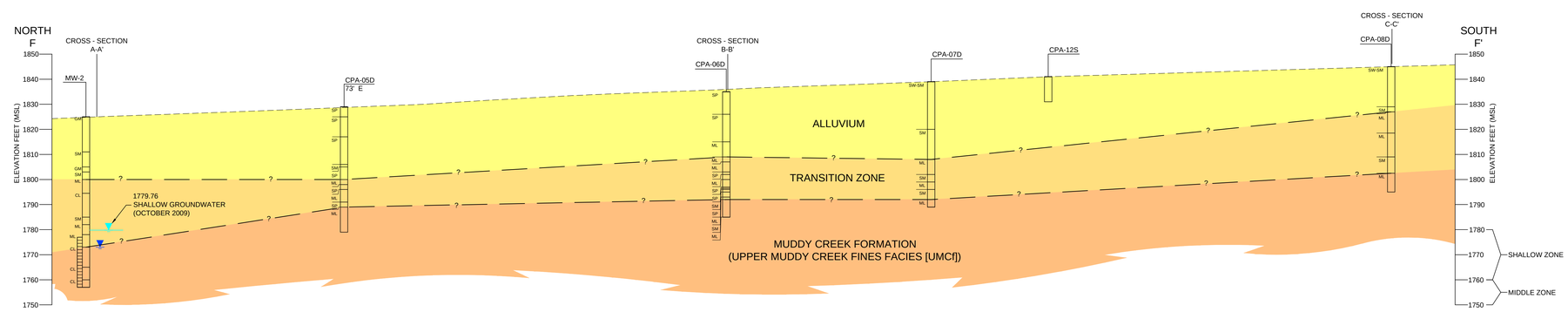
CROSS - SECTION D-D'



PLAN VIEW

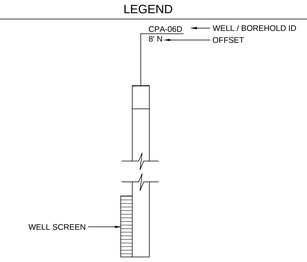


CROSS - SECTION E-E'



CROSS - SECTION F-F'

LEGEND



	STATIC WATER TABLE AT TIME OF DRILLING
	DEEP GROUNDWATER
	SHALLOW GROUNDWATER
NCR	NO CORE RECOVERY
MSL	MEAN SEA LEVEL

VERTICAL SCALE IN FEET: 40, 20, 0, 10, 20

HORIZONTAL SCALE IN FEET: 40, 20, 0, 40, 80

NOTES:

1. SUBSURFACE CONDITIONS MAY VARY AWAY FROM BORING LOCATIONS AND WITH THE PASSAGE OF TIME.
2. CROSS - SECTIONS ARE 2X VERTICALLY EXAGGERRATED.

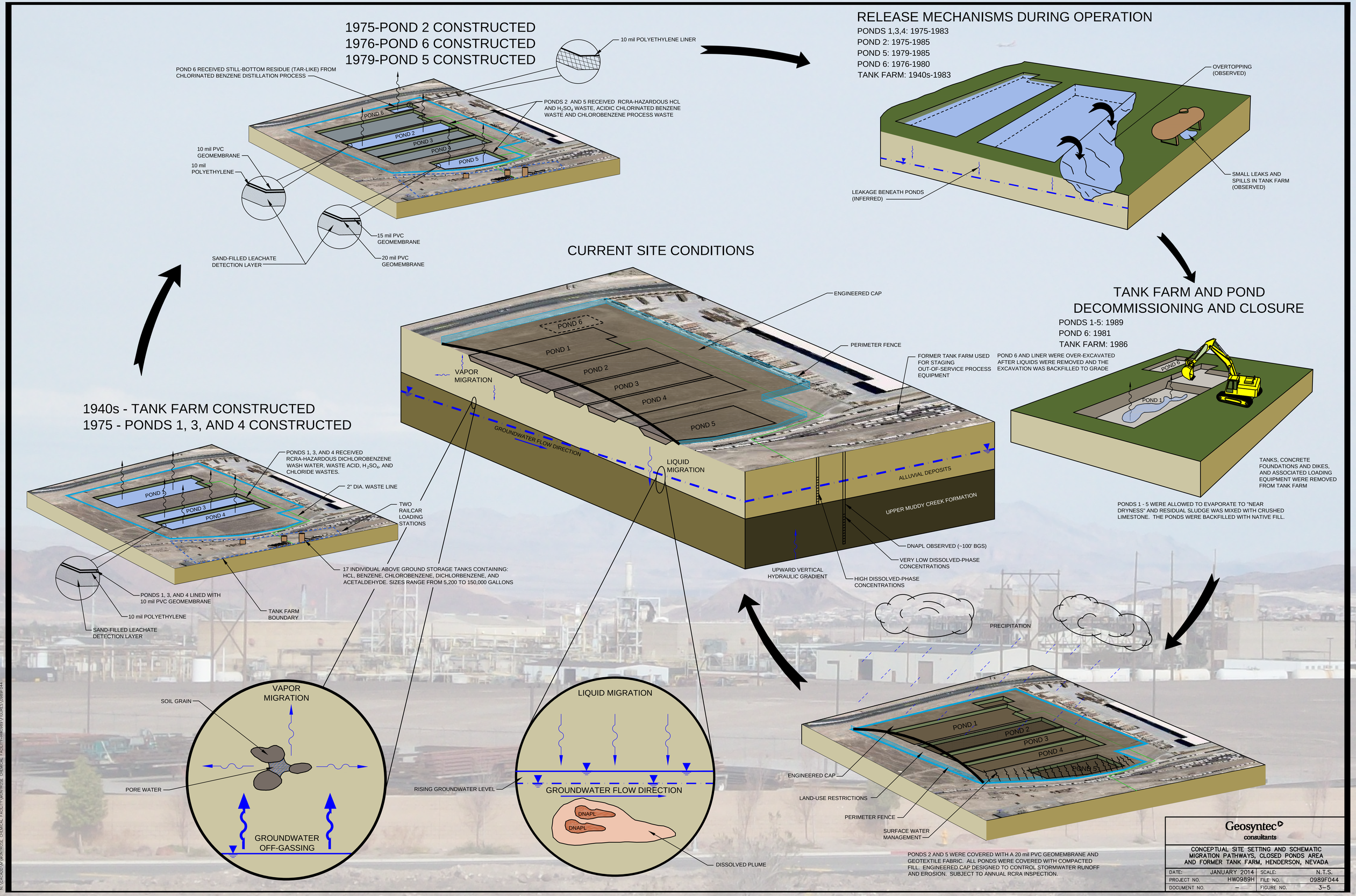
IDEALIZED CROSS-SECTIONS D-D' THROUGH F-F' CLOSED PONDS AREA AND FORMER TANK FARM, CONCEPTUAL SITE MODEL FORMER MONTROSE FACILITY - HENDERSON, NEVADA

Geosyntec consultants

FIGURE 3-4

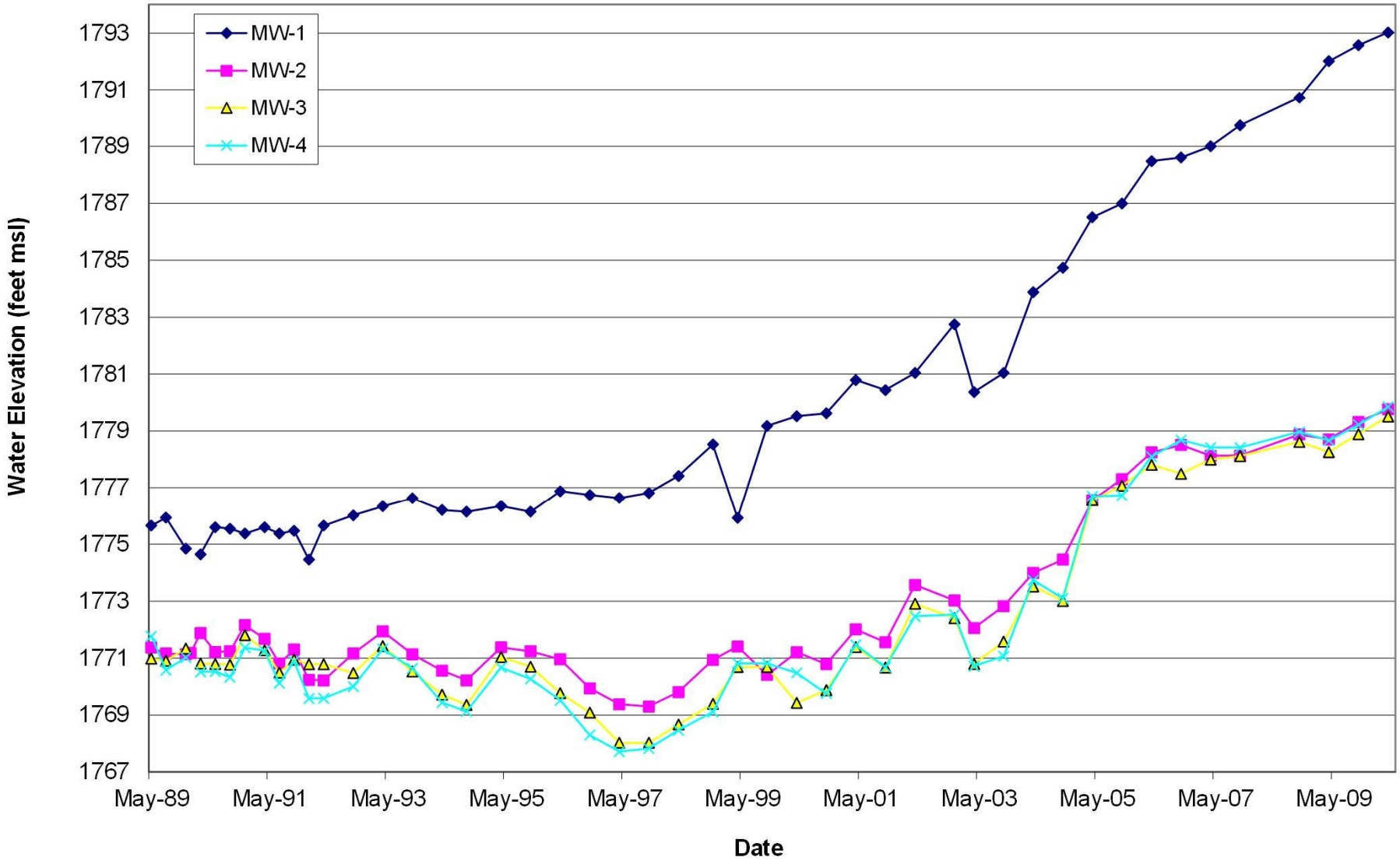
PROJECT NO: HW0989H | JANUARY 2014

N:\CAD\DWG\MONTROSE CHEMICAL FACILITY-HW\0989H\GORESUMMP.DWG

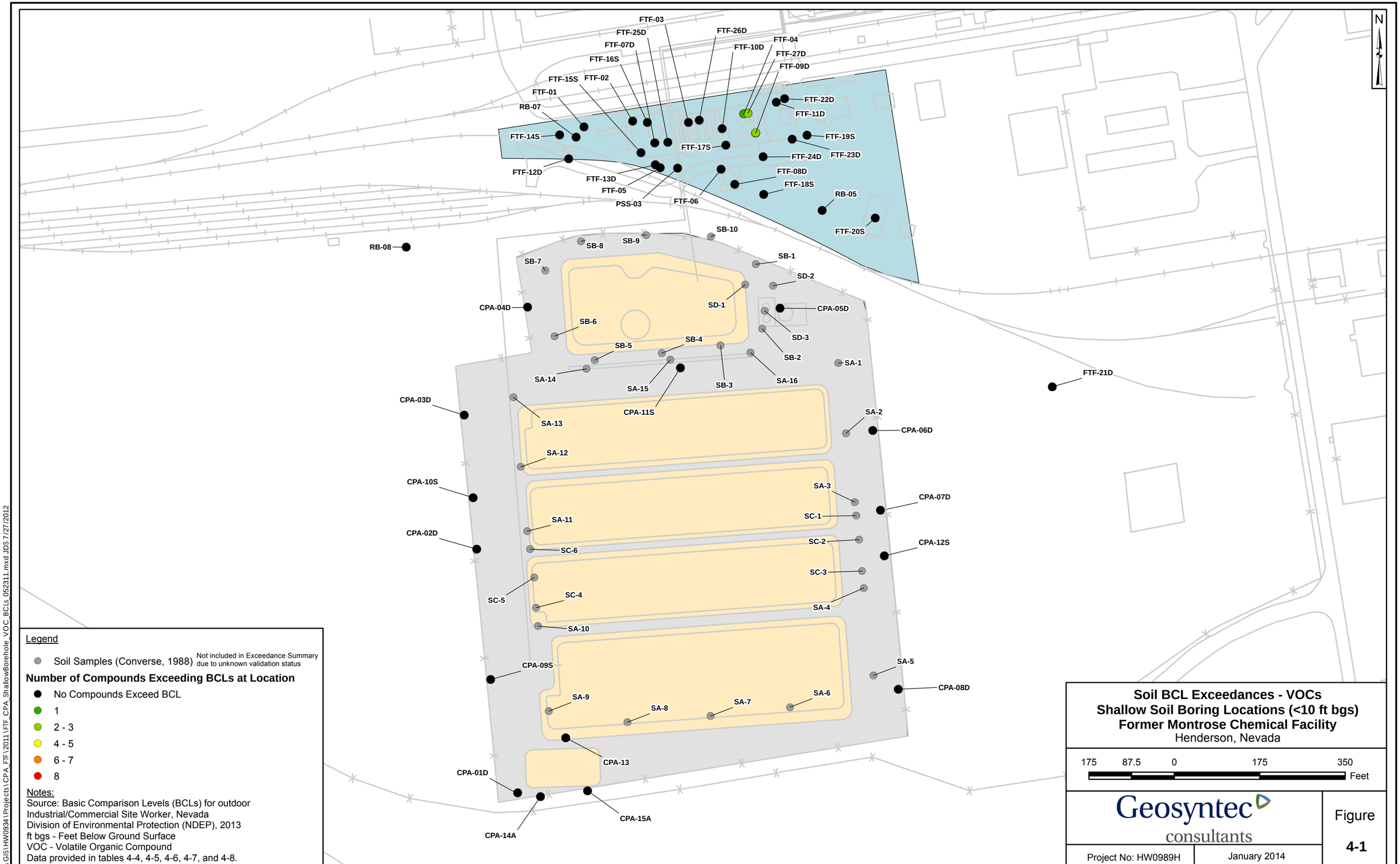

1975-POND 2 CONSTRUCTED
1976-POND 6 CONSTRUCTED
1979-POND 5 CONSTRUCTED
10 mil POLYETHYLENE LINER
POND 6 RECEIVED STILL-BOTTOM RESIDUE (TAR-LIKE) FROM CHLORINATED BENZENE DISTILLATION PROCESS
PONDS 2 AND 5 RECEIVED RCRA-HAZARDOUS HCL AND H_2SO_4 WASTE, ACIDIC CHLORINATED BENZENE WASTE AND CHLOROBENZENE PROCESS WASTE
POND 6
POND 2
POND 3
POND 4
POND 5
10 mil PVC GEOMEMBRANE
10 mil POLYETHYLENE
15 mil PVC GEOMEMBRANE
20 mil PVC GEOMEMBRANE
SAND-FILLED LEACHATE DETECTION LAYER
RELEASE MECHANISMS DURING OPERATION
PONDS 1,3,4: 1975-1983
POND 2: 1975-1985
POND 5: 1979-1985
POND 6: 1976-1980
TANK FARM: 1940s-1983
OVERTOPPING (OBSERVED)
SMALL LEAKS AND SPILLS IN TANK FARM (OBSERVED)
LEAKAGE BENEATH PONDS (INFERRED)
CURRENT SITE CONDITIONS
ENGINEERED CAP
PERIMETER FENCE
FORMER TANK FARM USED FOR STAGING OUT-OF-SERVICE PROCESS EQUIPMENT
POND 6
POND 1
POND 2
POND 3
POND 4
POND 5
VAPOR MIGRATION
GROUNDWATER FLOW DIRECTION
LIQUID MIGRATION
ALLUVIAL DEPOSITS
UPPER MUDDY CREEK FORMATION
DNAPL OBSERVED (~100' BGS)
VERY LOW DISSOLVED-PHASE CONCENTRATIONS
HIGH DISSOLVED-PHASE CONCENTRATIONS
UPWARD VERTICAL HYDRAULIC GRADIENT
TANK FARM AND POND DECOMMISSIONING AND CLOSURE
PONDS 1-5: 1989
POND 6: 1981
TANK FARM: 1986
POND 6 AND LINER WERE OVER-EXCAVATED AFTER LIQUIDS WERE REMOVED AND THE EXCAVATION WAS BACKFILLED TO GRADE
POND 6
POND 1
TANKS, CONCRETE FOUNDATIONS AND DIKES, AND ASSOCIATED LOADING EQUIPMENT WERE REMOVED FROM TANK FARM
PONDS 1 - 5 WERE ALLOWED TO EVAPORATE TO "NEAR DRYNESS" AND RESIDUAL SLUDGE WAS MIXED WITH CRUSHED LIMESTONE. THE PONDS WERE BACKFILLED WITH NATIVE FILL.
1940s - TANK FARM CONSTRUCTED
1975 - PONDS 1, 3, AND 4 CONSTRUCTED
PONDS 1, 3, AND 4 RECEIVED RCRA-HAZARDOUS DICHLOROBENZENE WASH WATER, WASTE ACID, H_2SO_4, AND CHLORIDE WASTES.
2" DIA. WASTE LINE
TWO RAILCAR LOADING STATIONS
POND 1
POND 3
POND 4
17 INDIVIDUAL ABOVE GROUND STORAGE TANKS CONTAINING: HCL, BENZENE, CHLOROBENZENE, DICHLORBENZENE, AND ACETALDEHYDE. SIZES RANGE FROM 5,200 TO 150,000 GALLONS
PONDS 1, 3, AND 4 LINED WITH 10 mil PVC GEOMEMBRANE
10 mil POLYETHYLENE
SAND-FILLED LEACHATE DETECTION LAYER
TANK FARM BOUNDARY
PRECIPITATION
POND 1
POND 2
POND 3
POND 4
POND 5
ENGINEERED CAP
LAND-USE RESTRICTIONS
PERIMETER FENCE
SURFACE WATER MANAGEMENT
PONDS 2 AND 5 WERE COVERED WITH A 20 mil PVC GEOMEMBRANE AND GEOTEXTILE FABRIC. ALL PONDS WERE COVERED WITH COMPACTED FILL. ENGINEERED CAP DESIGNED TO CONTROL STORMWATER RUNOFF AND EROSION. SUBJECT TO ANNUAL RCRA INSPECTION.
VAPOR MIGRATION
SOIL GRAIN
PORE WATER
GROUNDWATER OFF-GASSING
LIQUID MIGRATION
RISING GROUNDWATER LEVEL
GROUNDWATER FLOW DIRECTION
DNAPL
DNAPL
DISSOLVED PLUME
Geosyntec consultants
CONCEPTUAL SITE SETTING AND SCHEMATIC MIGRATION PATHWAYS, CLOSED PONDS AREA AND FORMER TANK FARM, HENDERSON, NEVADA
DATE: JANUARY 2014
SCALE: N.T.S.
PROJECT NO. HW0989H
FILE NO. 0989F044
DOCUMENT NO. –
FIGURE NO. 3–5
N:\CACADD\W\MONTROSE_CHEMICAL_FACILITY\MONTROSE_CHEMICAL_FACILITY-HW0989\FIGURES\0989F044

Geosyntec consultants

Figure 3-6: Groundwater Elevations in MW-1, MW-2, MW-3, and MW-4 (May 1989 to April 2010)



feet msl - feet above mean sea level



Legend

Soil Samples (Converse, 1988) — Not included in Exceedance Summary due to unknown validation status

Number of Compounds Exceeding BCLs at Location

- No Compounds Exceed BCL
- 1
- 2 - 3
- 4 - 5
- 6 - 7
- 8

Notes:
Source: Basic Comparison Levels (BCLs) for outdoor Industrial/Commercial Site Worker, Nevada Division of Environmental Protection (NDEP), 2013
ft bgs - Feet Below Ground Surface
VOC - Volatile Organic Compound
Data provided in tables 4-4, 4-5, 4-6, 4-7, and 4-8.

Soil BCL Exceedances - VOCs
Shallow Soil Boring Locations (<10 ft bgs)
Former Montrose Chemical Facility
Henderson, Nevada

175 87.5 0 175 350 Feet

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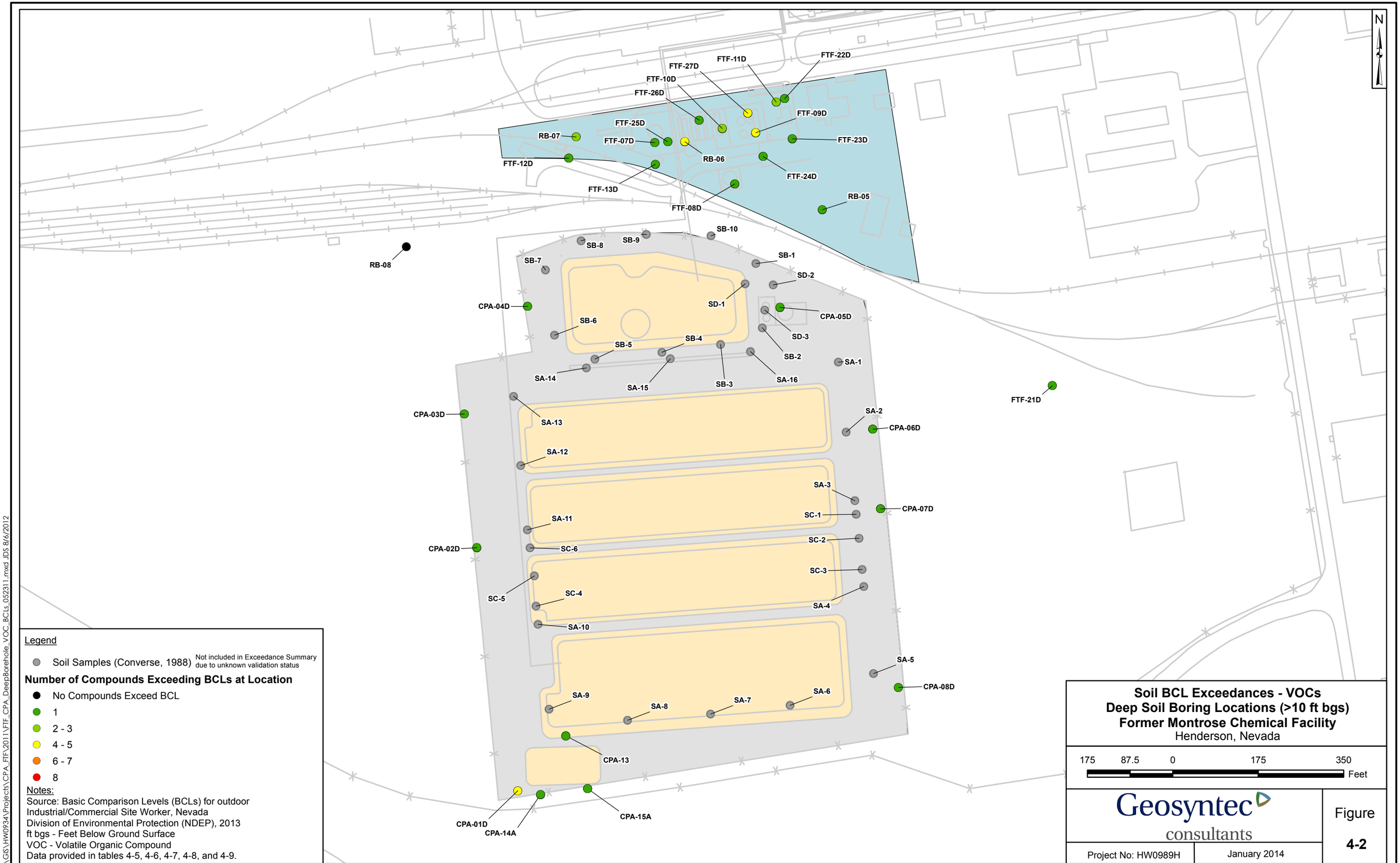
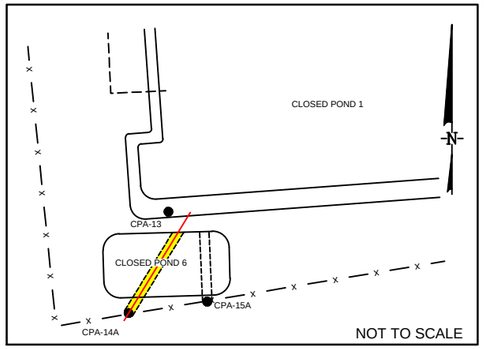
Project No: HW0989H | January 2014

Figure **4-1**

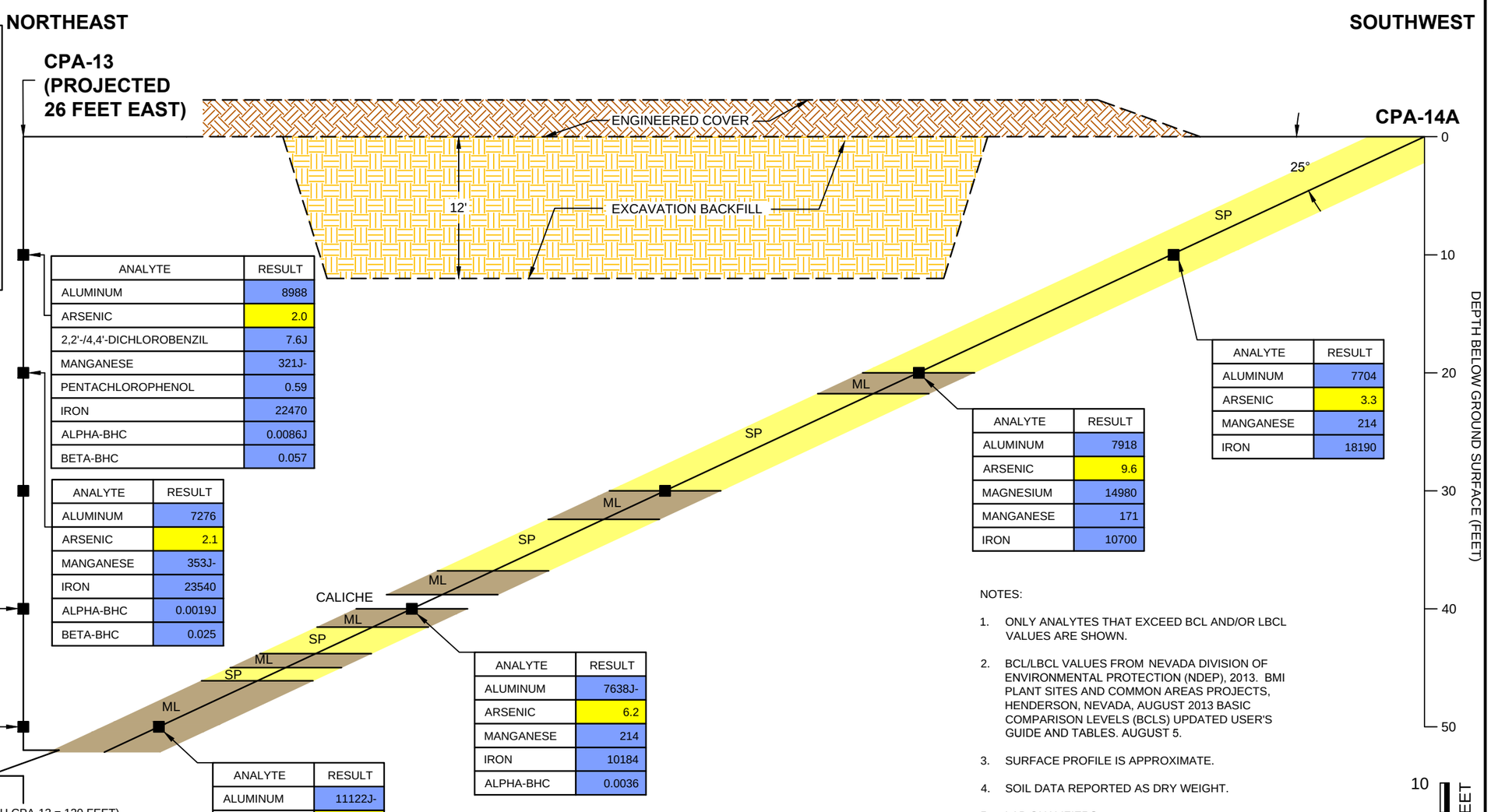
G:\GIS\HW0934\Projects\CPA_FTF\2011\FTF_CPA_ShallowBorehole_VOC_BCLs_052311.mxd JDS 7/27/2012



Soil BCL Exceedances - VOCs
Deep Soil Boring Locations (>10 ft bgs)
Former Montrose Chemical Facility
Henderson, Nevada



KEY MAP



ANALYTE	RESULT
ALUMINUM	8988
ARSENIC	2.0
2,2'-/4,4'-DICHLOROBENZIL	7.6J
MANGANESE	321J-
PENTACHLOROPHENOL	0.59
IRON	22470
ALPHA-BHC	0.0086J
BETA-BHC	0.057

ANALYTE	RESULT
ALUMINUM	7276
ARSENIC	2.1
MANGANESE	353J-
IRON	23540
ALPHA-BHC	0.0019J
BETA-BHC	0.025

ANALYTE	RESULT
ALUMINUM	7906
ARSENIC	5.9
MANGANESE	130J-
IRON	18760

ANALYTE	RESULT
ALUMINUM	14740
ARSENIC	9.0
CHLOROFORM	7.5
MAGNESIUM	16080
MANGANESE	295
IRON	17420

(TOTAL DEPTH CPA-13 = 120 FEET)

ANALYTE	RESULT
ALUMINUM	11122J-
ARSENIC	10.2
CHLOROFORM	6.6J-
MAGNESIUM	20100
MANGANESE	456
IRON	14740
ALPHA-BHC	0.0013

ANALYTE	RESULT
ALUMINUM	7638J-
ARSENIC	6.2
MANGANESE	214
IRON	10184
ALPHA-BHC	0.0036

ANALYTE	RESULT
ALUMINUM	7918
ARSENIC	9.6
MAGNESIUM	14980
MANGANESE	171
IRON	10700

ANALYTE	RESULT
ALUMINUM	7704
ARSENIC	3.3
MANGANESE	214
IRON	18190

NOTES:

1. ONLY ANALYTES THAT EXCEED BCL AND/OR LBCL VALUES ARE SHOWN.
2. BCL/LBCL VALUES FROM NEVADA DIVISION OF ENVIRONMENTAL PROTECTION (NDEP), 2013. BMI PLANT SITES AND COMMON AREAS PROJECTS, HENDERSON, NEVADA, AUGUST 2013 BASIC COMPARISON LEVELS (BCLS) UPDATED USER'S GUIDE AND TABLES. AUGUST 5.
3. SURFACE PROFILE IS APPROXIMATE.
4. SOIL DATA REPORTED AS DRY WEIGHT.
5. LAB QUALIFIERS:

   J ESTIMATED VALUE. ANALYTE DETECTED AT A LEVEL LESS THAN THE REPORTING LIMIT (RL) AND GREATER THAN OR EQUAL TO THE METHOD DETECTION LIMIT (MDL).

   J- ESTIMATED VALUE WITH A NEGATIVE BIAS.

10 0 SCALE IN FEET

10 0 SCALE IN FEET

SUMMARY LIST OF ANALYTES ABOVE BCL AND/OR LBCL

ANALYTE	BCL/OUTDOOR COMMERICAL/INDUSTRIAL WORKER (mg/kg)	LBCL (mg/kg)
ALUMINUM	100000	1500
ARSENIC	1.77	20
CHLOROFORM	1.71	0.6
MAGNESIUM	100000	13000
MANGANESE	100000	65.2
2,2'-/4,4'-DICHLOROBENZIL	341	0.006
PENTACHLOROPHENOL	3.0	0.02
IRON	100000	151
ALPHA-BHC	269.5	0.0006
BETA-BHC	53.4	0.002

EXPLANATION

■	SAMPLE LOCATION CONCENTRATIONS IN MILLIGRAMS PER KILOGRAM (mg/kg)
2.1	CONCENTRATION GREATER THAN BCL VALUE
8988	CONCENTRATION GREATER THAN LBCL VALUE
7.5	CONCENTRATION GREATER THAN BCL AND LBCL VALUE
BCL	BASIC COMPARISON LEVEL
LBCL	LEACHING BASED COMPARISON LEVEL (DILUTION ATTENUATION FACTOR = 20)
	POORLY GRADED SAND (SP)
	SILT (ML)

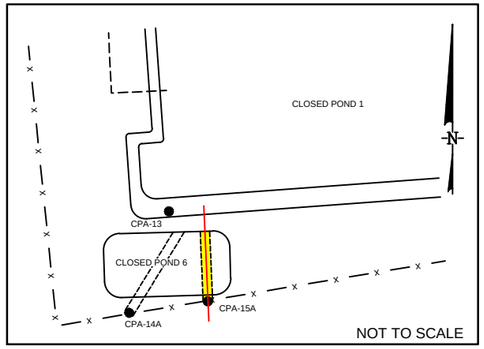
SOIL BORING CPA-14A CROSS SECTION
CLOSED POND 6
HENDERSON, NEVADA

Geosyntec consultants

FIGURE 4-3

PROJECT NO: HW0989H | JANUARY 2014

N:\CACADD\MMONTROSE CHEMICAL FACILITY\MONTROSE CHEMICAL FACILITY-HW0989\FIGURES\0989F039



KEY MAP

SUMMARY LIST OF ANALYTES ABOVE BCL AND/OR LBCL		
ANALYTE	BCL/OUTDOOR COMMERICAL/INDUSTRIAL WORKER (mg/kg)	LBCL (mg/kg)
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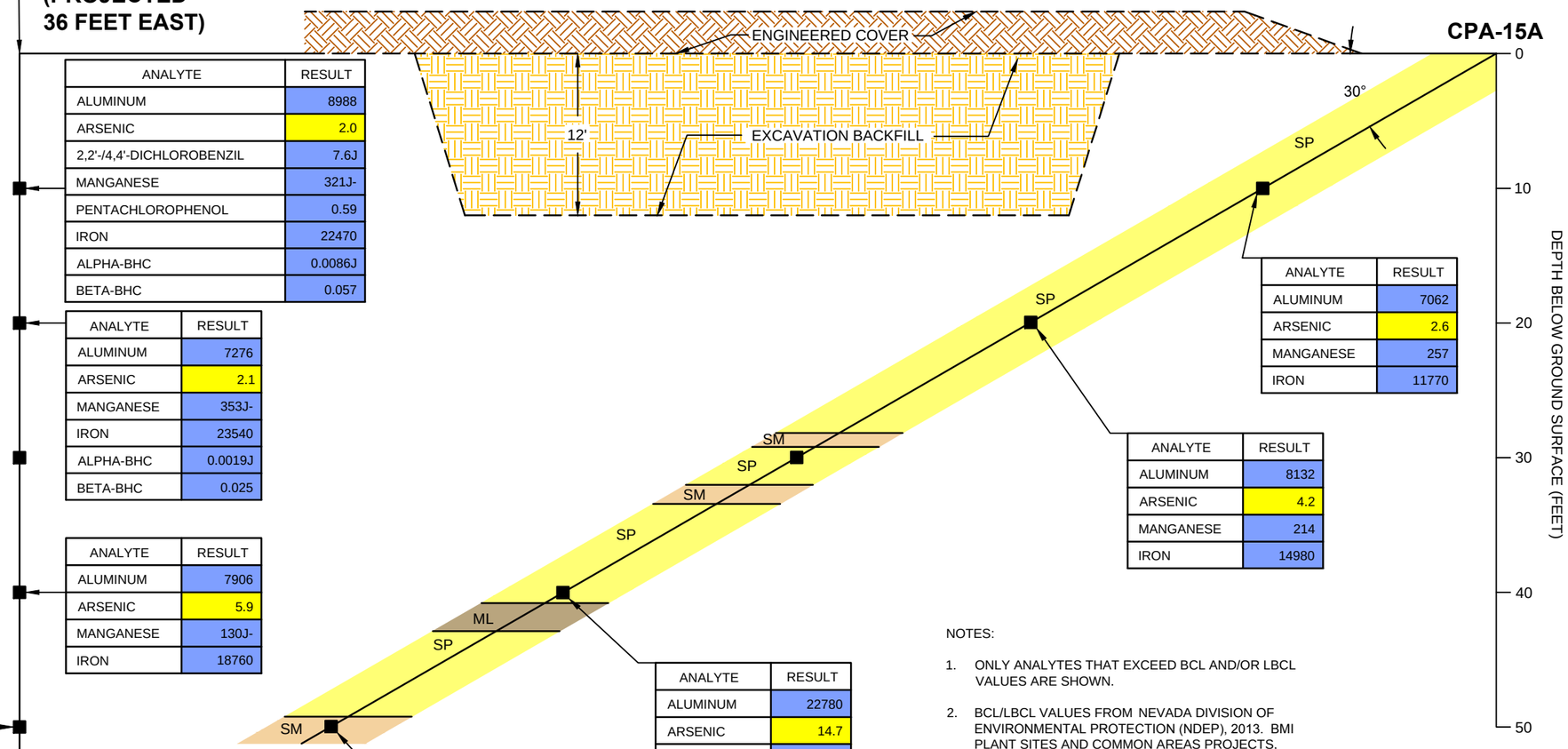
2,2'-/4,4'-DICHLOROBENZIL	341	0.006
PENTACHLOROPHENOL	3.0	0.02
IRON	100000	151
ALPHA-BHC	269.5	0.0006
BETA-BHC	53.9	0.002



ANALYTE	RESULT
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ARSENIC	2.0
2,2'-/4,4'-DICHLOROBENZIL	7.6J
MANGANESE	321J-
PENTACHLOROPHENOL	0.59
IRON	22470
ALPHA-BHC	0.0086J
BETA-BHC	0.057

ANALYTE	RESULT
ALUMINUM	7276
ARSENIC	2.1
MANGANESE	353J-
IRON	23540
ALPHA-BHC	0.0019J
BETA-BHC	0.025

ANALYTE	RESULT
ALUMINUM	7906
ARSENIC	5.9
MANGANESE	130J-
IRON	18760

ANALYTE	RESULT
ALUMINUM	14740
ARSENIC	9.0
CHLOROFORM	7.5
MAGNESIUM	16080
MANGANESE	295
IRON	17420

(TOTAL DEPTH
CPA-13 = 120 FEET)

ANALYTE	RESULT
ALUMINUM	7062
ARSENIC	2.6
MANGANESE	257
IRON	11770

ANALYTE	RESULT
ALUMINUM	8132
ARSENIC	4.2
MANGANESE	214
IRON	14980

ANALYTE	RESULT
ALUMINUM	22780
ARSENIC	14.7
CHLOROFORM	1.47
MAGNESIUM	25460
MANGANESE	348
IRON	20100

ANALYTE	RESULT
ALUMINUM	12194
ARSENIC	7.4
CHLOROFORM	2.4
MAGNESIUM	20100
MANGANESE	281
IRON	14740

NOTES:

1. ONLY ANALYTES THAT EXCEED BCL AND/OR LBCL VALUES ARE SHOWN.
2. BCL/LBCL VALUES FROM NEVADA DIVISION OF ENVIRONMENTAL PROTECTION (NDEP), 2013. BMI PLANT SITES AND COMMON AREAS PROJECTS, HENDERSON, NEVADA, AUGUST 2013 BASIC COMPARISON LEVELS (BCLS) UPDATED USER'S GUIDE AND TABLES. AUGUST 5.
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   J- ESTIMATED VALUE WITH A NEGATIVE BIAS.

10 0
SCALE IN FEET

EXPLANATION

- ■ SAMPLE LOCATION
  CONCENTRATIONS IN MILLIGRAMS PER KILOGRAM (mg/kg)
- 2.1 CONCENTRATION GREATER THAN BCL VALUE
- 8988 CONCENTRATION GREATER THAN LBCL VALUE
- 7.5 CONCENTRATION GREATER THAN BCL AND LBCL VALUE
- BCL BASIC COMPARISON LEVEL
- LBCL LEACHING BASED COMPARISON LEVEL (DILUTION ATTENUATION FACTOR = 20)
- POORLY GRADED SAND (SP)
- SILT (ML)
- SILTY SAND (SM)

SOIL BORING CPA-15A CROSS SECTION
CLOSED POND 6
HENDERSON, NEVADA

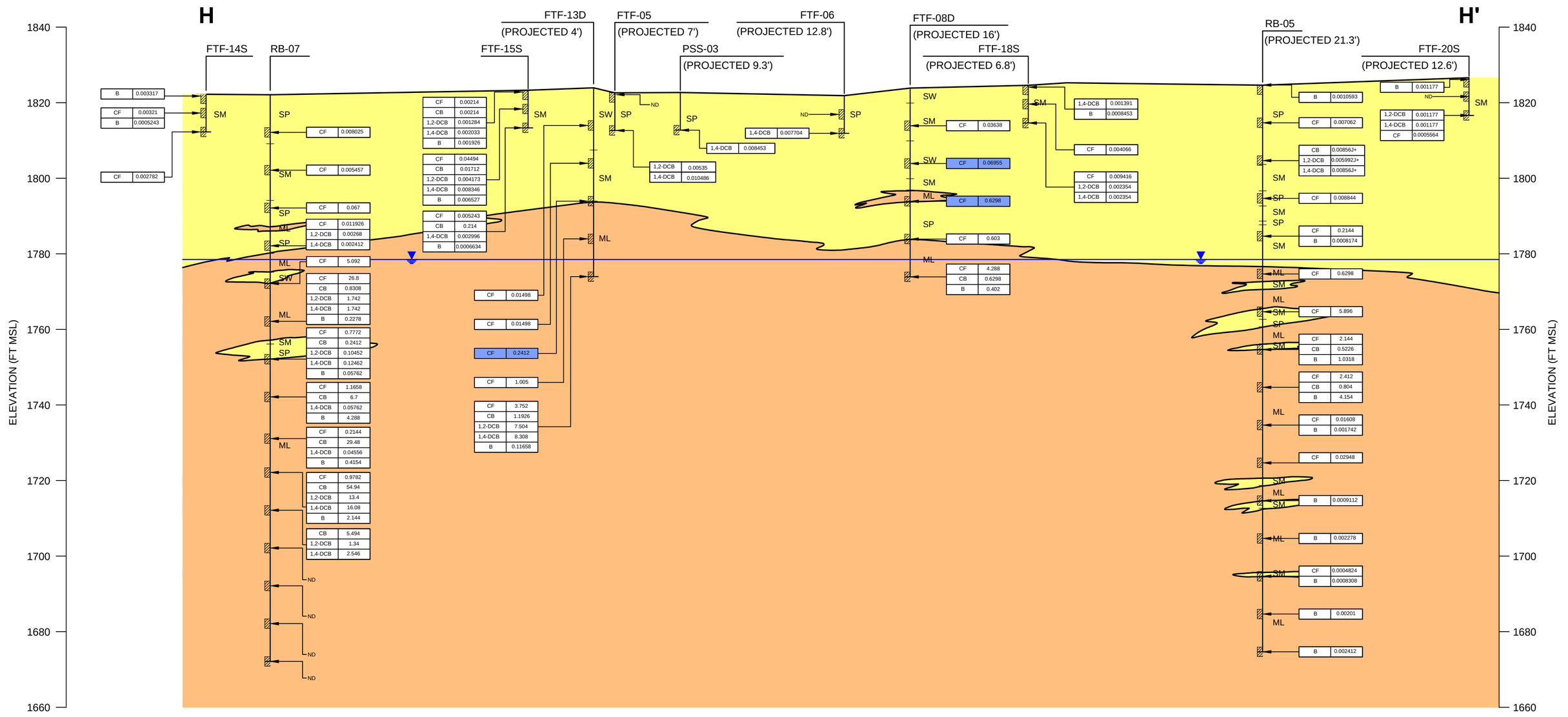
Geosyntec consultants

FIGURE 4-4

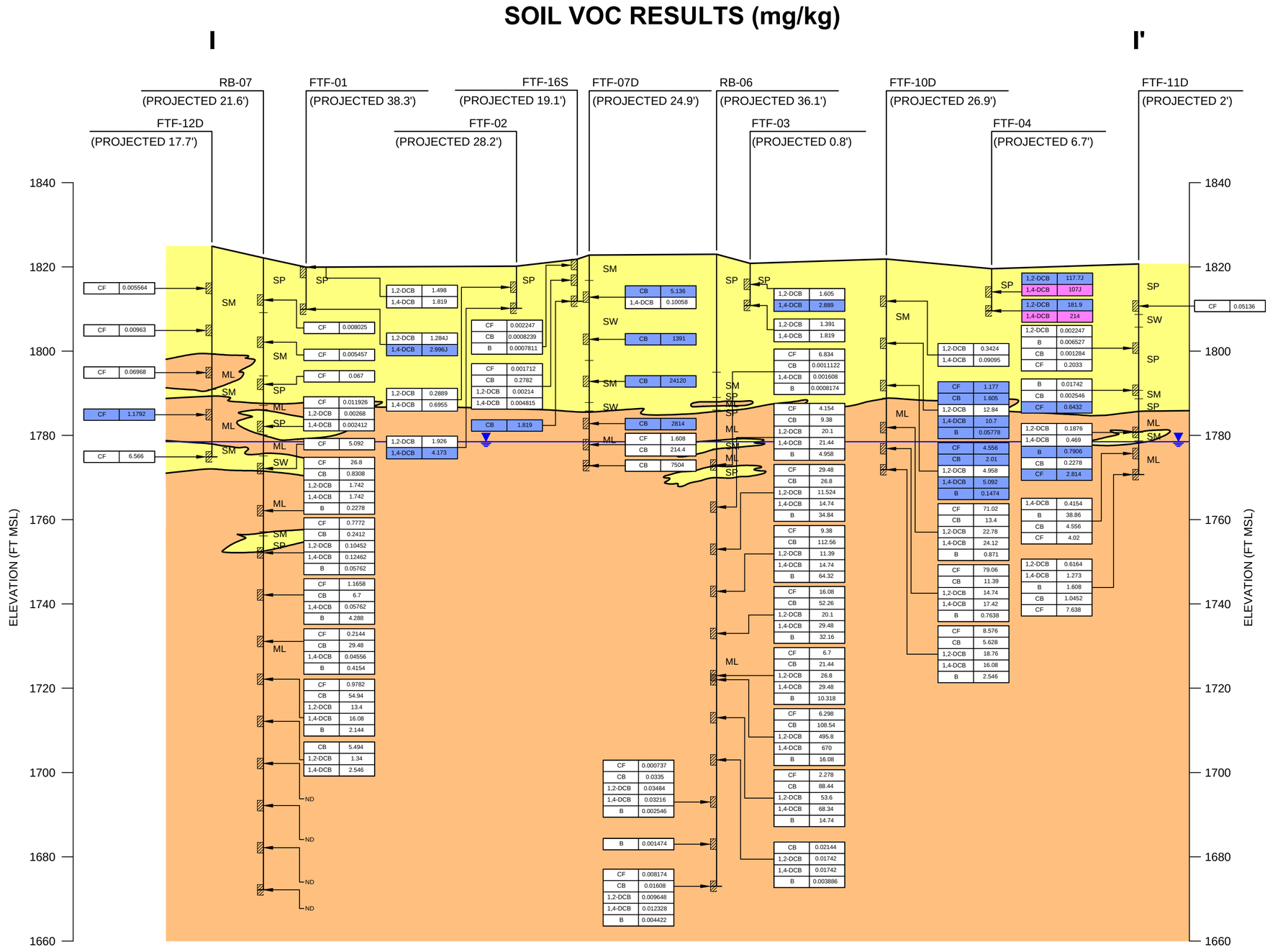
PROJECT NO: HW0989H | JANUARY 2014

N:\CACADD\MMONTROSE CHEMICAL FACILITY\MONTROSE CHEMICAL FACILITY-HW0989\FIGURES\0989F039

SOIL VOC RESULTS (mg/kg)



SOIL VOC RESULTS (mg/kg)



EXPLANATION

FTF-12D ← SOIL BORING IDENTIFIER

SOIL SAMPLE

SOIL BORING

SAND (SP/SM)

SILT/CLAY (ML/CL)

ND	INDICATOR COMPOUNDS NOT DETECTED
mg/kg	MILLIGRAMS PER KILOGRAM
J	ESTIMATED VALUE
J+	ESTIMATED VALUE WITH A POSITIVE BIAS
FT MSL	FEET (ABOVE MEAN SEA LEVEL)
BCL	BASIC COMPARISON LEVEL
LBCL	LEACHING BASED COMPARISON LEVEL (DILUTION ATTENUATION FACTOR = 20)

CONCENTRATION GREATER THAN LBCL VALUE

CONCENTRATION GREATER THAN BCL AND LBCL VALUE

AVERAGE GROUNDWATER ELEVATION = 1778.5 FT MSL, USING MW-02 AND MW-03 (APRIL 2010) AND AA-MW-21 AND AA-MW-22 (JULY 2008) GROUNDWATER ELEVATION DATA.

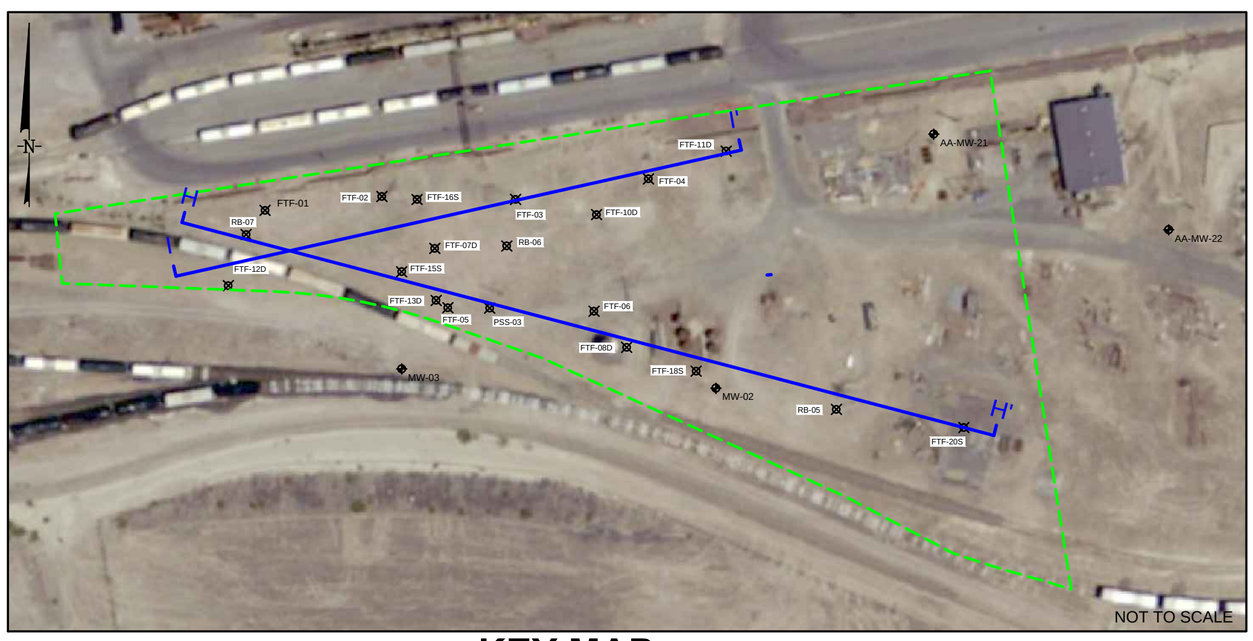
CF	CHLOROFORM
CB	CHLOROBENZENE
1,2-DCB	1,2-DICHLOROBENZENE
1,4-DCB	1,4-DICHLOROBENZENE
B	BENZENE

NOTES:

1. BCL VALUES USED FOR COMPARISON IN TOP 10 FEET OF SOIL.
2. LBCL VALUES USED FOR COMPARISON IN VADOSE ZONE (I.E., ABOVE AVERAGE GROUNDWATER ELEVATION OF 1778.5 FT MSL).

SUMMARY LIST OF ANALYTES ABOVE BCL AND/OR LBCL

ANALYTE	BCL/OUTDOOR COMMERICAL/INDUSTRIAL WORKER (mg/kg)	LBCL (mg/kg)
CF	1.71	0.6
CB	695	1.4
1,2-DCB	373	18
1,4-DCB	14.3	2
B	4.5	0.04



KEY MAP

0 40
SCALE IN FEET

20 0
SCALE IN FEET

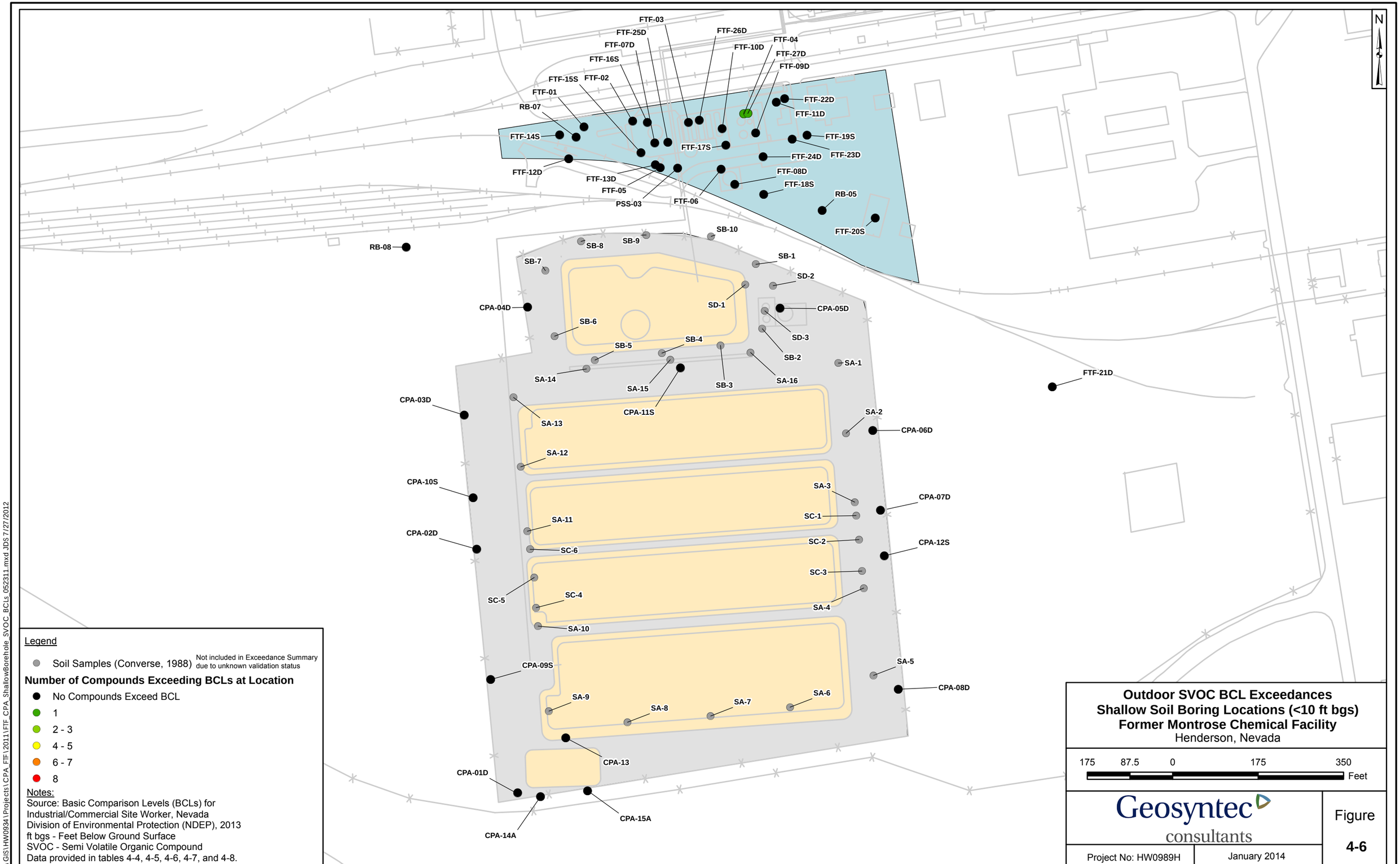
CROSS SECTIONS H-H' AND I-I'
SOIL VOC RESULTS
FORMER TANK FARM AREA
HENDERSON, NEVADA

Geosyntec consultants

FIGURE 4-5

PROJECT NO: HW0989H | JANUARY 2014

N:\CACADD\MMONTROSE CHEMICAL FACILITY\MONTROSE CHEMICAL FACILITY-HW0989\FIGURES\0989F041



Legend

Soil Samples (Converse, 1988) — Not included in Exceedance Summary due to unknown validation status

Number of Compounds Exceeding BCLs at Location

- No Compounds Exceed BCL
- 1
- 2 - 3
- 4 - 5
- 6 - 7
- 8

Notes:
Source: Basic Comparison Levels (BCLs) for Industrial/Commercial Site Worker, Nevada Division of Environmental Protection (NDEP), 2013
ft bgs - Feet Below Ground Surface
SVOC - Semi Volatile Organic Compound
Data provided in tables 4-4, 4-5, 4-6, 4-7, and 4-8.

Outdoor SVOC BCL Exceedances
Shallow Soil Boring Locations (<10 ft bgs)
Former Montrose Chemical Facility
Henderson, Nevada

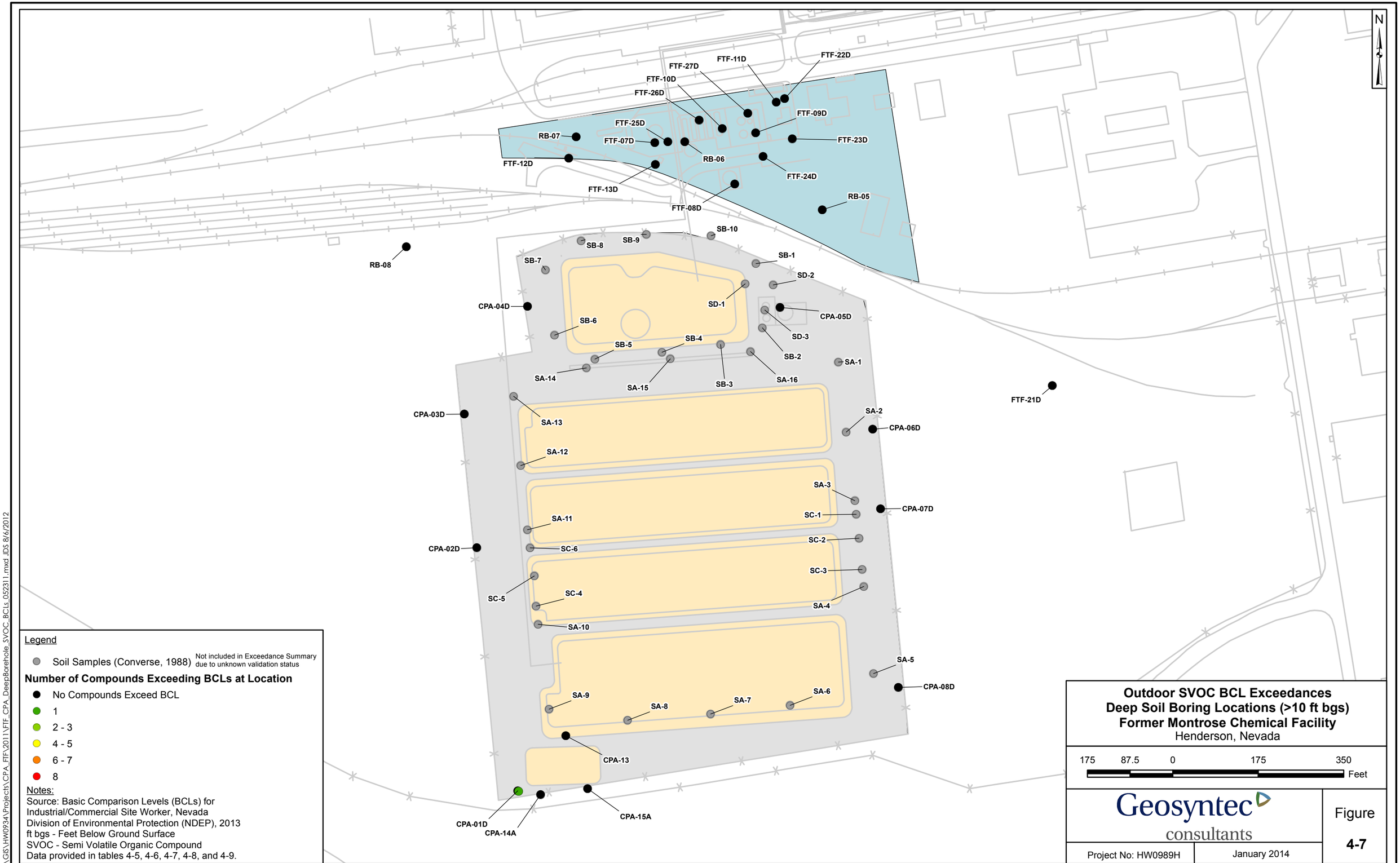
175 87.5 0 175 350 Feet

Geosyntec consultants

Project No: HW0989H | January 2014

Figure **4-6**

G:\GIS\HW0934\Projects\CPA_FTF\2011\FTF_CPA_ShallowBorehole_SVOC_BCLs_052311.mxd JDS 7/27/2012



Outdoor SVOC BCL Exceedances
Deep Soil Boring Locations (>10 ft bgs)
Former Montrose Chemical Facility
Henderson, Nevada

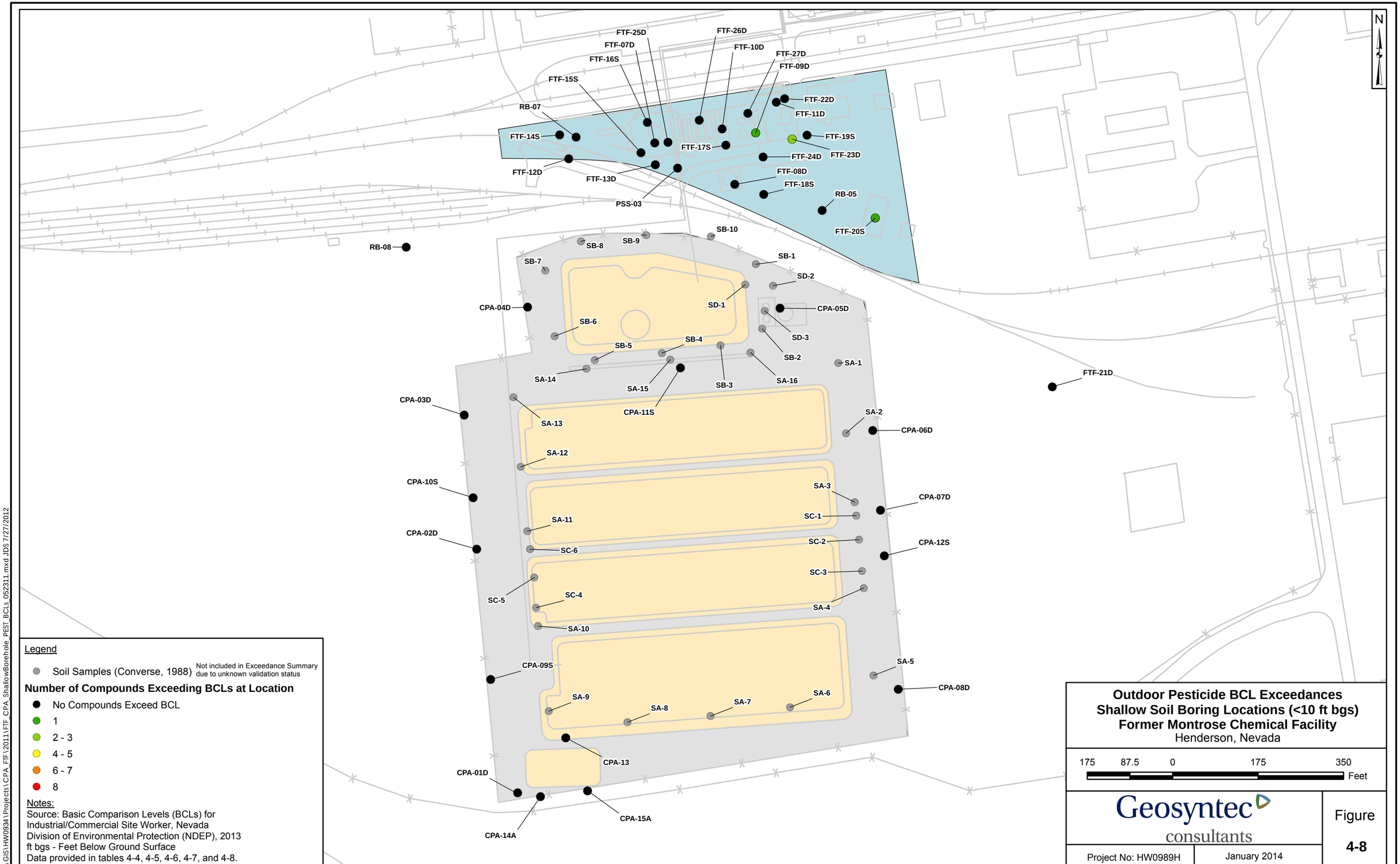
Geosyntec consultants

Project No: HW0989H

January 2014

Figure **4-7**

G:\GIS\HW0934\Projects\CPA_FTF\2011\FTF_CPA_DeepBorehole_SVOC_BCLs_052311.mxd JDS 8/6/2012



Legend

Soil Samples (Converse, 1988) — Not included in Exceedance Summary due to unknown validation status

Number of Compounds Exceeding BCLs at Location

- No Compounds Exceed BCL
- 1
- 2 - 3
- 4 - 5
- 6 - 7
- 8

Notes:
Source: Basic Comparison Levels (BCLs) for Industrial/Commercial Site Worker, Nevada Division of Environmental Protection (NDEP), 2013
ft bgs - Feet Below Ground Surface
Data provided in tables 4-4, 4-5, 4-6, 4-7, and 4-8.

Outdoor Pesticide BCL Exceedances
Shallow Soil Boring Locations (<10 ft bgs)
Former Montrose Chemical Facility
Henderson, Nevada

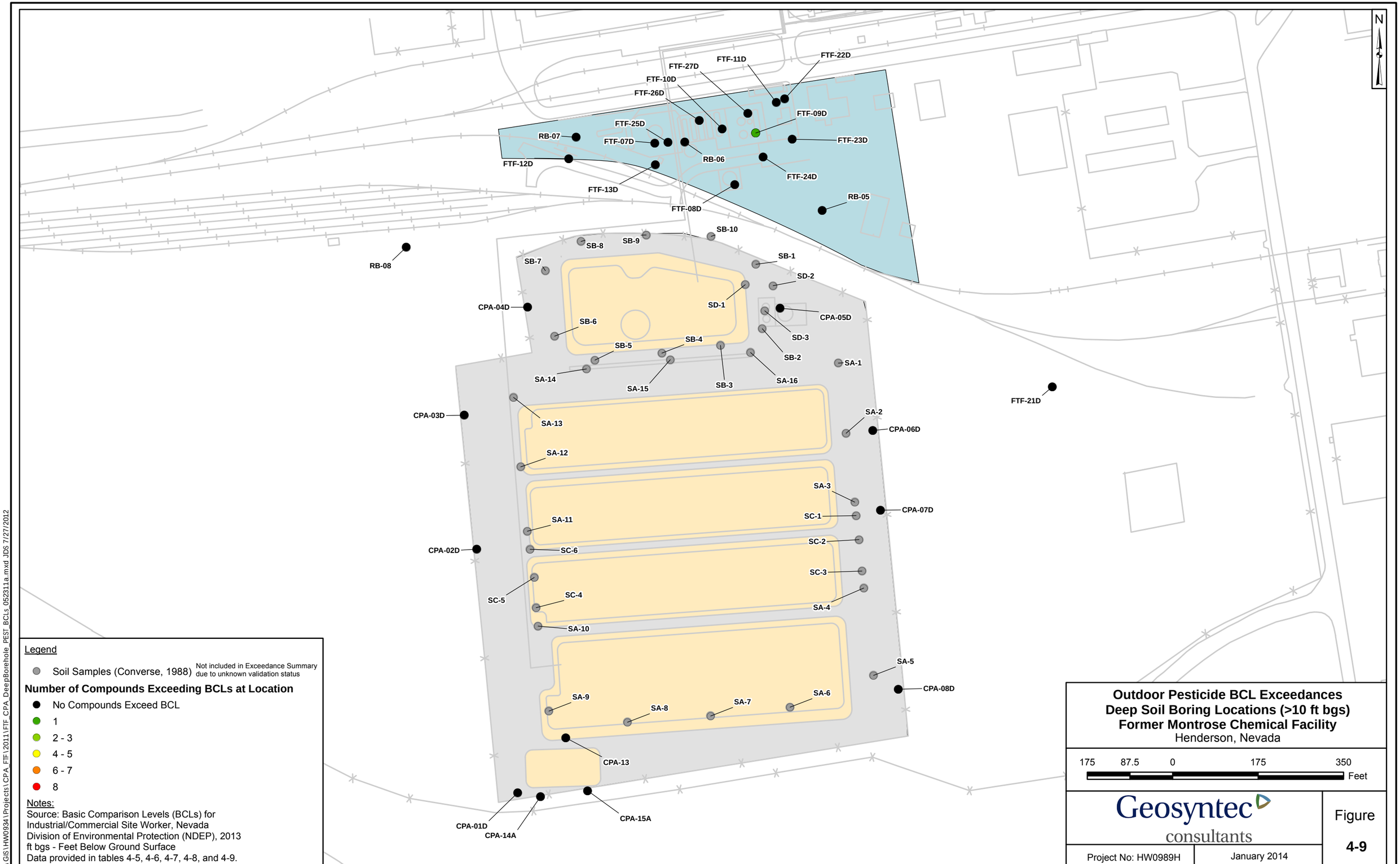
175 87.5 0 175 350 Feet

Geosyntec consultants

Project No: HW0989H | January 2014

Figure **4-8**

G:\GIS\HW0934\Projects\CPA_FTF\2011\FTF_CPA_ShallowBorehole_PEST_BCLs_052311.mxd JDS 7/27/2012



Legend

Soil Samples (Converse, 1988) — Not included in Exceedance Summary due to unknown validation status

Number of Compounds Exceeding BCLs at Location

- No Compounds Exceed BCL
- 1
- 2 - 3
- 4 - 5
- 6 - 7
- 8

Notes:
Source: Basic Comparison Levels (BCLs) for Industrial/Commercial Site Worker, Nevada Division of Environmental Protection (NDEP), 2013
ft bgs - Feet Below Ground Surface
Data provided in tables 4-5, 4-6, 4-7, 4-8, and 4-9.

Outdoor Pesticide BCL Exceedances
Deep Soil Boring Locations (>10 ft bgs)
Former Montrose Chemical Facility
Henderson, Nevada

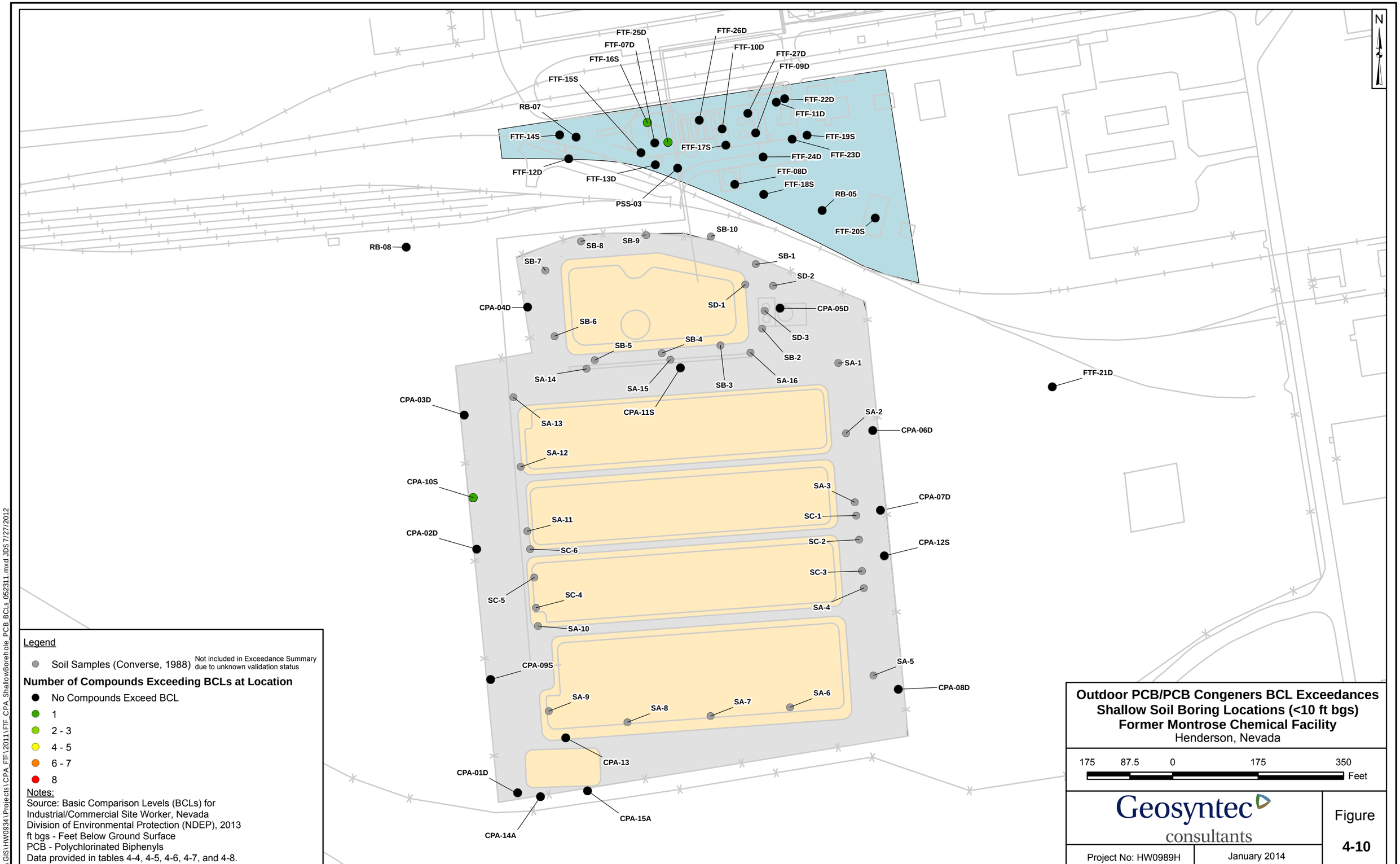
175 87.5 0 175 350 Feet

Geosyntec consultants

Project No: HW0989H | January 2014

Figure **4-9**

G:\GIS\HW0934\Projects\CPA_FTF\2011\FTF_CPA_DeepBorehole_PEST_BCLs_052311a.mxd JDS 7/27/2012



Legend

Soil Samples (Converse, 1988) — Not included in Exceedance Summary due to unknown validation status

Number of Compounds Exceeding BCLs at Location

- No Compounds Exceed BCL
- 1
- 2 - 3
- 4 - 5
- 6 - 7
- 8

Notes:
Source: Basic Comparison Levels (BCLs) for Industrial/Commercial Site Worker, Nevada Division of Environmental Protection (NDEP), 2013
ft bgs - Feet Below Ground Surface
PCB - Polychlorinated Biphenyls
Data provided in tables 4-4, 4-5, 4-6, 4-7, and 4-8.

Outdoor PCB/PCB Congeners BCL Exceedances
Shallow Soil Boring Locations (<10 ft bgs)
Former Montrose Chemical Facility
Henderson, Nevada

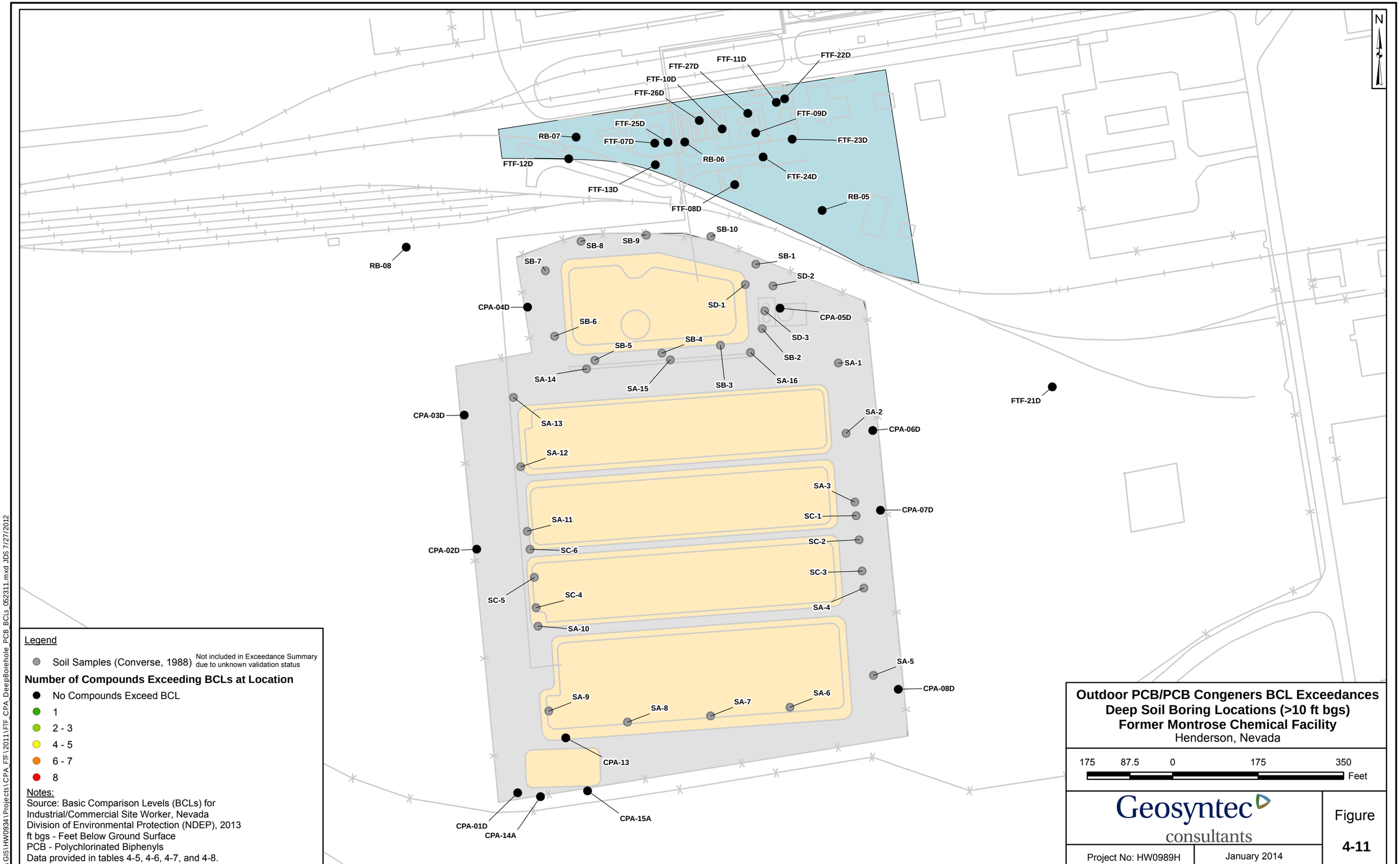
175 87.5 0 175 350 Feet

Geosyntec consultants

Project No: HW0989H | January 2014

Figure **4-10**

G:\GIS\HW0934\Projects\CPA_FTF\2011\FTF_CPA_ShallowBorehole_PCB_BCLs_052311.mxd JDS 7/27/2012



Legend

Soil Samples (Converse, 1988) — Not included in Exceedance Summary due to unknown validation status

Number of Compounds Exceeding BCLs at Location

- No Compounds Exceed BCL
- 1
- 2 - 3
- 4 - 5
- 6 - 7
- 8

Notes:
Source: Basic Comparison Levels (BCLs) for Industrial/Commercial Site Worker, Nevada Division of Environmental Protection (NDEP), 2013
ft bgs - Feet Below Ground Surface
PCB - Polychlorinated Biphenyls
Data provided in tables 4-5, 4-6, 4-7, and 4-8.

Outdoor PCB/PCB Congeners BCL Exceedances
Deep Soil Boring Locations (>10 ft bgs)
Former Montrose Chemical Facility
Henderson, Nevada

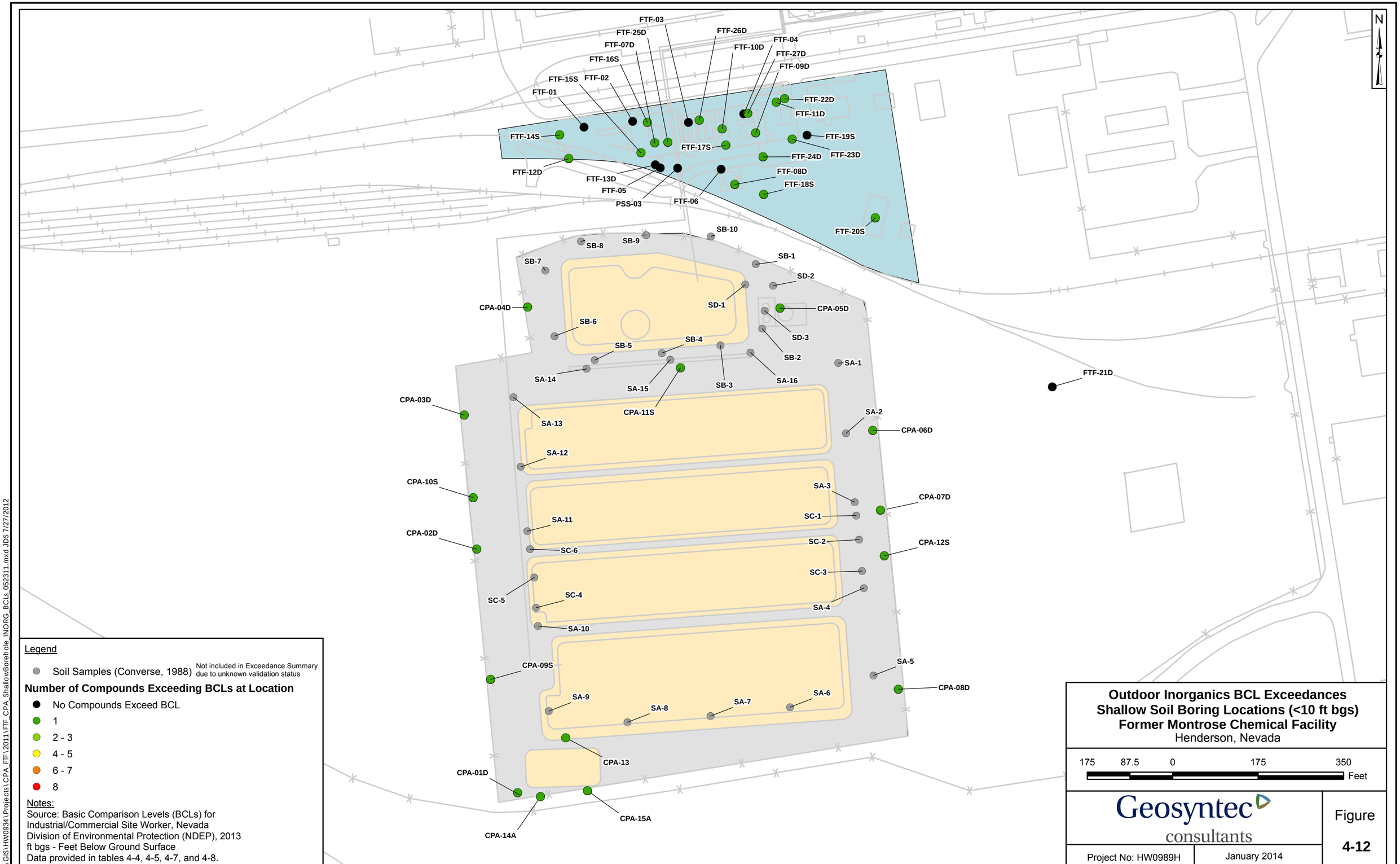
175 87.5 0 175 350 Feet

Geosyntec consultants

Project No: HW0989H | January 2014

Figure 4-11

G:\GIS\HW0934\Projects\CPA_FTF\2011\FTF_CPA_DeepBorehole_PCB_BCLs_052311.mxd JDS 7/27/2012



Legend

Soil Samples (Converse, 1988) — Not included in Exceedance Summary due to unknown validation status

Number of Compounds Exceeding BCLs at Location

- No Compounds Exceed BCL
- 1
- 2 - 3
- 4 - 5
- 6 - 7
- 8

Notes:
Source: Basic Comparison Levels (BCLs) for Industrial/Commercial Site Worker, Nevada Division of Environmental Protection (NDEP), 2013
ft bgs - Feet Below Ground Surface
Data provided in tables 4-4, 4-5, 4-7, and 4-8.

Outdoor Inorganics BCL Exceedances
Shallow Soil Boring Locations (<10 ft bgs)
Former Montrose Chemical Facility
Henderson, Nevada

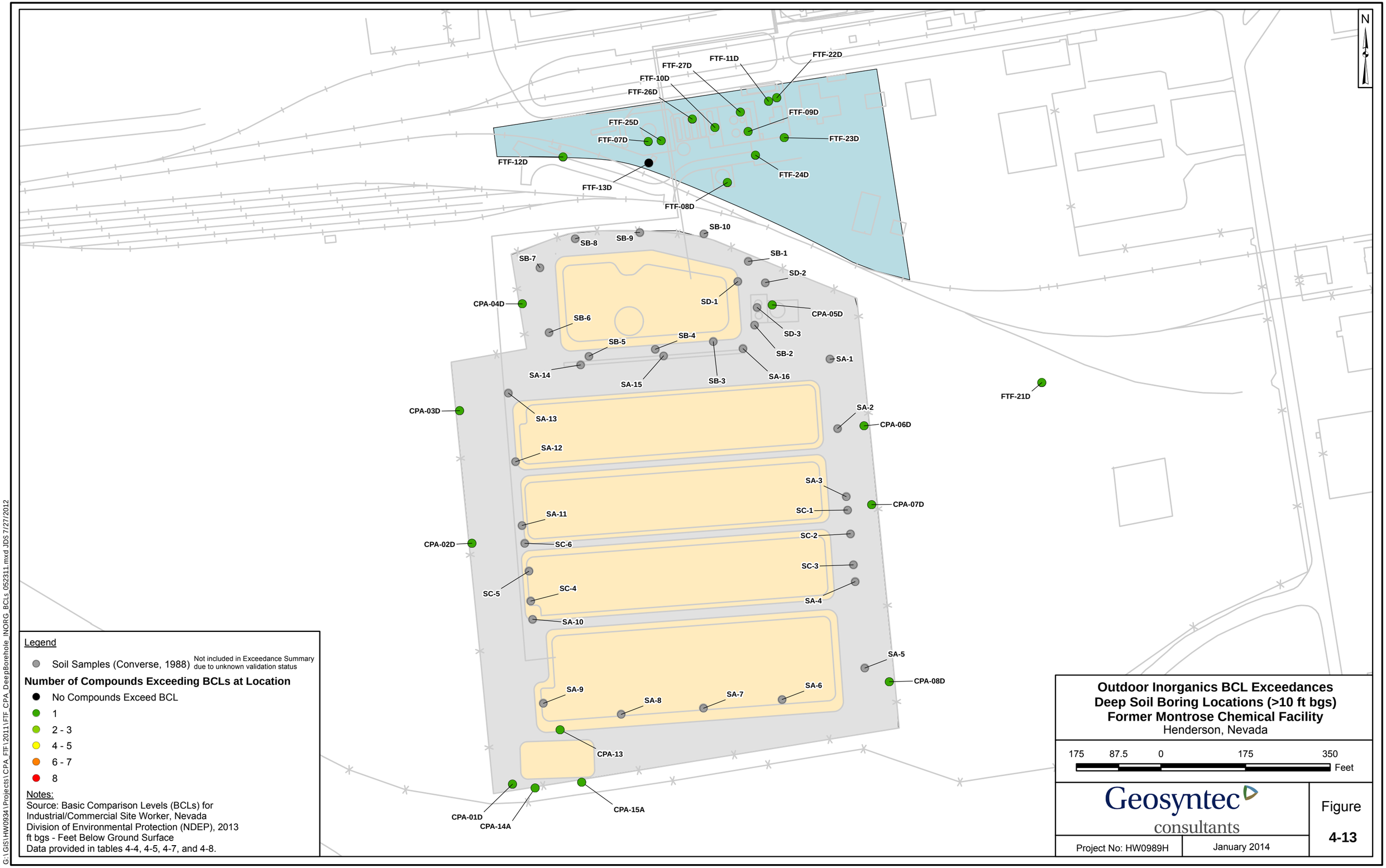
175 87.5 0 175 350 Feet

Geosyntec consultants

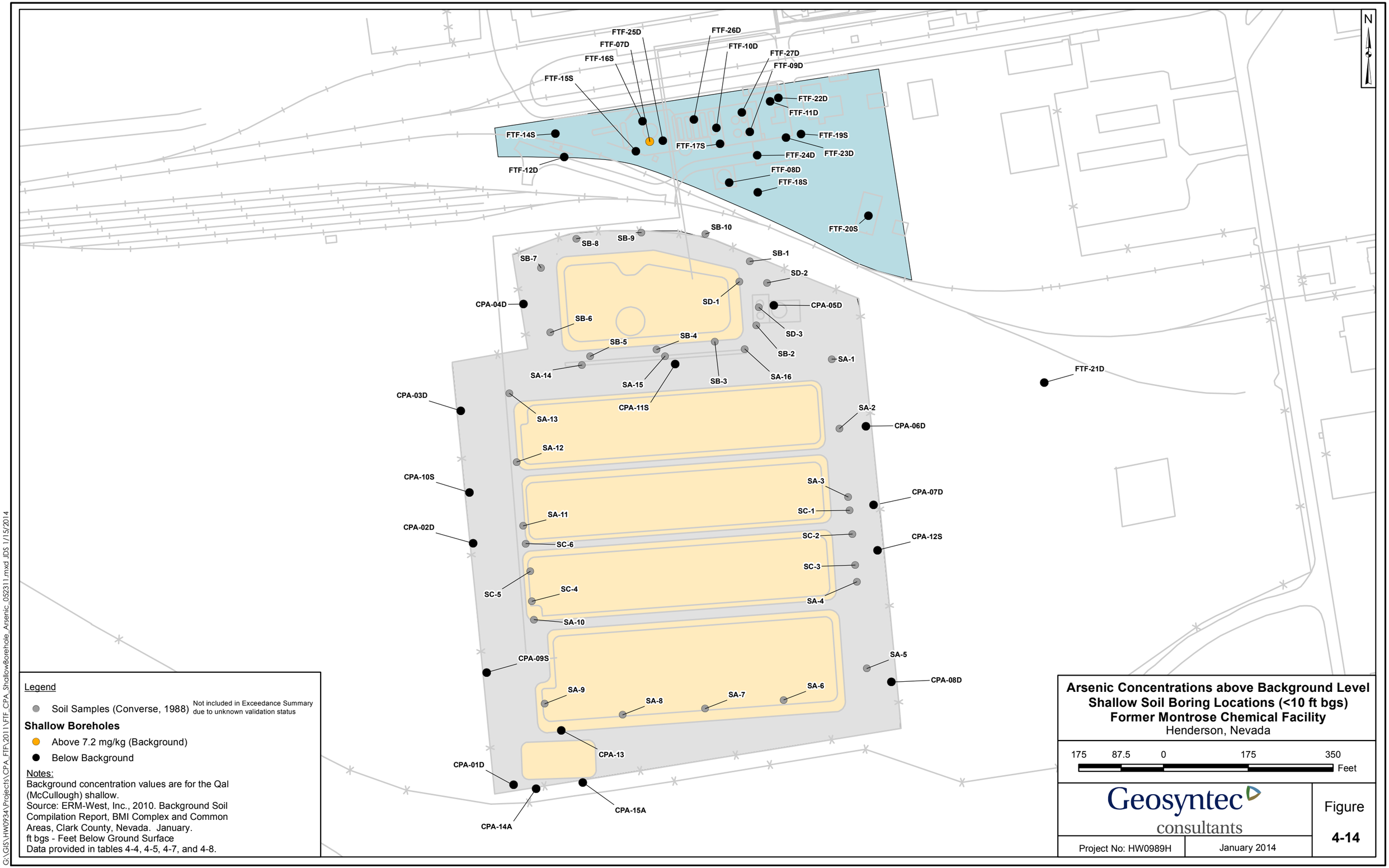
Project No: HW0989H | January 2014

Figure **4-12**

G:\GIS\HW0934\Projects\CPA_FTF\2011\FTF_CPA_ShallowBorehole_INORG_BCLs_052311.mxd JDS 7/27/2012



Outdoor Inorganics BCL Exceedances
Deep Soil Boring Locations (>10 ft bgs)
Former Montrose Chemical Facility
Henderson, Nevada



Legend

Soil Samples (Converse, 1988) — Not included in Exceedance Summary due to unknown validation status

Shallow Boreholes

- Above 7.2 mg/kg (Background)
- Below Background

Notes:
Background concentration values are for the Qal (McCullough) shallow.
Source: ERM-West, Inc., 2010. Background Soil Compilation Report, BMI Complex and Common Areas, Clark County, Nevada. January.
ft bgs - Feet Below Ground Surface
Data provided in tables 4-4, 4-5, 4-7, and 4-8.

Arsenic Concentrations above Background Level
Shallow Soil Boring Locations (<10 ft bgs)
Former Montrose Chemical Facility
Henderson, Nevada

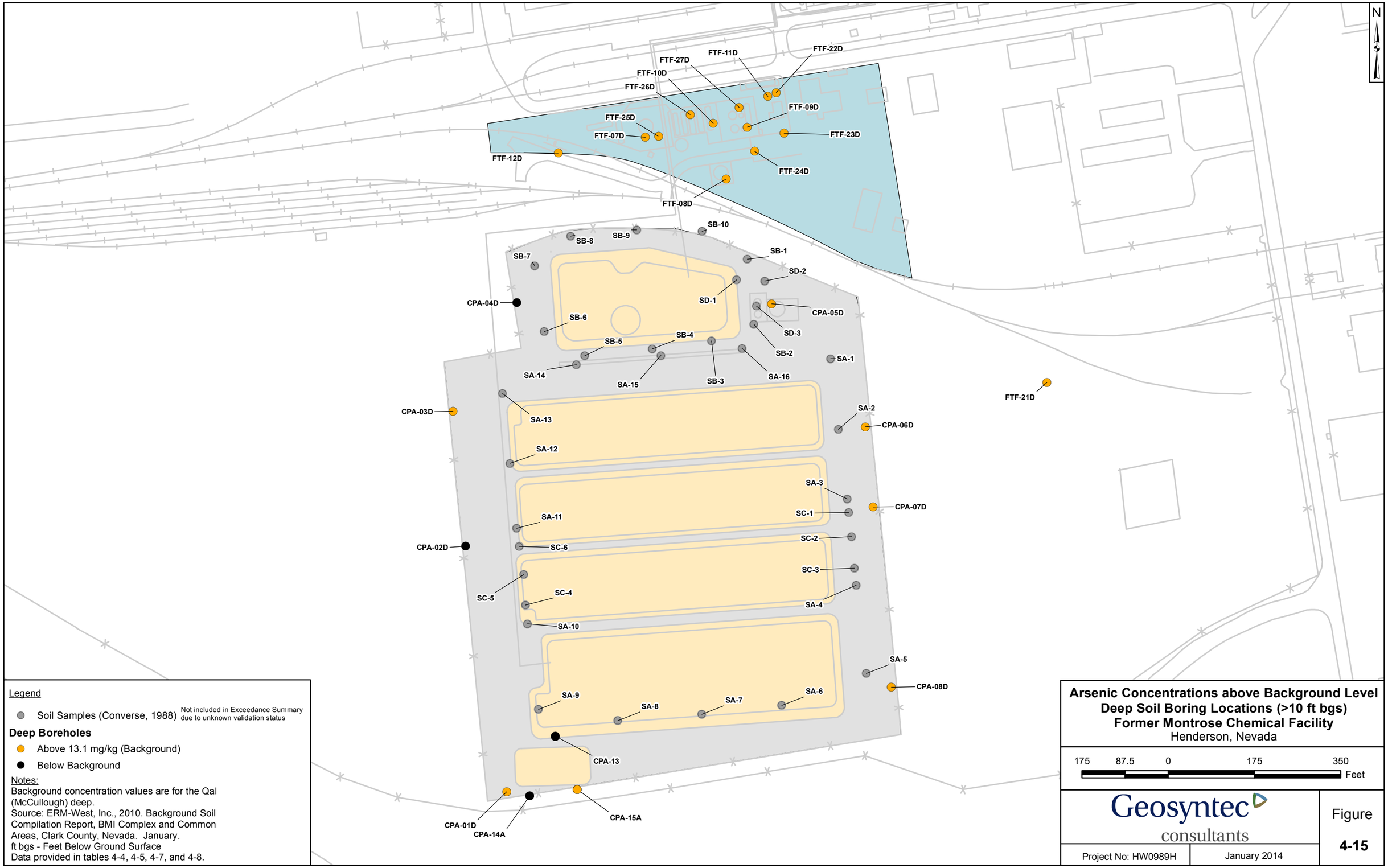
175 87.5 0 175 350 Feet

Geosyntec consultants

Project No: HW0989H | January 2014

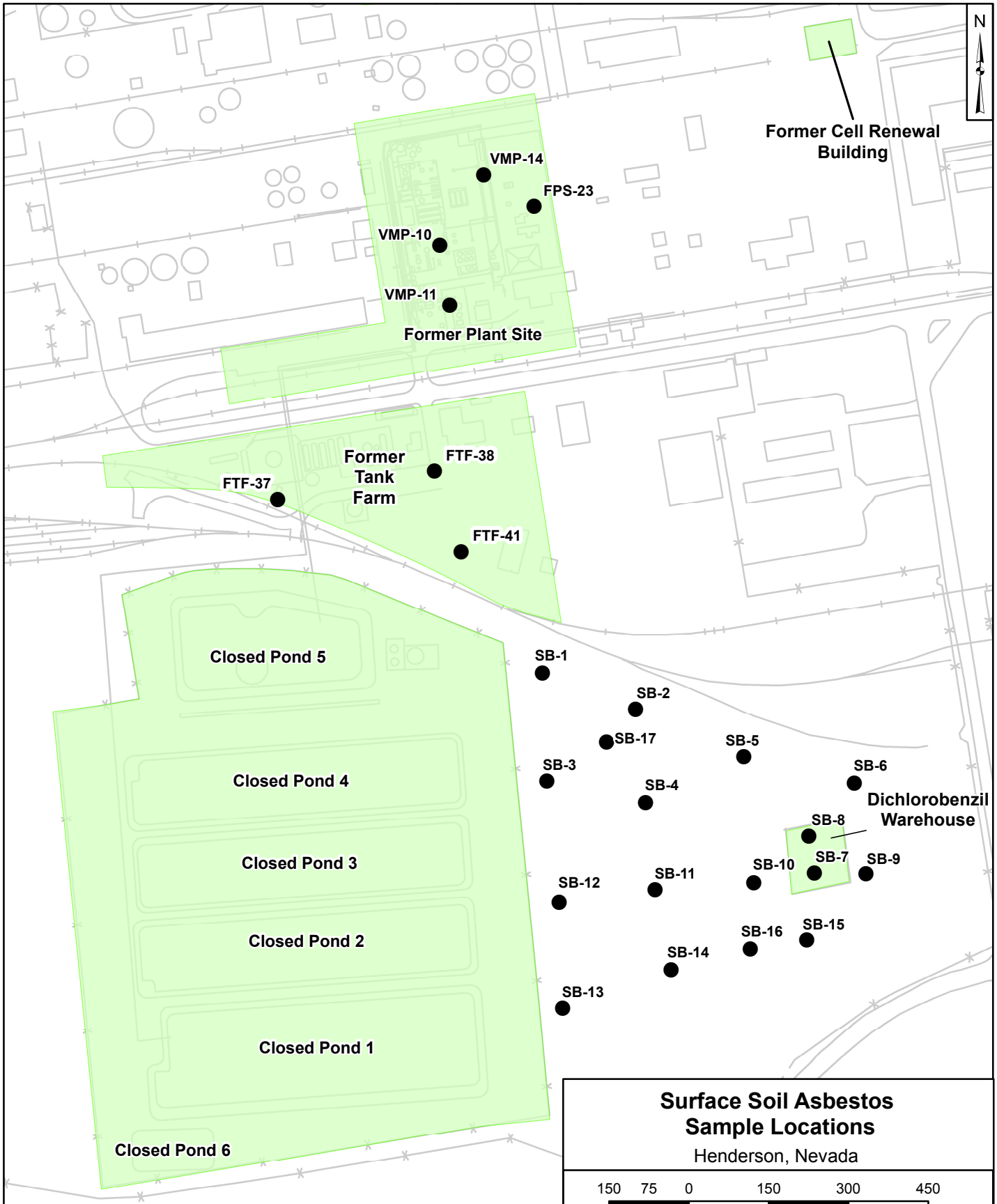
Figure **4-14**

G:\GIS\HW0934\Projects\CPA_FTF\2011\FTF_CPA_Shallow8orehole_Arsenic_052311.mxd JDS 1/15/2014



Arsenic Concentrations above Background Level
Deep Soil Boring Locations (>10 ft bgs)
Former Montrose Chemical Facility
Henderson, Nevada

G:\GIS\HW0934\Projects\CPA_FTF\2011\FTF_CPA_DeepBorehole_Arsenic_052311.mxd CC 1/15/2014



Surface Soil Asbestos Sample Locations

Henderson, Nevada

150 75 0 150 300 450 Feet

Legend

● Surface Soil Sample Analyzed for Asbestos (Geosyntec, 2010b,c,d)

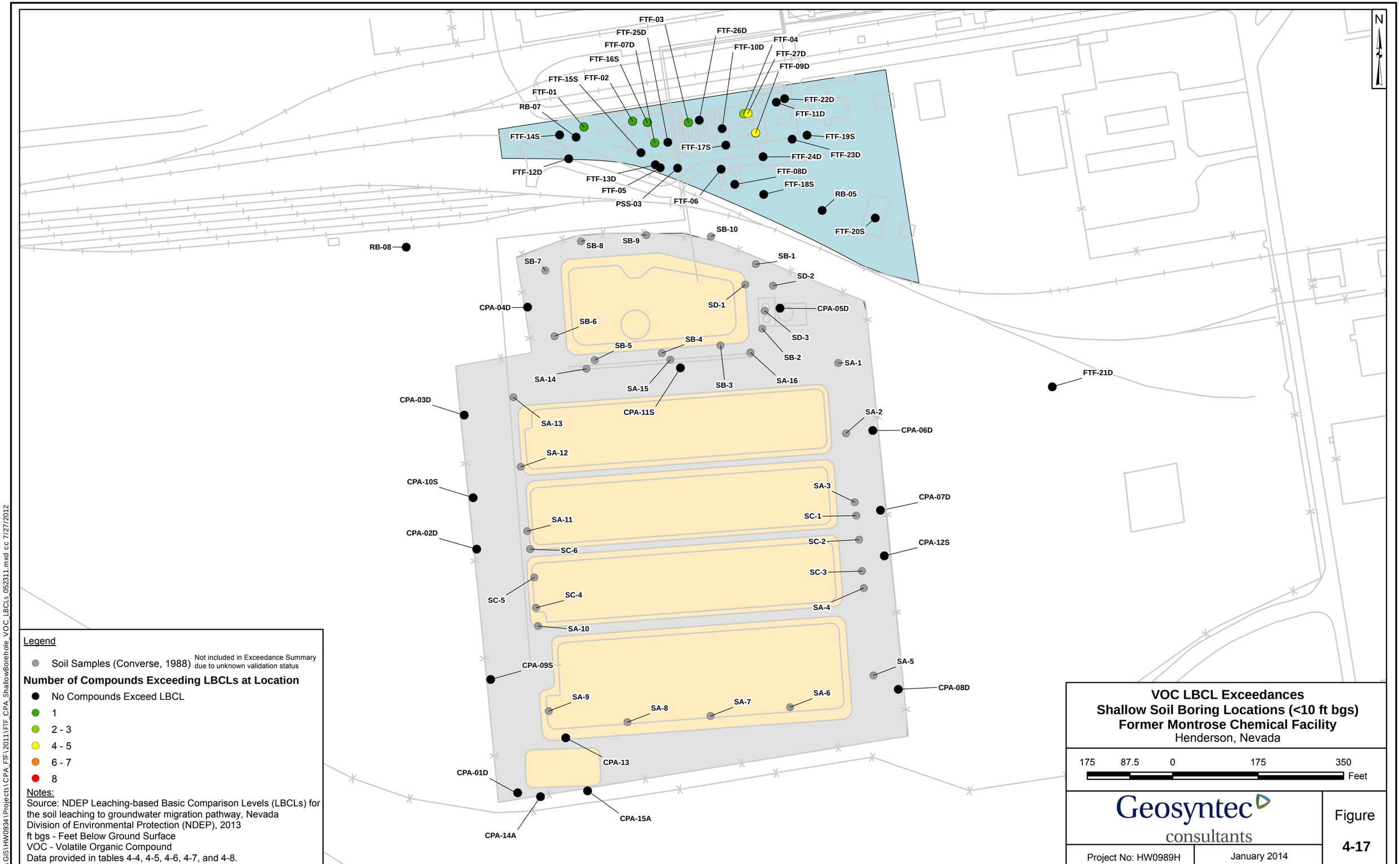
Note:
Samples analyzed by U.S. EPA Method 540-R-97-028

Geosyntec consultants

Project No: HW0989H | January 2014

Figure 4-16

G:\GIS\HW0934\Projects\CPA_FTF\SurfaceSoilAsbestosSampling.mxd



Legend

Soil Samples (Converse, 1988) — Not included in Exceedance Summary due to unknown validation status

Number of Compounds Exceeding LBCLs at Location

- No Compounds Exceed LBCL
- 1
- 2 - 3
- 4 - 5
- 6 - 7
- 8

Notes:
Source: NDEP Leaching-based Basic Comparison Levels (LBCLs) for the soil leaching to groundwater migration pathway, Nevada Division of Environmental Protection (NDEP), 2013
ft bgs - Feet Below Ground Surface
VOC - Volatile Organic Compound
Data provided in tables 4-4, 4-5, 4-6, 4-7, and 4-8.

VOC LBCL Exceedances
Shallow Soil Boring Locations (<10 ft bgs)
Former Montrose Chemical Facility
Henderson, Nevada

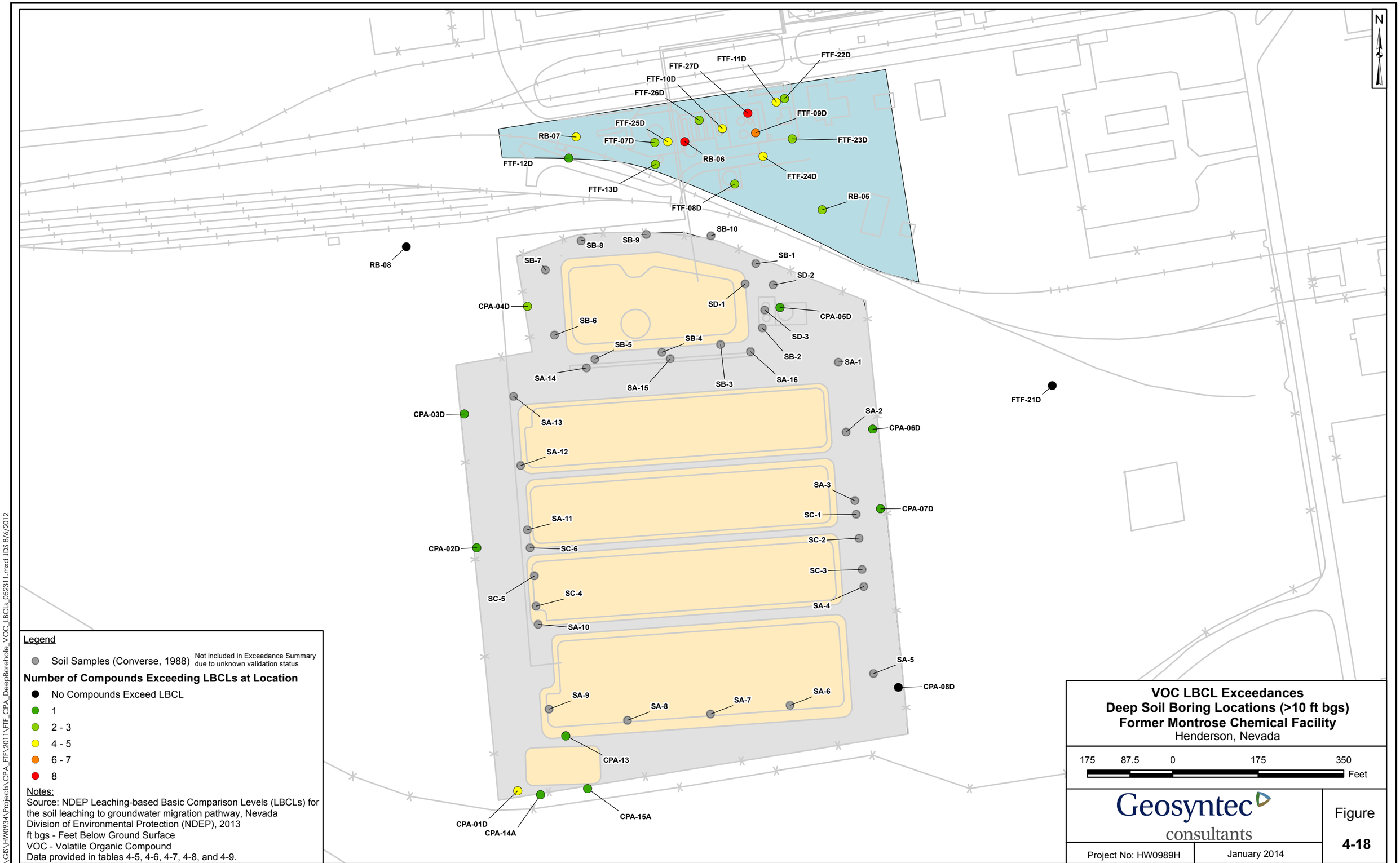
175 87.5 0 175 350 Feet

Geosyntec consultants

Project No: HW0989H | January 2014

Figure **4-17**

G:\GIS\HW0934\Projects\CPA_FTF\2011\FTF_CPA_ShallowBorehole_VOC_LBCLs_052311.mxd cc 7/27/2012



Legend

Soil Samples (Converse, 1988) — Not included in Exceedance Summary due to unknown validation status

Number of Compounds Exceeding LBCLs at Location

- No Compounds Exceed LBCL
- 1
- 2 - 3
- 4 - 5
- 6 - 7
- 8

Notes:
Source: NDEP Leaching-based Basic Comparison Levels (LBCLs) for the soil leaching to groundwater migration pathway, Nevada Division of Environmental Protection (NDEP), 2013
ft bgs - Feet Below Ground Surface
VOC - Volatile Organic Compound
Data provided in tables 4-5, 4-6, 4-7, 4-8, and 4-9.

VOC LBCL Exceedances
Deep Soil Boring Locations (>10 ft bgs)
Former Montrose Chemical Facility
Henderson, Nevada

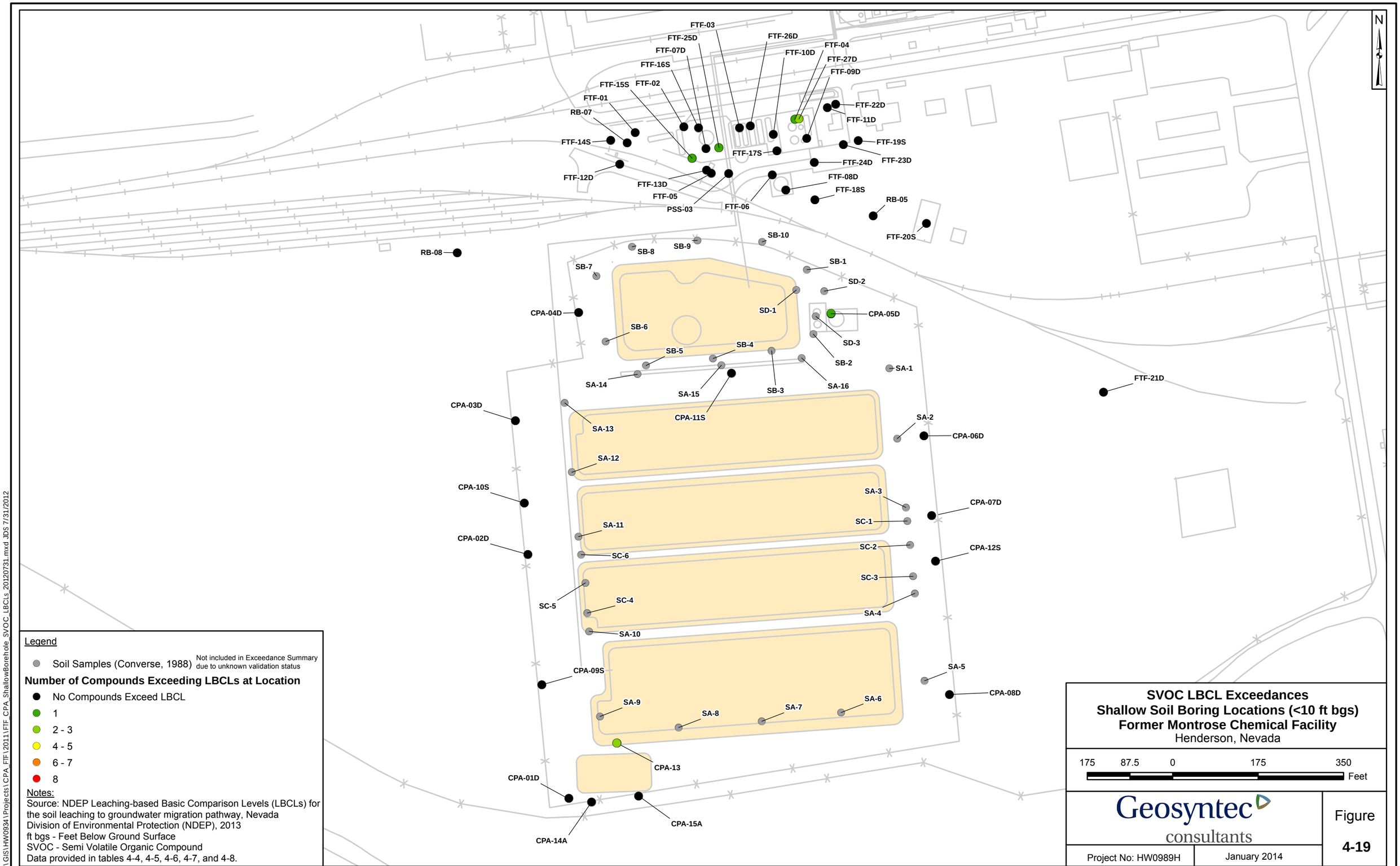
175 87.5 0 175 350 Feet

Geosyntec consultants

Project No: HW0989H | January 2014

Figure **4-18**

G:\GIS\HW0934\Projects\CPA_FTF\2011\FTF_CPA_DeepBorehole_VOC_LBCLs_052311.mxd JDS 8/6/2012



Legend

Soil Samples (Converse, 1988) — Not included in Exceedance Summary due to unknown validation status

Number of Compounds Exceeding LBCLs at Location

- No Compounds Exceed LBCL
- 1
- 2 - 3
- 4 - 5
- 6 - 7
- 8

Notes:
Source: NDEP Leaching-based Basic Comparison Levels (LBCLs) for the soil leaching to groundwater migration pathway, Nevada Division of Environmental Protection (NDEP), 2013
ft bgs - Feet Below Ground Surface
SVOC - Semi Volatile Organic Compound
Data provided in tables 4-4, 4-5, 4-6, 4-7, and 4-8.

SVOC LBCL Exceedances
Shallow Soil Boring Locations (<10 ft bgs)
Former Montrose Chemical Facility
Henderson, Nevada

175 87.5 0 175 350 Feet

Geosyntec consultants

Project No: HW0989H | January 2014

Figure **4-19**

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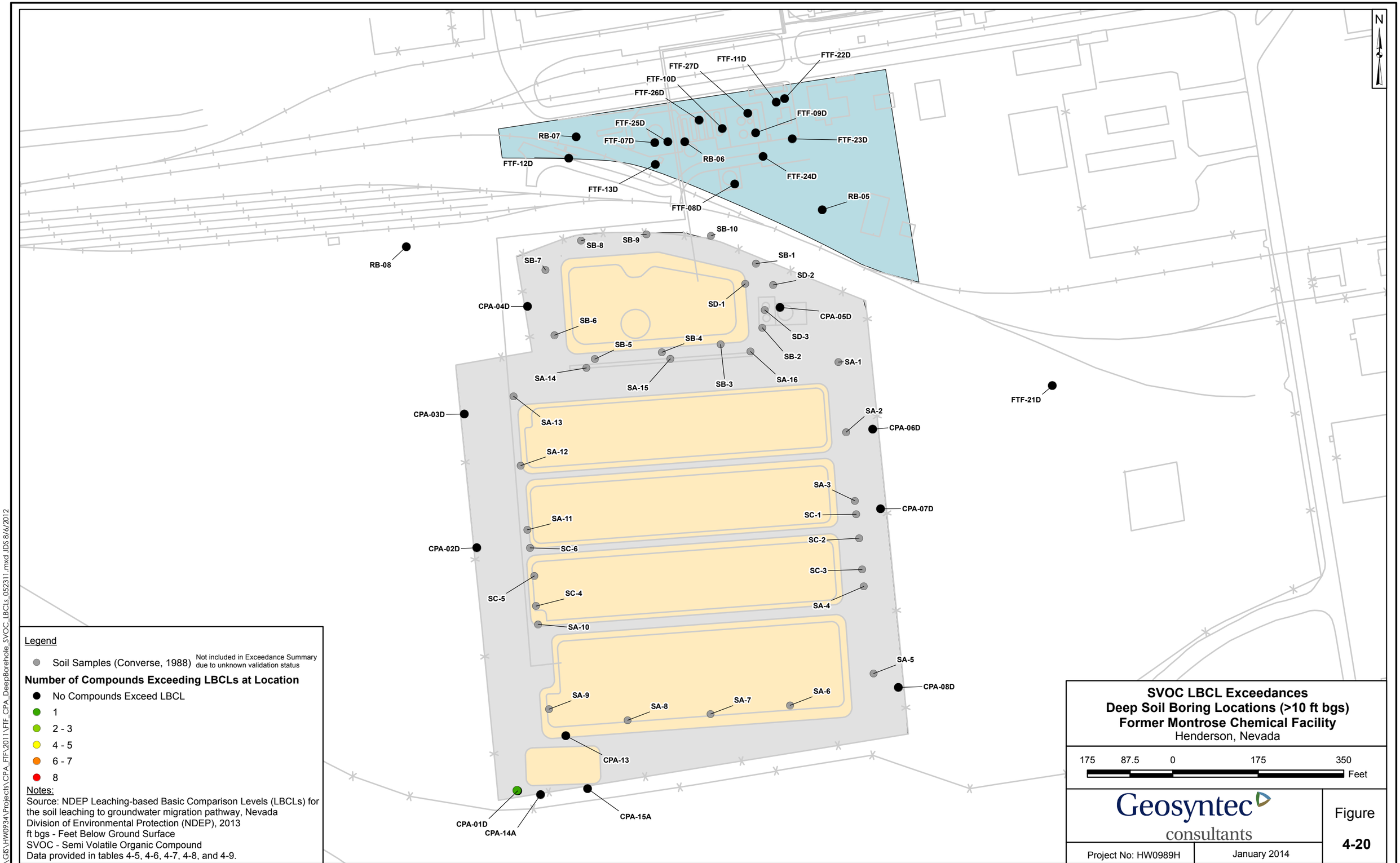


Legend

Soil Samples (Converse, 1988) — Not included in Exceedance Summary due to unknown validation status

Number of Compounds Exceeding LBCLs at Location

- No Compounds Exceed LBCL
- 1
- 2 - 3
- 4 - 5
- 6 - 7
- 8

Notes:
Source: NDEP Leaching-based Basic Comparison Levels (LBCLs) for the soil leaching to groundwater migration pathway, Nevada Division of Environmental Protection (NDEP), 2013
ft bgs - Feet Below Ground Surface
SVOC - Semi Volatile Organic Compound
Data provided in tables 4-5, 4-6, 4-7, 4-8, and 4-9.

SVOC LBCL Exceedances
Deep Soil Boring Locations (>10 ft bgs)
Former Montrose Chemical Facility
Henderson, Nevada

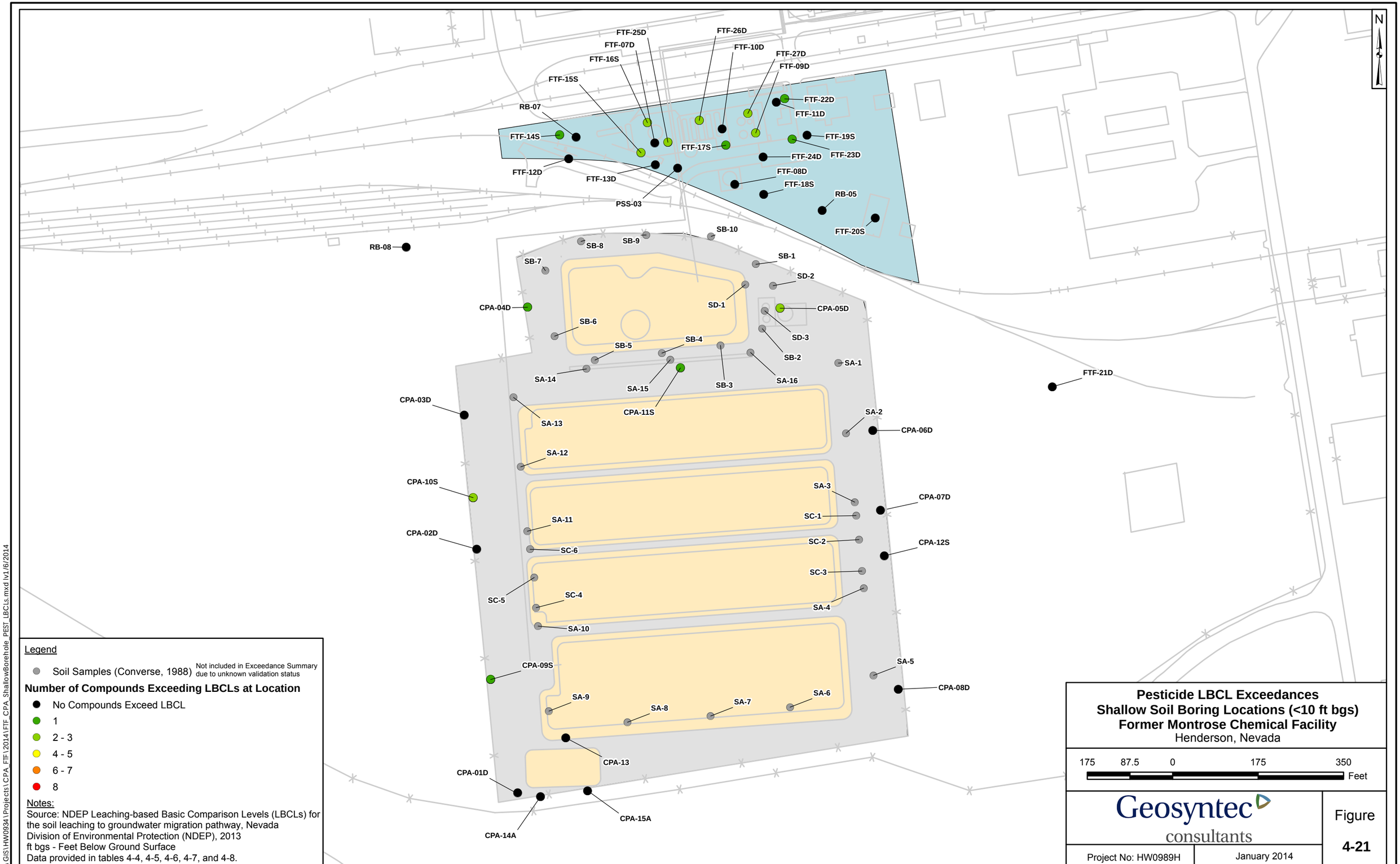
175 87.5 0 175 350 Feet

Geosyntec consultants

Project No: HW0989H | January 2014

Figure **4-20**

G:\GIS\HW0934\Projects\CPA_FTF\2011\FTF_CPA_DeepBorehole_SVOC_LBCLs_052311.mxd JDS 8/6/2012



Legend

Soil Samples (Converse, 1988) — Not included in Exceedance Summary due to unknown validation status

Number of Compounds Exceeding LBCLs at Location

- No Compounds Exceed LBCL
- 1
- 2 - 3
- 4 - 5
- 6 - 7
- 8

Notes:
Source: NDEP Leaching-based Basic Comparison Levels (LBCLs) for the soil leaching to groundwater migration pathway, Nevada Division of Environmental Protection (NDEP), 2013
ft bgs - Feet Below Ground Surface
Data provided in tables 4-4, 4-5, 4-6, 4-7, and 4-8.

Pesticide LBCL Exceedances
Shallow Soil Boring Locations (<10 ft bgs)
Former Montrose Chemical Facility
Henderson, Nevada

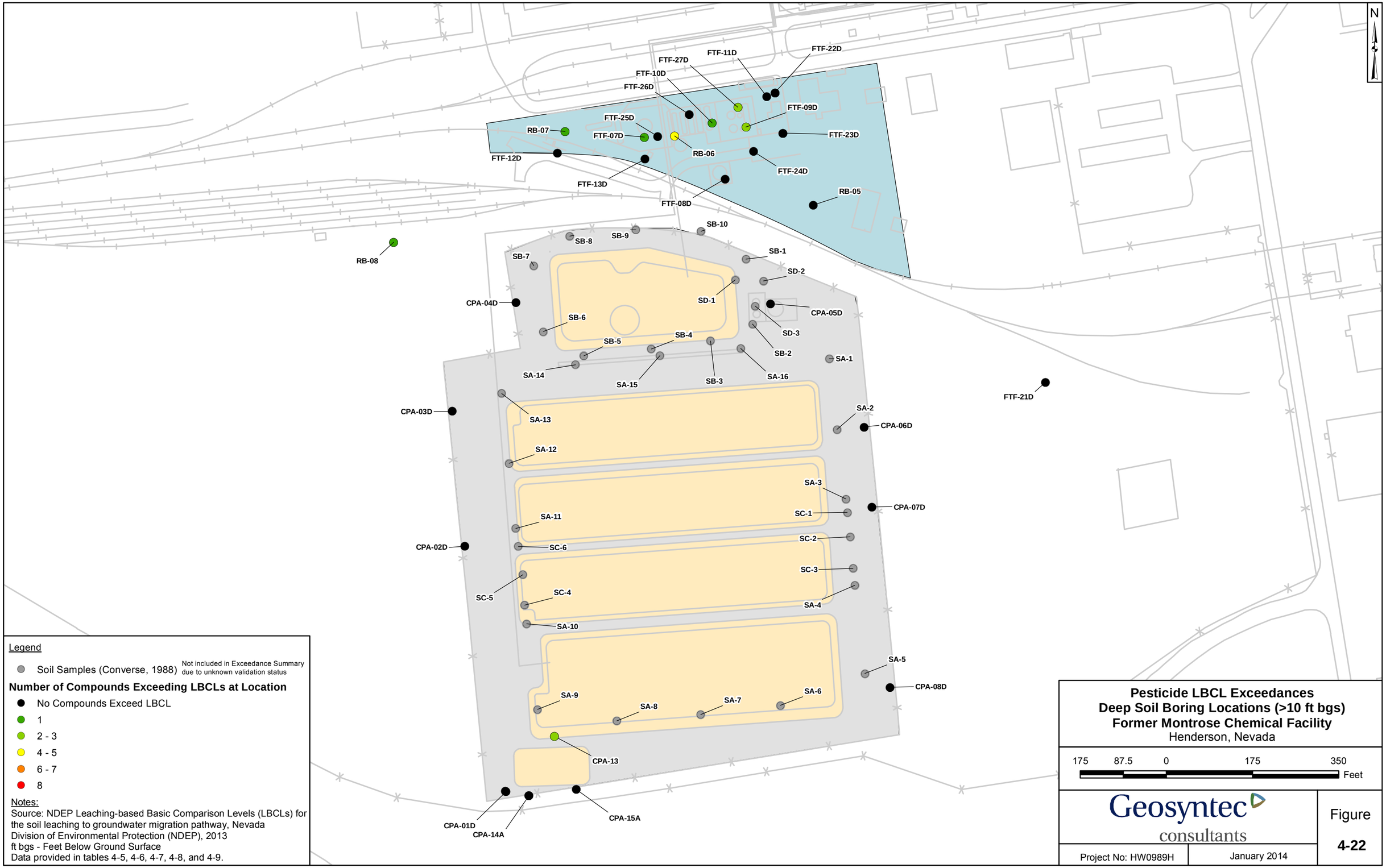
175 87.5 0 175 350 Feet

Geosyntec consultants

Project No: HW0989H | January 2014

Figure **4-21**

G:\GIS\HW0934\Projects\CPA_FTF\2014\FTF_CPA_ShallowBorehole_PEST_LBCLs.mxd \v1/6/2014



Legend

Soil Samples (Converse, 1988) — Not included in Exceedance Summary due to unknown validation status

Number of Compounds Exceeding LBCLs at Location

- No Compounds Exceed LBCL
- 1
- 2 - 3
- 4 - 5
- 6 - 7
- 8

Notes:
Source: NDEP Leaching-based Basic Comparison Levels (LBCLs) for the soil leaching to groundwater migration pathway, Nevada Division of Environmental Protection (NDEP), 2013
ft bgs - Feet Below Ground Surface
Data provided in tables 4-5, 4-6, 4-7, 4-8, and 4-9.

Pesticide LBCL Exceedances
Deep Soil Boring Locations (>10 ft bgs)
Former Montrose Chemical Facility
Henderson, Nevada

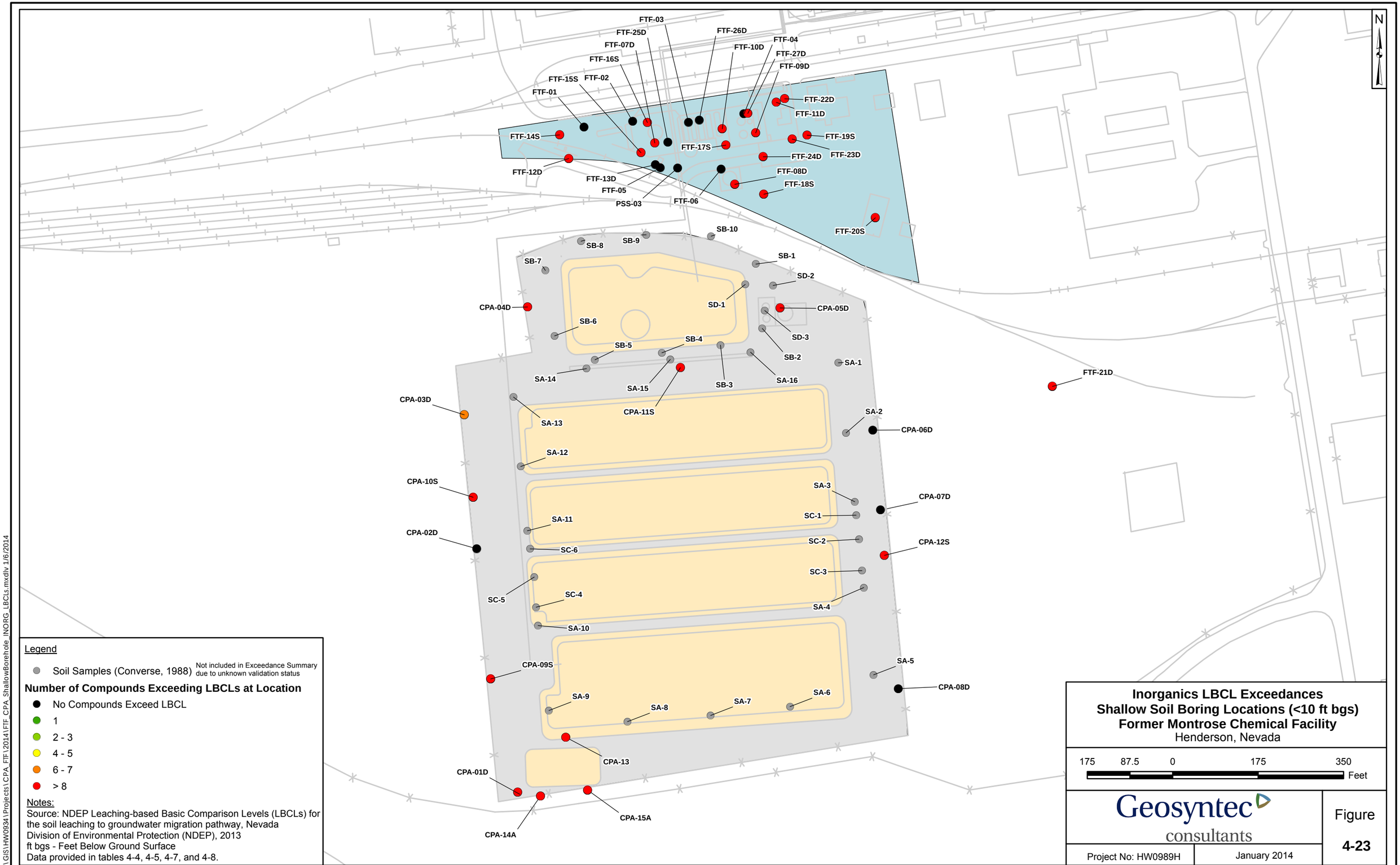
175 87.5 0 175 350 Feet

Geosyntec consultants

Project No: HW0989H | January 2014

Figure **4-22**

G:\GIS\HW0934\Projects\CPA_FTF\2014\FTF_CPA_DeepBorehole_PEST_LBCLs.mxd lv 1/6/2014



Legend

Soil Samples (Converse, 1988) — Not included in Exceedance Summary due to unknown validation status

Number of Compounds Exceeding LBCLs at Location

- No Compounds Exceed LBCL
- 1
- 2 - 3
- 4 - 5
- 6 - 7
- > 8

Notes:
Source: NDEP Leaching-based Basic Comparison Levels (LBCLs) for the soil leaching to groundwater migration pathway, Nevada Division of Environmental Protection (NDEP), 2013
ft bgs - Feet Below Ground Surface
Data provided in tables 4-4, 4-5, 4-7, and 4-8.

Inorganics LBCL Exceedances
Shallow Soil Boring Locations (<10 ft bgs)
Former Montrose Chemical Facility
Henderson, Nevada

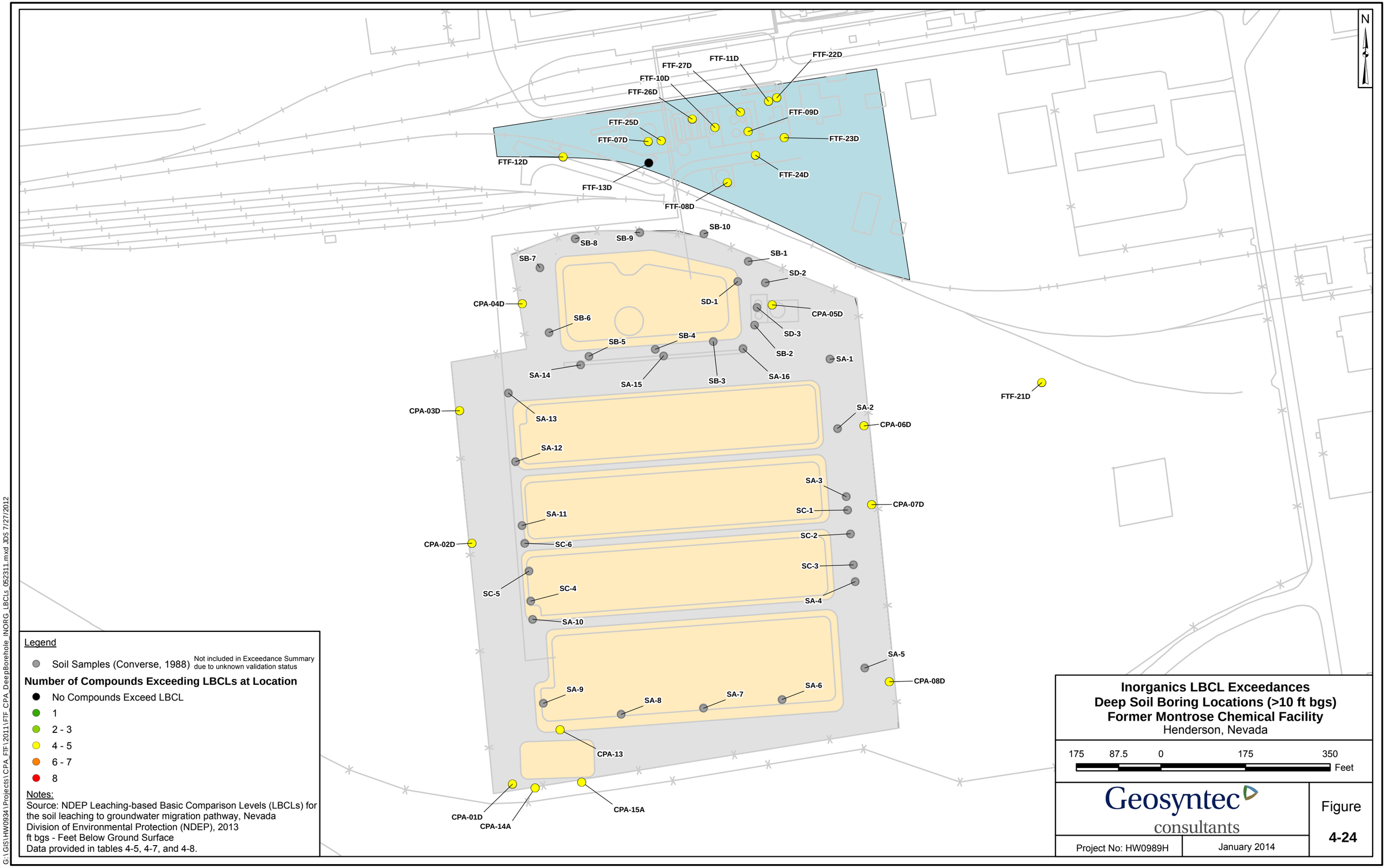
175 87.5 0 175 350 Feet

Geosyntec consultants

Project No: HW0989H | January 2014

Figure **4-23**

G:\GIS\HW0934\Projects\CPA_FTF\2014\FTF_CPA_ShallowBorehole_INORG_LBCLs.mxd\v 1/6/2014



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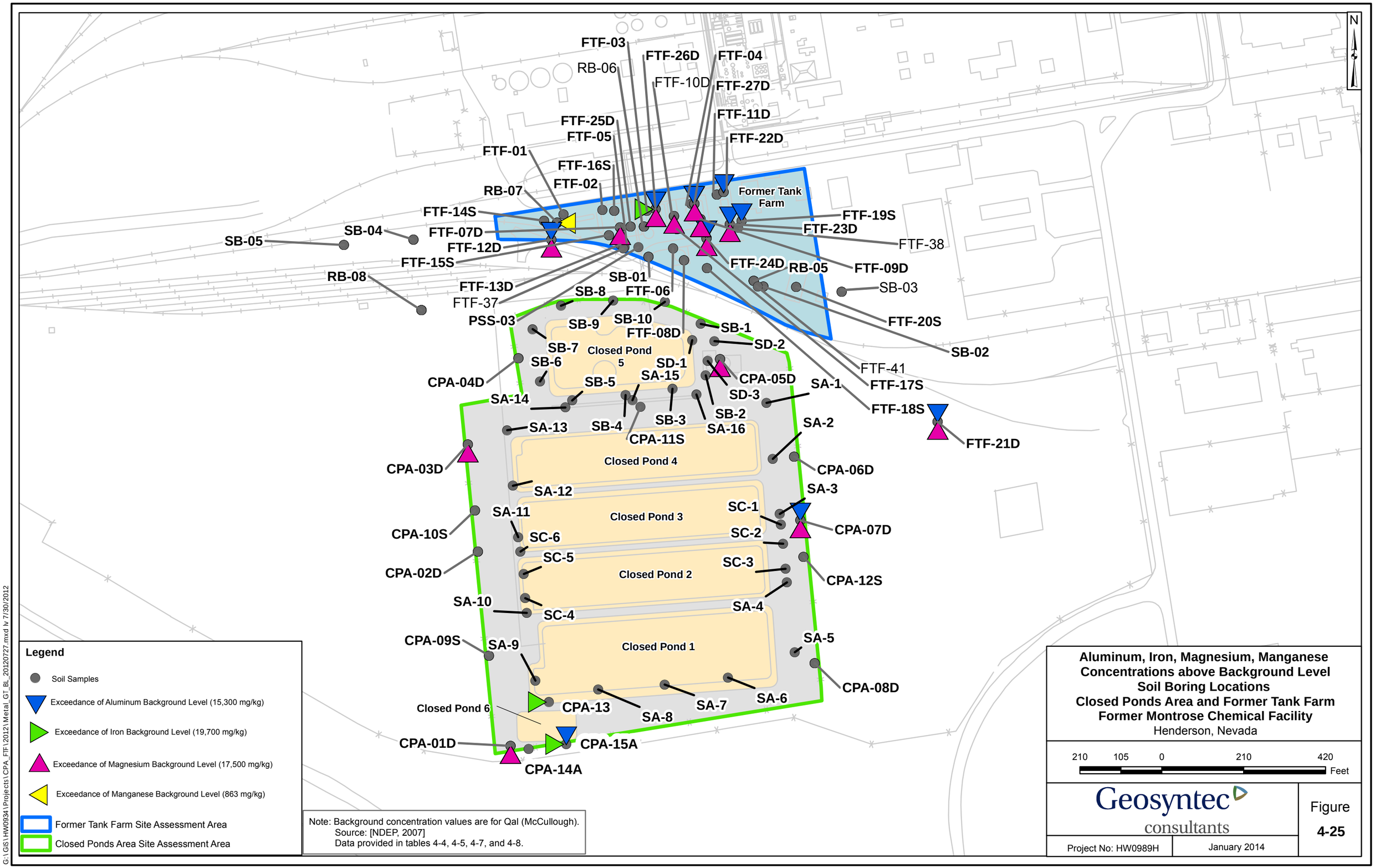
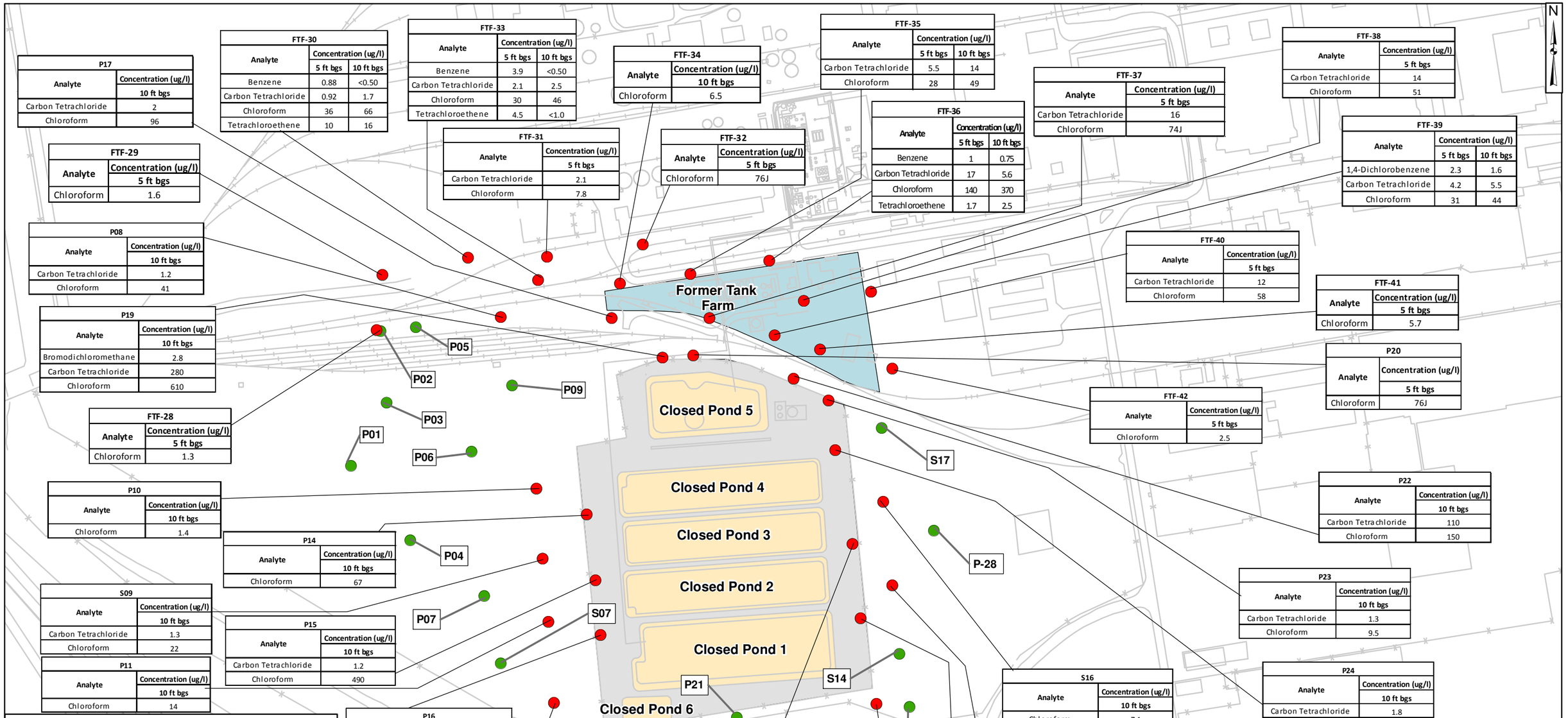


Aluminum, Iron, Magnesium, Manganese Concentrations above Background Level
Soil Boring Locations
Closed Ponds Area and Former Tank Farm
Former Montrose Chemical Facility
Henderson, Nevada



P17	
Analyte	Concentration (ug/l)
	10 ft bgs
Carbon Tetrachloride	2
Chloroform	96

FTF-29	
Analyte	Concentration (ug/l)
	5 ft bgs
Chloroform	1.6

P08	
Analyte	Concentration (ug/l)
	10 ft bgs
Carbon Tetrachloride	1.2
Chloroform	41

P19	
Analyte	Concentration (ug/l)
	10 ft bgs
Bromodichloromethane	2.8
Carbon Tetrachloride	280
Chloroform	610

FTF-28	
Analyte	Concentration (ug/l)
	5 ft bgs
Chloroform	1.3

P10	
Analyte	Concentration (ug/l)
	10 ft bgs
Chloroform	1.4

S09	
Analyte	Concentration (ug/l)
	10 ft bgs
Carbon Tetrachloride	1.3
Chloroform	22

P11	
Analyte	Concentration (ug/l)
	10 ft bgs
Chloroform	14

FTF-30		
Analyte	Concentration (ug/l)	
	5 ft bgs	10 ft bgs
Benzene	0.88	<0.50
Carbon Tetrachloride	0.92	1.7
Chloroform	36	66
Tetrachloroethene	10	16

FTF-33		
Analyte	Concentration (ug/l)	
	5 ft bgs	10 ft bgs
Benzene	3.9	<0.50
Carbon Tetrachloride	2.1	2.5
Chloroform	30	46
Tetrachloroethene	4.5	<1.0

FTF-31	
Analyte	Concentration (ug/l)
	5 ft bgs
Carbon Tetrachloride	2.1
Chloroform	7.8

FTF-34	
Analyte	Concentration (ug/l)
	10 ft bgs
Chloroform	6.5

FTF-32	
Analyte	Concentration (ug/l)
	5 ft bgs
Chloroform	76J

FTF-35		
Analyte	Concentration (ug/l)	
	5 ft bgs	10 ft bgs
Carbon Tetrachloride	5.5	14
Chloroform	28	49

FTF-36		
Analyte	Concentration (ug/l)	
	5 ft bgs	10 ft bgs
Benzene	1	0.75
Carbon Tetrachloride	17	5.6
Chloroform	140	370
Tetrachloroethene	1.7	2.5

FTF-37	
Analyte	Concentration (ug/l)
	5 ft bgs
Carbon Tetrachloride	16
Chloroform	74J

FTF-38	
Analyte	Concentration (ug/l)
	5 ft bgs
Carbon Tetrachloride	14
Chloroform	51

FTF-39		
Analyte	Concentration (ug/l)	
	5 ft bgs	10 ft bgs
1,4-Dichlorobenzene	2.3	1.6
Carbon Tetrachloride	4.2	5.5
Chloroform	31	44

FTF-40	
Analyte	Concentration (ug/l)
	5 ft bgs
Carbon Tetrachloride	12
Chloroform	58

FTF-41	
Analyte	Concentration (ug/l)
	5 ft bgs
Chloroform	5.7

P20	
Analyte	Concentration (ug/l)
	5 ft bgs
Chloroform	76J

FTF-42	
Analyte	Concentration (ug/l)
	5 ft bgs
Chloroform	2.5

P22	
Analyte	Concentration (ug/l)
	10 ft bgs
Carbon Tetrachloride	110
Chloroform	150

P14	
Analyte	Concentration (ug/l)
	10 ft bgs
Chloroform	67

P15	
Analyte	Concentration (ug/l)
	10 ft bgs
Carbon Tetrachloride	1.2
Chloroform	490

P23	
Analyte	Concentration (ug/l)
	10 ft bgs
Carbon Tetrachloride	1.3
Chloroform	9.5

P24	
Analyte	Concentration (ug/l)
	10 ft bgs
Carbon Tetrachloride	1.8
Chloroform	280

S16	
Analyte	Concentration (ug/l)
	10 ft bgs
Chloroform	7.1

P16	
Analyte	Concentration (ug/l)
	10 ft bgs
Bromodichloromethane	1.2
Carbon Tetrachloride	28
Chloroform	7900

P25	
Analyte	Concentration (ug/l)
	10 ft bgs
1,1-Dichloropropene	5.4
Bromodichloromethane	5.5
Carbon Tetrachloride	7.1
Chloroform	1500

S15	
Analyte	Concentration (ug/l)
	10 ft bgs
Chloroform	1.3

P12	
Analyte	Concentration (ug/l)
	10 ft bgs
Chloroform	6.3

P26	
Analyte	Concentration (ug/l)
	10 ft bgs
Chloroform	88

P-30	
Analyte	Concentration (ug/l)
	5 ft bgs
Chloroform	3.6

P18	
Analyte	Concentration (ug/l)
	10 ft bgs
Chloroform	5.8

P27	
Analyte	Concentration (ug/l)
	10 ft bgs
Chloroform	2

Legend

- Locations with no exceedances of Industrial/Commercial Soil Vapor Screening Levels from 0-10 ft bgs
- Location with one or more exceedances of Industrial/Commercial Soil Vapor Screening Levels from 0-10 ft bgs

Notes:
Soil Vapor Screening Levels derivation described in text for Soil Vapor to Indoor Air Pathway.
ug/l = micrograms per liter
ft bgs = feet below ground surface
J = Estimated Value
Industrial/Commercial Soil Vapor Screening Levels (ug/l):

1,1-Dichloropropene	1.5
1,4-Dichorobenzene	0.56
Benzene	0.79
Bromodichloromethane	0.17
Carbon Tetrachloride	1.022
Chloroform	0.27
Tetrachloroethene	1.0

Data provided in table 4-11.

Future Conditions - Soil Vapor to Indoor Air Screening Level Exceedances
Shallow Soil Vapor Investigation (0-10 ft bgs)
Former Montrose Chemical Facility
Henderson, Nevada

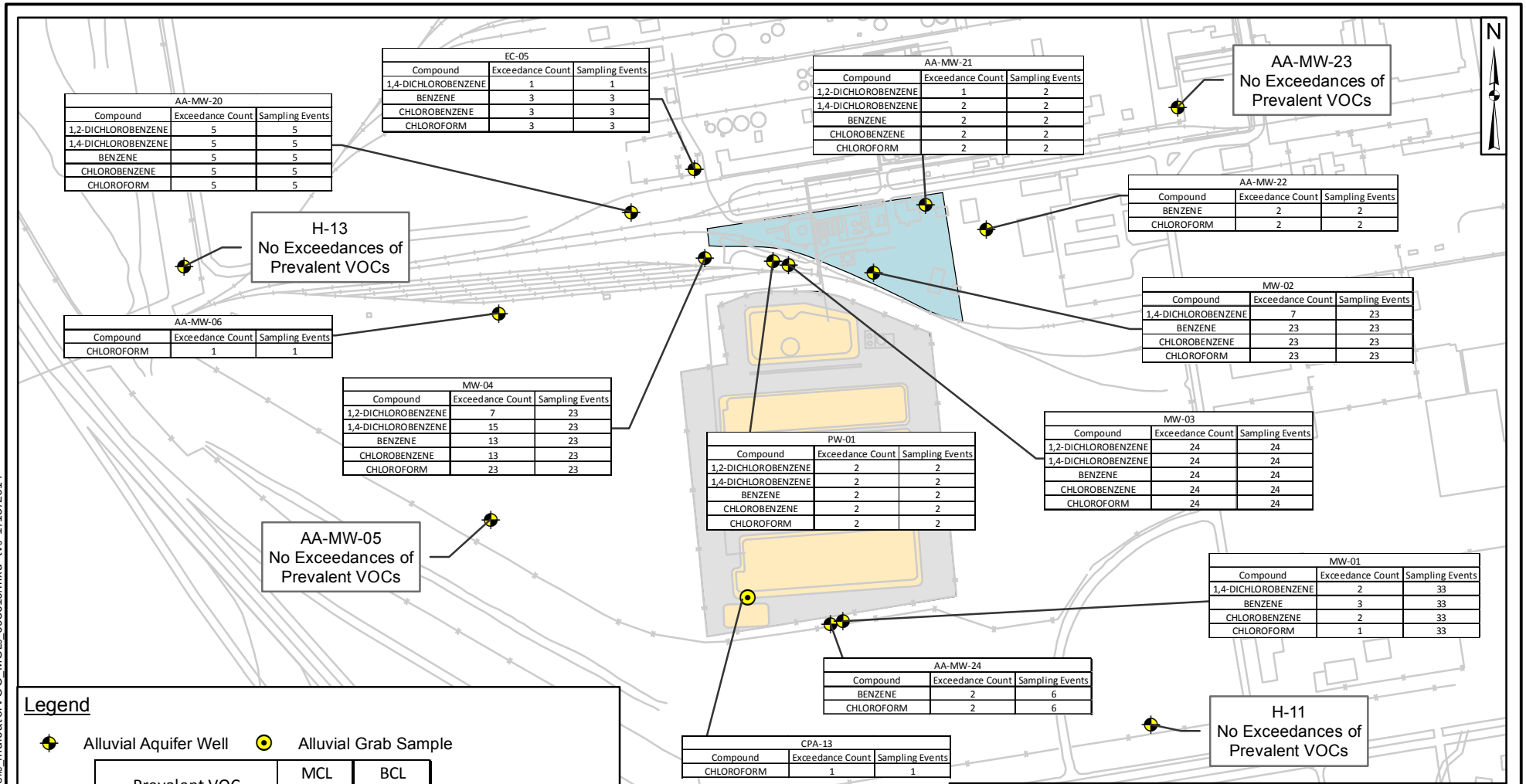
310 155 0 310 620 Feet

Geosyntec consultants

Project No: HW0989H | January 2014

Figure 4-26

G:\GIS\HW0934\Projects\CPA_FTF\FTF_CPA_SoilVaporShallowExceedance_20120807.mxd lvs 8/7/2012



AA-MW-20		
Compound	Exceedance Count	Sampling Events
1,2-DICHLOROBENZENE	5	5
1,4-DICHLOROBENZENE	5	5
BENZENE	5	5
CHLOROBENZENE	5	5
CHLOROFORM	5	5

EC-05		
Compound	Exceedance Count	Sampling Events
1,4-DICHLOROBENZENE	1	1
BENZENE	3	3
CHLOROBENZENE	3	3
CHLOROFORM	3	3

AA-MW-21		
Compound	Exceedance Count	Sampling Events
1,2-DICHLOROBENZENE	1	2
1,4-DICHLOROBENZENE	2	2
BENZENE	2	2
CHLOROBENZENE	2	2
CHLOROFORM	2	2

AA-MW-22		
Compound	Exceedance Count	Sampling Events
BENZENE	2	2
CHLOROFORM	2	2

MW-02		
Compound	Exceedance Count	Sampling Events
1,4-DICHLOROBENZENE	7	23
BENZENE	23	23
CHLOROBENZENE	23	23
CHLOROFORM	23	23

AA-MW-06		
Compound	Exceedance Count	Sampling Events
CHLOROFORM	1	1

MW-04		
Compound	Exceedance Count	Sampling Events
1,2-DICHLOROBENZENE	7	23
1,4-DICHLOROBENZENE	15	23
BENZENE	13	23
CHLOROBENZENE	13	23
CHLOROFORM	23	23

PW-01		
Compound	Exceedance Count	Sampling Events
1,2-DICHLOROBENZENE	2	2
1,4-DICHLOROBENZENE	2	2
BENZENE	2	2
CHLOROBENZENE	2	2
CHLOROFORM	2	2

MW-03		
Compound	Exceedance Count	Sampling Events
1,2-DICHLOROBENZENE	24	24
1,4-DICHLOROBENZENE	24	24
BENZENE	24	24
CHLOROBENZENE	24	24
CHLOROFORM	24	24

MW-01		
Compound	Exceedance Count	Sampling Events
1,4-DICHLOROBENZENE	2	33
BENZENE	3	33
CHLOROBENZENE	2	33
CHLOROFORM	1	33

AA-MW-24		
Compound	Exceedance Count	Sampling Events
BENZENE	2	6
CHLOROFORM	2	6

CPA-13		
Compound	Exceedance Count	Sampling Events
CHLOROFORM	1	1

Legend

Alluvial Aquifer Well Alluvial Grab Sample

Prevalent VOC	MCL (ug/L)	BCL (ug/L)
1,2-DICHLOROBENZENE	600	600
1,4-DICHLOROBENZENE	75	75
BENZENE	5	5
CHLOROBENZENE	100	100
CHLOROFORM	80	0.193

Notes:
* MCLs were used as the primary basis of comparison. In the absence of MCLs, NDEP BCLs were used.
ug/L - micrograms per liter
VOC - Volatile Organic Compound
BCL Source: Basic Comparison Levels (BCLs) for Residential Water, Nevada Division of Environmental Protection (NDEP), 2013
MCL Source: EPA Region IX Maximum Contaminant Levels (MCLs)
Data provided in table 4-12.

Shallow Zone Wells with Prevalent VOC MCL Exceedances
Former Montrose Chemical Facility
Henderson, Nevada

490 245 0 490 980 Feet

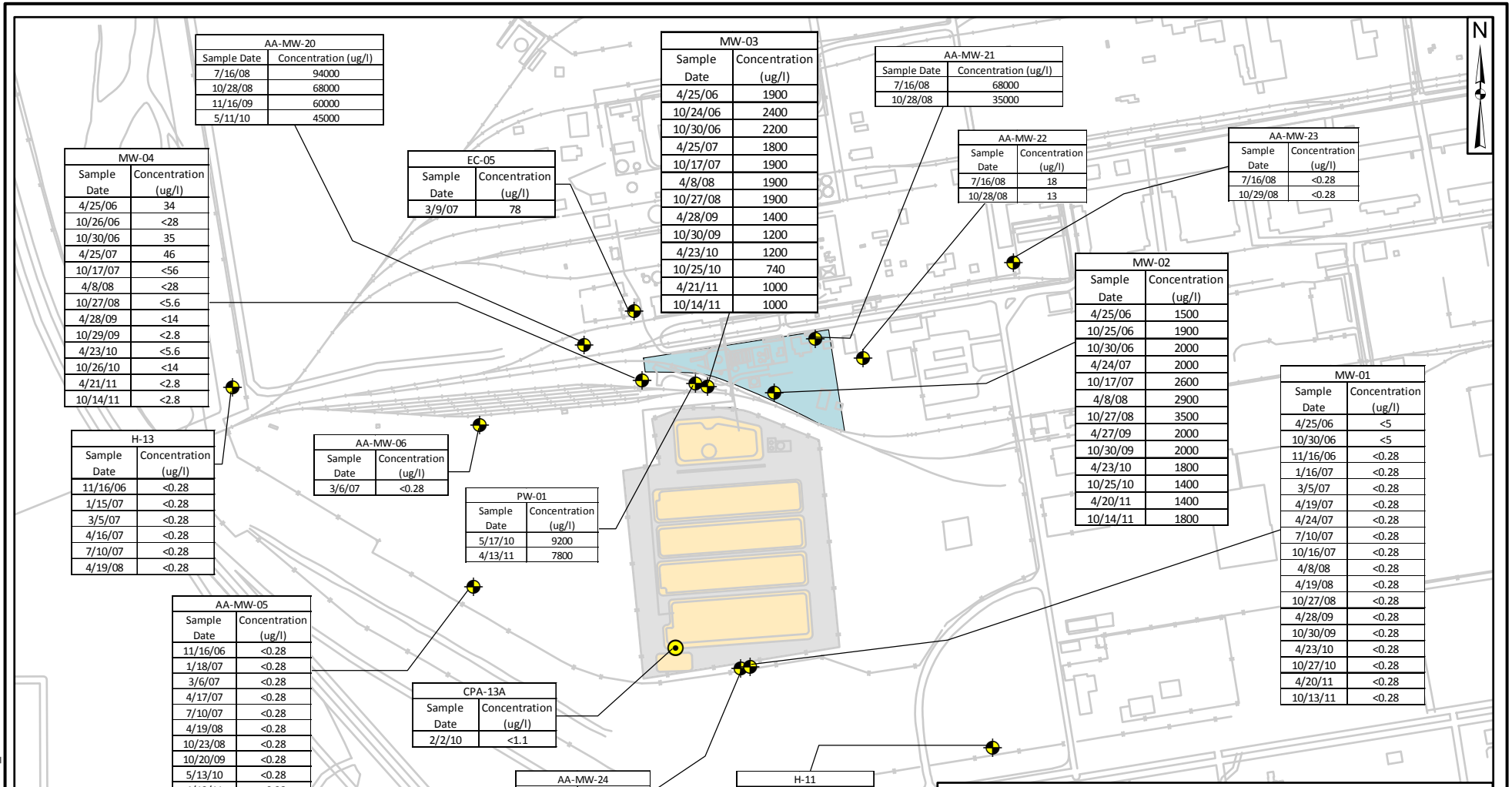
Geosyntec consultants

Project No: HW0989H

January 2014

Figure 4-27

G:\GIS\HW0934\Projects\CPA_FTF\FTF_CPA_Alluvial_Wells_IndicatorVOC_MCLs_093010.mxd tvs 1/15/2014



AA-MW-20	
Sample Date	Concentration (ug/l)
7/16/08	94000
10/28/08	68000
11/16/09	60000
5/11/10	45000

MW-03	
Sample Date	Concentration (ug/l)
4/25/06	1900
10/24/06	2400
10/30/06	2200
4/25/07	1800
10/17/07	1900
4/8/08	1900
10/27/08	1900
4/28/09	1400
10/30/09	1200
4/23/10	1200
10/25/10	740
4/21/11	1000
10/14/11	1000

AA-MW-21	
Sample Date	Concentration (ug/l)
7/16/08	68000
10/28/08	35000

AA-MW-22	
Sample Date	Concentration (ug/l)
7/16/08	18
10/28/08	13

AA-MW-23	
Sample Date	Concentration (ug/l)
7/16/08	<0.28
10/29/08	<0.28

MW-04	
Sample Date	Concentration (ug/l)
4/25/06	34
10/26/06	<28
10/30/06	35
4/25/07	46
10/17/07	<56
4/8/08	<28
10/27/08	<5.6
4/28/09	<14
10/29/09	<2.8
4/23/10	<5.6
10/26/10	<14
4/21/11	<2.8
10/14/11	<2.8

EC-05	
Sample Date	Concentration (ug/l)
3/9/07	78

MW-02	
Sample Date	Concentration (ug/l)
4/25/06	1500
10/25/06	1900
10/30/06	2000
4/24/07	2000
10/17/07	2600
4/8/08	2900
10/27/08	3500
4/27/09	2000
10/30/09	2000
4/23/10	1800
10/25/10	1400
4/20/11	1400
10/14/11	1800

MW-01	
Sample Date	Concentration (ug/l)
4/25/06	<5
10/30/06	<5
11/16/06	<0.28
1/16/07	<0.28
3/5/07	<0.28
4/19/07	<0.28
4/24/07	<0.28
7/10/07	<0.28
10/16/07	<0.28
4/8/08	<0.28
4/19/08	<0.28
10/27/08	<0.28
4/28/09	<0.28
10/30/09	<0.28
4/23/10	<0.28
10/27/10	<0.28
4/20/11	<0.28
10/13/11	<0.28

H-13	
Sample Date	Concentration (ug/l)
11/16/06	<0.28
1/15/07	<0.28
3/5/07	<0.28
4/16/07	<0.28
7/10/07	<0.28
4/19/08	<0.28

AA-MW-06	
Sample Date	Concentration (ug/l)
3/6/07	<0.28

PW-01	
Sample Date	Concentration (ug/l)
5/17/10	9200
4/13/11	7800

AA-MW-05	
Sample Date	Concentration (ug/l)
11/16/06	<0.28
1/18/07	<0.28
3/6/07	<0.28
4/17/07	<0.28
7/10/07	<0.28
4/19/08	<0.28
10/23/08	<0.28
10/20/09	<0.28
5/13/10	<0.28
4/12/11	<0.28

CPA-13A	
Sample Date	Concentration (ug/l)
2/2/10	<1.1

AA-MW-24	
Sample Date	Concentration (ug/l)
7/16/08	11
10/29/08	6.6
10/30/09	<0.28
5/12/10	<0.28
4/26/11	<0.28
10/13/11	<0.28

H-11	
Sample Date	Concentration (ug/l)
11/16/06	0.94
1/16/07	<0.28
3/5/07	0.91
4/16/07	<0.28
7/9/07	<0.28
4/19/08	<0.28
10/22/08	<0.28
11/20/09	0.31
5/7/10	0.34
4/25/11	0.28

Legend

Alluvial Aquifer Well Alluvial Grab Sample

ug/L - micrograms per liter
Benzene MCL - 5 ug/L
Data provided in table 4-12.

Note:
Figure includes data from 2006-2011

Shallow Zone Wells
Benzene Concentrations
Former Montrose Chemical Facility
Henderson, Nevada

620 310 0 620 1,240 Feet

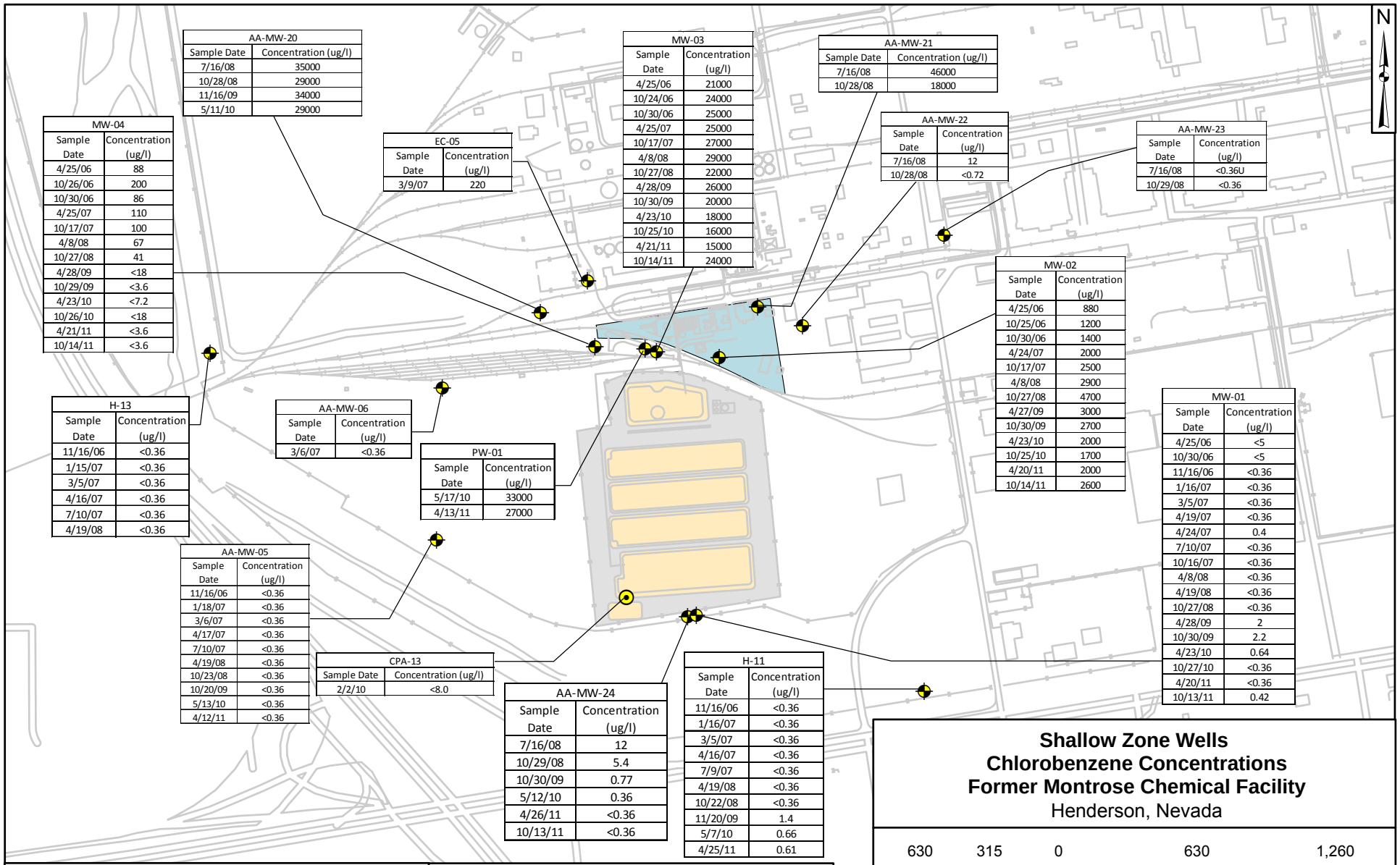
Geosyntec consultants

Project No: HW0989H

January 2014

Figure **4-28**

G:\GIS\HW0934\Projects\CPA_FTF\FTF_CPA_Alluvial_Wells_Benzene.mxd tvs 1/14/2014



AA-MW-20	
Sample Date	Concentration (ug/l)
7/16/08	35000
10/28/08	29000
11/16/09	34000
5/11/10	29000

MW-04	
Sample Date	Concentration (ug/l)
4/25/06	88
10/26/06	200
10/30/06	86
4/25/07	110
10/17/07	100
4/8/08	67
10/27/08	41
4/28/09	<18
10/29/09	<3.6
4/23/10	<7.2
10/26/10	<18
4/21/11	<3.6
10/14/11	<3.6

EC-05	
Sample Date	Concentration (ug/l)
3/9/07	220

MW-03	
Sample Date	Concentration (ug/l)
4/25/06	21000
10/24/06	24000
10/30/06	25000
4/25/07	25000
10/17/07	27000
4/8/08	29000
10/27/08	22000
4/28/09	26000
10/30/09	20000
4/23/10	18000
10/25/10	16000
4/21/11	15000
10/14/11	24000

AA-MW-21	
Sample Date	Concentration (ug/l)
7/16/08	46000
10/28/08	18000

AA-MW-22	
Sample Date	Concentration (ug/l)
7/16/08	12
10/28/08	<0.72

AA-MW-23	
Sample Date	Concentration (ug/l)
7/16/08	<0.36U
10/29/08	<0.36

MW-02	
Sample Date	Concentration (ug/l)
4/25/06	880
10/25/06	1200
10/30/06	1400
4/24/07	2000
10/17/07	2500
4/8/08	2900
10/27/08	4700
4/27/09	3000
10/30/09	2700
4/23/10	2000
10/25/10	1700
4/20/11	2000
10/14/11	2600

H-13	
Sample Date	Concentration (ug/l)
11/16/06	<0.36
1/15/07	<0.36
3/5/07	<0.36
4/16/07	<0.36
7/10/07	<0.36
4/19/08	<0.36

AA-MW-06	
Sample Date	Concentration (ug/l)
3/6/07	<0.36

PW-01	
Sample Date	Concentration (ug/l)
5/17/10	33000
4/13/11	27000

MW-01	
Sample Date	Concentration (ug/l)
4/25/06	<5
10/30/06	<5
11/16/06	<0.36
1/16/07	<0.36
3/5/07	<0.36
4/19/07	<0.36
4/24/07	0.4
7/10/07	<0.36
10/16/07	<0.36
4/8/08	<0.36
4/19/08	<0.36
10/27/08	<0.36
4/28/09	2
10/30/09	2.2
4/23/10	0.64
10/27/10	<0.36
4/20/11	<0.36
10/13/11	0.42

AA-MW-05	
Sample Date	Concentration (ug/l)
11/16/06	<0.36
1/18/07	<0.36
3/6/07	<0.36
4/17/07	<0.36
7/10/07	<0.36
4/19/08	<0.36
10/23/08	<0.36
10/20/09	<0.36
5/13/10	<0.36
4/12/11	<0.36

CPA-13	
Sample Date	Concentration (ug/l)
2/2/10	<8.0

AA-MW-24	
Sample Date	Concentration (ug/l)
7/16/08	12
10/29/08	5.4
10/30/09	0.77
5/12/10	0.36
4/26/11	<0.36
10/13/11	<0.36

H-11	
Sample Date	Concentration (ug/l)
11/16/06	<0.36
1/16/07	<0.36
3/5/07	<0.36
4/16/07	<0.36
7/9/07	<0.36
4/19/08	<0.36
10/22/08	<0.36
11/20/09	1.4
5/7/10	0.66
4/25/11	0.61

Legend

Alluvial Aquifer Well

Alluvial Grab Sample

ug/L - micrograms per liter
Chlorobenzene MCL - 100 ug/L
Data provided in table 4-12.

Notes:
Figure includes data from 2006-2011.
Lab Qualifier:
U The sample was analyzed for, but was not detected above the sample quantitation or detection limit or applied due to suspected blank contamination.

Shallow Zone Wells
Chlorobenzene Concentrations
Former Montrose Chemical Facility
Henderson, Nevada

630 315 0 630 1,260 Feet

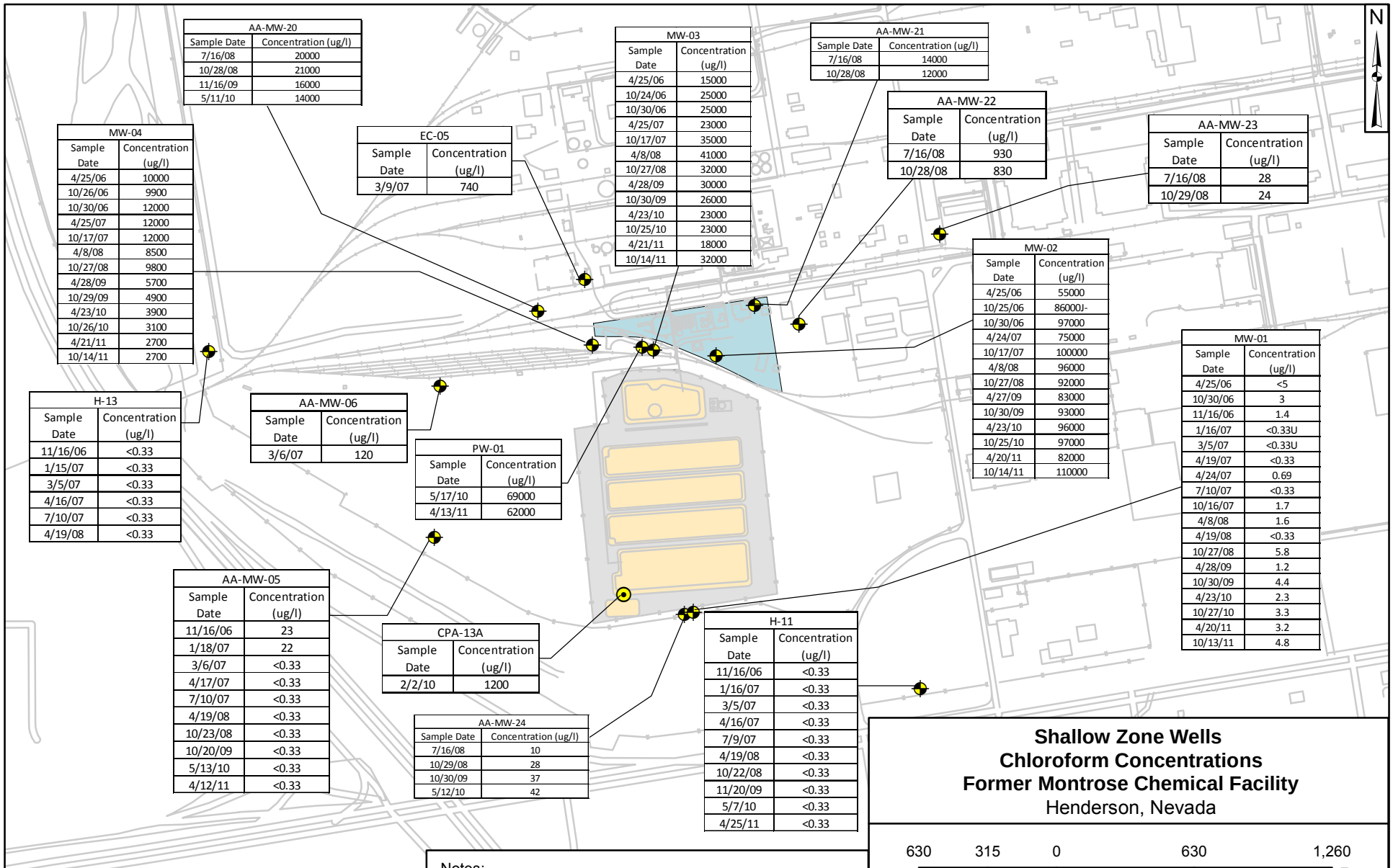
Geosyntec consultants

Project No: HW0989H

January 2014

Figure **4-29**

G:\GIS\HW0934\Projects\CPA_FTF\FTF_CPA_Alluvial_Wells_Chlorobenzene_20120725.mxd tvs 1/14/2014



AA-MW-20	
Sample Date	Concentration (ug/l)
7/16/08	20000
10/28/08	21000
11/16/09	16000
5/11/10	14000

MW-04	
Sample Date	Concentration (ug/l)
4/25/06	10000
10/26/06	9900
10/30/06	12000
4/25/07	12000
10/17/07	12000
4/8/08	8500
10/27/08	9800
4/28/09	5700
10/29/09	4900
4/23/10	3900
10/26/10	3100
4/21/11	2700
10/14/11	2700

EC-05	
Sample Date	Concentration (ug/l)
3/9/07	740

MW-03	
Sample Date	Concentration (ug/l)
4/25/06	15000
10/24/06	25000
10/30/06	25000
4/25/07	23000
10/17/07	35000
4/8/08	41000
10/27/08	32000
4/28/09	30000
10/30/09	26000
4/23/10	23000
10/25/10	23000
4/21/11	18000
10/14/11	32000

AA-MW-21	
Sample Date	Concentration (ug/l)
7/16/08	14000
10/28/08	12000

AA-MW-22	
Sample Date	Concentration (ug/l)
7/16/08	930
10/28/08	830

AA-MW-23	
Sample Date	Concentration (ug/l)
7/16/08	28
10/29/08	24

MW-02	
Sample Date	Concentration (ug/l)
4/25/06	55000
10/25/06	86000J-
10/30/06	97000
4/24/07	75000
10/17/07	100000
4/8/08	96000
10/27/08	92000
4/27/09	83000
10/30/09	93000
4/23/10	96000
10/25/10	97000
4/20/11	82000
10/14/11	110000

MW-01	
Sample Date	Concentration (ug/l)
4/25/06	<5
10/30/06	3
11/16/06	1.4
1/16/07	<0.33U
3/5/07	<0.33U
4/19/07	<0.33
4/24/07	0.69
7/10/07	<0.33
10/16/07	1.7
4/8/08	1.6
4/19/08	<0.33
10/27/08	5.8
4/28/09	1.2
10/30/09	4.4
4/23/10	2.3
10/27/10	3.3
4/20/11	3.2
10/13/11	4.8

H-13	
Sample Date	Concentration (ug/l)
11/16/06	<0.33
1/15/07	<0.33
3/5/07	<0.33
4/16/07	<0.33
7/10/07	<0.33
4/19/08	<0.33

AA-MW-06	
Sample Date	Concentration (ug/l)
3/6/07	120

PW-01	
Sample Date	Concentration (ug/l)
5/17/10	69000
4/13/11	62000

AA-MW-05	
Sample Date	Concentration (ug/l)
11/16/06	23
1/18/07	22
3/6/07	<0.33
4/17/07	<0.33
7/10/07	<0.33
4/19/08	<0.33
10/23/08	<0.33
10/20/09	<0.33
5/13/10	<0.33
4/12/11	<0.33

CPA-13A	
Sample Date	Concentration (ug/l)
2/2/10	1200

AA-MW-24	
Sample Date	Concentration (ug/l)
7/16/08	10
10/29/08	28
10/30/09	37
5/12/10	42

H-11	
Sample Date	Concentration (ug/l)
11/16/06	<0.33
1/16/07	<0.33
3/5/07	<0.33
4/16/07	<0.33
7/9/07	<0.33
4/19/08	<0.33
10/22/08	<0.33
11/20/09	<0.33
5/7/10	<0.33
4/25/11	<0.33

Legend

Alluvial Aquifer Well Alluvial Grab Sample

ug/L - micrograms per liter
Chloroform MCL - 80 ug/L
Data provided in table 4-12.

Notes:
Figure includes data from 2006 to 2011.
Lab Qualifiers:
U The sample was analyzed for, but was not detected above the sample quantitation or detection limit or applied due to suspected blank contamination.
J Estimated value with a negative bias.

Shallow Zone Wells
Chloroform Concentrations
Former Montrose Chemical Facility
Henderson, Nevada

630 315 0 630 1,260 Feet

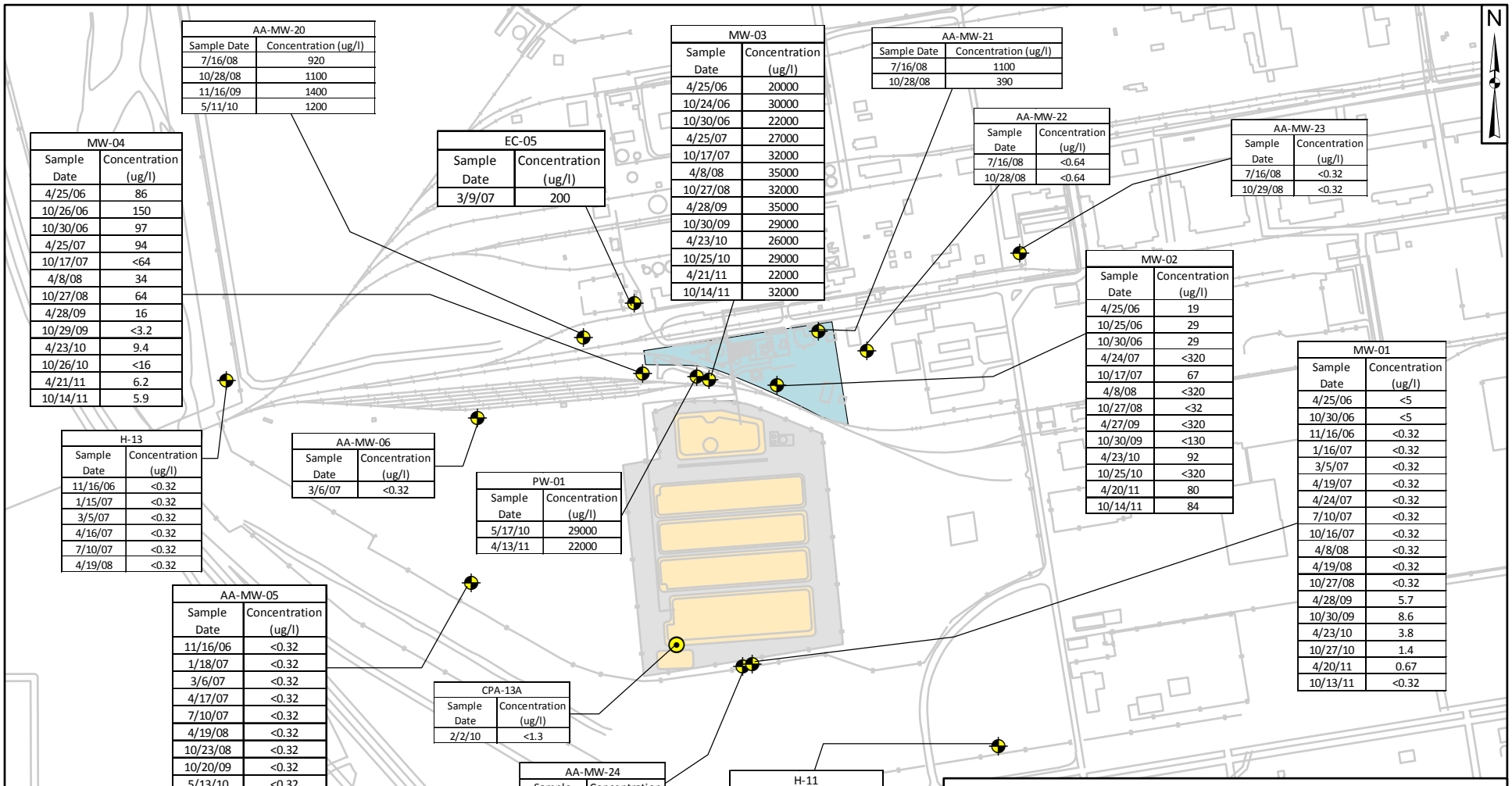
Geosyntec consultants

Project No: HW0989H

January 2014

Figure **4-30**

G:\GIS\HW0934\Projects\CPA_FTF\FTF_CPA_Alluvial_Wells_Chloroform_20120725.mxd tvs 1/14/2014



AA-MW-20	
Sample Date	Concentration (ug/l)
7/16/08	920
10/28/08	1100
11/16/09	1400
5/11/10	1200

MW-04	
Sample Date	Concentration (ug/l)
4/25/06	86
10/26/06	150
10/30/06	97
4/25/07	94
10/17/07	<64
4/8/08	34
10/27/08	64
4/28/09	16
10/29/09	<3.2
4/23/10	9.4
10/26/10	<16
4/21/11	6.2
10/14/11	5.9

EC-05	
Sample Date	Concentration (ug/l)
3/9/07	200

MW-03	
Sample Date	Concentration (ug/l)
4/25/06	20000
10/24/06	30000
10/30/06	22000
4/25/07	27000
10/17/07	32000
4/8/08	35000
10/27/08	32000
4/28/09	35000
10/30/09	29000
4/23/10	26000
10/25/10	29000
4/21/11	22000
10/14/11	32000

AA-MW-21	
Sample Date	Concentration (ug/l)
7/16/08	1100
10/28/08	390

AA-MW-22	
Sample Date	Concentration (ug/l)
7/16/08	<0.64
10/28/08	<0.64

AA-MW-23	
Sample Date	Concentration (ug/l)
7/16/08	<0.32
10/29/08	<0.32

MW-02	
Sample Date	Concentration (ug/l)
4/25/06	19
10/25/06	29
10/30/06	29
4/24/07	<320
10/17/07	67
4/8/08	<320
10/27/08	<32
4/27/09	<320
10/30/09	<130
4/23/10	92
10/25/10	<320
4/20/11	80
10/14/11	84

MW-01	
Sample Date	Concentration (ug/l)
4/25/06	<5
10/30/06	<5
11/16/06	<0.32
1/16/07	<0.32
3/5/07	<0.32
4/19/07	<0.32
4/24/07	<0.32
7/10/07	<0.32
10/16/07	<0.32
4/8/08	<0.32
4/19/08	<0.32
10/27/08	<0.32
4/28/09	5.7
10/30/09	8.6
4/23/10	3.8
10/27/10	1.4
4/20/11	0.67
10/13/11	<0.32

H-13	
Sample Date	Concentration (ug/l)
11/16/06	<0.32
1/15/07	<0.32
3/5/07	<0.32
4/16/07	<0.32
7/10/07	<0.32
4/19/08	<0.32

AA-MW-06	
Sample Date	Concentration (ug/l)
3/6/07	<0.32

PW-01	
Sample Date	Concentration (ug/l)
5/17/10	29000
4/13/11	22000

AA-MW-05	
Sample Date	Concentration (ug/l)
11/16/06	<0.32
1/18/07	<0.32
3/6/07	<0.32
4/17/07	<0.32
7/10/07	<0.32
4/19/08	<0.32
10/23/08	<0.32
10/20/09	<0.32
5/13/10	<0.32
4/12/11	<0.32

CPA-13A	
Sample Date	Concentration (ug/l)
2/2/10	<1.3

AA-MW-24	
Sample Date	Concentration (ug/l)
7/16/08	0.36
10/29/08	<0.32
10/30/09	1.1
5/12/10	<0.32
4/26/11	<0.32
10/13/11	<0.32

H-11	
Sample Date	Concentration (ug/l)
11/16/06	<0.32
1/16/07	<0.32
3/5/07	<0.32
4/16/07	<0.32
7/9/07	<0.32
4/19/08	<0.32
10/22/08	<0.32
11/20/09	<0.32
5/7/10	<0.32
4/25/11	<0.32

Shallow Zone Wells
1,2-Dichlorobenzene Concentrations
Former Montrose Chemical Facility
Henderson, Nevada

640 320 0 640 1,280 Feet

Legend

Alluvial Aquifer Well Alluvial Grab Sample

ug/L - micrograms per liter
1,2-Dichlorobenzene MCL - 600 ug/L
Data provided in table 4-12.

Note:
Figure includes data from 2006-2011.

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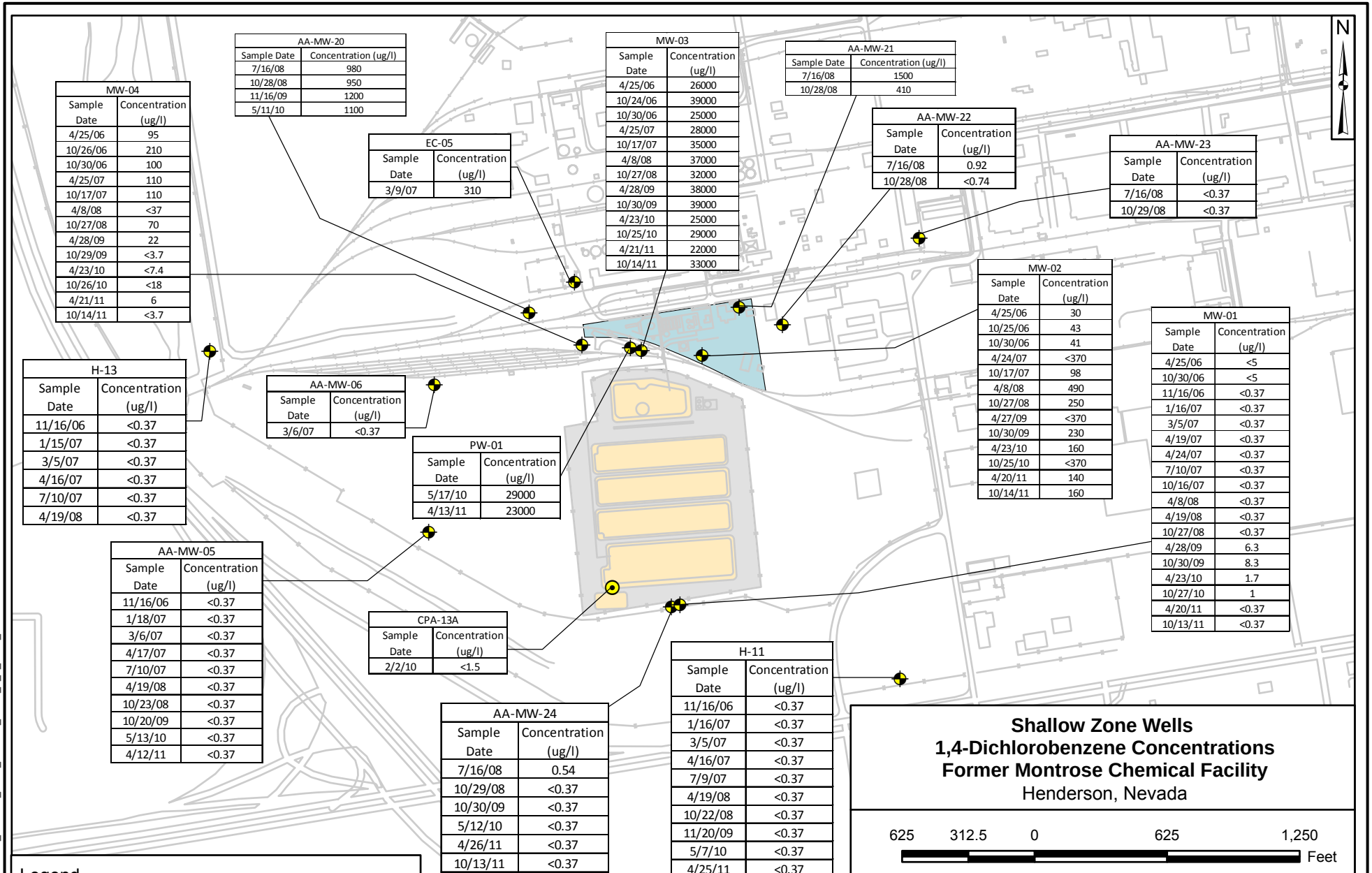
January 2014

Figure 4-31

G:\GIS\HW0934\Projects\CPA_FTF\FTF_CPA_Alluvial_Wells_1_2_DCB_20120725.mxd tvs 1/14/2014



MW-04	
Sample Date	Concentration (ug/l)
4/25/06	95
10/26/06	210
10/30/06	100
4/25/07	110
10/17/07	110
4/8/08	<37
10/27/08	70
4/28/09	22
10/29/09	<3.7
4/23/10	<7.4
10/26/10	<18
4/21/11	6
10/14/11	<3.7

AA-MW-20	
Sample Date	Concentration (ug/l)
7/16/08	980
10/28/08	950
11/16/09	1200
5/11/10	1100

EC-05	
Sample Date	Concentration (ug/l)
3/9/07	310

MW-03	
Sample Date	Concentration (ug/l)
4/25/06	26000
10/24/06	39000
10/30/06	25000
4/25/07	28000
10/17/07	35000
4/8/08	37000
10/27/08	32000
4/28/09	38000
10/30/09	39000
4/23/10	25000
10/25/10	29000
4/21/11	22000
10/14/11	33000

AA-MW-21	
Sample Date	Concentration (ug/l)
7/16/08	1500
10/28/08	410

AA-MW-22	
Sample Date	Concentration (ug/l)
7/16/08	0.92
10/28/08	<0.74

AA-MW-23	
Sample Date	Concentration (ug/l)
7/16/08	<0.37
10/29/08	<0.37

MW-02	
Sample Date	Concentration (ug/l)
4/25/06	30
10/25/06	43
10/30/06	41
4/24/07	<370
10/17/07	98
4/8/08	490
10/27/08	250
4/27/09	<370
10/30/09	230
4/23/10	160
10/25/10	<370
4/20/11	140
10/14/11	160

MW-01	
Sample Date	Concentration (ug/l)
4/25/06	<5
10/30/06	<5
11/16/06	<0.37
1/16/07	<0.37
3/5/07	<0.37
4/19/07	<0.37
4/24/07	<0.37
7/10/07	<0.37
10/16/07	<0.37
4/8/08	<0.37
4/19/08	<0.37
10/27/08	<0.37
4/28/09	6.3
10/30/09	8.3
4/23/10	1.7
10/27/10	1
4/20/11	<0.37
10/13/11	<0.37

H-13	
Sample Date	Concentration (ug/l)
11/16/06	<0.37
1/15/07	<0.37
3/5/07	<0.37
4/16/07	<0.37
7/10/07	<0.37
4/19/08	<0.37

AA-MW-06	
Sample Date	Concentration (ug/l)
3/6/07	<0.37

PW-01	
Sample Date	Concentration (ug/l)
5/17/10	29000
4/13/11	23000

AA-MW-05	
Sample Date	Concentration (ug/l)
11/16/06	<0.37
1/18/07	<0.37
3/6/07	<0.37
4/17/07	<0.37
7/10/07	<0.37
4/19/08	<0.37
10/23/08	<0.37
10/20/09	<0.37
5/13/10	<0.37
4/12/11	<0.37

CPA-13A	
Sample Date	Concentration (ug/l)
2/2/10	<1.5

AA-MW-24	
Sample Date	Concentration (ug/l)
7/16/08	0.54
10/29/08	<0.37
10/30/09	<0.37
5/12/10	<0.37
4/26/11	<0.37
10/13/11	<0.37

H-11	
Sample Date	Concentration (ug/l)
11/16/06	<0.37
1/16/07	<0.37
3/5/07	<0.37
4/16/07	<0.37
7/9/07	<0.37
4/19/08	<0.37
10/22/08	<0.37
11/20/09	<0.37
5/7/10	<0.37
4/25/11	<0.37

Shallow Zone Wells
1,4-Dichlorobenzene Concentrations
Former Montrose Chemical Facility
Henderson, Nevada

Legend

Alluvial Aquifer Well Alluvial Grab Sample

ug/L - micrograms per liter
1,4-Dichlorobenzene MCL - 75 ug/L
Data provided in table 4-12.

Note:
Figure includes data from 2006-2011.

Geosyntec consultants

Project No: HW0989H

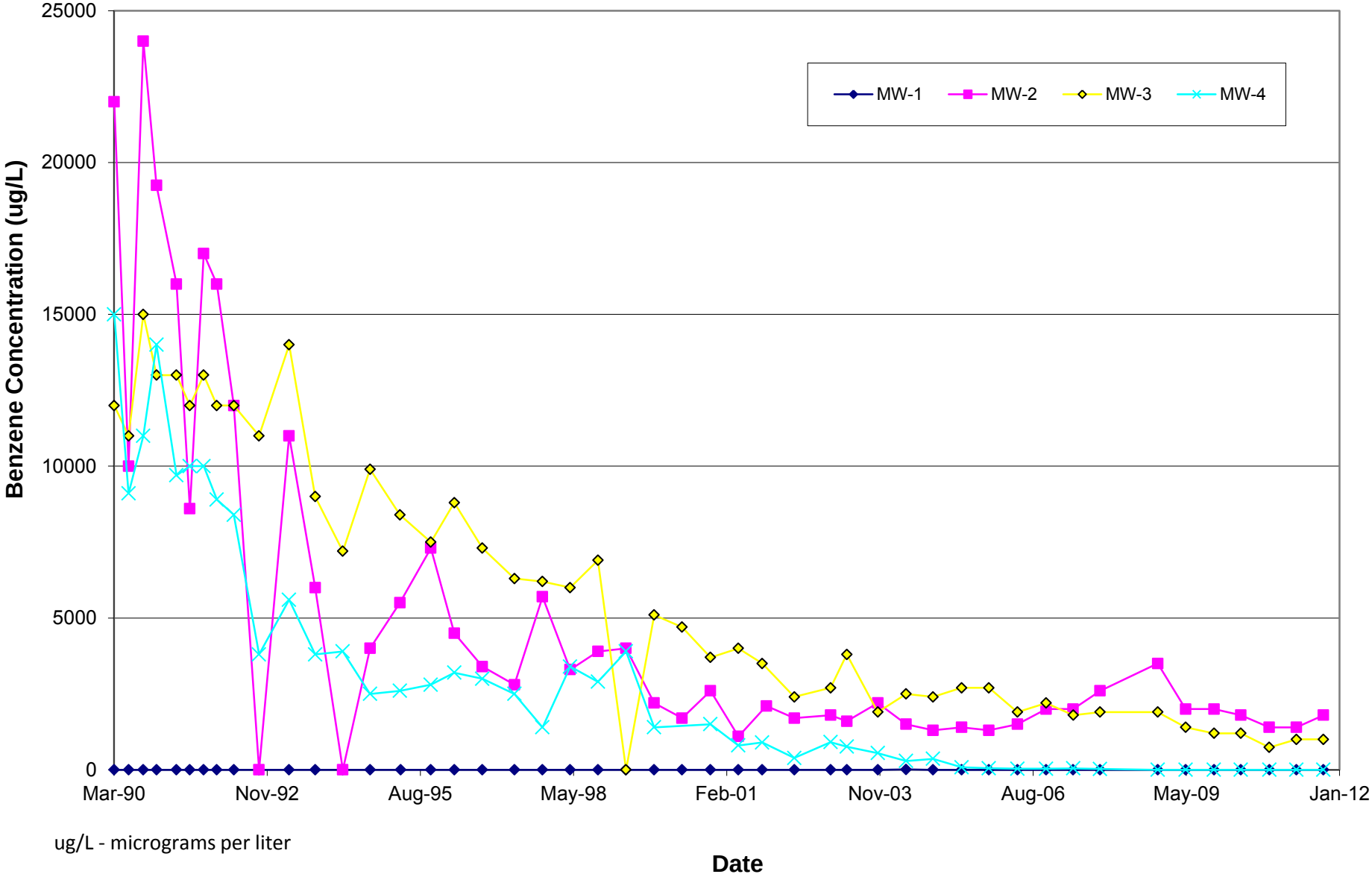
January 2014

Figure 4-32

G:\GIS\HW0934\Projects\CPA_FTF\FTF_CPA_Alluvial_Wells_1_4_DCB_20120725.mxd tvs 1/14/2014

Geosyntec consultants

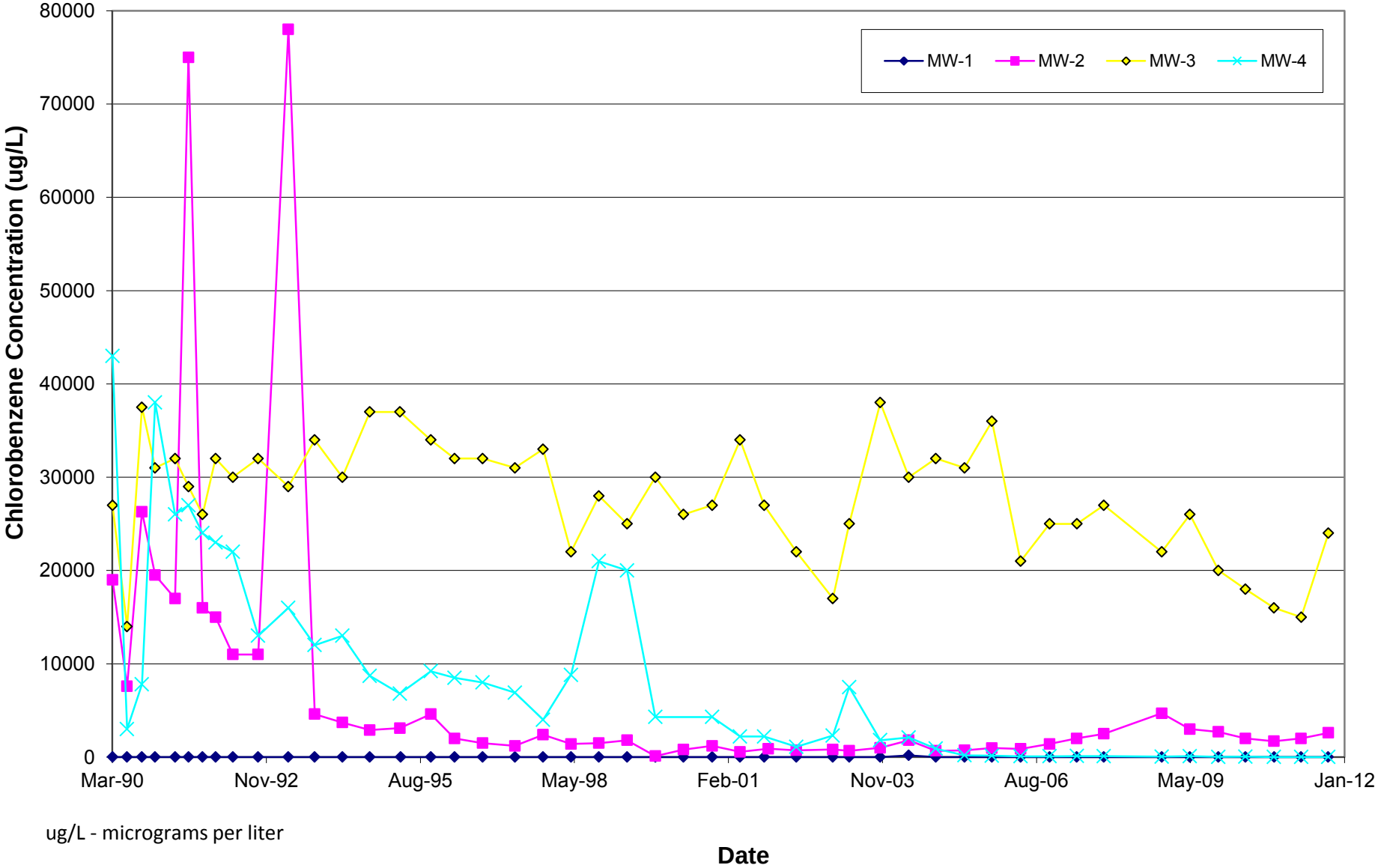
Figure 4-33: Benzene Concentrations in MW-1, MW-2, MW-3, and MW-4 (March 1990 to October 2011)



ug/L - micrograms per liter

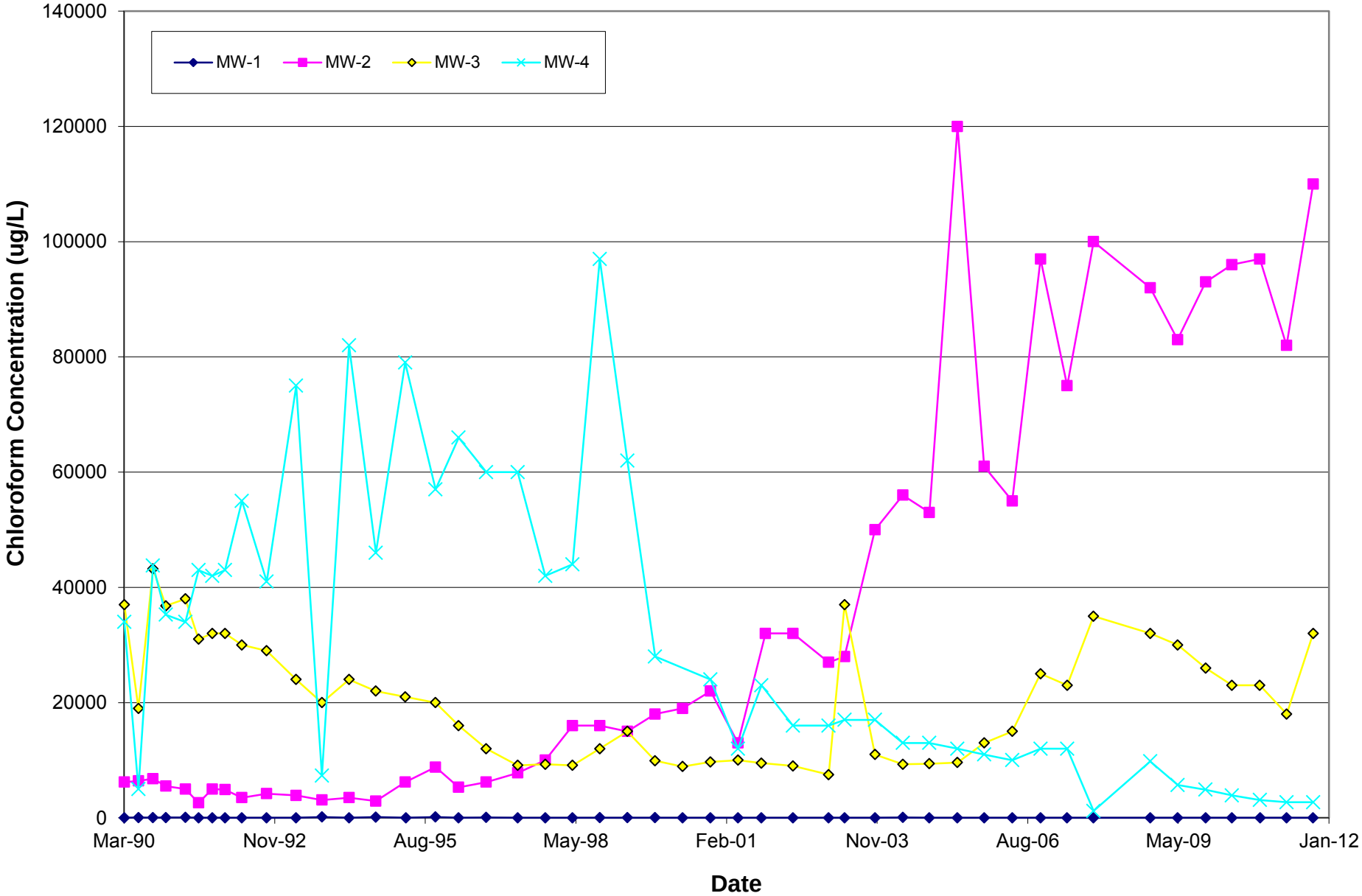
Geosyntec consultants

Figure 4-34: Chlorobenzene Concentrations in MW-1, MW-2, MW-3, and MW-4 (March 1990 to October 2011)



Geosyntec consultants

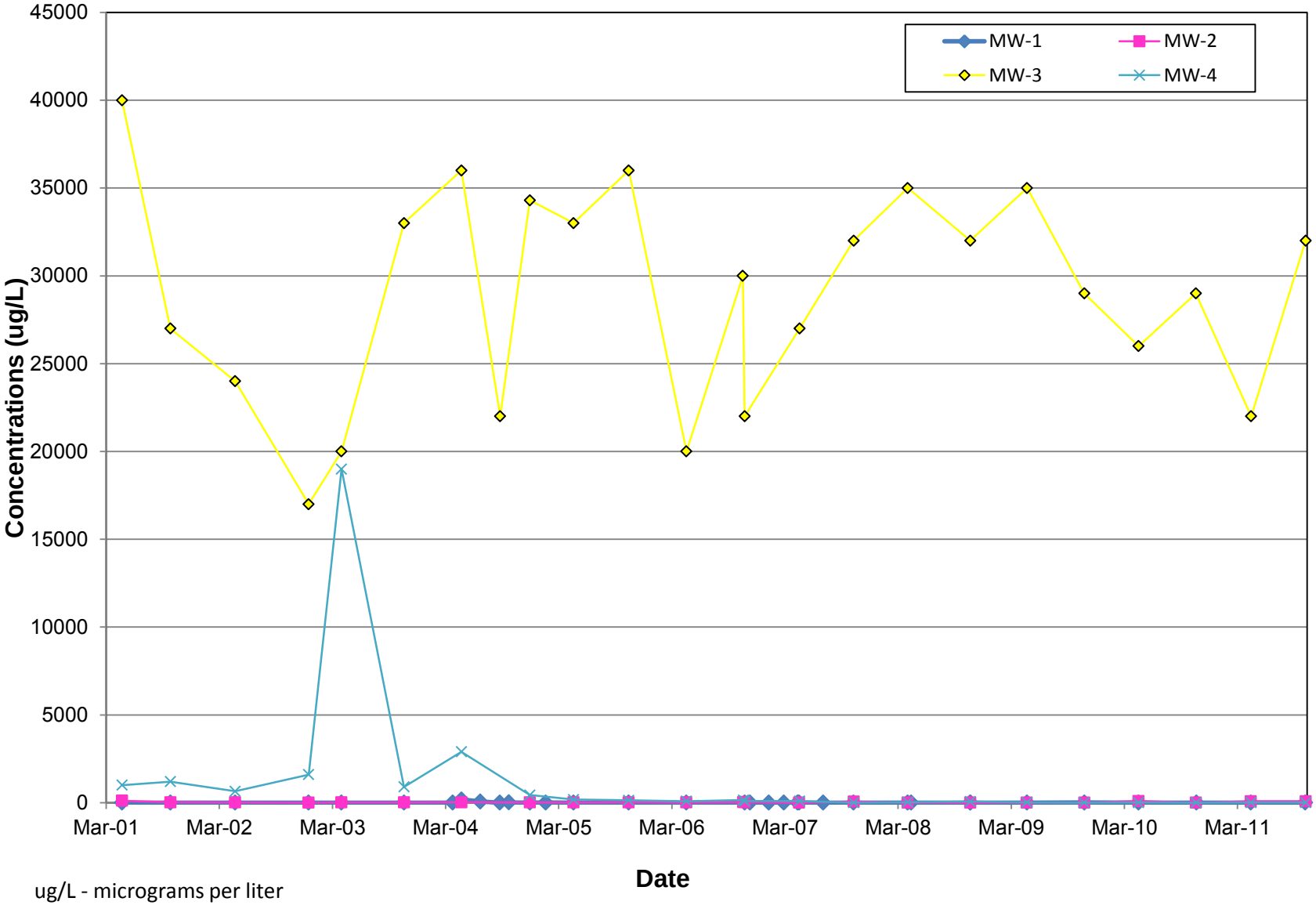
Figure 4-35: Chloroform Concentrations in MW-1, MW-2, MW-3, and MW-4 (March 1990 to October 2011)



ug/L - micrograms per liter

Geosyntec consultants

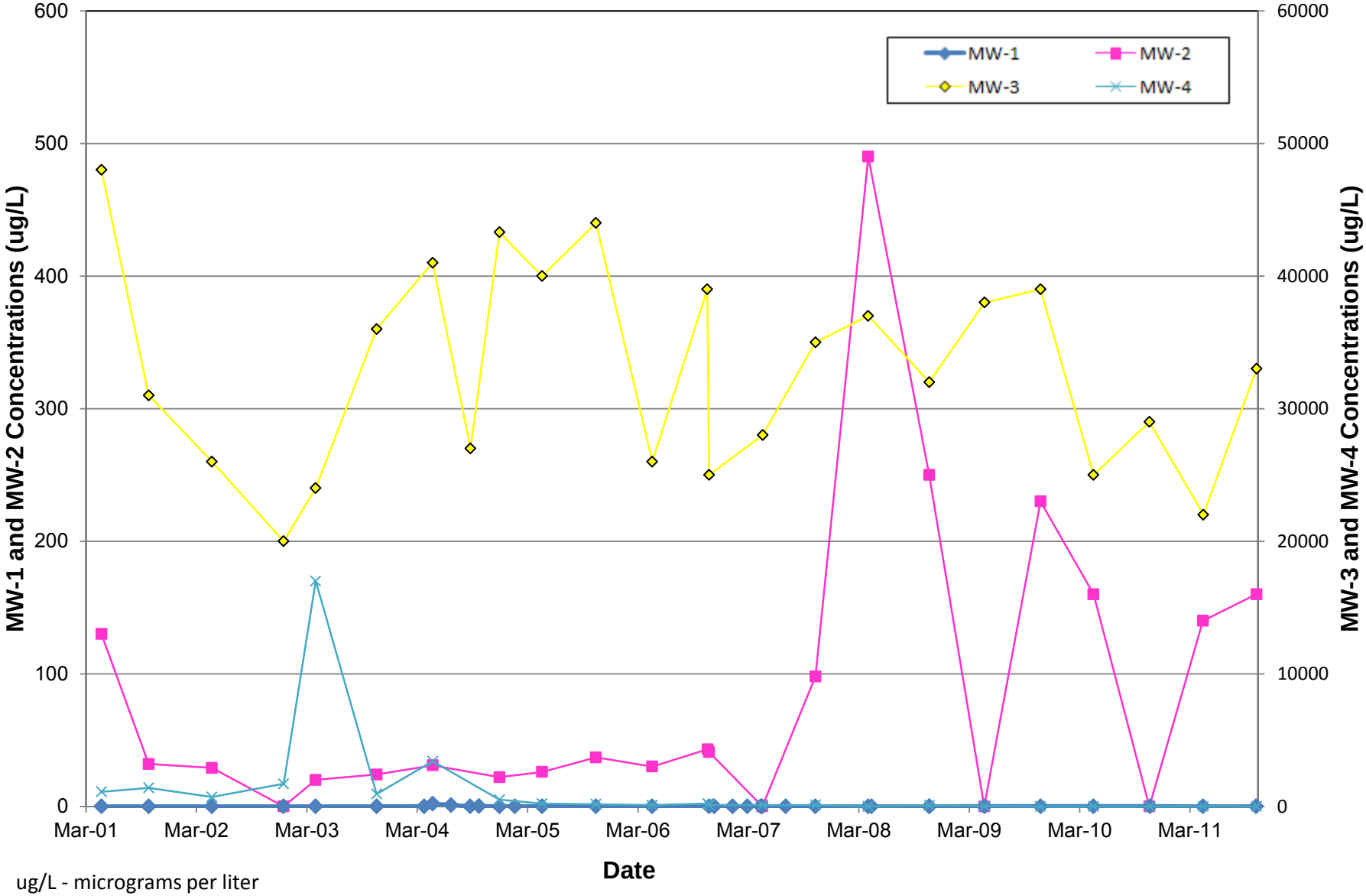
Figure 4-36: 1,2-Dichlorobenzene Concentrations in MW-1, MW-2, MW-3, and MW-4 (2001 to 2011)



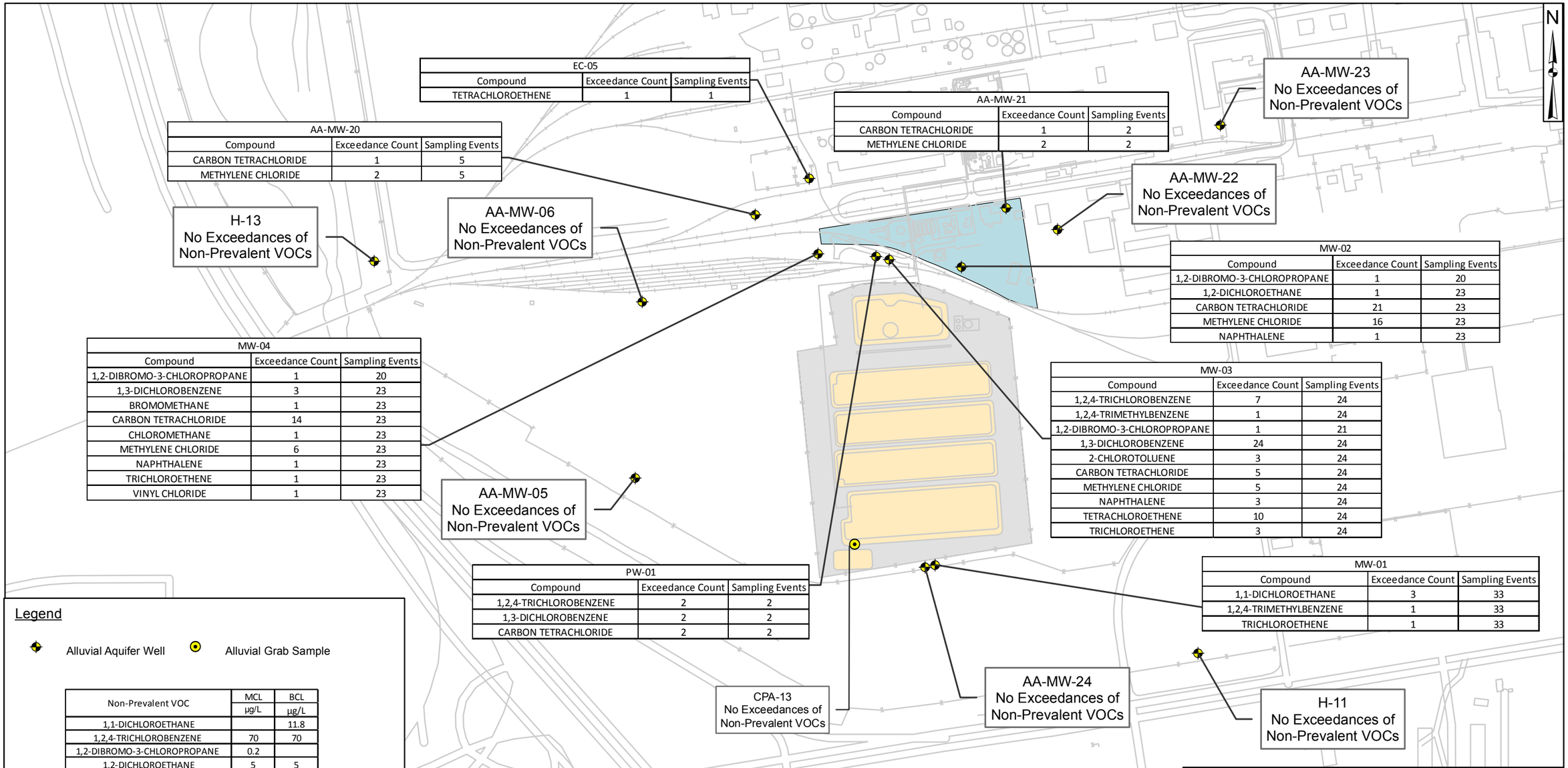
ug/L - micrograms per liter

Geosyntec consultants

Figure 4-37: 1,4-Dichlorobenzene Concentrations in MW-1, MW-2, MW-3, and MW-4 (2001 to 2012)



ug/L - micrograms per liter



EC-05		
Compound	Exceedance Count	Sampling Events
TETRACHLOROETHENE	1	1

AA-MW-21		
Compound	Exceedance Count	Sampling Events
CARBON TETRACHLORIDE	1	2
METHYLENE CHLORIDE	2	2

AA-MW-20		
Compound	Exceedance Count	Sampling Events
CARBON TETRACHLORIDE	1	5
METHYLENE CHLORIDE	2	5

MW-02		
Compound	Exceedance Count	Sampling Events
1,2-DIBROMO-3-CHLOROPROPANE	1	20
1,2-DICHLOROETHANE	1	23
CARBON TETRACHLORIDE	21	23
METHYLENE CHLORIDE	16	23
NAPHTHALENE	1	23

MW-04		
Compound	Exceedance Count	Sampling Events
1,2-DIBROMO-3-CHLOROPROPANE	1	20
1,3-DICHLOROBENZENE	3	23
BROMOMETHANE	1	23
CARBON TETRACHLORIDE	14	23
CHLOROMETHANE	1	23
METHYLENE CHLORIDE	6	23
NAPHTHALENE	1	23
TRICHLOROETHENE	1	23
VINYL CHLORIDE	1	23

MW-03		
Compound	Exceedance Count	Sampling Events
1,2,4-TRICHLOROBENZENE	7	24
1,2,4-TRIMETHYLBENZENE	1	24
1,2-DIBROMO-3-CHLOROPROPANE	1	21
1,3-DICHLOROBENZENE	24	24
2-CHLOROTOLUENE	3	24
CARBON TETRACHLORIDE	5	24
METHYLENE CHLORIDE	5	24
NAPHTHALENE	3	24
TETRACHLOROETHENE	10	24
TRICHLOROETHENE	3	24

PW-01		
Compound	Exceedance Count	Sampling Events
1,2,4-TRICHLOROBENZENE	2	2
1,3-DICHLOROBENZENE	2	2
CARBON TETRACHLORIDE	2	2

MW-01		
Compound	Exceedance Count	Sampling Events
1,1-DICHLOROETHANE	3	33
1,2,4-TRIMETHYLBENZENE	1	33
TRICHLOROETHENE	1	33

Legend

Alluvial Aquifer Well

Alluvial Grab Sample

Non-Prevalent VOC	MCL µg/L	BCL µg/L
1,1-DICHLOROETHANE		11.8
1,2,4-TRICHLOROBENZENE	70	70
1,2-DIBROMO-3-CHLOROPROPANE	0.2	
1,2-DICHLOROETHANE	5	5
1,3-DICHLOROBENZENE		110
CARBON TETRACHLORIDE	5	5
METHYLENE CHLORIDE	5	5
NAPHTHALENE		4.29
TETRACHLOROETHENE	5	5
TRICHLOROETHENE	5	5
VINYL CHLORIDE	2	2

Notes:
* MCLs were used as the primary basis of comparison. In the absence of MCLs, NDEP BCLs were used.
BCL Source: Basic Comparison Levels (BCLs) for Residential Water, Nevada Division of Environmental Protection (NDEP), 2013
MCL Source: EPA Region IX Maximum Contaminant Levels (MCLs)
VOC - Volatile Organic Compound
ug/L - Micrograms per Liter
Data provided in table 4-12.

Shallow Zone Wells with Non-Prevalent VOC MCL Exceedances
Former Montrose Chemical Facility
Henderson, Nevada

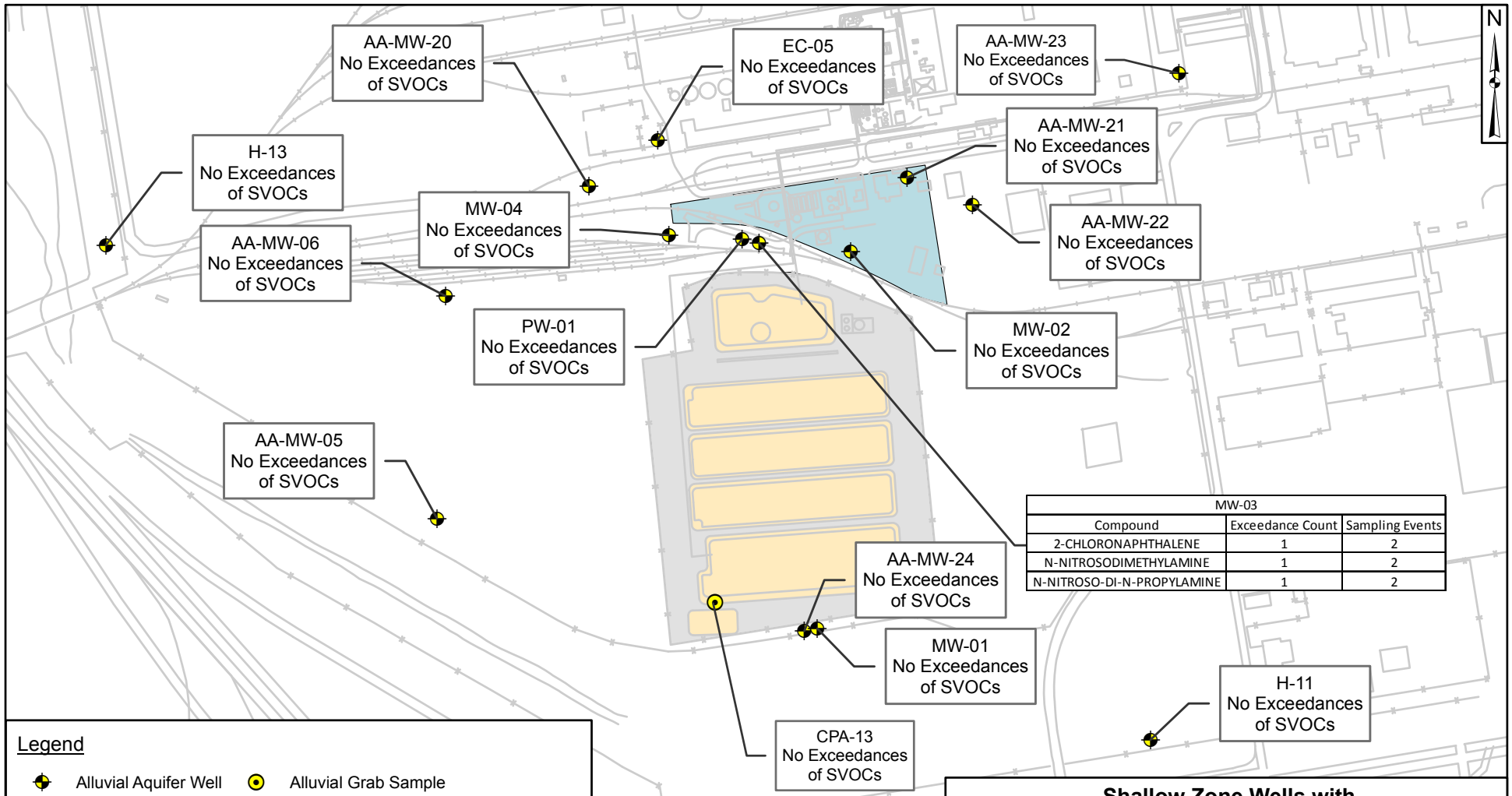
400 200 0 400 800 Feet

Geosyntec consultants

Figure 4-38

Project No: HW0989H | January 2014

G:\GIS\HW0934\Projects\CPA_FTF\FTF_CPA_Alluvial Wells NonIndicatorVOC_MCLs_020211.mxd TVS 1/15/2014



MW-03		
Compound	Exceedance Count	Sampling Events
2-CHLORONAPHTHALENE	1	2
N-NITROSODIMETHYLAMINE	1	2
N-NITROSO-DI-N-PROPYLAMINE	1	2

Legend

Alluvial Aquifer Well Alluvial Grab Sample

SVOC	MCL	BCL
	ug/L	ug/L
2-CHLORONAPHTHALENE		2.08423
N-NITROSODIMETHYLAMINE		0.00132
N-NITROSO-DI-N-PROPYLAMINE		0.0096

Notes:
* MCLs were used as the primary basis of comparison. In the absence of MCLs, NDEP BCLs were used.
BCL Source: Basic Comparison Levels (BCLs) for Residential Water, Nevada Division of Environmental Protection (NDEP), 2013
MCL Source: EPA Region IX Maximum Contaminant Levels (MCLs)
SVOC - Semi-Volatile Organic Compound
ug/L - Micrograms per Liter
Data provided in table 4-12.

Shallow Zone Wells with SVOC MCL Exceedances
Former Montrose Chemical Facility
Henderson, Nevada

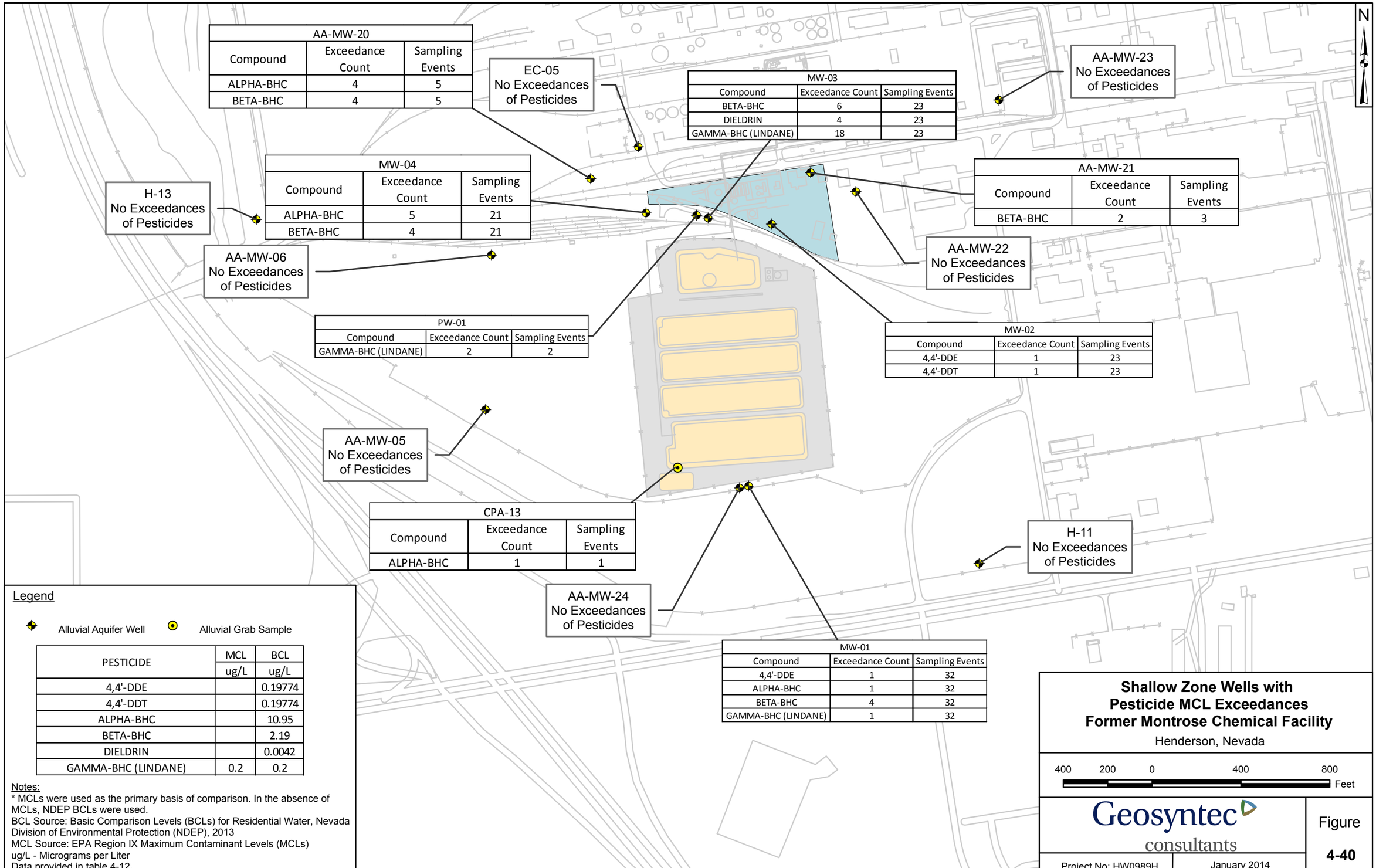
460 230 0 460 920 Feet

Geosyntec consultants

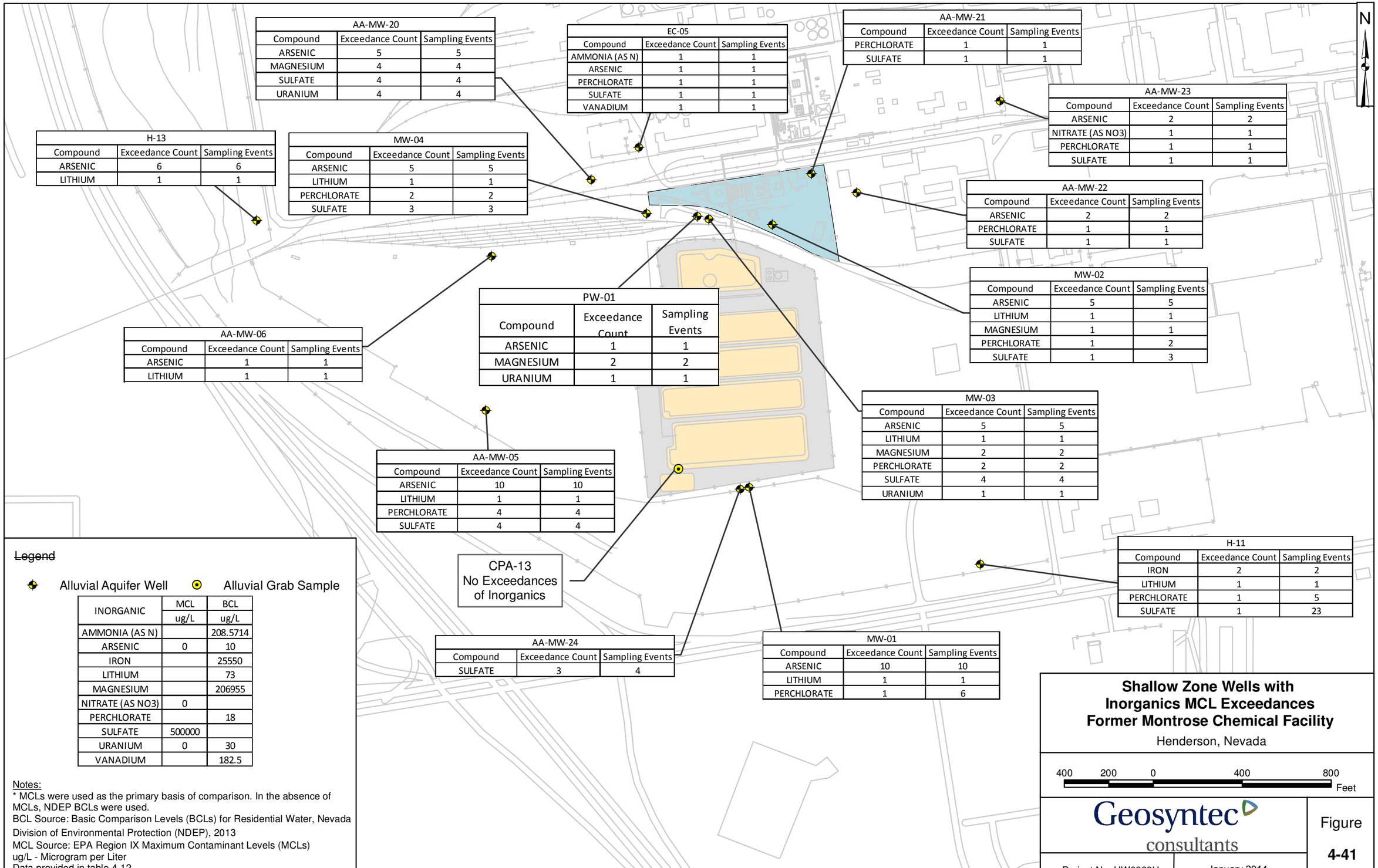
Project No: HW0989H | January 2014

Figure 4-39

G:\GIS\HW0934\Projects\CPA_FTF\FTF_CPA_Alluvial_Wells_SVOC_MCLs_020211.mxd tvs 7/27/2012



Shallow Zone Wells with Pesticide MCL Exceedances
Former Montrose Chemical Facility
Henderson, Nevada



AA-MW-20		
Compound	Exceedance Count	Sampling Events
ARSENIC	5	5
MAGNESIUM	4	4
SULFATE	4	4
URANIUM	4	4

EC-05		
Compound	Exceedance Count	Sampling Events
AMMONIA (AS N)	1	1
ARSENIC	1	1
PERCHLORATE	1	1
SULFATE	1	1
VANADIUM	1	1

AA-MW-21		
Compound	Exceedance Count	Sampling Events
PERCHLORATE	1	1
SULFATE	1	1

AA-MW-23		
Compound	Exceedance Count	Sampling Events
ARSENIC	2	2
NITRATE (AS NO3)	1	1
PERCHLORATE	1	1
SULFATE	1	1

H-13		
Compound	Exceedance Count	Sampling Events
ARSENIC	6	6
LITHIUM	1	1

MW-04		
Compound	Exceedance Count	Sampling Events
ARSENIC	5	5
LITHIUM	1	1
PERCHLORATE	2	2
SULFATE	3	3

AA-MW-22		
Compound	Exceedance Count	Sampling Events
ARSENIC	2	2
PERCHLORATE	1	1
SULFATE	1	1

MW-02		
Compound	Exceedance Count	Sampling Events
ARSENIC	5	5
LITHIUM	1	1
MAGNESIUM	1	1
PERCHLORATE	1	2
SULFATE	1	3

PW-01		
Compound	Exceedance Count	Sampling Events
ARSENIC	1	1
MAGNESIUM	2	2
URANIUM	1	1

AA-MW-06		
Compound	Exceedance Count	Sampling Events
ARSENIC	1	1
LITHIUM	1	1

MW-03		
Compound	Exceedance Count	Sampling Events
ARSENIC	5	5
LITHIUM	1	1
MAGNESIUM	2	2
PERCHLORATE	2	2
SULFATE	4	4
URANIUM	1	1

AA-MW-05		
Compound	Exceedance Count	Sampling Events
ARSENIC	10	10
LITHIUM	1	1
PERCHLORATE	4	4
SULFATE	4	4

H-11		
Compound	Exceedance Count	Sampling Events
IRON	2	2
LITHIUM	1	1
PERCHLORATE	1	5
SULFATE	1	23

AA-MW-24		
Compound	Exceedance Count	Sampling Events
SULFATE	3	4

MW-01		
Compound	Exceedance Count	Sampling Events
ARSENIC	10	10
LITHIUM	1	1
PERCHLORATE	1	6

~~Legend~~

Alluvial Aquifer Well Alluvial Grab Sample

INORGANIC	MCL ug/L	BCL ug/L
AMMONIA (AS N)		208.5714
ARSENIC	0	10
IRON		25550
LITHIUM		73
MAGNESIUM		206955
NITRATE (AS NO3)	0	
PERCHLORATE		18
SULFATE	500000	
URANIUM	0	30
VANADIUM		182.5

Notes:
* MCLs were used as the primary basis of comparison. In the absence of MCLs, NDEP BCLs were used.
BCL Source: Basic Comparison Levels (BCLs) for Residential Water, Nevada Division of Environmental Protection (NDEP), 2013
MCL Source: EPA Region IX Maximum Contaminant Levels (MCLs)
ug/L - Microgram per Liter
Data provided in table 4-12.

Shallow Zone Wells with Inorganics MCL Exceedances
Former Montrose Chemical Facility
Henderson, Nevada

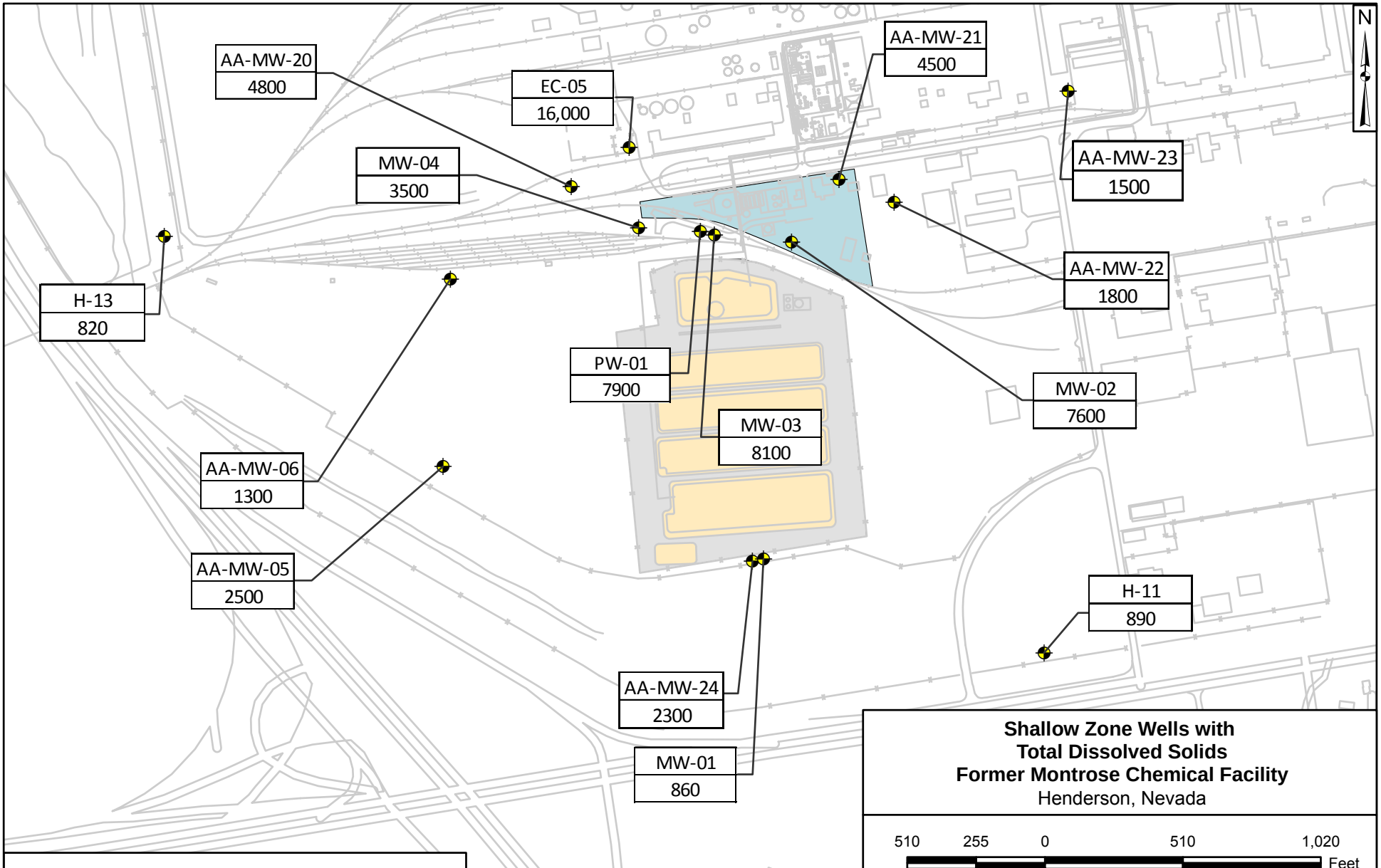
400 200 0 400 800 Feet

Geosyntec consultants

Project No: HW0989H | January 2014

Figure 4-41

G:\GIS\HW0934\Projects\CPA_FFI\FF_CPA_Alluvial_Wells_INORG_MCLs_20120802.mxd 1vs 8/2/2012



Shallow Zone Wells with Total Dissolved Solids
Former Montrose Chemical Facility
Henderson, Nevada

510 255 0 510 1,020 Feet

Legend

Alluvial Aquifer Well

Notes:
Units = milligrams per liter (mg/L)
Total Dissolved Solids results taken from most recent groundwater sampling event in Table 4-12.

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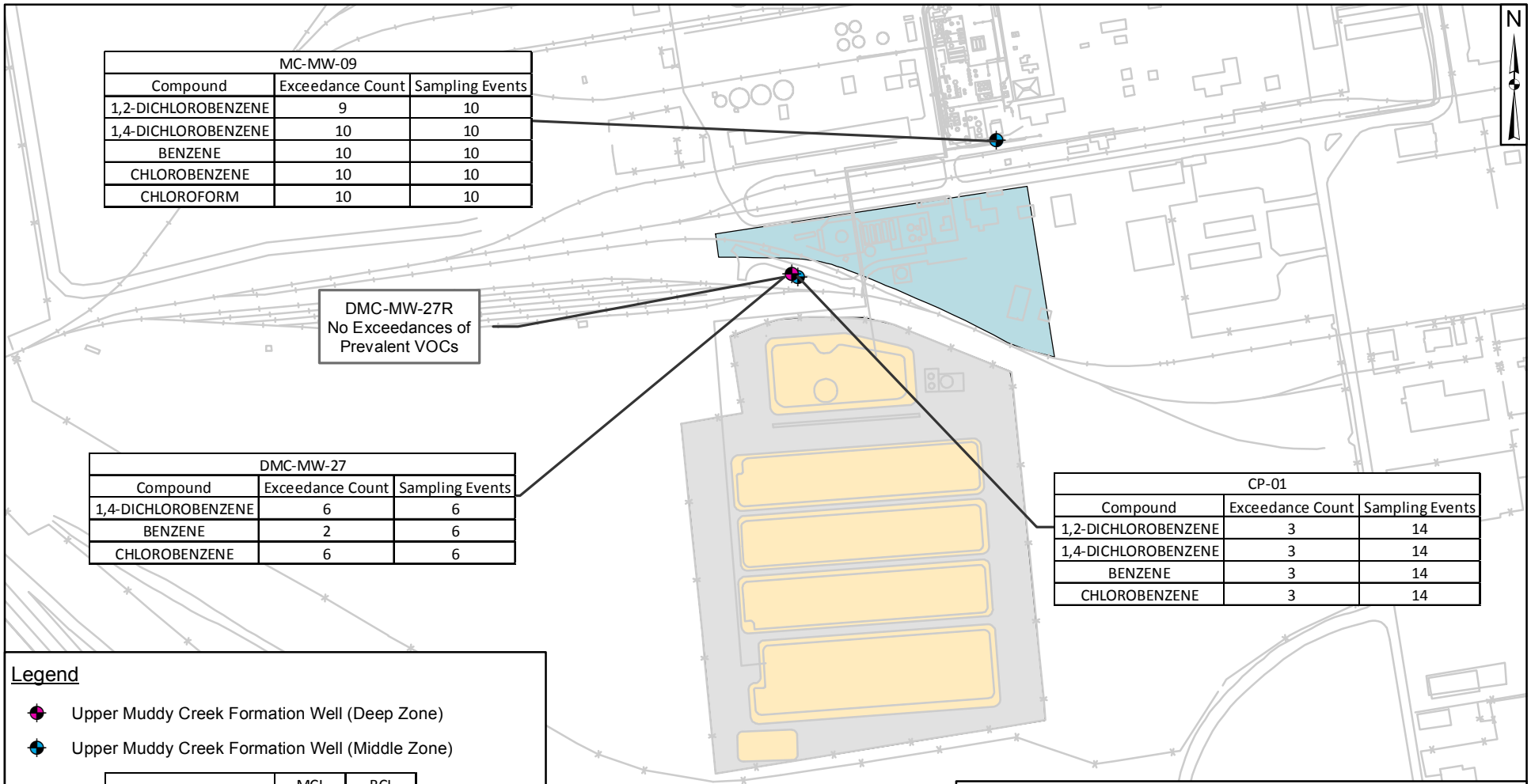
Project No: HW0989H | January 2014

Figure 4-42

G:\GIS\HW0934\Projects\CPA_FTF\FTF_CPA_Alluvial_Wells_TDS_02032011.mxd SN 1/14/2014



MC-MW-09		
Compound	Exceedance Count	Sampling Events
1,2-DICHLOROBENZENE	9	10
1,4-DICHLOROBENZENE	10	10
BENZENE	10	10
CHLOROBENZENE	10	10
CHLOROFORM	10	10

DMC-MW-27		
Compound	Exceedance Count	Sampling Events
1,4-DICHLOROBENZENE	6	6
BENZENE	2	6
CHLOROBENZENE	6	6

CP-01		
Compound	Exceedance Count	Sampling Events
1,2-DICHLOROBENZENE	3	14
1,4-DICHLOROBENZENE	3	14
BENZENE	3	14
CHLOROBENZENE	3	14

Legend

- Upper Muddy Creek Formation Well (Deep Zone)
- Upper Muddy Creek Formation Well (Middle Zone)

Prevalent VOC	MCL (ug/L)	BCL (ug/L)
1,2-DICHLOROBENZENE	600	600
1,4-DICHLOROBENZENE	75	75
BENZENE	5	5
CHLOROBENZENE	100	100
CHLOROFORM	80	0.193

Notes:
* MCLs were used as the primary basis of comparison. In the absence of MCLs, NDEP BCLs were used.
BCL Source: Basic Comparison Levels (BCLs) for Residential Water, Nevada Division of Environmental Protection (NDEP), 2013
MCL Source: EPA Region IX Maximum Contaminant Levels (MCLs)
VOC - Volatile Organic Compound
ug/L - Micrograms per Liter
Data provided in table 4-13.

Middle and Deep Zone Wells with Prevalent VOC MCL Exceedances
Former Montrose Chemical Facility
Henderson, Nevada

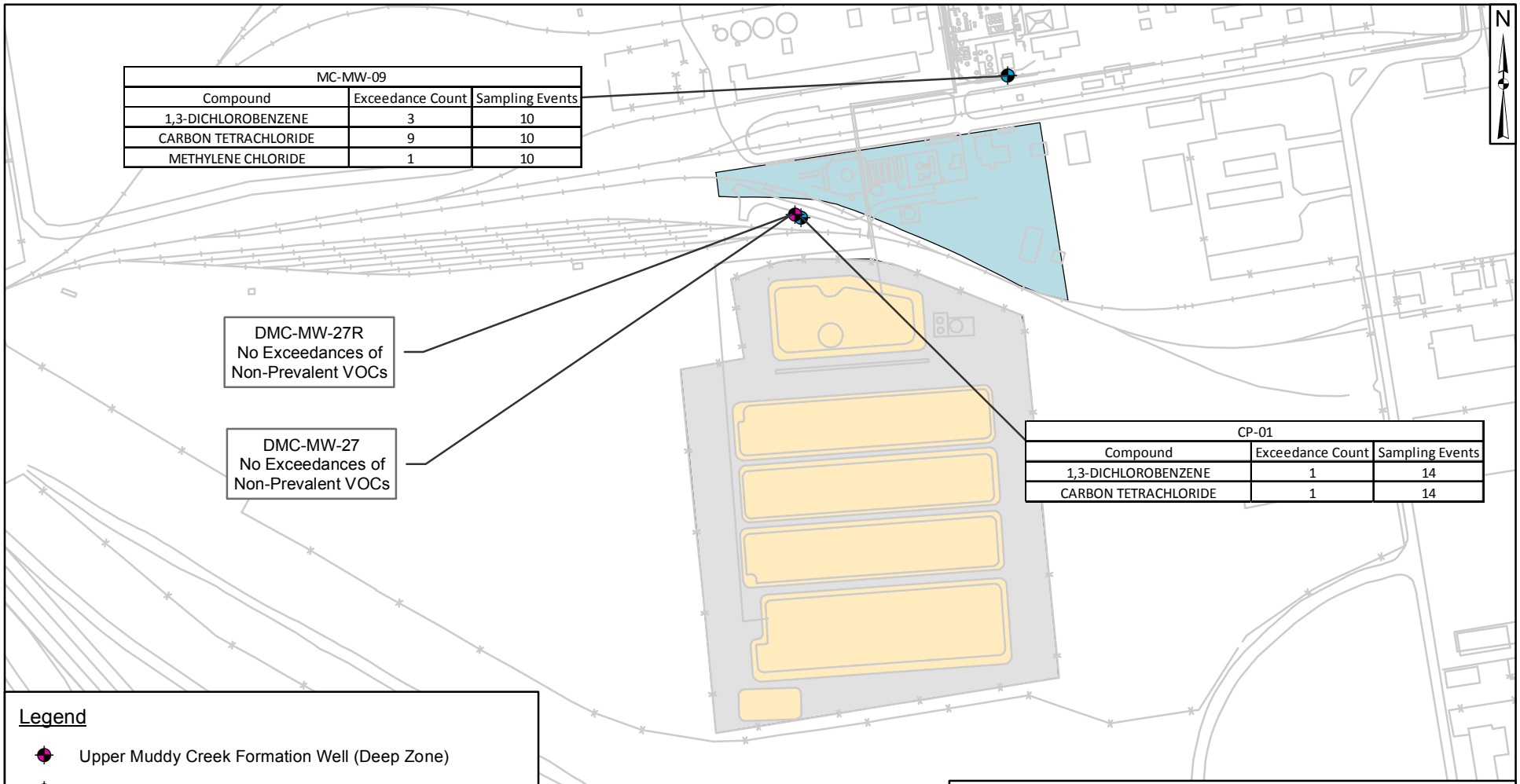
360 180 0 360 720 Feet

Geosyntec consultants

Project No: HW0989H | January 2014

Figure 4-43

G:\GIS\HW0934\Projects\CPA_FTF\FTF_CPA_UMC_Wells_IndicatorVOCsMCLs_022011.mxd SN 052011



MC-MW-09		
Compound	Exceedance Count	Sampling Events
1,3-DICHLOROBENZENE	3	10
CARBON TETRACHLORIDE	9	10
METHYLENE CHLORIDE	1	10

CP-01		
Compound	Exceedance Count	Sampling Events
1,3-DICHLOROBENZENE	1	14
CARBON TETRACHLORIDE	1	14

Legend

- Upper Muddy Creek Formation Well (Deep Zone)
- Upper Muddy Creek Formation Well (Middle Zone)

Non-Prevalent VOC	MCL µg/L	BCL µg/L
1,3-DICHLOROBENZENE		86.73267327
CARBON TETRACHLORIDE	5	5
METHYLENE CHLORIDE	5	5

Notes:
* MCLs were used as the primary basis of comparison. In the absence of MCLs, NDEP BCLs were used.
BCL Source: Basic Comparison Levels (BCLs) for Residential Water, Nevada Division of Environmental Protection (NDEP), 2013
MCL Source: EPA Region IX Maximum Contaminant Levels (MCLs)
VOC - Volatile Organic Compound
ug/L - Microgram per Liter
Data provided in table 4-13.

Middle and Deep Zone Wells with Non-Prevalent VOC MCL Exceedances
Former Montrose Chemical Facility
Henderson, Nevada

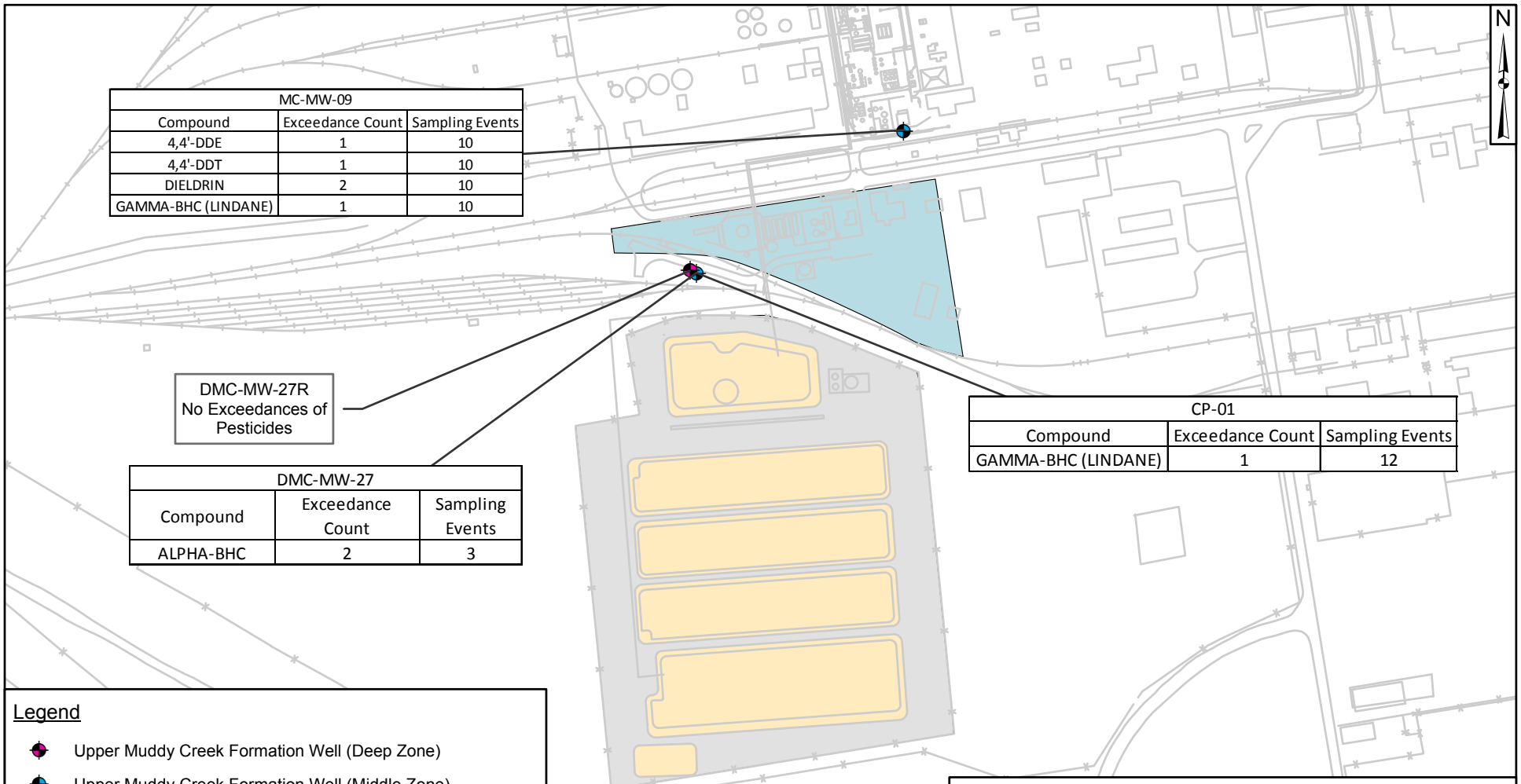
370 185 0 370 740 Feet

Geosyntec consultants

Project No: HW0989H | January 2014

Figure 4-44

G:\GIS\HW0934\Projects\CPA_FTF\FTF_CPA_UMC_Wells_NonIndicatorVOCsMCLs_20140115.mxd SN 1/15/2014



MC-MW-09		
Compound	Exceedance Count	Sampling Events
4,4'-DDE	1	10
4,4'-DDT	1	10
DIELDRIN	2	10
GAMMA-BHC (LINDANE)	1	10

DMC-MW-27		
Compound	Exceedance Count	Sampling Events
ALPHA-BHC	2	3

CP-01		
Compound	Exceedance Count	Sampling Events
GAMMA-BHC (LINDANE)	1	12

Legend

- Upper Muddy Creek Formation Well (Deep Zone)
- Upper Muddy Creek Formation Well (Middle Zone)

PESTICIDE	MCL	BCL
	ug/L	ug/L
ALPHA-BHC		10.95
BETA-BHC		2.19
DIELDRIN		0.004201971
GAMMA-BHC (LINDANE)	0.2	0.2

Notes:
* MCLs were used as the primary basis of comparison. In the absence of MCLs, NDEP BCLs were used.
BCL Source: Basic Comparison Levels (BCLs) for Residential Water, Nevada Division of Environmental Protection (NDEP), 2013
MCL Source: EPA Region IX Maximum Contaminant Levels (MCLs)
ug/L - Microgram per Liter
Data provided in table 4-13.

Middle and Deep Zone Wells with Pesticide MCL Exceedances
Former Montrose Chemical Facility
Henderson, Nevada

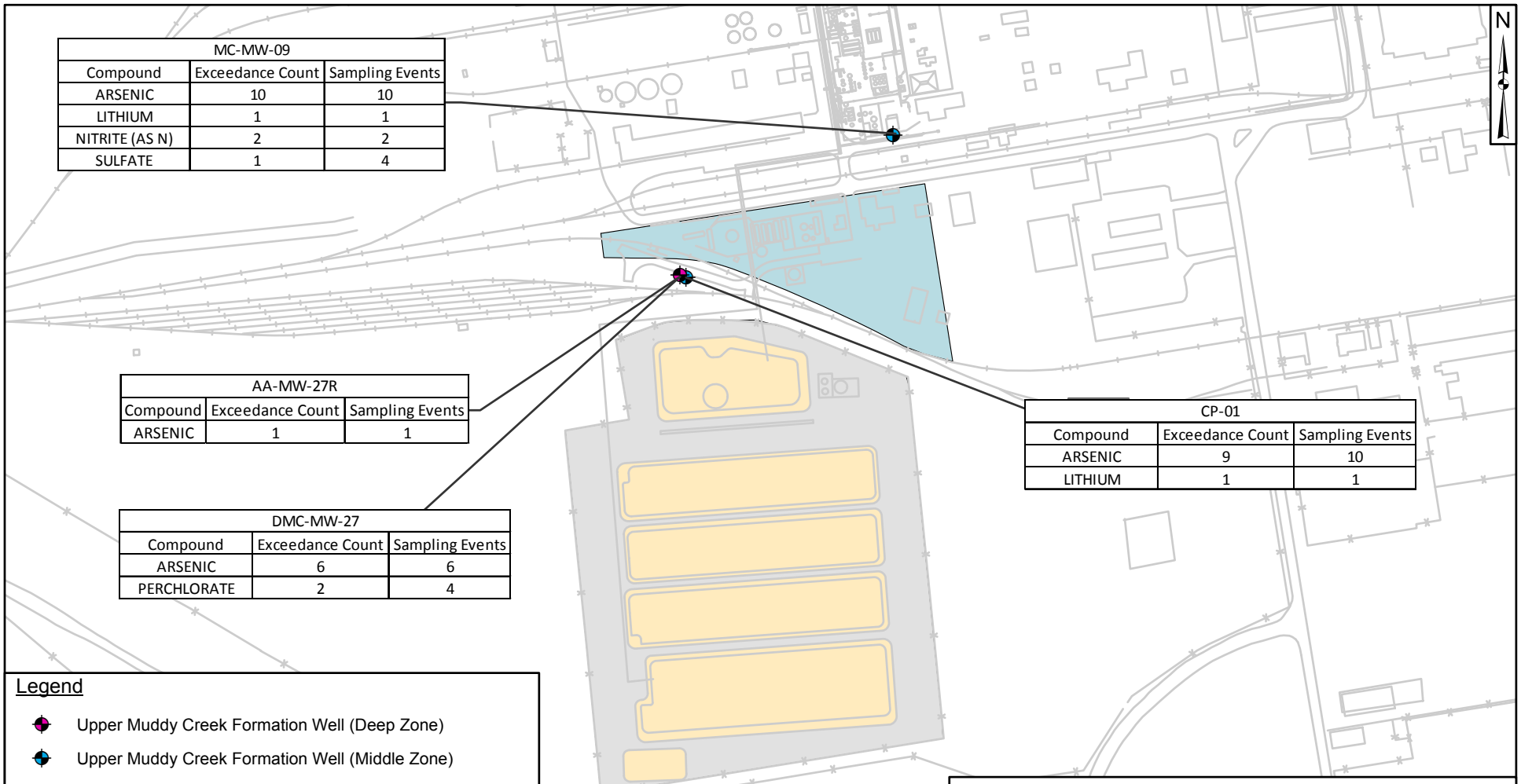
370 185 0 370 740 Feet

Geosyntec consultants

Project No: HW0989H | January 2014

Figure 4-45

G:\GIS\HW0934\Projects\CPA_FTF\FTF_CPA_UMC_Wells_PEST_MCLs_022011.mxd SN 8/2/2012



MC-MW-09		
Compound	Exceedance Count	Sampling Events
ARSENIC	10	10
LITHIUM	1	1
NITRITE (AS N)	2	2
SULFATE	1	4

AA-MW-27R		
Compound	Exceedance Count	Sampling Events
ARSENIC	1	1

DMC-MW-27		
Compound	Exceedance Count	Sampling Events
ARSENIC	6	6
PERCHLORATE	2	4

CP-01		
Compound	Exceedance Count	Sampling Events
ARSENIC	9	10
LITHIUM	1	1

Legend

- Upper Muddy Creek Formation Well (Deep Zone)
- Upper Muddy Creek Formation Well (Middle Zone)

INORGANIC	MCL	BCL
	ug/L	ug/L
ARSENIC	10	10
LITHIUM		73
PERCHLORATE		18

Notes:
* MCLs were used as the primary basis of comparison. In the absence of MCLs, NDEP BCLs were used.
BCL Source: Basic Comparison Levels (BCLs) for Residential Water, Nevada Division of Environmental Protection (NDEP), 2013
MCL Source: EPA Region IX Maximum Contaminant Levels (MCLs)
ug/L - Microgram per Liter
Data provided in table 4-13.

Middle and Deep Zone Wells with Inorganics MCL Exceedances
Former Montrose Chemical Facility
Henderson, Nevada

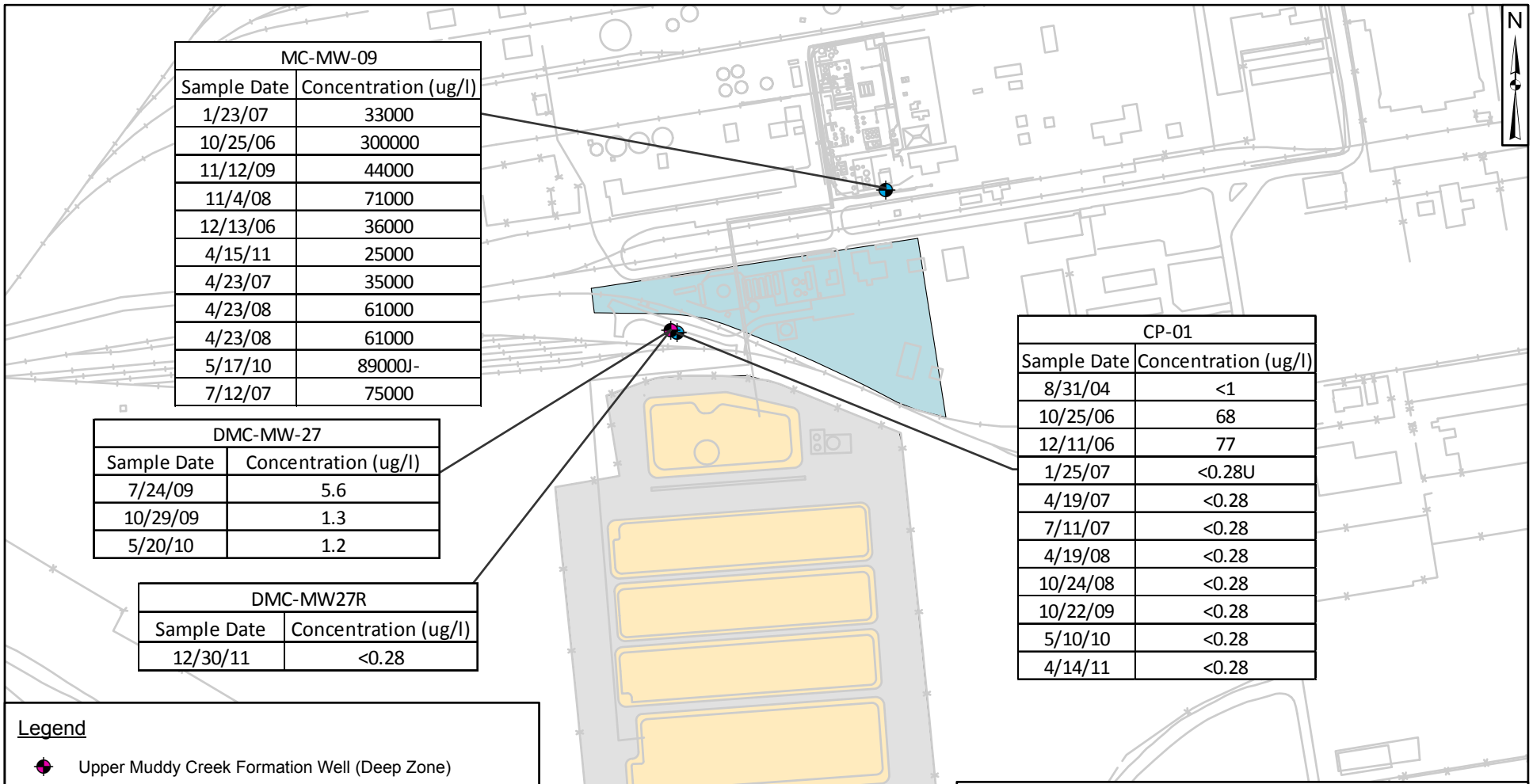
360 180 0 360 720 Feet

Geosyntec consultants

Project No: HW0989H | January 2014

Figure **4-46**

G:\GIS\HW0934\Projects\CPA_FTF\FTF_CPA_UMC_Wells_INORG_MCLs_022011.mxd SN 7/30/2012



MC-MW-09	
Sample Date	Concentration (ug/l)
1/23/07	33000
10/25/06	300000
11/12/09	44000
11/4/08	71000
12/13/06	36000
4/15/11	25000
4/23/07	35000
4/23/08	61000
4/23/08	61000
5/17/10	89000J-
7/12/07	75000

DMC-MW-27	
Sample Date	Concentration (ug/l)
7/24/09	5.6
10/29/09	1.3
5/20/10	1.2

DMC-MW27R	
Sample Date	Concentration (ug/l)
12/30/11	<0.28

CP-01	
Sample Date	Concentration (ug/l)
8/31/04	<1
10/25/06	68
12/11/06	77
1/25/07	<0.28U
4/19/07	<0.28
7/11/07	<0.28
4/19/08	<0.28
10/24/08	<0.28
10/22/09	<0.28
5/10/10	<0.28
4/14/11	<0.28

Legend

- Upper Muddy Creek Formation Well (Deep Zone)
- Upper Muddy Creek Formation Well (Middle Zone)

COMPOUND	MCL
	ug/L
BENZENE	5

Notes:
ug/L - Microgram per Liter
MCL Source: EPA Region IX Maximum Contaminant Levels (MCLs)
Data provided in table 4-13.
Lab Qualifier:
U The sample was analyzed for, but was not detected above the sample quantitation or detection limit or applied due to suspected blank contamination.
J- Estimated value with negative bias

Middle and Deep Zone Wells
Benzene Concentrations
Former Montrose Chemical Facility
Henderson, Nevada

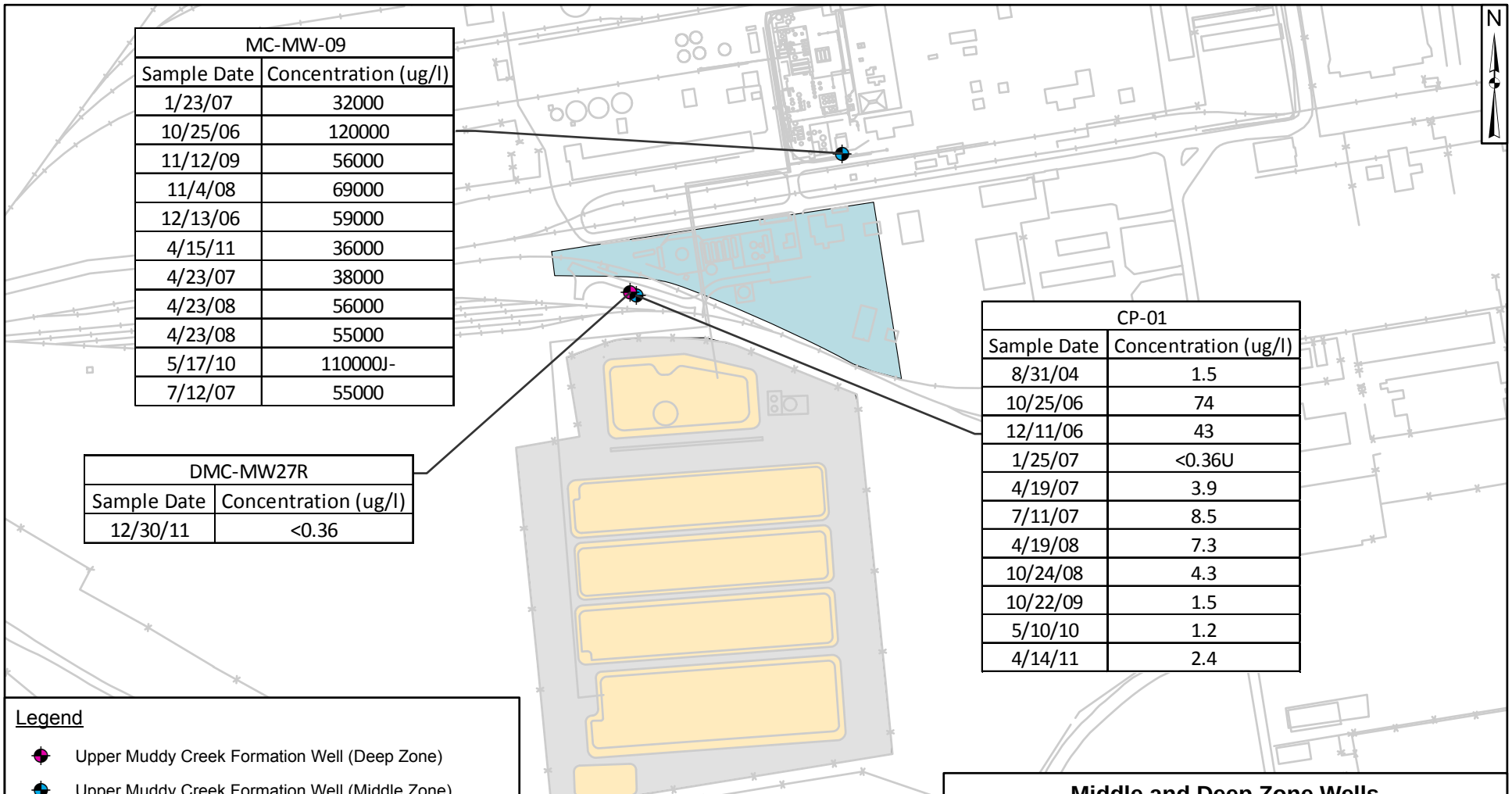
370 185 0 370 740 Feet

Geosyntec consultants

Project No: HW0989H | January 2014

Figure **4-47**

G:\GIS\HW0934\Projects\CPA_FTF\FTF_CPA_UMC_Wells_Benzene_20120726.mxd SN 052011



MC-MW-09	
Sample Date	Concentration (ug/l)
1/23/07	32000
10/25/06	120000
11/12/09	56000
11/4/08	69000
12/13/06	59000
4/15/11	36000
4/23/07	38000
4/23/08	56000
4/23/08	55000
5/17/10	110000J-
7/12/07	55000

DMC-MW27R	
Sample Date	Concentration (ug/l)
12/30/11	<0.36

CP-01	
Sample Date	Concentration (ug/l)
8/31/04	1.5
10/25/06	74
12/11/06	43
1/25/07	<0.36U
4/19/07	3.9
7/11/07	8.5
4/19/08	7.3
10/24/08	4.3
10/22/09	1.5
5/10/10	1.2
4/14/11	2.4

Legend

Upper Muddy Creek Formation Well (Deep Zone)

Upper Muddy Creek Formation Well (Middle Zone)

COMPOUND	MCL
	ug/L
CHLOROBENZENE	100

Notes:
ug/L - Microgram per Liter
MCL Source: EPA Region IX Maximum Contaminant Levels (MCLs)
Data provided in table 4-13.
Lab Qualifier:
U The sample was analyzed for, but was not detected above the sample quantitation or detection limit or applied due to suspected blank contamination.
J- Estimated value with negative bias

Middle and Deep Zone Wells
Chlorobenzene Concentrations
Former Montrose Chemical Facility
Henderson, Nevada

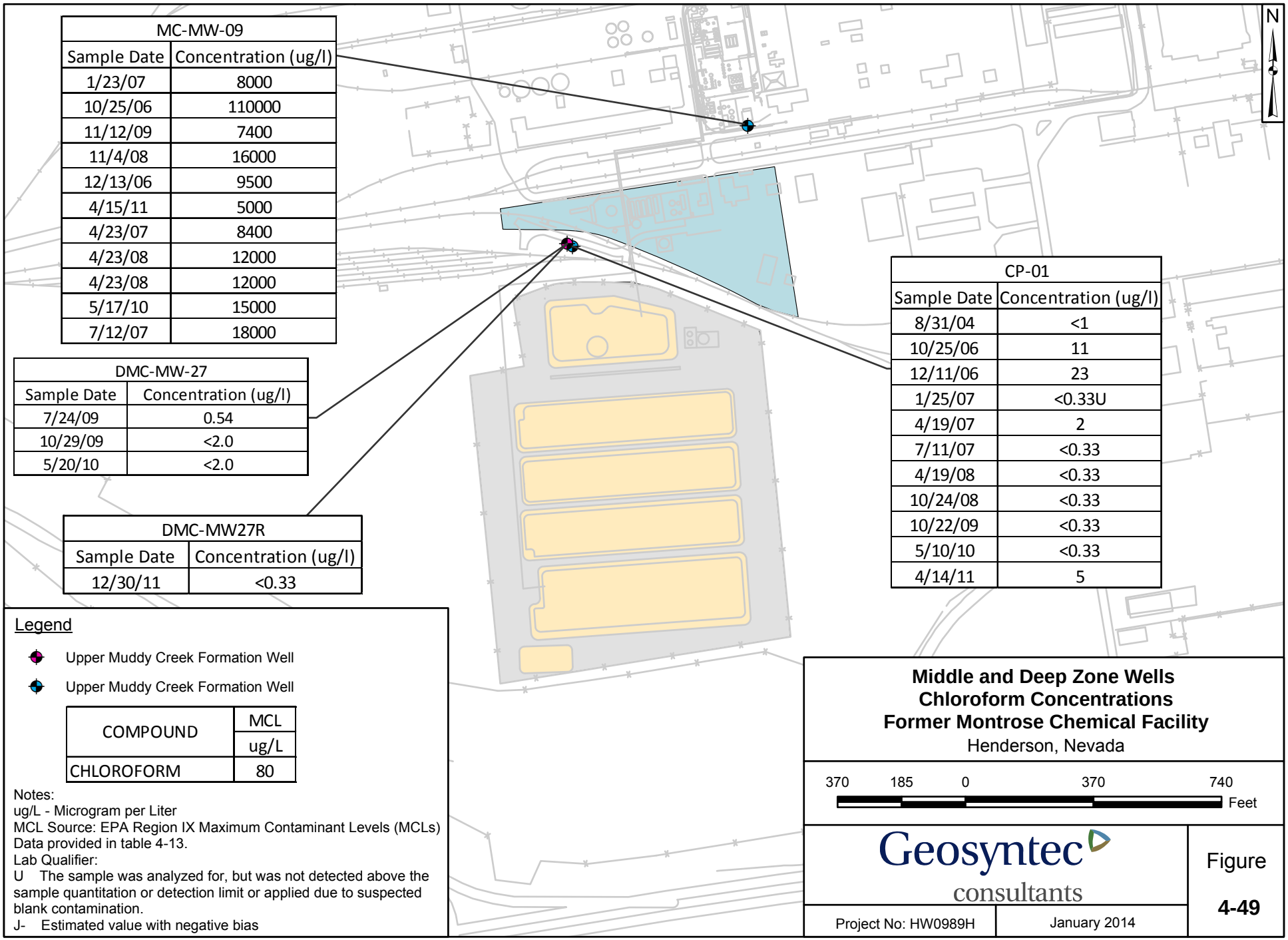
370 185 0 370 740 Feet

Geosyntec consultants

Project No: HW0989H | January 2014

Figure **4-48**

G:\GIS\HW0934\Projects\CPA_FTF\FTF_CPA_UMC_Wells_Chlorobenzene_20120726.mxd c.c 7/31/2012



MC-MW-09	
Sample Date	Concentration (ug/l)
1/23/07	8000
10/25/06	110000
11/12/09	7400
11/4/08	16000
12/13/06	9500
4/15/11	5000
4/23/07	8400
4/23/08	12000
4/23/08	12000
5/17/10	15000
7/12/07	18000

DMC-MW-27	
Sample Date	Concentration (ug/l)
7/24/09	0.54
10/29/09	<2.0
5/20/10	<2.0

DMC-MW27R	
Sample Date	Concentration (ug/l)
12/30/11	<0.33

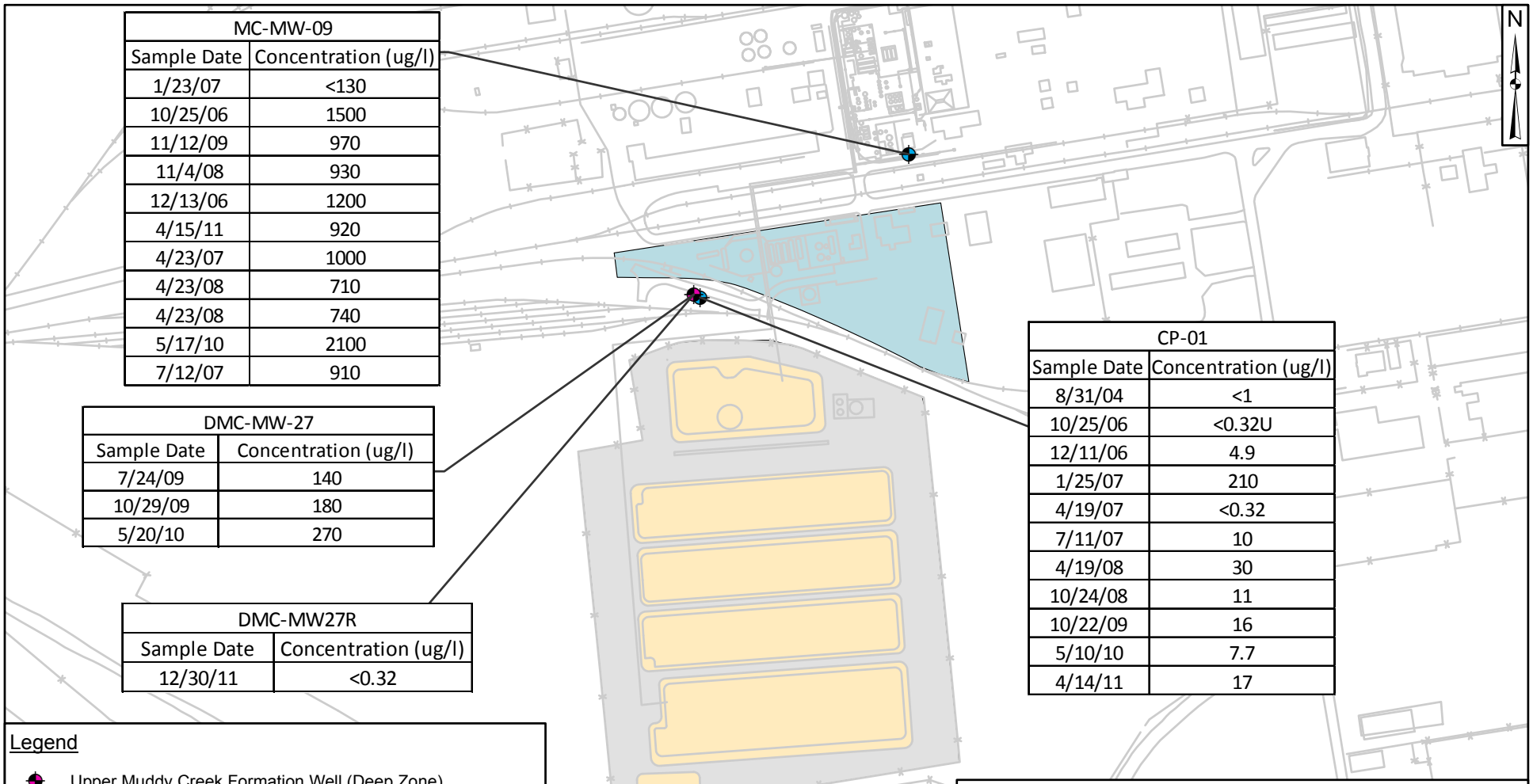
CP-01	
Sample Date	Concentration (ug/l)
8/31/04	<1
10/25/06	11
12/11/06	23
1/25/07	<0.33U
4/19/07	2
7/11/07	<0.33
4/19/08	<0.33
10/24/08	<0.33
10/22/09	<0.33
5/10/10	<0.33
4/14/11	5

COMPOUND	MCL
	ug/L
CHLOROFORM	80

Notes:
ug/L - Microgram per Liter
MCL Source: EPA Region IX Maximum Contaminant Levels (MCLs)
Data provided in table 4-13.
Lab Qualifier:
U The sample was analyzed for, but was not detected above the sample quantitation or detection limit or applied due to suspected blank contamination.
J- Estimated value with negative bias

Middle and Deep Zone Wells
Chloroform Concentrations
Former Montrose Chemical Facility
Henderson, Nevada

G:\GIS\HW0934\Projects\CPA_FTF\FTF_CPA_UMC_Wells_Chloroform_20120726.mxd cc 7/31/2012



MC-MW-09	
Sample Date	Concentration (ug/l)
1/23/07	<130
10/25/06	1500
11/12/09	970
11/4/08	930
12/13/06	1200
4/15/11	920
4/23/07	1000
4/23/08	710
4/23/08	740
5/17/10	2100
7/12/07	910

DMC-MW-27	
Sample Date	Concentration (ug/l)
7/24/09	140
10/29/09	180
5/20/10	270

DMC-MW27R	
Sample Date	Concentration (ug/l)
12/30/11	<0.32

CP-01	
Sample Date	Concentration (ug/l)
8/31/04	<1
10/25/06	<0.32U
12/11/06	4.9
1/25/07	210
4/19/07	<0.32
7/11/07	10
4/19/08	30
10/24/08	11
10/22/09	16
5/10/10	7.7
4/14/11	17

Legend

- Upper Muddy Creek Formation Well (Deep Zone)
- Upper Muddy Creek Formation Well (Middle Zone)

COMPOUND	MCL
	ug/L
1,2-DICHLOROBENZENE	600

Notes:
ug/L - Microgram per Liter
MCL Source: EPA Region IX Maximum Contaminant Levels (MCLs)
Data provided in table 4-13.
Lab Qualifier:
U The sample was analyzed for, but was not detected above the sample quantitation or detection limit or applied due to suspected blank contamination.
J- Estimated value with negative bias

Middle and Deep Zone Wells
1,2-Dichlorobenzene Concentrations
Former Montrose Chemical Facility
Henderson, Nevada

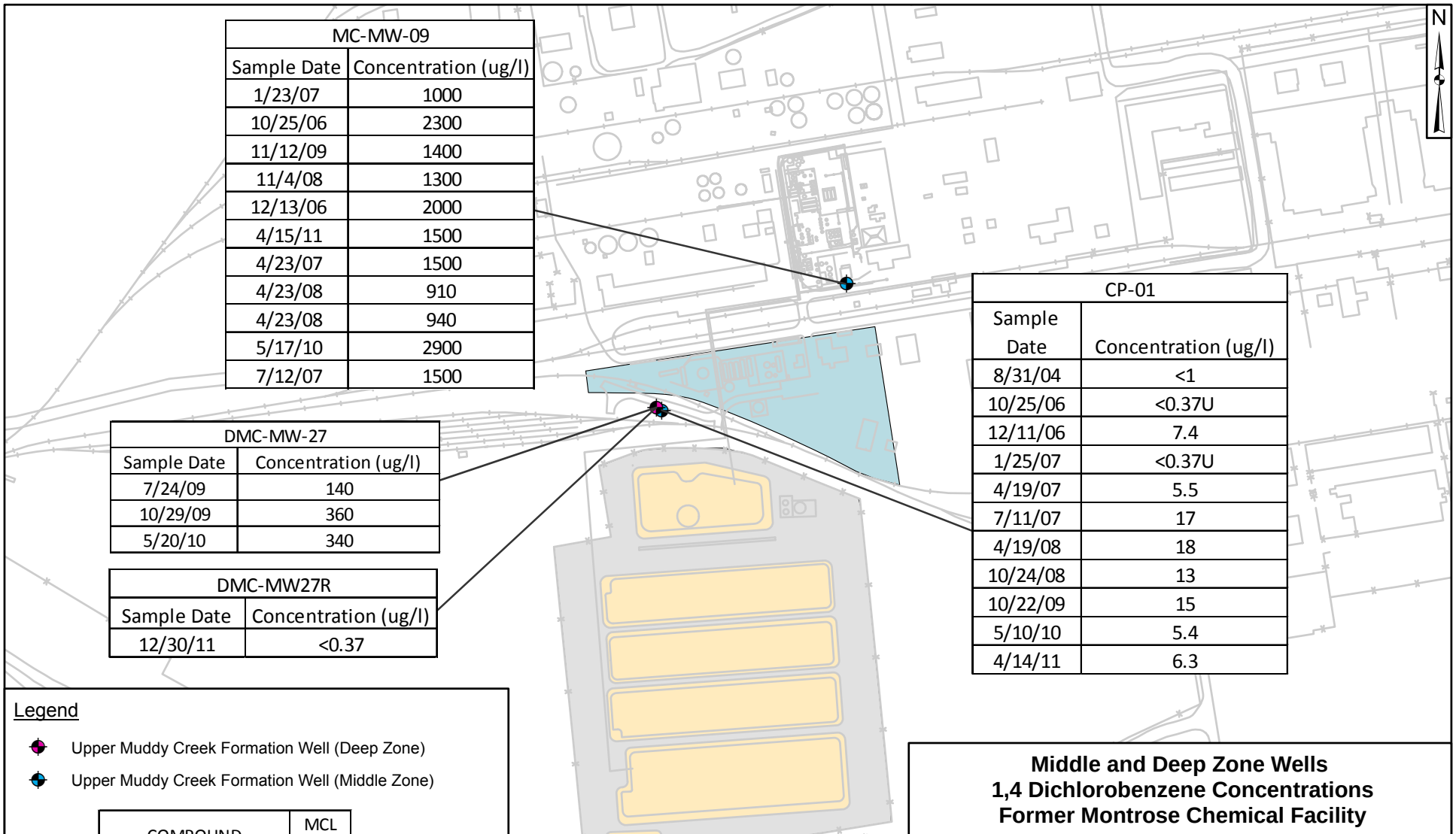
360 180 0 360 720 Feet

Geosyntec consultants

Project No: HW0989H | January 2014

Figure **4-50**

G:\GIS\HW0934\Projects\CPA_FTF\FTF_CPA_UMC_Wells_1_2_DCB_20120726.mxd cc 7/31/2012



MC-MW-09	
Sample Date	Concentration (ug/l)
1/23/07	1000
10/25/06	2300
11/12/09	1400
11/4/08	1300
12/13/06	2000
4/15/11	1500
4/23/07	1500
4/23/08	910
4/23/08	940
5/17/10	2900
7/12/07	1500

DMC-MW-27	
Sample Date	Concentration (ug/l)
7/24/09	140
10/29/09	360
5/20/10	340

DMC-MW27R	
Sample Date	Concentration (ug/l)
12/30/11	<0.37

CP-01	
Sample Date	Concentration (ug/l)
8/31/04	<1
10/25/06	<0.37U
12/11/06	7.4
1/25/07	<0.37U
4/19/07	5.5
7/11/07	17
4/19/08	18
10/24/08	13
10/22/09	15
5/10/10	5.4
4/14/11	6.3

Legend

- Upper Muddy Creek Formation Well (Deep Zone)
- Upper Muddy Creek Formation Well (Middle Zone)

COMPOUND	MCL
	ug/L
1,4-DICHLOROBENZENE	75

Notes:
ug/L - Microgram per Liter
MCL Source: EPA Region IX Maximum Contaminant Levels (MCLs)
Data provided in table 4-13.
Lab Qualifier:
U The sample was analyzed for, but was not detected above the sample quantitation or detection limit or applied due to suspected blank contamination.
J- Estimated value with negative bias

Middle and Deep Zone Wells
1,4 Dichlorobenzene Concentrations
Former Montrose Chemical Facility
Henderson, Nevada

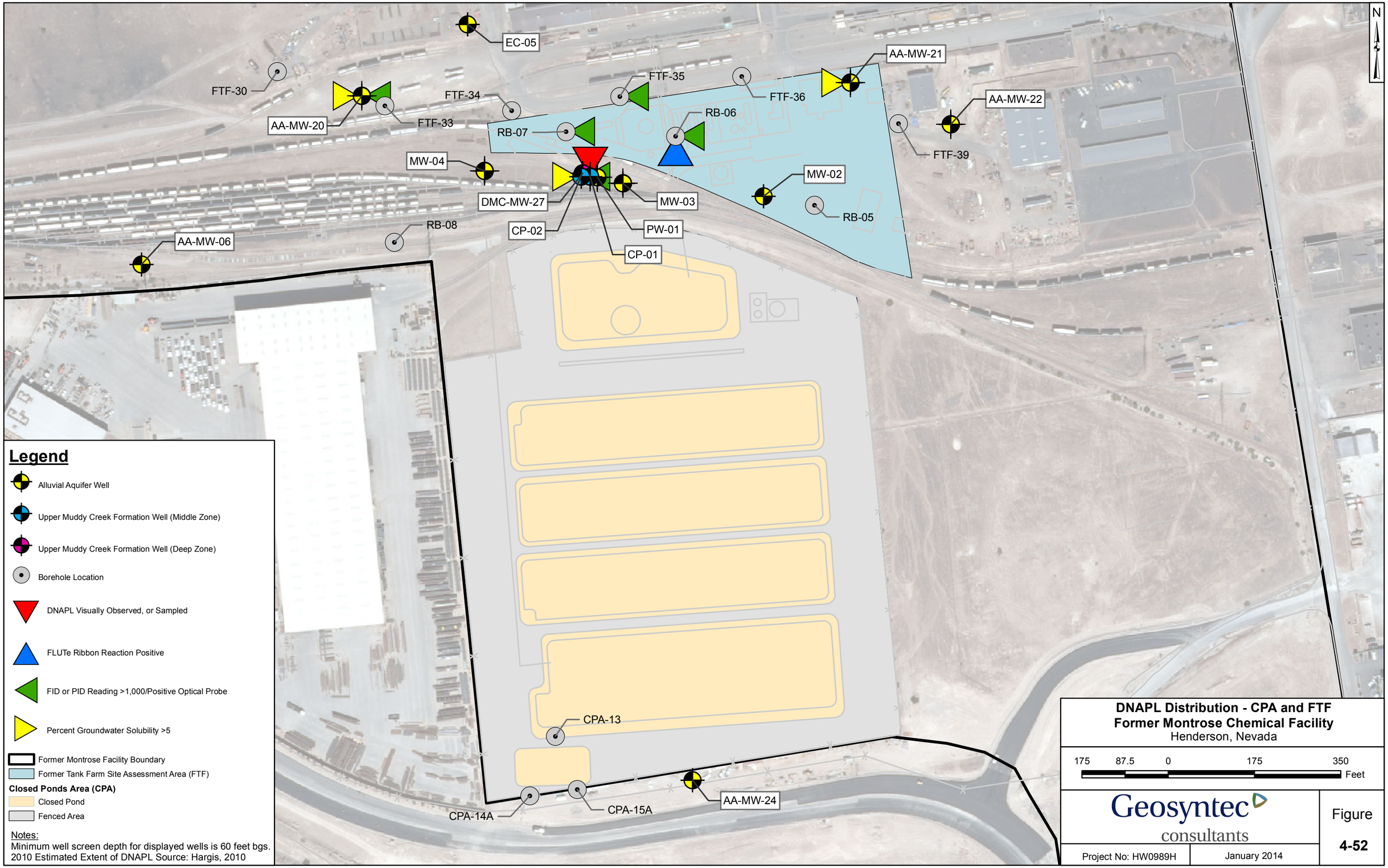
370 185 0 370 740 Feet

Geosyntec consultants

Project No: HW0989H | January 2014

Figure **4-51**

G:\GIS\HW0934\Projects\CPA_FTF\FTF_CPA_UMC_Wells_1_4_DCB_20120726.mxd SN 052011



DNAPL Distribution - CPA and FTF
Former Montrose Chemical Facility
Henderson, Nevada

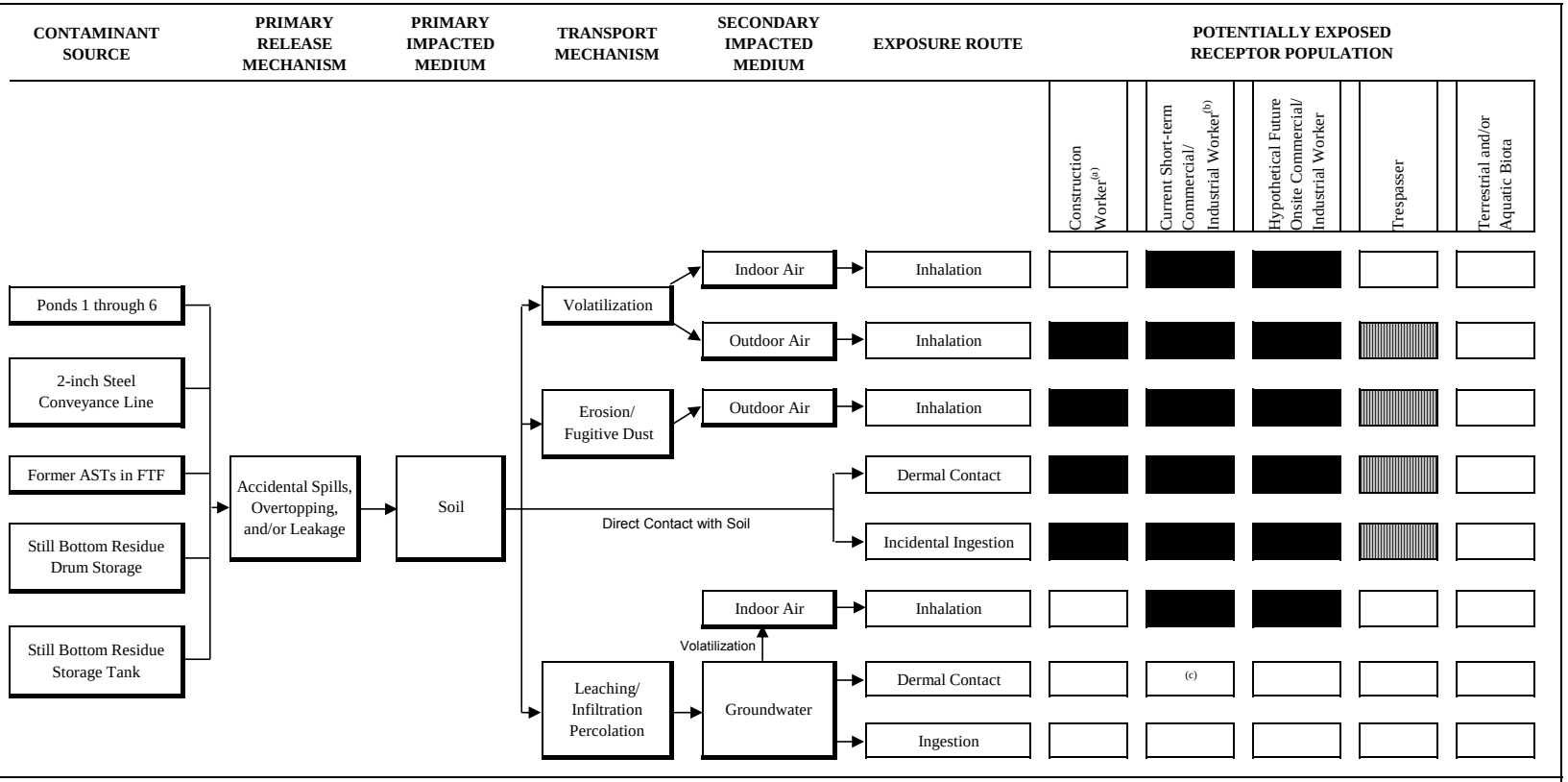
Geosyntec consultants

Project No: HW0989H

January 2014

Figure **4-52**

G:\GIS\HW0934\Projects\DNAPL\FTF_CPA_DNAPL_DISTRIBUTION_20120731.mxd JDS 1/17/2014



NOTES:

Complete exposure pathway, which will be quantitatively evaluated in the risk assessment.

Potentially complete exposure pathway, which will be qualitatively evaluated in the risk assessment. CPA is fenced and FTF access is controlled by security.

Incomplete exposure pathway; no evaluation necessary.

(a) Evaluating this scenario would be protective of other receptors with much lower exposure potential (i.e. trespassers).

(b) Outdoor workers who infrequently traverse the FTF to access adjacent areas or who infrequently access storage at the CPA

(c) The Site-specific Health and Safety Plan will address procedures to minimize potential dermal contact during groundwater sampling.

** Surface water and sediment pathways not considered complete pathways due to the presence of an engineered cap.

CONCEPTUAL SITE MODEL
Former Tank Farm and Closed Ponds Area
Former Montrose Chemical Facility
Henderson, Nevada

Geosyntec consultants

Figure **5-1**

January 2014

TABLES

APPENDIX A

OPERATIONAL AND DECOMMISSIONING HISTORY

APPENDIX A

OPERATIONAL AND DECOMMISSIONING HISTORY

PONDS 1, 3, AND 4 (RCRA CLOSED PONDS) AND WASTE LINE

A-1.0 Introduction

As stated in Section 2.0, the ponds at the CPA were decommissioned and the tanks removed from the FTF in the 1980s. A detailed description of the ponds' construction, operation, and decommissioning is presented in the *Draft Phase II Environmental Conditions Investigation (ECI) Report, Former Montrose Facility, Henderson, Nevada* [SECOR, 1997]. A brief summary of the decommissioning of the CPA and FTF areas and associated features is presented in this Appendix, with information taken from the Phase II ECI Report prepared by SECOR [SECOR, 1997] unless specified otherwise.

References to Sections, Figures and Appendices within this Appendix refer to those included in the main text of this report.

A-2.0 PONDS 1, 3, AND 4 (RCRA CLOSED PONDS) AND WASTE LINE

A-2.1 Operational History

During active operations, wastes contained in Ponds 1, 3, and 4 were classified as Resource Conservations and Recovery Act (RCRA) hazardous on the basis of corrosivity (Converse, 1993). Ponds 1, 3, and 4 (Figure 2-1) mainly received DCB wash water, waste acid streams, sulfuric acid, and chloride wastes [Converse, 1993]. The more mobile inorganic constituents associated with these wastes are sulfate from sulfuric acid, chloride from chloride wastes, and phosphorous trichloride. Based on the presence of these compounds in the waste stream directed to the ponds, the probable organic constituents in these three ponds included: 1,2-DCB, 1,3-DCB, 1,4-DCB, chlorobenzene, and chloroform [Converse, 1993].

These ponds were operated from 1976 through June 1983, each received similar wastes via a two-inch waste line ("Associated 2–inch-diameter Waste Line"). The ponds were constructed with a double liner system (10 one-thousandths of an inch [mil] polyvinyl chloride [PVC] over 10 mil polyethylene) and a leachate detection layer consisting of 2 to 4 inches of sand connected to a gravel-filled ditch and standpipe [Converse, 1993].

Releases from former Ponds 1, 3, and 4 occurred as a result of being overfilled above their freeboard levels during the early years of operation or lining damage [Converse, 1993].

A-2.2 Decommissioning History

The decommissioning of Ponds 1, 3, and 4 began in October 1983 and was completed in December 1989. The decommissioning process began by evaporating the liquid contents of the ponds to near dryness followed by thoroughly mixing the residual sludge with crushed limestone to neutralize residual acid. This activity was completed in January 1984 and used an estimated 33,250 cubic yards (yd^3) of limestone fill. The ponds were then filled with native fill in compacted lifts in the partially filled impoundments to restore them to original grade. The decommissioning of these ponds was completed with the placement of an engineered cap, installed concurrently with the engineered cap constructed for Ponds 2 and 5.

SECOR reports that at the same time the cap was being installed over Ponds 2 and 5 in 1989, an additional cap was placed atop Ponds 1, 3, and 4. This additional cap for Ponds 1, 3, and 4 is reported to be limited to a compacted, graded sand cap. In addition, cap construction drawings for Ponds 2 and 5 included with the Phase II ECI report show a PVC membrane only extending across Ponds 2 and 5. The *Phase I ECA for Former Montrose Chemical Corporation Facility, Henderson, Nevada* prepared by Converse Consultants describes that an engineered cap, including a PVC membrane, was constructed atop Ponds 1, 3, and 4 [Converse, 1993]. This cap is reported to include: a 12-inch layer of compacted clay overlain, in turn, by a 20-mil PVC membrane overlain, in turn, by a 9-inch layer of sand and 12-inches of native fill [Converse, 1993].

During active operations, wastes contained in Ponds 1, 3, and 4 were classified as RCRA hazardous on the basis of corrosivity. Neutralization of the acid in these ponds during decommissioning eliminated the requirement for a RCRA Post-Closure Permit and in May 1987, the NDEP issued a determination that the ponds were adequately neutralized and did not require "further closure as RCRA impoundments" [NDEP, 1987].

A-3.0 PONDS 2 AND 5 (RCRA CLOSED PONDS)

A-3.1 Operational History

Ponds 2 and 5 (Figure 2-1) were used for HCl and sulfuric acid wastes, acidic chlorinated benzene wastes, and wastes from the chlorobenzene processes [Converse, 1993]. The more mobile constituents associated with these wastes are chloride from HCl, polychlorinated benzene acid wash, "chloride-bearing wastes," and the hydrochloric acid process wastes. Potential organic constituents from these ponds included chlorinated benzenes [Converse, 1993].

Pond 2 was constructed in December 1975 and Pond 5 was constructed in March 1979. Available construction information indicates the following:

- Pond 2 – constructed with a double liner system (10 mil PVC over 10 mil polyethylene) and a leachate detection layer consisting of 2 to 4 inches of sand connected to a gravel-filled ditch and observation wells [Converse, 1993].

- Pond 5 – constructed with a double liner system (15 mil PVC over 20 mil PVC) and a leachate collection system consisting of 6 to 12 inches of sand connected to a gravel-filled collection trench and 12-inch PVC leachate collection pipes [Converse, 1993].

During active operations, wastes contained in these ponds were classified as RCRA hazardous on the basis of corrosivity and toxicity [Converse, 1993].

One minor release at the DCB Storage Tank T-57, located within the boundary of Pond 5, was documented in 1981 prior to operations ceasing and subsequent decommissioning of the CPA. This release consisted of a small spill of approximately 20 gallons adjacent to the 26,000 gallon storage tank. Other releases from former Ponds 2 3, and 5 occurred as a result of being overfilled above their freeboard levels during the early years of operation or damage to the pond lining [Converse, 1993].

A-3.2 Decommissioning History

During active operations, wastes contained in these ponds were classified as RCRA hazardous on the basis of corrosivity and toxicity. Accordingly, both ponds were decommissioned in 1989 pursuant to RCRA regulations, in accordance with 40 Code of Federal Regulations (CFR) 264 Subpart N, as if they were hazardous waste landfills. Decommissioning of Ponds 2 and 5 was performed in accordance with a NDEP-approved "Closure and Post-Closure Plan," submitted on May 20, 1987 (direct reference not available, Plan referenced in Converse, 1992).

SECOR reports that the initial steps taken in the NDEP-approved decommissioning process for Ponds 2 and 5 mirrored those performed for Ponds 1, 3, and 4, whereby the liquid contents of the ponds were evaporated to near dryness, the residual sludge was mixed with crushed limestone, and native fill was then placed and compacted in lifts in the impoundments to restore them to original grade. The Phase I Environmental Conditions Assessment (ECA) report prepared by Converse Consultants indicates that the ponds were evaporated to dryness followed by filling of the ponds with dry soil to original grade [Converse, 1993]. Both reports identify (albeit with minor differences in layer thicknesses) that an engineered cap was installed to cover Ponds 2 and 5 consisting of a 20-mil PVC membrane overlain, in turn, by a sand filter, geotextile

fabric, and compacted native fill. A diagram depicting the cap cover design is provided in Figure 3-5.

A-4.0 POND 6

A-4.1 Operational History

Pond 6 was used to store still-bottom residue (SBR) from the chlorinated benzene distillation process [Converse, 1993]. Pond 6 was operated from August 1976 through March 1980, in the area to the south of the FTF (Figure 2-1). The pond was constructed with a single 10 mil polyethylene liner (Converse, 1993). SBR is a tar-like substance containing a wide range of chlorinated benzenes including chlorobenzene, DCB, trichlorobenzene, and PCBs. The more mobile organic constituents of SBR are the DCB and chlorobenzene [Converse, 1993].

A-4.2 Decommissioning History

Pond 6 was operated from August 1976 through March 1980. The decommissioning of this pond was completed in October 1981, under NDEP oversight. NDEP approved the Montrose plan for decommissioning Pond 6 in an order dated April 14, 1981 [NDEP, 1981]. The NDEP-approved decommissioning process began by the removal of the liquid waste from the pond, followed by the excavation and offsite disposal of the pond solids (SBR), liner, and underlying soils [Converse, 1993]. An estimated 9,800 cubic feet (ft^3) of soil beneath the pond was excavated and transported off site for disposal, based on the NDEP-acknowledged cleanup criterion of 50 milligram per kilogram (mg/kg) of polychlorinated biphenyls (PCBs) "as required by 40 CFR Part 761" [Converse, 1993]. The impoundment was then filled with soil, a clay layer, and capped with an additional soil layer.

A-5.0 FORMER TANK FARM

A-5.1 Operational History

The Former Tank Farm (FTF) is located to the north of the CPA and was primarily used for the storage of raw materials used by Montrose in manufacturing organic chemicals [Converse, 1993]. There are no precise construction dates available for the FTF, but it is postulated that it existed from the onset of Montrose operations.

The FTF consisted of two railcar loading stations for benzene and acetaldehyde and 17 individual aboveground storage tanks (ASTs) used to store raw materials (Figure 2-2). The tanks ranged in size from 5,200 to 150,000 gallons and contained a variety of materials including HCl, benzene, chlorobenzene, DCB, and acetaldehyde. USTs were not used in this area [Hargis, 2008a].

ASTs containing flammable materials were diked and a chemical audit conducted in 1982 indicated that small leaks from the ASTs would be directed to the Montrose ponds through the FPS process sewers [Converse, 1993]. Larger spills would be directed to the "Stauffer Chemical evaporation pond" (pond number not specified) through the stormwater sewer [Converse, 1993]. The loading areas for the ASTs were reportedly not diked, and drainage was directed to the Montrose process and the Stauffer stormwater sewers [Converse, 1993].

Two minor spills of HCl occurred during its operational history. The releases reportedly occurred in February 1975 and July 3, 1980 and both resulted from the failure of the lining in the respective tanks [Converse, 1993].

A-5.2 Decommissioning History

It is reported that the tanks and associated loading equipment were removed from the FTF between 1983 and 1984 during the decommissioning of the FPS (Hargis, 2008a). To confirm the timeframe for the removal of the tanks, Converse conducted a review of aerial photographs, which indicated that all of the tanks were removed from the FTF sometime between 1984 and 1986 [Converse, 1993]. As of 1997, the concrete pad was still present [SECOR, 1997]; however, it has since been removed and the FTF currently exists as undeveloped land.

A-6.0 SBR STORAGE TANK AREA

A-6.1 Operational History

Subsequent to the decommissioning of Pond 6 in 1981, SBR was stored in three aboveground steel tanks located east of Pond 5 (Figure 2-1). The tanks ranged in capacity from 26,000 to 95,000 gallons and were located in a concrete containment area. The only documented release within this area occurred in 1981 and resulted in the release of approximately 20 gallons of SBR adjacent to the 26,000 gallon tank.

A-6.2 Decommissioning History

This area was demolished in 1983 through 1984 following termination of facility operations. The tank contents and liquids used for decontamination were transported off site for incineration [Hargis, 2008a].

In 2001, Pioneer reported an unknown substance located on the ground surface approximately 300 feet east-northeast of the tank area. Due to the physical appearance of the material and the potential of it being SBR, a limited soil investigation was conducted by SECOR. As part of the investigation, samples of the material, and a

sample of the underlying material were submitted for laboratory analysis. Comparison of analytical results of the unknown material and Montrose's SBR analytical records indicate that the material is not consistent with SBR [SECOR, 2001]. NDEP disagreed with this finding; however, and in September 2002 Pioneer excavated and transferred 48 yd^3 of the material and surrounding soil to an offsite landfill for disposal.

A-7.0 SBR DRUM STORAGE AREA

A-7.1 Operational History

The SBR drum storage area was located approximately 250 feet north-northeast of the SBR storage tank area (Figure 2-1). Subsequent to the decommissioning of former Pond 6, SBR and other PCB containing materials were contained in sealed drums within the drum storage area from 1981 to 1983. There are no documented releases within the SBR Drum Storage Area.

A-7.2 Decommissioning History

Decommissioning of the area was completed in July 1994 and included decontamination using kerosene-based wet and dry methods and offsite disposal of all tanks, drums, and concrete [Hargis, 2008a].

A-8.0 GRANULAR ACTIVATED CARBON

A-8.1 Operational History

As part of the active Montrose soil vapor extraction (SVE) system operating within the FPS north of the CPA, granular activated carbon (GAC) is used for the adsorption of VOCs from the extracted soil vapors. The GAC requires periodic replacement, and as a result, several thousand pounds of "spent" GAC are produced annually. The spent GAC is transported and temporarily stored within trailers in the CPA (Figure 2-1). On October 22, 2008, NDEP conducted a RCRA inspection of the storage area as part of a general inspection of SVE operations to assess compliance with handling and transport of hazardous wastes. No deficiencies were identified with the handling and storage of spent carbon wastes at the CPA. There are no documented releases of spent GAC as a result of the transport and storage the material to the designated area within the CPA.

A-8.2 Decommissioning History

GAC from the SVE system is still stored on a temporary basis within the CPA until being transported to an office disposal facility.

APPENDIX B

SITE PHOTOGRAPHS, FORMER MONTROSE CLOSED PONDS AREA – APRIL 24, 2009

Photo 1: View of the CPA looking west

Photo2: View of the CPA looking northwest

Photo3: View of the CPA looking northwest

Photo 4: View of the CPA looking north

Photo5: View of the CPA looking northwest

Photo6: View of the CPA looking northeast

APPENDIX C

SITE INVESTIGATION SUMMARY

APPENDIX C

SITE INVESTIGATION SUMMARY

C-1. SITE INVESTIGATION SUMMARY

C-1.1 Introduction

The following summary of investigations provides a brief historical background to the progression of activities that have led to the current understanding of the environmental conditions at the CPA and FTF. Details of these investigations are provided in the documents listed below and are summarized briefly in the sections that follow.

- *Summary Report on Soil Sampling and Analytical Reports for Closure on Ponds No. 2 and 5* [Converse, 1988].
- *The Bi-annual Compliance Well Groundwater Sampling Program – 1989 through Present* [Hargis, 2010].
- *Phase I ECA* [Converse, 1993].
- *Phase II ECI Programs:*
  - *Phase II ECI [SECOR, 1997];*
  - *Additional Groundwater Investigation [SECOR, 2000];*
  - *Deep Water-bearing Zone Investigation [SECOR, 2001];*
  - *Supplemental Soil Investigation, reported in [Hargis, 2008a];*
  - *Soil Vapor and Soils Investigation, reported in [Hargis, 2008a];*
  - *Dense Non-Aqueous Phase Liquid (DNAPL) Investigation, reported in [Hargis, 2008a]; and*
- *Downgradient CPA and FTF Groundwater Investigation, reported in [Hargis, 2008a].*
- *Closed Pond 6, Soil and Groundwater Investigation [Geosyntec, 2010b].*
- *Former Tank Farm Site Assessment Area, Soil Vapor, Soil, and Surface Soil Investigation [Geosyntec, 2010c].*

C-1.2 Soil Sampling and Analytical Reports for Closure on Ponds No. 2 and 5 (1988)

An investigation of surface soil (0 – 0.5 feet below ground surface [ft bgs]) conducted in 1988 consisted of sampling and collection of six soil samples collected from around Pond 5; 16 soil samples collected from around Ponds 1 through 4 (SA-1 through SA-16); three soil samples from the former PCB storage tank site near Pond 5 (SD-1,

SD-2, and SD-3); six soil samples collected from around Ponds 2 (SC-1 through SC-6); and, ten soil samples collected from around Pond 5 (SB-1 through SB-10) [Converse, 1988]. Soil sample locations are provided on Figure C-1.

Soil samples collected during this investigation were analyzed for pH, phenols, VOCs, semi-volatile organic compounds (SVOCs), organochlorine pesticides, PCBs, cyanide, and select metals. While the data from this investigation cannot be validated due to the lack of documentation, the results are summarized in Table C-1 as they provided the basis for later investigations. The scope of subsequent soil investigations has geographically encompassed the previous locations, and data from those investigations are discussed in later sections of this CSM.

C-1.3 Bi-Annual Post-Closure Well Sampling Program (1989 to Present)

This RCRA Post-Closure monitoring program at the CPA consists of periodic sampling and analysis of groundwater samples from four monitor wells surrounding the CPA (MW-1, MW-2, MW-3, and MW-4) to meet the requirements of the Post-Closure monitoring plan (Figure 2-4). This program has been conducted since May 1989 in accordance with the *Amended Closure / Post Closure Plan, Henderson Facility Ponds #2 & #5, dated September 28, 1987* [Montrose, 1987]. Since its inception, 44 groundwater sampling events have been conducted. Initially, these sampling events were conducted on a quarterly basis (May 1989 to April 1992), then semi-annually since October 1992. Currently, the monitor wells are sampled for VOCs, dichlorobenzil, pesticides, pH, and specific electrical conductance. Boring logs are provided in **Appendix D**. The results of the groundwater monitoring program are summarized in Table 4-12 and Section 4.5.

The most prevalent compounds identified by monitoring the downgradient wells have been chloroform, chlorobenzene, 1,2-DCB, 1,4-DCB, and benzene. Results of the monitoring program indicate that the CPA is the source of VOCs in groundwater immediately downgradient of the Site Assessment Areas. Over the time period covered by the post-closure monitoring program, the prevalent VOC concentrations have shown variable trends. Benzene concentrations have decreased in all three downgradient monitor wells (MW-2, MW-3, and MW-4). Concentrations of 1,2-DCB, 1,4-DCB, and chlorobenzene have decreased in wells MW-2 and MW-4, but have remained erratic in well MW-3. Significant increases in chloroform concentrations have been observed in well MW-2 that coincides with significant decreases in chloroform concentrations in well MW-4. More recently chloroform concentrations have increased in well MW-3.

C-1.4 Phase I ECA (1993)

Montrose completed a Phase I ECA for the Montrose Facility in 1993 [Converse, 1993]. The Phase I ECA discussed Montrose's former operations at the CPA-FTF and provided an extensive review of documents describing the manufacture, storage, and disposal of chemicals throughout the CPA-FTF. Known and potential releases in the vicinity of the CPA -FTF were discussed in the ECA, and are summarized in **Appendix A** of this report.

The Phase I ECA concluded that no further action was needed for the CPA (Ponds 1 through 6), as they had been adequately capped and had post-closure monitor wells installed immediately upgradient and downgradient of the capped CPA pursuant to RCRA closure procedures. Furthermore, the ponds themselves were not considered to represent an ongoing source of DNAPL or liquids as they were dried, decommissioned and no longer existed. The FTF was also concluded to not require any further action at the time because there were no spills reported other than those described in **Appendix A** of this report, nor was visual indication of contamination noted during inspection of the CPA.

C-1.5 Phase II Environmental Conditions Investigation (1997)

Based on NDEP's review of the previously submitted Converse ECA report, 24 study areas were recommended for further review and investigation, as stated in a *Phase II Letter of Understanding (LOU) between NDEP and Montrose* dated August 15, 1994 [NDEP, 1994]. The objective of the Phase II ECI was to provide a preliminary evaluation of potential contamination at these study areas.

The Phase II ECI for the CPA and FTF was completed during late 1996 and 1997 [SECOR, 1997]. Sampling activities were not conducted within the actual pond areas because the existing cap extended beyond the footprint of the closed ponds and there was a desire not to compromise the integrity of the cap. Instead, three shallow borings (PSS-1 through -3) were installed to a depth of 10 ft bgs along the waste lines that fed the ponds while they were in operation. During this same investigation, six shallow borings (FTF-1 through FTF-6) were installed to a maximum depth of 10 ft bgs in the vicinity of the FTF. Soil sample locations are provided on Figure C-1. Boring logs for these sampling efforts are included in **Appendix D**. Soil samples collected during this investigation were analyzed for VOCs by EPA Method 8260, SVOCs by EPA Method 8270, inorganics by EPA Method 300.0, and pH by EPA Method 9045. The analytical results for soil from this investigation are summarized in Table 4-4 and are discussed in Section 4.

The Phase II ECI Report [SECOR, 1997] concluded that concentrations of the target compounds were found below the NDEP's Action levels.

C-1.6 Additional Groundwater Investigation (2000)

A groundwater investigation was conducted downgradient of the Montrose CPA and FTF between October 1999 and January 2000 [SECOR, 2000]. The objective of this investigation program was to evaluate the nature and extent of contaminated groundwater downgradient from the CPA and FTF. The investigation consisted of the installation of eight exploratory borings (SB-1 through SB-8) in an east-west transect along the downgradient, northern edge of the CPA (see Figure C-2). These eight borings were drilled to 70 ft bgs and sampled every 5 feet with continuous coring between 50 and 60 ft bgs. Soil samples obtained from drilling were not submitted for laboratory chemical analysis. Instead, sample headspace readings were recorded and are provided on the boring logs included in **Appendix D**. Two soil samples were analyzed for soil physical parameters; one from the water-bearing zone (between 50 and 60 ft bgs) and another collected at 70 ft bgs. These physical property results are summarized in Table C-2.

Laboratory analysis of the groundwater grab samples obtained from the eight exploratory boreholes showed that the most significant concentrations of compounds are bounded by SB-8 to the west and SB-2 to the east. Decreased groundwater concentrations of target compounds were found toward the west in the groundwater grab sample from SB-8, and results were non-detectable further west in Well H-13. Similarly, to the east, concentrations were non-detectable, except for chloroform in groundwater grab samples from SB-2 and SB-3.

Headspace readings are shown to be the highest immediately downgradient of the CPA in borehole SB-1 at the groundwater interface. Headspace readings for boreholes SB-2 and SB-3, located east of SB-1 and northeast of the ponds, did not show any positive readings at the groundwater interface. A decrease in headspace readings was observed further west of the CPA from boreholes SB-4 through SB-8, with no observable readings in SB-8.

C-1.7 Deep Water-Bearing Zone Investigation (2001-2002)

The objective of this program was to investigate the presence and nature of the next significant water-bearing zone below the alluvial aquifer. The work was conducted in the vicinity of the CPA and FTF between September 2000 and January 2001 at the request of the NDEP to determine whether chemical contaminants in the alluvial aquifer may have migrated deeper [SECOR, 2001]. A series of subsurface soil samples and a groundwater grab sample were obtained from a single boring (CP-01) drilled to a depth

of 130 ft bgs and located approximately 70 feet downgradient of the CPA (Figure C-2). The boring log for CP-01 is provided in **Appendix D**.

A summary of soil analytical results from this boring is provided in Table 4-9. This boring was converted to a Deep Zone groundwater monitor well with a total depth of 125 feet and 10 feet of screen from 115 to 125 ft bgs in the Upper Muddy Creek Formation (UMCf). The well has been sampled (13 times) since September 2000 for VOCs, SVOCs, PCBs, pesticides, metals, total dissolved solids (TDS), silica, and other organics. These groundwater results are summarized in Table 4-13 and discussed in Section 4.5 of this report.

In 2002, a step-drawdown test was conducted to evaluate the sustainable hydraulic yield of the Middle Zone (UMCf) [SECOR, 2002]. The findings of this investigation are summarized below.

- Thin intermittent water-bearing zones were observed between 70 and 124 ft bgs, with a deep water-bearing zone observed between 119 and 124 ft bgs.
- A chemically impacted soil layer measuring 0.9 ft in thickness was observed in the saturated zone at 99 ft bgs during drilling. Subsequently, this material has been identified as a multi-component organic chemical DNAPL [SECOR, 2001].
- While not an appropriate method for determining hydraulic conductivity (K), SECOR estimated K to be 12 feet per day (ft/day) using the step-drawdown data. Subsequent formal pumping test conducted by Hargis in 2008 resulted in a K value of 0.05 ft/day, which is more indicative of the sediments underlying the CPA-FTF.

C-1.8 Supplemental Investigations (2006 - 2013)

Supplemental investigations were performed in the vicinity of the CPA and FTF in 2006 through 2008 with the objective of expanding previous investigation knowledge to cover the range of Montrose Site-Related Chemicals (SRCs). The program included evaluation of soils, soil vapor, and groundwater, as well as a special evaluation of DNAPL occurrence. These investigations are summarized in the Site-wide CSM [Hargis, 2008a] and included the following:

- **Soils**: Soil was sampled at 12 locations within the perimeter of the CPA (CPA-1 through CPA-12) and 14 locations within the FTF (FTF-7 though FTF-20), and one location outside the FTF (FTF-21) as shown on Figure C-1. Fifteen of these were deep borings of approximately 50 feet and eleven were shallow (10 feet or less). Soil samples were analyzed for VOCs, SVOCs,

PCBs, pesticides, and SRC metals. Boring logs are provided in **Appendix D**. Analytical results for soil are summarized in Table 4-5 and discussed in Section 4.3.

In general, analytical results show presence of compounds including VOCs, SVOCs, aldehydes, PCBs, and various inorganics. However, chloroform was the most prevalent compound present with the highest concentrations found in the deeper samples (50 ft bgs).

- **Soil Vapor Investigation:** A soil vapor investigation was conducted in the immediate vicinity of the CPA and throughout the then undeveloped land to the west of the CPA in April and May of 2006 [Hargis, 2008a]. Soil vapor was sampled (more than 90 total samples) from several depths (sample IDs P-1 through P-27 as shown on Figure C-3). The soil vapor points were advanced to approximately 50 ft bgs and sampled approximately every 5 to 10 feet for VOCs. Analytical results for soil vapor are summarized in Table 4-11 and discussed in Section 4.4.

  Of the more than 90 samples analyzed, chloroform was the predominant compound detected. Only one detection of benzene was observed, while detections of chlorobenzene, 1,2-DCB, or 1,4-DCB were not observed. While chloroform was observed in soil vapor throughout the area of the CPA, concentrations decreased significantly within approximately 100 feet of the CPA boundary to the west, east, and south (Figure C-3).

- **DNAPL Investigation:** Four DNAPL reconnaissance borings (RBs) were drilled to nominally 150 ft bgs downgradient of the CPA in late 2006 [Hargis, 2008a]. These boring locations are referred to as RB-05 through RB-08 and were located along the northern perimeter of the CPA. Figure C-4 shows the locations of borings in which soils were screened for the potential presence of DNAPL, including borings RB-5 through RB-8. At these locations screening for DNAPL materials included using photoionization detector (PID)/flame ionization detector (FID) measurements, Flexible Liner Underground Technologies (FLUTe™) ribbon applications, soil sampling for the analysis indicated on Table 4-6, and visual observation. Boring logs are provided in **Appendix D**. Analytical results for soil from these four borings are summarized in Table 4-6 and discussed in Section 4.

  Evidence of DNAPL, including elevated PID/FID readings and reaction to FLUTe™ ribbon, was noted in RB-06 at approximately 101 ft bgs. No evidence of DNAPL was noted in the remaining borings advanced as part of this investigation (RB-05, RB-07, and RB-08). The analytical results show chloroform was the most prevalent compound with the highest concentrations

observed at the saturated zone between 60 to 70 ft bgs. Soil samples analyzed from RB-06 and RB-07, immediately downgradient of the CPA, had the highest detectable concentrations of chloroform and other volatile compounds. The westernmost boring, RB-08, had the lowest detectable concentrations of volatile compounds.

- **CPA and FTF Downgradient Groundwater and DNAPL Investigation:** The objective of this investigation was to expand groundwater characterization to the east and northeast of the ponds area primarily to evaluate the extent of chloroform migration in that direction. Additionally, borings were installed to further evaluate the possible presence of DNAPL northeast of the CPA. Five DNAPL reconnaissance borings were drilled to nominally 150 ft bgs downgradient of the CPA in July 2008 [Hargis, 2008a]. These borings were subsequently converted to groundwater monitor wells referred to as AA-MW-20 through AA-MW-24 (Figure C-4). Investigation at these locations included screening for DNAPL materials using a PID, FLUTe™ ribbon applications, soil and visual observation. Boring logs are provided in **Appendix D**. Groundwater analytical results are summarized in Table 4-12 and discussed in Section 4 of this report.

  Evidence of DNAPL was not found in any of these investigation boreholes. In general, elevated VOC concentrations in groundwater were observed immediately downgradient of the CPA with concentrations diminishing significantly in monitor wells situated further downgradient towards the north and northeast (Figure C-4).

- **Additional DNAPL Investigation:** DNAPL reconnaissance boring CP-02 was advanced to a total depth of 115 ft bgs and completed as a groundwater monitor well with a screened interval from 92 to 102 ft bgs. During advancement of the CP-02 boring, lithology was screened for the presence of VOCs using a FID, and the interval from 83 to 115 ft bgs was screened with FLUTe™ for the presence of DNAPL. No DNAPL was visually observed in the lithologic core recovered from CP-02, and there were no reactions observed on the FLUTE™ ribbon. Subsequent groundwater sampling of well CP-02 detected concentrations of benzene at 0.4% and 0.6% solubility and chloroform at 0.02% and 0.03% solubility. In addition to benzene and chloroform, 1,4-DCB and 1,2-DCB were detected at concentrations ranging from 4% to 5% solubility and 2% to 3% solubility, respectively (AECOM, 2013). A complete summary of the installation and sampling of CP-02 is included in the DNAPL Investigation Summary Report prepared by AECOM and submitted to NDEP on December 31, 2013.

C-1.9 Soil Investigation (2009)

The purpose of this investigation was to address data gaps within the FTF identified by NDEP (2009e) during review of the FTF CSM [Hargis, 2009]. Based on NDEP comments, four soil borings (FTF-22D through FTF-25D) were advanced in the vicinity of previous borings to help determine the extent of VOCs in the FTF (Figure C-1). An additional two borings (FTF-26D and FTF-27D) as shown on Figure C-1 were advanced in the vicinity of former Tanks P-13, 11,14, 15, 15A, and 21 to satisfy NDEP request for additional sampling in the area downgradient or within the footprint of the former tanks. Analytical results for soil samples collected during this investigation are summarized in Table 4-7 and discussed in Section 4 of this report.

C-1.10 Closed Pond 6 Soil and Groundwater Investigation (2010)

The purpose of the 2010 investigation was to assess the potential presence, nature, and distribution of specific classes of chemical compounds, evaluate the potential presence of DNAPL, and obtain physical soil property data in the vicinity of Pond 6. The overall objective of this investigation was to assess whether the former Closed Pond 6 area remains a source of contaminant loading to groundwater.

One vertical boring (CPA-13) was advanced to a total vertical depth of approximately 120 ft bgs and two angled borings (CPA-14A and CPA-15A) were advanced to total vertical depths of approximately 50 ft bgs, at the locations shown on Figure C-1 (Geosyntec, 2010b). Continuous soil cores were collected from each of the three borings and field-screened for the presence of DNAPL using FLUTe™ ribbon and a PID. Boring logs are provided in **Appendix D**. Soil samples were collected at 10-ft intervals from the three borings for chemical and physical properties testing. Soil samples were analyzed for VOCs, SVOCs, organochlorine pesticides (OCPs), Total Organic Carbon (TOC), Arochlor PCBs, PCB congeners (209), Montrose SRC metals, and total uranium. One groundwater grab sample was collected from the top of the shallow water bearing zone encountered in vertical boring CPA-13 (at approximately 60 ft bgs). The groundwater sample was analyzed for VOCs, SVOCs, OCPs, Arochlor PCBs, and PCB congeners (209). Analytical results for soil are summarized in Table 4-8 and discussed in Section 4. Analytical results for groundwater are summarized in Table 4-12, and discussed in Section 4 of this report. The soil physical property data are summarized in Table C-3.

C-1.11 FTF Soil Vapor and Surface Soil Investigation (2010)

The primary purpose of the 2010 investigation was to evaluate the lateral and vertical distribution of VOCs in soil vapor in the vicinity of the FTF to augment data from

previous studies and to assess whether VOCs, if present, are migrating via vapor from groundwater or from a potential source in the vadose zone.

Soil vapor probes were installed at 15 locations at the FTF (FTF-28 through FTF-42) and at three locations around the CPA (P-28 through P-30) as shown on Figure C-3 (Geosyntec, 2010c). Soil vapor samples were collected from 5 ft bgs at each probe and at six of the 18 locations (FTF-30, FTF-33, FTF-34, FTF-35, FTF-36, and FTF-39) additional soil vapor samples were collected from approximately 10, 20 and 40 ft bgs. Soil vapor samples were analyzed for VOCs. The results are summarized in Table 4-11 and discussed in Section 4.4. Six continuous soil cores were collected from each of the six borings advanced to 40 ft bgs and field-screened for the presence of DNAPL using FLUTe™ ribbon and a PID. Boring logs are provided in **Appendix D**.

Soil samples were collected for physical properties testing at three of the six boring locations that were advanced to 40 ft bgs (FTF-30, FTF-36, and FTF-39). Samples were obtained from depths of approximately 5, 10, 20, and 40 ft bgs. The soil physical property data are summarized in Table C-3. Surface soil samples were also collected for asbestos analysis at three locations in the FTF area (FTF-37, FTF-38, and FTF-41). The asbestos results are summarized in Table 4-10 and discussed in Section 4 of this report. Asbestos samples were also taken at the nearby Dichlorobenzene Warehouse and Former Plant Site areas.

TABLES

Table C-1 Historical Summary of Soil and Sediment Sampling

Table C-2 Summary of Soil Physical Property Results - Former Montrose Closed Ponds Area

Table C-3 Summary of Soil Physical Properties - Montrose Site Assessment Areas

FIGURES

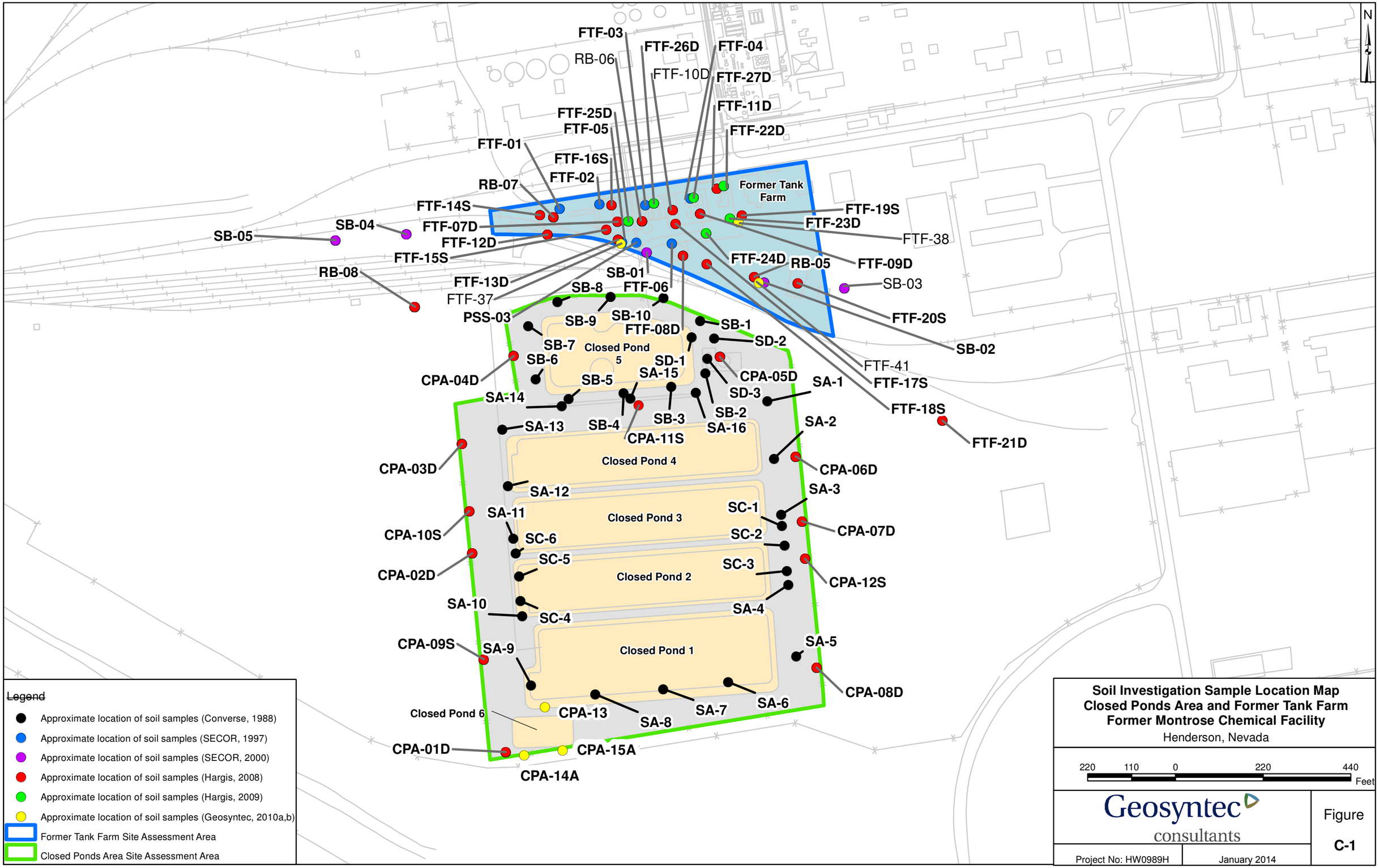
Figure C-1 Soil Investigation Sample Location Map

Figure C-2 Groundwater Investigation Sample Location Map

Figure C-3 Soil Vapor Investigation Sample Location Map

Figure C-4 DNAPL Investigation Sample Location Map

APPENDIX C – FIGURES



Legend

- Approximate location of soil samples (Converse, 1988)
- Approximate location of soil samples (SECOR, 1997)
- Approximate location of soil samples (SECOR, 2000)
- Approximate location of soil samples (Hargis, 2008)
- Approximate location of soil samples (Hargis, 2009)
- Approximate location of soil samples (Geosyntec, 2010a,b)
- Former Tank Farm Site Assessment Area
- Closed Ponds Area Site Assessment Area

Soil Investigation Sample Location Map
Closed Ponds Area and Former Tank Farm
Former Montrose Chemical Facility
Henderson, Nevada

220 110 0 220 440 Feet

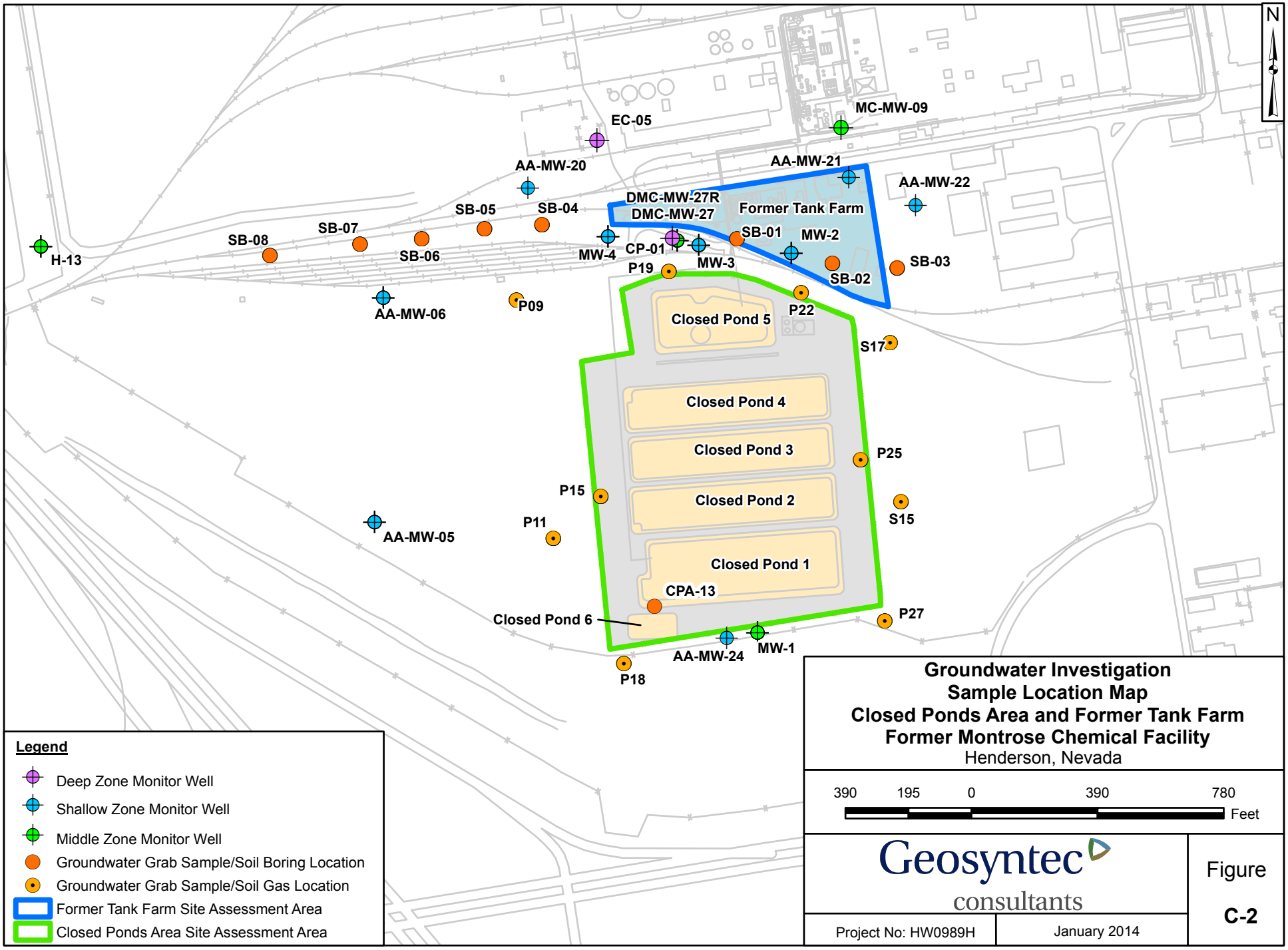
Geosyntec consultants

Project No: HW0989H

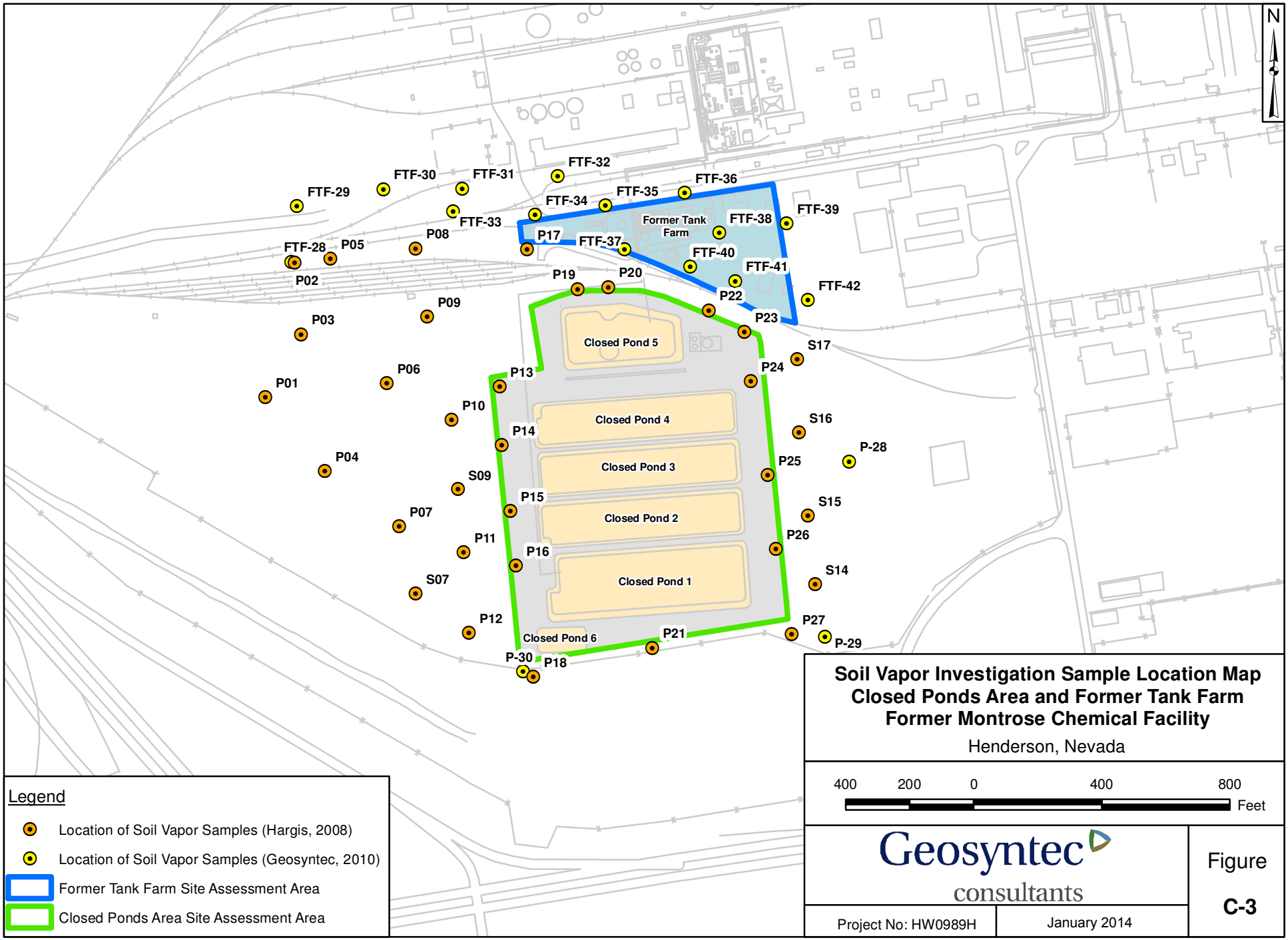
January 2014

Figure **C-1**

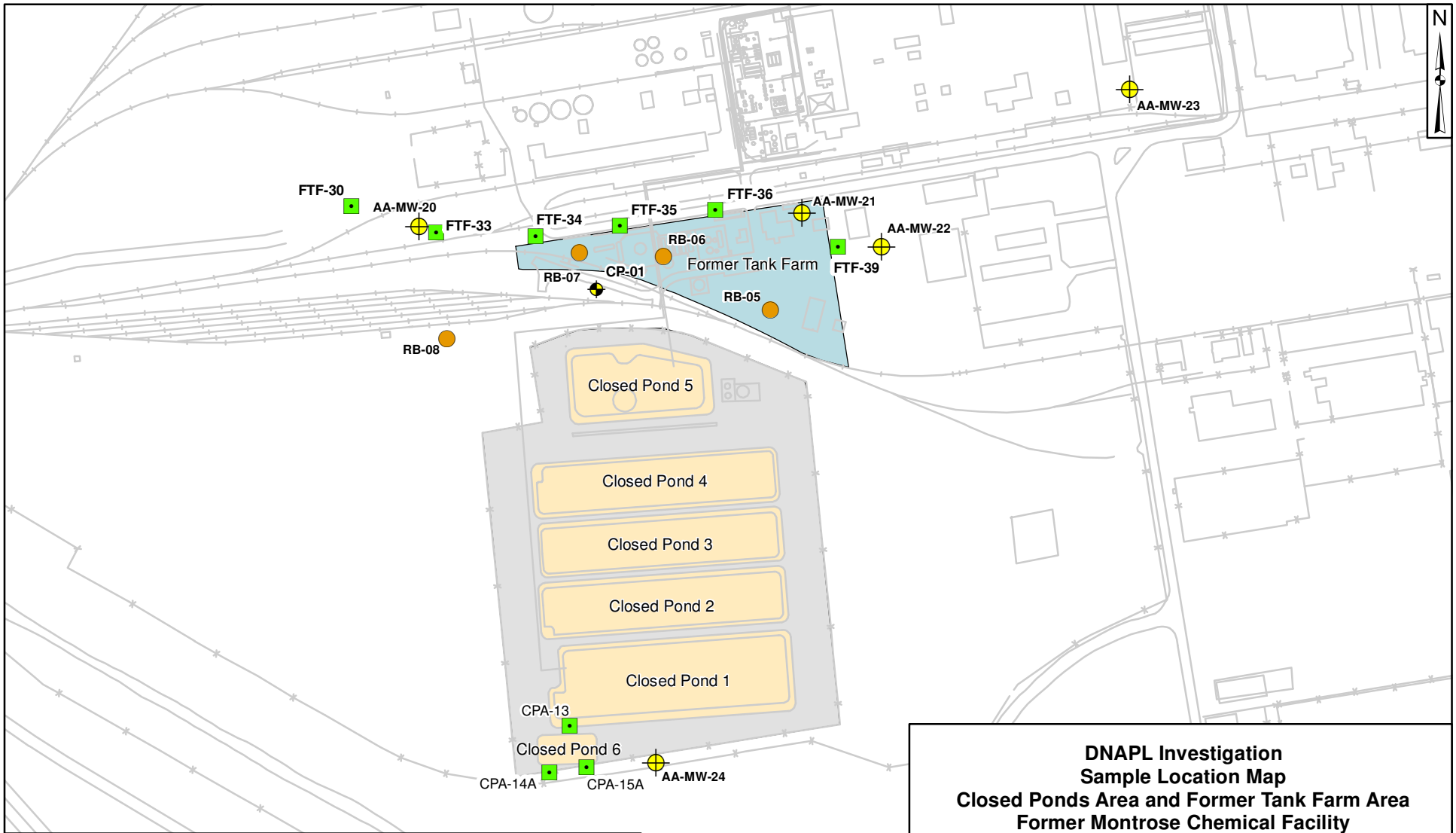
G:\GIS\HW0934\Projects\CPA_FTF\FTF_CPA_SoilInvestigationMap_06132011.mxd tvs 9/14/2011



Groundwater Investigation
Sample Location Map
Closed Ponds Area and Former Tank Farm
Former Montrose Chemical Facility
Henderson, Nevada



Soil Vapor Investigation Sample Location Map
Closed Ponds Area and Former Tank Farm
Former Montrose Chemical Facility
Henderson, Nevada



Legend

- Middle Zone Monitor Well (SECOR, 2001)
- Deep DNAPL Investigation Boring Location (Hargis, 2006)
- Shallow Zone Monitor Well (Geosyntec, 2008)
- Soil and DNAPL Investigation Boring Location (Geosyntec, 2010a,b)

DNAPL - Dense Non-Aqueous Phase Liquids

DNAPL Investigation
Sample Location Map
Closed Ponds Area and Former Tank Farm Area
Former Montrose Chemical Facility
Henderson, Nevada

400 200 0 400 800 Feet

Geosyntec consultants

Project No: HW0989H

January 2014

Figure **C-4**

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APPENDIX C – TABLES

TABLE C-1
HISTORICAL SUMMARY OF SOIL AND SEDIMENT SAMPLING
TOXIC METALS AND INORGANICS
FORMER MONTROSE FACILITY
HENDERSON, NEVADA
SECOR JOB NO. M0071-001-01

SAMPLE NUMBER	SE-1	SB-1	SB-2	SB-3	SB-4	SB-5	SB-6	SB-7	SB-8	SB-9	SB-10	SC-1	SC-2
SAMPLE DATE	04/88	04/88	04/88	04/88	04/88	04/88	04/88	04/88	04/88	04/88	04/88	04/88	04/88
SAMPLE MEDIUM	SS	SS	SS	SS	SS	SS	SS	SS	SS	SS	SS	SS	SS
TOXIC METALS													
Antimony, mg/kg	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0
Arsenic, mg/kg	1.3	1.7	2.8	1.0	2.0	1.1	1.9	1.7	3.3	1.2	1.2	1.6	1.6
Barium, mg/kg	0.66	0.30	0.42	0.30	0.26	0.24	0.40	0.23	0.37	0.35	0.31	0.26	0.21
Cadmium, mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chromium, mg/kg	9.0	7.0	9.0	7.0	7.0	6.0	8.0	7.0	5.0	7.0	8.0	6.0	5.0
Copper, mg/kg	15	11	13	10	11	8.6	13	11	12	12	11	15	11
Lead, mg/kg	7.0	7.0	5.0	<5.0	7.0	6.0	11	14	6.0	10	7.0	10	8.0
Mercury, mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
Nickel, mg/kg	12	11	12	12	11	9.0	12	9.0	11	12	12	12	10
Selenium, mg/kg	<0.5	<0.5	<0.5	<0.5	0.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Silver, mg/kg	<0.5	0.6	0.6	0.6	0.6	<0.5	0.6	0.6	0.6	0.6	0.6	0.7	0.7
Thallium, mg/kg	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Zinc, mg/kg	35	25	34	23	26	21	32	24	40	27	25	31	29
OTHER METALS													
Antimony, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Barium, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Calcium, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cobalt, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Iron, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Magnesium, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Manganese, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Potassium, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Sodium, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tin, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Vanadium, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MISCELLANEOUS													
pH (S.U.)	8.6	7.9	7.7	8.2	7.9	8.0	7.8	8.0	7.8	8.2	8.1	8.1	8.1
Cyanide, Total, mg/kg	<0.2	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.2	<0.2	<0.2
SAMPLE LOCATION	0.5 Mi. SW of Ponds	Pond 5, NEC	Pond 5, NEC	Pond 5, SEC	Pond 5, South	Pond 5, SWC	Pond 5 SWC,	Pond 5, NWC	Pond 5, NWC	Pond 5, North	Pond 5, NEC	Pond 2, NEC	Pond 2, SEC

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SOURCE: Converse, 1988

TABLE C-1
HISTORICAL SUMMARY OF SOIL AND SEDIMENT SAMPLING
TOXIC METALS AND INORGANICS
FORMER MONTROSE FACILITY
HENDERSON, NEVADA
SECOR JOB NO. M0071-001-01

SAMPLE NUMBER	SC-3	SC-4	SC-5	SC-6	SA-1	SA-2	SA-3	SA-4	SA-5	SA-6	SA-7	SA-8	SA-9
SAMPLE DATE	04/88	04/88	04/88	04/88	04/88	04/88	04/88	04/88	04/88	04/88	04/88	04/88	04/88
SAMPLE MEDIUM	SS	SS	SS	SS	SS	SS	SS	SS	SS	SS	SS	SS	SS
TOXIC METALS													
Antimony, mg/kg	<8.0	<8.0	<8.0	<8.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Arsenic, mg/kg	1.2	1.5	1.3	0.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Beryllium, mg/kg	0.18	0.27	0.18	0.16	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cadmium, mg/kg	<0.5	<0.5	<0.5	<0.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Chromium, mg/kg	3.0	6.0	2.0	2.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Copper, mg/kg	8.6	10	6.9	7.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Lead, mg/kg	8.0	6.0	<5.0	<5.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Mercury, mg/kg	<0.4	<0.4	<0.4	<0.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Nickel, mg/kg	9.0	10	8.0	7.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Selenium, mg/kg	<0.5	<0.5	<0.5	<0.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Silver, mg/kg	0.5	0.7	0.5	<0.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Thallium, mg/kg	<5.0	<5.0	<5.0	<5.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Zinc, mg/kg	25	28	17	15	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
OTHER METALS													
Antimony, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Barium, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Calcium, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cobalt, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Iron, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Magnesium, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Managanese, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Potassium, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Sodium, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tin, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Vanadium, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MISCELLANEOUS													
pH (S.U.)	8.0	8.2	8.8	8.0	7.8	8.4	7.8	8.1	8.4	8.1	7.7	7.4	8.6
Cyanide, Total, mg/kg	<0.2	<0.2	<0.2	<0.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
SAMPLE LOCATION	Pond 3, SWC	Pond 2, SWC	Pond 2, West	Pond 2, NWC	Pond 4, NEC	Pond 3/4, East	Pond 3, SEC	Pond 1 NEC	Pond 1, SEC	Pond 1, SE	Pond 1, South	Pond 1 SW	Pond 1, SWC

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SOURCE: Converse, 1988

TABLE C-1
HISTORICAL SUMMARY OF SOIL AND SEDIMENT SAMPLING
TOXIC METALS AND INORGANICS
FORMER MONTROSE FACILITY
HENDERSON, NEVADA
SECOR JOB NO. M0071-001-01

SAMPLE NUMBER	SA-10	SA-11	SA-12	SA-13	SA-14	SA-15	SA-16
SAMPLE DATE	4/88	4/88	4/88	4/88	4/88	4/88	4/88
SAMPLE MEDIUM	SS	SS	SS	SS	SS	SS	SS
TOXIC METALS							
Antimony, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Arsenic, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Beryllium, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cadmium, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Chromium, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Copper, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Lead, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Mercury, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Nickel, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Selenium, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Silver, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Thallium, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Zinc, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A
OTHER METALS							
Antimony, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Barium, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Calcium, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cobalt, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Iron, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Magnesium, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Managanese, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Potassium, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Sodium, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tin, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Vanadium, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MISCELLANEOUS							
pH (S.U.)	8.0	8.0	6.2	6.0	7.9	8.0	8.1
Cyanide, Total, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A
SAMPLE LOCATION	Pond 1, NWC	Pond 3, SWC	Pond 3/4, West	Pond 4, NWC	Pond 4, NW	Pond 4, North	Pond 4, NE

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SOURCE: Converse, 1988

TABLE C-1

7/24/97

HISTORICAL SUMMARY OF SOIL AND SEDIMENT SAMPLING
TOXIC METALS AND INORGANICS
FORMER MONTROSE FACILITY
HENDERSON, NEVADA
SECOR JOB NO. M0071-001-01

SAMPLE NUMBER	1	2	3	4	14	15	16	17	14A-1	14B-1	14C-1	14D-1	14E-1
SAMPLE DATE	12/84	12/84	12/84	12/84	12/84	12/84	12/84	12/84	06/85	06/85	06/85	06/85	06/85
SAMPLE MEDIUM	SS	SS	SS	SS	SS/SED	SS/SED	SS/SED	SS/SED	SS	SS	SS	SS	SS
TOXIC METALS													
Antimony, mg/kg	N/D	N/A	N/A	N/A	N/A	N/A	N/D	N/A	N/A	N/A	N/A	N/A	N/A
Arsenic, mg/kg	N/D	N/A	N/A	N/A	N/A	N/A	7	N/A	N/A	N/A	N/A	N/A	N/A
Beryllium, mg/kg	N/D	N/A	N/A	N/A	N/A	N/A	N/D	N/A	N/A	N/A	N/A	N/A	N/A
Cadmium, mg/kg	1/5	N/A	N/A	N/A	N/A	N/A	N/D	N/A	N/A	N/A	N/A	N/A	N/A
Chromium, mg/kg	45	N/A	N/A	N/A	N/A	N/A	30	N/A	N/A	N/A	N/A	N/A	N/A
Copper, mg/kg	220	N/A	N/A	N/A	N/A	N/A	30	N/A	N/A	N/A	N/A	N/A	N/A
Lead, mg/kg	200	N/A	N/A	N/A	N/A	N/A	30	N/A	N/A	N/A	N/A	N/A	N/A
Mercury, mg/kg	N/D	N/A	N/A	N/A	N/A	N/A	N/D	N/A	N/A	N/A	N/A	N/A	N/A
Nickel, mg/kg	40	N/A	N/A	N/A	N/A	N/A	18E	N/A	N/A	N/A	N/A	N/A	N/A
Selenium, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Silver, mg/kg	N/D	N/A	N/A	N/A	N/A	N/A	N/D	N/A	N/A	N/A	N/A	N/A	N/A
Thallium, mg/kg	N/D	N/A	N/A	N/A	N/A	N/A	N/D	N/A	N/A	N/A	N/A	N/A	N/A
Zinc, mg/kg	760E	N/A	N/A	N/A	N/A	N/A	90E	N/A	N/A	N/A	N/A	N/A	N/A
OTHER METALS													
Aluminum, mg/kg	6,000	N/A	N/A	N/A	N/A	N/A	12,000	N/A	N/A	N/A	N/A	N/A	N/A
Barium, mg/kg	190	N/A	N/A	N/A	N/A	N/A	210	N/A	N/A	N/A	N/A	N/A	N/A
Calcium, mg/kg	37,500	N/A	N/A	N/A	N/A	N/A	36,300	N/A	N/A	N/A	N/A	N/A	N/A
Cobalt, mg/kg	N/D	N/A	N/A	N/A	N/A	N/A	N/D	N/A	N/A	N/A	N/A	N/A	N/A
Iron, mg/kg	15,600	N/A	N/A	N/A	N/A	N/A	12,300	N/A	N/A	N/A	N/A	N/A	N/A
Magnesium, mg/kg	16,000	N/A	N/A	N/A	N/A	N/A	16,000	N/A	N/A	N/A	N/A	N/A	N/A
Managanese, mg/kg	260	N/A	N/A	N/A	N/A	N/A	540	N/A	N/A	N/A	N/A	N/A	N/A
Potassium, mg/kg	1,200E	N/A	N/A	N/A	N/A	N/A	2,800	N/A	N/A	N/A	N/A	N/A	N/A
Sodium, mg/kg	N/D	N/A	N/A	N/A	N/A	N/A	N/D	N/A	N/A	N/A	N/A	N/A	N/A
Tin, mg/kg	60E	N/A	N/A	N/A	N/A	N/A	N/D	N/A	N/A	N/A	N/A	N/A	N/A
Vanadium, mg/kg	25E	N/A	N/A	N/A	N/A	N/A	40	N/A	N/A	N/A	N/A	N/A	N/A
MISCELLANEOUS													
pH (S.U.)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cyanide, Total, mg/kg	0.60E	N/A	N/A	N/A	N/A	N/A	0.30E	N/A	N/A	N/A	N/A	N/A	N/A
SAMPLE LOCATION	MCCC Plant SWC	MCCC Plant NW	MCCC Plant NWC	MCCC Plant SEC	Pond 6 East	Pond 1 200 FT.W.	Pond 3 300 FT W	Pond 6 West	Pond 5 East	Pond 4 East	Pond 3 East	Pond 2 East	Pond 1 East

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SOURCE: Converse, 1988

TABLE C-1
HISTORICAL SUMMARY OF SOIL AND SEDIMENT SAMPLING
TOXIC METALS AND INORGANICS
FORMER MONTROSE FACILITY
HENDERSON, NEVADA
SECOR JOB NO. M0071-001-01

SAMPLE NUMBER	14F-1	14F-1	3A-4	3A-5	3A-6
SAMPLE DATE	06/85	06/85	06/85	06/85	06/85
SAMPLE MEDIUM	SS	SUB. S	SS/SED	SS/SED	SS/SED
TOXIC METALS					
Antimony, mg/kg	N/D	N/D	N/D	N/A	N/A
Arsenic, mg/kg	N/D	5.3	N/D	N/A	N/A
Beryllium, mg/kg	0.5TR	0.5TR	0.3TR	N/A	N/A
Cadmium, mg/kg	1.8TR	7.2E	7.2E	N/A	N/A
Chromium, mg/kg	41E	176	20E	N/A	N/A
Copper, mg/kg	19	26	29	N/A	N/A
Lead, mg/kg	19	20	74	N/A	N/A
Mercury, mg/kg	N/D	N/D	N/D	N/A	N/A
Nickel, mg/kg	147	1,340	19TR	N/A	N/A
Selenium, mg/kg	N/A	N/A	N/A	N/A	N/A
Silver, mg/kg	5.3E	5.3E	3.8TR	N/A	N/A
Thallium, mg/kg	24	28	23	N/A	N/A
Zinc, mg/kg	42	38	69	N/A	N/A
OTHER METALS					
Aluminum, mg/kg	11,900	9,940	13,500	N/A	N/A
Barium, mg/kg	215	234	231	N/A	N/A
Calcium, mg/kg	36,600	38,600	33,700	N/A	N/A
Cobalt, mg/kg	10TR	3.4	8.5TR	N/A	N/A
Iron, mg/kg	16,000	14,800	16,600	N/A	N/A
Magnesium, mg/kg	10,300	12,400	13,700	N/A	N/A
Managanese, mg/kg	395	622E	637E	N/A	N/A
Potassium, mg/kg	5,820	3,470	5,313	N/A	N/A
Sodium, mg/kg	785TR	3,700	671TR	N/A	N/A
Tin, mg/kg	4.9TR	N/D	13TR	N/A	N/A
Vanadium, mg/kg	41	39	45	N/A	N/A
MISCELLANEOUS					
pH (S.U.)	N/A	N/A	N/A	N/A	N/A
Cyanide, Total, mg/kg	N/D	N/D	N/D	N/A	N/A
SAMPLE LOCATION	Tank Farm SEC	Tank Farm SEC	Pond 1 200 FT.W	Pond 3 250 FT. W	Pond 4 300 FT. NW

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SOURCE. Converse, 1988

TABLE C-1
HISTORICAL SUMMARY OF SOIL AND SEDIMENT SAMPLING
ORGANOCHLORINE PESTICIDES AND PCBs
FORMER MONTROSE FACILITY
HENDERSON, NEVADA
SECOR JOB NO. M0071-001-01

SAMPLE NUMBER	SE-1	SB-1	SB-2	SB-3	SB-4	SB-5	SB-6	SB-7	SB-8	SB-9	SB-10	SC-1	SC-2
SAMPLE DATE	04/88	04/88	04/88	04/88	04/88	04/88	04/88	04/88	04/88	04/88	04/88	04/88	04/88
SAMPLE MEDIUM	SS	SS	SS	SS	SS	SS	SS	SS	SS	SS	SS	SS	SS
ORGANOCHLORINE PESTICIDES													
Aldrin, mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Alpha-BHC, mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Beta-BHC, mg/kg	0.19	0.23	0.12	0.13	0.54	0.21	0.17	0.27	0.27	0.59	3.80	0.51	0.48
Delta-BHC, mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Gamma-BHC, mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Chlordane, mg/kg	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
4,4'-DDD, mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
4,4'-DDE, mg/kg	<0.05	0.40	0.39	0.078	0.39	0.11	<0.00	2.50	0.62	0.80	0.18	0.89	0.44
4,4'-DDT, mg/kg	<0.20	0.71	0.23	<0.20	0.42	<0.20	<0.20	0.51	2.20	0.82	<0.20	0.27	0.44
Dieldrin, mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Endosulfan I, mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Endosulfan II, mg/kg	<0.05	<0.05	<0.05	<0.05	0.27	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Endo. Sulfate, mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Endrin, mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Endrin Aldehyde, mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Heptachlor, mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor Epoxide, mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Toxaphene, mg/kg	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	<2.0	<2.0	<2.0
POLYCHLORINATED BIPHENYLS (PCBs)													
Arochlor 1016, mg/kg	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Arochlor 1221, mg/kg	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Arochlor 1232, mg/kg	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Arochlor 1242, mg/kg	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Arochlor 1248, mg/kg	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Arochlor 1254, mg/kg	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Arochlor 1260, mg/kg	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Arochlor 1262, mg.kg	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
SAMPLE LOCATION	0.5 Mi. SW of Ponds	Pond 5, NEC	Pond 5, NEC	Pond 5, SEC	Pond 5, South	Pond 5, SWC	Pond 5, SWC,	Pond 5, NWC	Pond 5, NWC	Pond 5, North	Pond 5, NEC	Pond 2, NEC	Pond 2, East

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SOURCE: Converse, 1988

TABLE C-1
HISTORICAL SUMMARY OF SOIL AND SEDIMENT SAMPLING
ORGANOCHLORINE PESTICIDES AND PCBs
FORMER MONTROSE FACILITY
HENDERSON, NEVADA
SECOR JOB NO. M0071-001-01

SAMPLE NUMBER	SC-3	SC-4	SC-5	SC-6	SD-1	SD-2	SD-3
SAMPLE DATE	04/88	04/88	04/88	04/88	04/88	04/88	04/88
SAMPLE MEDIUM	SS	SS	SS	SS	SS	SS	SS
ORGANOCHLORINE PESTICIDES							
Aldrin, mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Alpha-BHC, mg/kg	1.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Beta-BHC, mg/kg	1.30	0.33	0.078	0.051	<0.05	<0.05	0.057
Delta-BHC, mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Gamma-BHC, mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Chlordane, mg/kg	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
4,4'-DDD, mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	0.44	<0.05
4,4'-DDE, mg/kg	0.31	1.30	1.10	0.27	0.99	0.59	0.58
4,4'-DDT, mg/kg	<0.2	<0.2	<0.2	<0.2	4.00	3.30	3.20
Dieldrin, mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	<0.03	<0.03
Endosulfan I, mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.65
Endosulfan II, mg/kg	<5.0	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Endo. Sulfate, mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Endrin, mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Endrin Aldehyde, mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Heptachlor, mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor Epoxide, mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Toxaphene, mg/kg	<0.2	<0.2	<0.2	<2.0	<0.2	<0.2	<0.2
POLYCHLORINATED BIPHENYLS (PCBs)							
Arochlor 1016, mg/kg	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Arochlor 1221, mg/kg	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Arochlor 1232, mg/kg	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Arochlor 1242, mg/kg	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Arochlor 1248, mg/kg	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Arochlor 1254, mg/kg	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Arochlor 1260, mg/kg	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Arochlor 1262, mg/kg	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
SAMPLE LOCATION	Pond 2, SEC	Pond 2, SEC	Pond 2, West	Pond 2, NWC	PCB AST, NWC	PCB AST, NEC	PCB AST, South

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SOURCE: Converse, 1988

TABLE C-1
HISTORICAL SUMMARY OF SOIL AND SEDIMENT SAMPLING
ORGANOCHLORINE PESTICIDES AND PCBs
FORMER MONTROSE FACILITY
HENDERSON, NEVADA
SECOR JOB NO. M0071-001-01

SAMPLE NUMBER	1	2	3	4	14	15	16	17	14A-1	14B-1	14C-1	14D-1	14E-1
SAMPLE DATE	12/84	12/84	12/84	12/84	12/84	12/84	12/84	12/84	06/85	06/85	06/85	06/85	06/85
SAMPLE MEDIUM	SS	SS	SS	SS	SS/SED	SS/SED	SS/SED	SS/SED	SS	SS	SS	SS	SS
ORGANOCHLORINE PESTICIDES													
Aldrin, mg/kg	N/D	N/A	N/A	N/A	N/A	N/A	N/D	N/A	N/A	N/A	N/A	N/A	N/A
Alpha-BHC, mg/kg	N/D	N/A	N/A	N/A	N/A	N/A	N/D	N/A	N/A	N/A	N/A	N/A	N/A
Beta-BHC, mg/kg	N/D	N/A	N/A	N/A	N/A	N/A	N/D	N/A	N/A	N/A	N/A	N/A	N/A
Delta-BHC, mg/kg	N/D	N/A	N/A	N/A	N/A	N/A	N/D	N/A	N/A	N/A	N/A	N/A	N/A
Gamma-BHC, mg/kg	N/D	N/A	N/A	N/A	N/A	N/A	N/D	N/A	N/A	N/A	N/A	N/A	N/A
Chlordane, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
4,4'-DDD, mg/kg	36	N/A	N/A	N/A	N/A	N/A	N/D	N/A	N/A	N/A	N/A	N/A	N/A
4,4'-DDE, mg/kg	330	N/A	N/A	N/A	N/A	N/A	1.00TR	N/A	N/A	N/A	N/A	N/A	N/A
4,4'-DDT, mg/kg	2,200	N/A	N/A	N/A	N/A	N/A	N/D	N/A	N/A	N/A	N/A	N/A	N/A
Dieldrin, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Endosulfan I, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Endosulfan II, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Endo. Sulfate, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Endrin, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Endrin Aldehyde, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Heptachlor, mg/kg	N/D	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Heptachlor Epoxide, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Toxaphene, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
POLYCHLORINATED BIPHENYLS (PCBs)													N/A
Arochlor 1016, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Arochlor 1221, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Arochlor 1232, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Arochlor 1242, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Arochlor 1248, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Arochlor 1254, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Arochlor 1260, mg/kg	N/D	N/A	N/A	N/A	N/A	N/A	N/D	N/A	N/A	N/A	N/A	N/A	N/A
Arochlor 1262, mg.kg	N/D	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
SAMPLE LOCATION	MCCC Plant SWC	MCCC Plant NW	MCCC Plant NWC	MCCC Plant SEC	Pond 6 East	Pond 1, 200 FT.W	Pond3, 300 FT. W	Pond 6 West	Pond 5 East	Pond 4 East	Pond 3 East	Pond 2 East	Pond 1 East

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SOURCE: Converse, 1988

TABLE C-1
HISTORICAL SUMMARY OF SOIL AND SEDIMENT SAMPLING
ORGANOCHLORINE PESTICIDES AND PCBs
FORMER MONTROSE FACILITY
HENDERSON, NEVADA
SECOR JOB NO. M0071-001-01

SAMPLE NUMBER	14F-1	14F-1	3A-4	3A-5	3A-6
SAMPLE DATE	06/85	06/85	06/85	06/85	06/85
SAMPLE MEDIUM	SS	SUB. S	SS/SED	SS/SED	SS/SED
ORGANOCHLORINE PESTICIDES					
Aldrin, mg/kg	N/D	N/D	N/D	N/D	N/D
Alpha-BHC, mg/kg	0.024	0.350	0.039	N/A	N/A
Beta-BHC, mg/kg	0.093	N/D	0.280	N/A	N/A
Delta-BHC, mg/kg	N/D	N/D	N/D	N/A	N/A
Gamma-BHC, mg/kg	N/D	N/D	N/D	N/A	N/A
Chlordane, mg/kg	N/A	N/A	N/A	N/A	N/A
4,4'-DDD, mg/kg	N/D	N/D	N/D	N/A	N/A
4,4'-DDE, mg/kg	0.012	0.560	0.270	N/A	N/A
4,4'-DDT, mg/kg	0.021	N/D	0.180	N/A	N/A
Dieldrin, mg/kg	N/A	N/A	N/A	N/A	N/A
Endosulfan I, mg/kg	N/A	N/A	N/A	N/A	N/A
Endosulfan II, mg/kg	N/A	N/A	N/A	N/A	N/A
Endo. Sulfate, mg/kg	N/A	N/A	N/A	N/A	N/A
Endrin, mg/kg	N/A	N/A	N/A	N/A	N/A
Endrin Aldehyde, mg/kg	N/A	N/A	N/A	N/A	N/A
Heptachlor, mg/kg	N/D	N/D	N/D	N/A	N/A
Heptachlor Epoxide, mg/kg	N/A	N/A	N/A	N/A	N/A
Toxaphene, mg/kg	N/A	N/A	N/A	N/A	N/A
POLYCHLORINATED BIPHENYLS (PCBs)					
Arochlor 1016, mg/kg	N/A	N/A	N/A	N/A	N/A
Arochlor 1221, mg/kg	N/A	N/A	N/A	N/A	N/A
Arochlor 1232, mg/kg	N/A	N/A	N/A	N/A	N/A
Arochlor 1242, mg/kg	N/A	N/A	N/A	N/A	N/A
Arochlor 1248, mg/kg	N/A	N/A	N/A	N/A	N/A
Arochlor 1254, mg/kg	N/A	N/A	N/A	N/A	N/A
Arochlor 1260, mg/kg	N/D	N/D	N/D	N/A	N/A
Arochlor 1262, mg.kg	N/A	N/A	N/A	N/A	N/A
SAMPLE LOCATION	Tank Farm SEC	Tank Farm SEC	Pond 1, 200 FT. SW	Pond 3, 250 FT. W	Pond 4, 300 FT. NW

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SOURCE: Converse, 1988

TABLE C-1
HISTORICAL SUMMARY OF SOIL AND SEDIMENT SAMPLING
VOLATILE ORGANIC COMPOUNDS
FORMER MONTROSE FACILITY
HENDERSON, NEVADA
SECOR JOB NO. M0071-001-01

SAMPLE NUMBER	SE-1	SB-1	SB-2	SB-3	SB-4	SB-5	SB-6	SB-7	SB-8	SB-9	SB-10	SC-1	SC-2
SAMPLE DATE	04/88	04/88	04/88	04/88	04/88	04/88	04/88	04/88	04/88	04/88	04/88	04/88	04/88
SAMPLE MEDIUM	SS	SS	SS	SS	SS	SS	SS	SS	SS	SS	SS	SS	SS
ORGANOCHLORINE PESTICIDES													
Acetone, mg/kg	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Acrolein, mg/kg	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Acrylonitrile, mg/kg	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Benzene, mg/kg	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Bromodichloro-methane, mg/kg	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Bromoform, mg/kg	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Bromomethane, mg/kg	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Carbon Disulfide, mg/kg	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Carbon Tetrachloride, mg/kg	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Chlorobenzene, mg/kg	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Chloroethane, mg/kg	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
2-Chloroethylvinylether, mg/kg	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Chloroform, mg/kg	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Chloromethane, mg/kg	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Cis-1,3-Dichloropropene, mg/kg	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Dibromochloromethane, mg/kg	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
1,2-Dichlorobenzene, mg/kg	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
1,3-Dichlorobenzene, mg/kg	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
1,4-Dichlorbenzene, mg/kg	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
1,1-Dichloroethane, mg/kg	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
1,2-Dichloroethene, mg/kg	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
1,1-Dichloroethene, mg/kg	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
1,2-Dichloropropoane, mg/kg	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Ethylbenzene, mg/kg	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Freon 113, mg/kg	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
SAMPLE LOCATION	0.5 MI SW of ponds	Pond 5, NEC	Pond 5 NEC	Pond 5 SEC	Pond 5 South	Pond 5 SWC	Pond 5 SWC	Pond 5 NWC	Pond 5 NWC	Pond 5 North	Pond 5 NEC	Pond 2 NEC	Pond 2 East

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SOURCE: Converse, 1988

TABLE C-1
HISTORICAL SUMMARY OF SOIL AND SEDIMENT SAMPLING
VOLATILE ORGANIC COMPOUNDS
FORMER MONTROSE FACILITY
HENDERSON, NEVADA
SECOR JOB NO. M0071-001-01

SAMPLE NUMBER	SC-3	SC-4	SC-5	SC-6
SAMPLE DATE	04/88	04/88	04/88	04/88
SAMPLE MEDIUM	SS	SS	SS	SS
ORGANOCHLORINE PESTICIDES				
2-Hexanone, mg/kg	<0.3	<0.3	<0.3	<0.3
Methylene Chloride, mg/kg	<0.3	<0.3	<0.3	<0.3
Methyl Ethyl Ketone, mg/kg	<0.3	<0.3	<0.3	<0.3
Methyl Isobutyl Ketone, mg/kg	<0.3	<0.3	<0.3	<0.3
Styrene, mg/kg	<0.3	<0.3	<0.3	<0.3
1,1,2,2-Tetrachloroethane, mg/kg	<0.3	<0.3	<0.3	<0.3
Tetrachloroethene, mg/kg	<0.3	<0.3	<0.3	<0.3
Toluene, mg/kg	<0.3	<0.3	<0.3	<0.3
Trans-1,2-Dichloroethene, mg/kg	<0.3	<0.3	<0.3	<0.3
Trans-1,3-Dichloropropane, mg/kg	<0.3	<0.3	<0.3	<0.3
1,1,1-Trichloroethane, mg/kg	<0.3	<0.3	<0.3	<0.3
1,1,2-Trichloroethane, mg/kg	<0.3	<0.3	<0.3	<0.3
Trichloroethene, mg/kg	<0.3	<0.3	<0.3	<0.3
Trichlorofluoromethane, mg/kg	<0.3	<0.3	<0.3	<0.3
Vinyl Acetate, mg/kg	<0.3	<0.3	<0.3	<0.3
Vinyl Chloride, mg/kg	<0.3	<0.3	<0.3	<0.3
Total Xylene Isomers, mg/kg	<0.3	<0.3	<0.3	<0.3
SAMPLE LOCATION	Pond 2 SEC	Pond 2 SWC	West	Pond 2, NWC

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SOURCE: Converse, 1988

TABLE C-1
HISTORICAL SUMMARY OF SOIL AND SEDIMENT SAMPLING
VOLATILE ORGANIC COMPOUNDS
FORMER MONTROSE FACILITY
HENDERSON, NEVADA
SECOR JOB NO. M0071-001-01

SAMPLE NUMBER	1	2	3	4	14	15	16	17	14A-1	14B-1	14C-1	14D-1	14E-1
SAMPLE DATE	12/84	12/84	12/84	12/84	12/84	12/84	12/84	12/84	06/85	06/85	06/85	06/85	06/85
SAMPLE MEDIUM	SS	SS	SS	SS	SS/SED	SS/SED	SS/SED	SS/SED	06/85	SS	SS	SS	SS
ORGANOCHLORINE PESTICIDES													
Acetone, mg/kg	N/D	N/A	N/A	N/A	N/A	N/A	N/D	N/A	N/A	N/A	N/A	N/A	N/A
Acrolein, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Acrylonitrile, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Benzene, mg/kg	N/D	N/A	N/A	N/A	N/A	N/A	N/D	N/A	N/A	N/A	N/A	N/A	N/A
Bromodichloro-methane, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Bromoform, mg/kg	0.010	N/A	N/A	N/A	N/A	N/A	N/D	N/A	N/A	N/A	N/A	N/A	N/A
Bromomethane, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Carbon Disulfide, mg/kg	N/D	N/A	N/A	N/A	N/A	N/A	N/D	N/A	N/A	N/A	N/A	N/A	N/A
Carbon Tetrachloride, mg/kg	0.0094	N/A	N/A	N/A	N/A	N/A	N/D	N/A	N/A	N/A	N/A	N/A	N/A
Chlorobenzene, mg/kg	0.093	N/A	N/A	N/A	N/A	N/A	0.012	N/A	N/A	N/A	N/A	N/A	N/A
Chloroethane, mg/kg	N/D	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2-Chloroethylvinylether, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Chloroform, mg/kg	N/D	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Chloromethane, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cis-1,2-Dichloroethene, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cis-1,3-Dichloropropene, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dibromochloromethane, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1,2-Dichlorobenzene, mg/kg	N/D	N/A	N/A	N/A	N/A	N/A	N/D	N/A	N/A	N/A	N/A	N/A	N/A
1,3-Dichlorobenzene, mg/kg	N/D	N/A	N/A	N/A	N/A	N/A	N/D	N/A	N/A	N/A	N/A	N/A	N/A
1,4-Dichlorbenzene, mg/kg	N/D	N/A	N/A	N/A	N/A	N/A	N/D	N/A	N/A	N/A	N/A	N/A	N/A
1,1-Dichloroethane, mg/kg	N/D	N/A	N/A	N/A	N/A	N/A	N/D	N/A	N/A	N/A	N/A	N/A	N/A
1,2-Dichloroethane, mg/kg	N/D	N/A	N/A	N/A	N/A	N/A	N/D	N/A	N/A	N/A	N/A	N/A	N/A
1,1-Dichloroethene, mg/kg	N/D	N/A	N/A	N/A	N/A	N/A	N/D	N/A	N/A	N/A	N/A	N/A	N/A
1,2-Dichloropropane, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Ethylbenzene, mg/kg	0.003TR	N/A	N/A	N/A	N/A	N/A	N/D	N/A	N/A	N/A	N/A	N/A	N/A
Freon 113, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
SAMPLE LOCATION	MCCC Plant SWC	MCCC Plant NW	MCCC Plant NWC	MCCC Plant SEC	Pond 6, East	Pond 1, 200 FT.W	Pond 3, 300 FT. W	Pond 6, West	Pond 5, East	Pond 4, East	Pond 3, East	Pond 2, East	Pond 1, East

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SOURCE: Converse, 1988

TABLE C-1
HISTORICAL SUMMARY OF SOIL AND SEDIMENT SAMPLING
VOLATILE ORGANIC COMPOUNDS
FORMER MONTROSE FACILITY
HENDERSON, NEVADA
SECOR JOB NO. M0071-001-01

SAMPLE NUMBER	1	2	3	4	14	15	16	17	14A-1	14B-1	14C-1	14D-1	14E-1
SAMPLE DATE	12/84	12/84	12/84	12/84	12/84	12/84	12/84	12/84	06/85	06/85	06/85	06/85	06/85
SAMPLE MEDIUM	SS	SS	SS	SS	SS/SED	SS/SED	SS/SED	SS/SED	06/85	SS	SS	SS	SS
2-Hexanone, mg/kg	ND	N/A	N/A	N/A	N/A	N/A	N/D	N/A	N/A	N/A	N/A	N/A	N/A
Methylene Chloride, mg/kg	0.150	N/A	N/A	N/A	N/A	N/A	0.200	N/A	N/A	N/A	N/A	N/A	N/A
Methyl Ethyl Ketone, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Methyl Isobutyl Ketone, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Styrene, mg/kg	0.022	N/A	N/A	N/A	N/A	N/A	N/D	N/A	N/A	N/A	N/A	N/A	N/A
1,1,2,2-Tetrachloroethane, mg/kg	0.050	N/A	N/A	N/A	N/A	N/A	N/D	N/A	N/A	N/A	N/A	N/A	N/A
Tetrachloroethene, mg/kg	0.0031TR	N/A	N/A	N/A	N/A	N/A	N/D	N/A	N/A	N/A	N/A	N/A	N/A
Toluene, mg/kg	N/D	N/A	N/A	N/A	N/A	N/A	N/D	N/A	N/A	N/A	N/A	N/A	N/A
Trans-1,2-Dichloroethene, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Trans-1,3-Dichloropropene, mg/k	N/D	N/A	N/A	N/A	N/A	N/A	N/D	N/A	N/A	N/A	N/A	N/A	N/A
1,1,1-Trichloroethane, mg/kg	N/D	N/A	N/A	N/A	N/A	N/A	N/D	N/A	N/A	N/A	N/A	N/A	N/A
1,1,2-Trichloroethane, mg/kg	N/D	N/A	N/A	N/A	N/A	N/A	N/D	N/A	N/A	N/A	N/A	N/A	N/A
Trichloroethene, mg/kg	N/D	N/A	N/A	N/A	N/A	N/A	N/D	N/A	N/A	N/A	N/A	N/A	N/A
Trichlorofluoromethane, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Vinyl Acetate, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Vinyl Chloride, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total Xylene Isomers, mg/kg	15	N/A	N/A	N/A	N/A	N/A	N/D	N/A	N/A	N/A	N/A	N/A	.
SAMPLE LOCATION	MCCC Plant SWC	MCCC Plant NW	MCCC Plant NWC	MCCC Plant SEC	Pond 6, East	Pond 1, 200 FT.W.	Pond 3, 300 FT. W	Pond 6, West	Pond 5, East	Pond 4, East	Pond 3, East	Pond 2, East	Pond 1, East

SOURCE: Converse, 1988

TABLE C-1
HISTORICAL SUMMARY OF SOIL AND SEDIMENT SAMPLING
VOLATILE ORGANIC COMPOUNDS
FORMER MONTROSE FACILITY
HENDERSON, NEVADA
SECOR JOB NO. M0071-001-01

SAMPLE NUMBER	14F-1	14F-1	3A-4	3A-5	3A-6
SAMPLE DATE	06/85	06/85	06/85	06/85	06/85
SAMPLE MEDIUM	SS	SUB.S	SS/SED	SS/SED	SS/SED
ORGANOCHLORINE PESTICIDES					
Acetone, mg/kg	N/D	N/D	180	N/A	N/A
Acrolein, mg/kg	N/A	N/A	N/A	N/A	N/A
Acrylonitrile, mg/kg	N/A	N/A	N/A	N/A	N/A
Benzene, mg/kg	N/D	N/D	N/D	N/D	N/D
Bromodichloro-methane, mg/kg	N/A	N/A	N/A	N/A	N/A
Bromoform, mg/kg	N/D	N/D	N/D	N/A	N/A
Bromomethane, mg/kg	N/A	N/A	N/A	N/A	N/A
Carbon Disulfide, mg/kg	N/D	N/D	N/D	N/A	N/A
Carbon Tetrachloride, mg/kg	N/D	N/D	N/D	N/A	N/A
Chlorobenzene, mg/kg	N/D	0.024	N/D	N/A	N/A
Chloroethane, mg/kg	N/D	N/D	N/D	N/A	N/A
2-Chloroethylvinylether, mg/kg	N/A	N/A	N/A	N/A	N/A
Chloroform, mg/kg	N/D	N/D	0.075	N/A	N/A
Chloromethane, mg/kg	N/A	N/A	N/A	N/A	N/A
Cis-1,2-Dichloroethene, mg/kg	N/A	N/A	N/A	N/A	N/A
Cis-1,3-Dichloropropene, mg/kg	N/A	N/A	N/A	N/A	N/A
Dibromochloromethane, mg/kg	N/A	N/A	N/A	N/A	N/A
1,2-Dichlorobenzene, mg/kg	N/D	33	N/D	N/A	N/A
1,3-Dichlorobenzene, mg/kg	N/D	N/D	N/D	N/A	N/A
1,4-Dichlorbenzene, mg/kg	N/D	30	N/D	N/A	N/A
1,1-Dichloroethane, mg/kg	N/D	N/D	N/D	N/A	N/A
1,2-Dichloroethane, mg/kg	N/D	N/D	N/D	N/A	N/A
1,1-Dichloroethene, mg/kg	N/D	N/D	N/D	N/A	N/A
1,2-Dichloropropane, mg/kg	N/A	N/A	N/A	N/A	N/A
Ethylbenzene, mg/kg	N/D	N/D	N/D	N/A	N/A
Freon 113, mg/kg	N/A	N/A	N/A	N/A	N/A
SAMPLE LOCATION	Tank Farm SEC	Tank Farm SEC	Pond 1, 200 FT. SW	Pond 3, 250 FT. W	Pond 4, 300 FT. NW

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SOURCE: Converse, 1988

TABLE C-1
HISTORICAL SUMMARY OF SOIL AND SEDIMENT SAMPLING
VOLATILE ORGANIC COMPOUNDS
FORMER MONTROSE FACILITY
HENDERSON, NEVADA
SECOR JOB NO. M0071-001-01

SAMPLE NUMBER	14F-1	14F-1	3A-4	3A-5	3A-6
SAMPLE DATE	06/85	06/85	06/85	06/85	06/85
SAMPLE MEDIUM	SS	Sub.S	SS/SED	SS/SED	SS/SED
2-Hexanone, mg/kg	N/D	N/D	N/D	N/A	N/A
Methylene Chloride, mg/kg	N/D	N/D	N/D	N/A	N/A
MethylEthylKetone, g/kg	N/A	N/A	N/A	N/A	N/A
Methyl Isobutyl Ketone, mg/kg	N/A	N/A	N/A	N/A	N/A
Styrene, mg/kg	N/D	N/D	N/D	N/A	N/A
1,1,2,2-Tetrachloroethane, mg/kg	N/D	N/D	N/D	N/A	N/A
Tetrachloroethene, mg/kg	N/D	N/D	N/D	N/A	N/A
Toluene, mg/kg	N/D	N/D	75	N/A	N/A
Trans-1,2-Dichloroethene, mg/kg	N/A	N/A	N/A	N/A	N/A
Trans-1,3-Dichloropropene, mg/k	N/D	N/D	N/D	N/A	N/A
1,1,1-Trichloroethane, mg/kg	N/D	N/D	N/D	N/A	N/A
1,1,2-Trichloroethane, mg/kg	N/D	N/D	N/D	N/A	N/A
Trichloroethane, mg/kg	N/D	N/D	N/D	N/A	N/A
Trichlorofluoromethane, mg/kg	N/A	N/A	N/A	N/A	N/A
Vinyl Acetate, mg/kg	N/A	N/A	N/A	N/A	N/A
Vinyl Chloride, mg/kg	N/A	N/A	N/A	N/A	N/A
Total Xylene Isomers, mg/kg	N/D	N/D	N/D	N/A	N/A
SAMPLE LOCATION	Tank Farm SEC	Tank Farm SEC	Pond 1, 200 FT. SW	Pond 3, 250 FT. W	Pond 4, 300 FT. NW

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SOURCE: Converse, 1988

TABLE C-1
HISTORICAL SUMMARY OF SOIL AND SEDIMENT SAMPLING
BASE/NEUTRAL and ACID (SEMI-VOLATILE) ORGANIC COMPOUNDS
FORMER MONTROSE FACILITY
HENDERSON, NEVADA
SECOR JOB NO. M0071-001-01

SAMPLE NUMBER	SE-1	SB-1	SB-2	SB-3	SB-4	SB-5	SB-6	SB-7	SB-8	SB-9	SB-10	SC-1
SAMPLE DATE	04/88	04/88	04/88	04/88	04/88	04/88	04/88	04/88	04/88	04/88	04/88	04/88
SAMPLE MEDIUM	SS	SS	SS	SS	SS	SS	SS	SS	SS	SS	SS	SS
Acenaphthene, mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Aniline, mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Aniline, mg/kg	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Anthracene, mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Benzidine,mg/kg	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0
Benzo(a)anthracene, mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Benzo (a) pyrene, mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Benzo (b) fluoranthene, mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Benzo (g,h,i) perylene, mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Benzoic Acid, mg/kg	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Benzo (k) fluoranthene, mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Benzyl Alcohol, mg/kg	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Bis(2-Chloroethoxy)Methane, mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bis(2-Chloroethyl)Ether, mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bis(2-Ethylhexyl)Phthalate, mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bis (2-Chloroisopropyl)Ether, mg/k	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
4-Bromophenylphenylether, mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Butylbenzylphthalate, mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chrysene, mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2-Chloronapthalene, mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2-Chlorophenol,1 mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
4-Chloroaniline, mg/kg	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
4-Chlorophenylphenylether, mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
4-Chloro-3-Methylphenol, mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Dibenzo(a,h)anthracene, mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Dibenzofuran, mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Dibutylphthalate, mg/kg	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
3,3'-Dichlorobenzidine, mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2,4-Dichlorophenol,mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Diethylphthalate, mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2,4-Dimethylphenol, mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
SAMPLE LOCATION	0.5 Mi. SW of Ponds	Pond 5, NEC	Pond 5, NEC	Pond 5 SEC	Pond 5, South	Pond 5, SWC	Pond 5, SWC	Pond 5, NWC	Pond 5, NWC	Pond 5, North	Pond 5, NEC	Pond 2, NEC

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SOURCE: Converse, 1988

TABLE C-1
HISTORICAL SUMMARY OF SOIL AND SEDIMENT SAMPLING
BASE/NEUTRAL and ACID (SEMI-VOLATILE) ORGANIC COMPOUNDS
FORMER MONTROSE FACILITY
HENDERSON, NEVADA
SECOR JOB NO. M0071-001-01

SAMPLE NUMBER	SE-1	SB-1	SB-2	SB-3	SB-4	SB-5	SB-6	SB-7	SB-8	SB-9	SB-10	SC-1
SAMPLE DATE	04/88	04/88	04/88	04/88	04/88	04/88	04/88	04/88	04/88	04/88	04/88	04/88
SAMPLE MEDIUM	SS	SS	SS	SS	SS	SS	SS	SS	SS	SS	SS	SS
Dimethylphthalate, mg/kg	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
2,4-Dinitrotoluene, mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2,4-Dinitrophenol, mg/kg	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
2,6-Dinitrotoluene, mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Di-n-octylphthalate, mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Diphenylhydrazine, mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Fluoranthene, mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Fluorene, mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Hexachlorobenzene, mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Hexachlorobutadiene, mg/kg	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Hexachlorocyclopentadiene, mg/kg	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Hexachloroethane, mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Indeno(1,2,3-c) pyrene, mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Isophorone, mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2-Methyl-4,6-Dinitrophenol, mg/kg	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
2-Methylnaphthalene, mg/kg	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2-Methylphenol, mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
4-Methylphenol, mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Naphthalene, mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2-Nitroaniline, mg/kg	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
3-Nitroaniline, mg/kg	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
4-Nitroaniline, mg/kg	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Nitrobenzene, mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2-Nitrophenol, mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
4-Nitrophenol, mg/kg	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
N-Nitrosodimethylamine, mg/kg	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0
N-Nitrosodi-n-propyl-amine, mg/kg	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0
N-Nitrosodiphenylamine, mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Pentachlorophenol, mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Phenanthrene, mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
SAMPLE LOCATION	0.5 Mi. SW of Ponds	Pond 5, NEC	Pond 5, NEC	Pond 5, SEC	Pond 5, South	Pond 5, SWC	Pond 5, SWC	Pond 5, NWC	Pond 5, NWC	Pond 5, North	Pond 5, NEC	Pond 2, NEC

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SOURCE: Converse, 1988

TABLE C-1
HISTORICAL SUMMARY OF SOIL AND SEDIMENT SAMPLING
BASE/NEUTRAL and ACID (SEMI-VOLATILE) ORGANIC COMPOUNDS
FORMER MONTROSE FACILITY
HENDERSON, NEVADA
SECOR JOB NO. M0071-001-01

SAMPLE NUMBER	SB-1	SB-1	SB-2	SB-3	SB-4	SB-5	SB-6	SB-7	SB-8	SB-9	SB-10	SC-1
SAMPLE DATE	04/88	04/88	04/88	04/88	04/88	04/88	04/88	04/88	04/88	04/88	04/88	04/88
SAMPLE MEDIUM	SS	SS	SS	SS	SS	SS	SS	SS	SS	SS	SS	SS
Phenol, mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Pyrene, mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2,4-Trichlorobenzene, mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2,4,5-Trichlorophenol, mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2,4,6-Trichlorophenol, mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
SAMPLE LOCATION	0.5 Mi. SW of Ponds	Pond 5, NEC	Pond 5, NEC	Pond 5, SEC	Pond 5, South	Pond 5, SWC	Pond 5, SWC	Pond 5, NWC	Pond 5, NWC	Pond 5, North	Pond 5, NEC	Pond 2, NEC

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SOURCE: Converse, 1988

TABLE C-1
HISTORICAL SUMMARY OF SOIL AND SEDIMENT SAMPLING
BASE/NEUTRAL and ACID (SEMI-VOLATILE) ORGANIC COMPOUNDS
FORMER MONTROSE FACILITY
HENDERSON, NEVADA
SECOR JOB NO. M0071-001-01

SAMPLE NUMBER	SC-2	SC-3	SC-4	SC-5	SC-6
SAMPLE DATE	04/88	04/88	04/88	04/88	04/88
SAMPLE MEDIUM	SS	SS	SS	SS	SS
Acenaphthene, mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0
Acenapthylene, mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0
Aniline, mg/kg	<2.0	<2.0	<2.0	<2.0	<2.0
Anthracene, mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0
Benzidine,mg/kg	<4.0	<4.0	<4.0	<4.0	<4.0
Benzo(a)anthracene, mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0
Benzo (a) pyrene, mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0
Benzo (b) fluoranthene, mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0
Benzo (g,h,i) perylene, mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0
Benzoic Acid, mg/kg	<5.0	<5.0	<5.0	<5.0	<5.0
Benzo (k) fluoranthene, mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0
Benzyl Alcohol, mg/kg	<2.0	<2.0	<2.0	<2.0	<2.0
Bis(2-Chloroethoxy)Methane, mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0
Bis(2-Chloroethyl)Ether, mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0
Bis (2-Chloroisopropyl)Ether, mg/k	<1.0	<1.0	<1.0	<1.0	<1.0
Bis(2-Ethylhexyl)Phthalate, mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0
4-Bromophenylphenylether, mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0
Butylbenzylphthalate, mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0
Chrysene, mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0
2-Chloronapthalene, mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0
2-Chlorophenol,1 mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0
4-Chloroaniline, mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0
4-Chlorophenylphenylether, mg/kg	<2.0	<2.0	<2.0	<2.0	<2.0
4-Chloro-3-Methylphenol, mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0
Dibenzo(a,h)anthracene, mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0
Dibenzofuran, mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0
Dibutylphthalate, mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0
3,3'-Dichlorobenzidine, mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0
2,4-Dichlorophenol,mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0
Diethylphthalate, mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0
2,4-Dimethylphenol, mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0
SAMPLE LOCATION	Pond 2, East	Pond 2, SEC	Pond 2, SWC	Pond 2, West	Pond 2, NWC

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SOURCE: Converse, 1988

TABLE C-1
HISTORICAL SUMMARY OF SOIL AND SEDIMENT SAMPLING
BASE/NEUTRAL and ACID (SEMI-VOLATILE) ORGANIC COMPOUNDS
FORMER MONTROSE FACILITY
HENDERSON, NEVADA
SECOR JOB NO. M0071-001-01

SAMPLE NUMBER	SC-2	SC-3	SC-4	SC-5	SC-6
SAMPLE DATE	04/88	04/88	04/88	04/88	04/88
SAMPLE MEDIUM	SS	SS	SS	SS	SS
Dimethylphthalate, mg/kg	<3.0	<3.0	<3.0	<3.0	<3.0
2,4-Dinitrotoluene, mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0
2,6-Dinitrotoluene, mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0
Di-n-octylphthalate, mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Diphenylhydrazine, mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0
Fluoranthene, mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0
Fluorene, mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0
Hexachlorobenzene, mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0
Hexachlorobutadiene, mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0
Hexachlorocyclopentadiene, mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0
Hexachloroethane, mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0
Indeno(1,2,3-c) pyrene, mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0
Isophorone, mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0
2-Methyl-4,6-Dinitrophenol,mg/kg	<5.0	<5.0	<5.0	<5.0	<5.0
2-Methylnaphthalene, mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0
2-Methylphenol, mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0
4-Methylphenol, mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0
Naphthalene, mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0
2-Nitroaniline, mg/kg	<5.0	<5.0	<5.0	<5.0	<5.0
3-Nitroaniline, mg/kg	<5.0	<5.0	<5.0	<5.0	<5.0
4-Nitroaniline, mg/kg	<5.0	<5.0	<5.0	<5.0	<5.0
Nitrobenzene, mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0
2-Nitrophenol, mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0
4-Nitrophenol, mg/kg	<3.0	<3.0	<3.0	<3.0	<3.0
N-Nitrosodimethylamine, mg/kg	<8.0	<8.0	<8.0	<8.0	<8.0
N-Nitrosodi-n-propyl-amine, mg/kg	<4.0	<4.0	<4.0	<4.0	<4.0
N-Nitrosodiphenylamine,mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0
Pentachlorophenol, mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0
Phenanthrene, mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0
SAMPLE LOCATION	Pond 2, East	Pond 2, SEC	Pond 2, SWC	Pond 2, West	Pond 2, NWC

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SOURCE: Converse, 1988

TABLE C-1
HISTORICAL SUMMARY OF SOIL AND SEDIMENT SAMPLING
BASE/NEUTRAL and ACID (SEMI-VOLATILE) ORGANIC COMPOUNDS
FORMER MONTROSE FACILITY
HENDERSON, NEVADA
SECOR JOB NO. M0071-001-01

SAMPLE NUMBER	SC-2	SC-3	SC-4	SC-5	SC-6
SAMPLE DATE	04/88	04/88	04/88	04/88	04/88
SAMPLE MEDIUM	SS	SS	SS	SS	SS
Phenol, mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0
Pyrene, mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0
1,2,4-Trichlorobenzene, mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0
2,4,5-Trichlorophenol, mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0
2,4,6-Trichlorophenol,mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0
SAMPLE LOCATION	Pond 2, East	Pond 2, SEC	Pond 2, SWC	West	Pond 2, NWC

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SOURCE: Converse, 1988

TABLE C-1

HISTORICAL SUMMARY OF SOIL AND SEDIMENT SAMPLING
BASE/NEUTRAL and ACID (SEMI-VOLATILE) ORGANIC COMPOUNDS
FORMER MONTROSE FACILITY
HENDERSON, NEVADA
SECOR JOB NO. M0071-001-01

SAMPLE NUMBER	1	2	3	4	14	15	16	17	14A-1	14B-1	14C-1	14D-1
SAMPLE DATE	12/84	12/84	12/84	12/84	12/84	12/84	12/84	12/84	06/85	06/85	06/85	06/85
SAMPLE MEDIUM	SS	SS	SS	SS	SS/SED	SS/SED	SS/SED	SS/SED	SS	SS	SS	SS
Acenaphthylene, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Acenaphthylene, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Aniline, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Aniline, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Anthracene, mg/kg	N/D	N/A	N/A	N/A	N/A	N/A	N/D	N/A	N/A	N/A	N/D	N/D
Benzidine,mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Benzo(a)anthracene, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/D	N/A	N/A	N/A	N/D	N/D
Benzo (a) pyrene, mg/kg	2.7TR	N/A	N/A	N/A	N/A	N/A	N/D	N/A	N/A	N/A	N/D	N/D
Benzo (b) fluoranthene, mg/kg	N/D	N/A	N/A	N/A	N/A	N/A	N/D	N/A	N/A	N/A	N/A	N/A
Benzo (g,h,i) perylene, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/D	N/A	N/A	N/A	N/A	N/A
Benzoic Acid, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/D	N/A	N/A	N/A	N/A	N/A
Benzo (k) fluoranthene, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Benzyl Alcohol, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Bis(2-Chloroethoxy)Methane, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Bis(2-Chloroethyl)Ether, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Bis (2-Chloroisopropyl)Ether, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Bis (2-Ethylhexyl)Phthalate, mg/kg	N/D	N/A	N/A	N/A	N/A	N/A	N/D	N/A	N/A	N/A	N/A	N/A
4-Bromophenylphenylether, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Butylbenzylphthalate, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Chrysene, mg/kg	N/D	N/A	N/A	N/A	N/A	N/A	N/D	N/A	N/A	N/A	N/A	N/A
2-Chloronapthalene, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2-Chlorophenol,l mg/kg	N/D	N/A	N/A	N/A	N/A	N/A	N/D	N/A	N/A	N/A	N/A	N/A
4-Chloroaniline, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
4-Chlorophenylphenylether, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
4-Chloro-3-Methylphenol, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dibenzo(a,h)anthracene, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dibenzofuran, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dibutylphthalate, mg/kg	N/D	N/A	N/A	N/A	N/A	N/A	N/D	N/A	N/A	N/A	N/A	N/A
3,3'-Dichlorobenzidine, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2,4-Dichlorophenol,mg/kg	N/D	N/A	N/A	N/A	N/A	N/A	N/D	N/A	N/A	N/A	N/A	N/A
Diethylphthalate, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2,4-Dimethylphenol, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
SAMPLE LOCATION	MCCC Plant, SWC	MCCC Plant, NW	MCCC Plant, NWC	MCCC Plant, SEC	Pond 6, East	Pond 1, 200 FT. West	Pond 3, 300 FT. West	Pond 6, West	Pond 5, East	Pond 4, East	Pond 3, East	Pond 2, East

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SOURCE: Converse, 1988

TABLE C-1
HISTORICAL SUMMARY OF SOIL AND SEDIMENT SAMPLING
BASE/NEUTRAL and ACID (SEMI-VOLATILE) ORGANIC COMPOUNDS
FORMER MONTROSE FACILITY
HENDERSON, NEVADA
SECOR JOB NO. M0071-001-01

SAMPLE NUMBER	1	2	3	4	14	15	16	17	14A-1	14B-1	14C-1	14D-1
SAMPLE DATE	12/84	12/84	12/84	12/84	12/84	12/84	12/84	12/84	0685	0685	0685	0685
SAMPLE MEDIUM	SS	SS	SS	SS	SS/SED	SS/SED	SS/SED	SS/SED	SS	SS	SS	SS
Dimethylphthalate, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2,4-Dinitrotoluene, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2,4-Dinitrophenol, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2,6-Dinitrotoluene, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Di-n-octylphthalate, mg/kg	N/D	N/A	N/A	N/A	N/A	N/A	N/D	N/A	N/A	N/A	N/A	N/A
1,2-Diphenylhydrazine, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Fluoranthene, mg/kg	N/D	N/A	N/A	N/A	N/A	N/A	N/D	N/A	N/A	N/A	N/A	N/A
Fluorene, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Hexachlorobenzene, mg/kg	3.6TR	N/A	N/A	N/A	N/A	N/A	N/D	N/A	N/A	N/A	N/A	N/A
Hexachlorobutadiene, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Hexachlorocyclopentadiene, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Hexachloroethane, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Indeno(1,2,3-c) pyrene, mg/kg	N/D	N/A	N/A	N/A	N/A	N/A	N/D	N/A	N/A	N/A	N/A	N/A
Isophorone, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2-Methyl-4,6-Dinitrophenol,mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2-Methylnaphthalene, mg/kg	N/D	N/A	N/A	N/A	N/A	N/A	N/D	N/A	N/A	N/A	N/A	N/A
2-Methylphenol, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
4-Methylphenol, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Naphthalene, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2-Nitroaniline, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
3-Nitroaniline, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
4-Nitroaniline, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Nitrobenzene, mg/kg	N/D	N/A	N/A	N/A	N/A	N/A	N/D	N/A	N/A	N/A	N/A	N/A
2-Nitrophenol, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
4-Nitrophenol, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N-Nitrosodimethylamine, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N-Nitrosodi-n-propyl-amine, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N-Nitrosodiphenylamine,mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Pentachlorophenol, mg/kg	N/D	N/A	N/A	N/A	N/A	N/A	N/D	N/A	N/A	N/A	N/A	N/A
Phenanthrene, mg/kg	N/D	N/A	N/A	N/A	N/A	N/A	N/D	N/A	N/A	N/A	N/A	N/A
SAMPLE LOCATION	MCCC Plant, SWC	MCCC Plant, NW	MCCC Plant, NWC	MCCC Plant, SEC	Pond 6, East	Pond 1, 200 FT. West	Pond 3, 300 FT. West	Pond 6, West	Pond 5, East	Pond 4, East	Pond 3, East	Pond 2, East

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SOURCE: Converse, 1988

TABLE C-1

HISTORICAL SUMMARY OF SOIL AND SEDIMENT SAMPLING
BASE/NEUTRAL and ACID (SEMI-VOLATILE) ORGANIC COMPOUNDS
FORMER MONTROSE FACILITY
HENDERSON, NEVADA
SECOR JOB NO. M0071-001-01

SAMPLE NUMBER	1	2	3	4	14	15	16	17	14A-1	14B-1	14C-1	14D-1
SAMPLE DATE	12/84	12/84	12/84	12/84	12/84	12/84	12/84	12/84	06/85	06/85	06/85	06/85
SAMPLE MEDIUM	SS	SS	SS	SS	SS/SED	SS/SED	SS/SED	SS/SED	SS	SS	SS	SS
Phenol, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Pyrene, mg/kg	N/D	N/A	N/A	N/A	N/A	N/A	N/D	N/A	N/A	N/A	N/A	N/A
1,2,4-Trichlorobenzene, mg/kg	N/D	N/A	N/A	N/A	N/A	N/A	N/D	N/A	N/A	N/A	N/A	N/A
2,4,5-Trichlorophenol, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2,4,6-Trichlorophenol, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
SAMPLE LOCATION	MCCC Plant, SWC	MCCC Plant, NW	MCCC Plant, NWC	MCCC Plant, SEC	Pond 6, East	Pond 1, 200 FT. West	Pond 3, 200 FT. West	Pond 6, West	Pond 5, East	Pond 4, East	Pond 3, East	Pond 2, East

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SOURCE: Converse, 1988

TABLE C-1
HISTORICAL SUMMARY OF SOIL AND SEDIMENT SAMPLING
BASE/NEUTRAL and ACID (SEMI-VOLATILE) ORGANIC COMPOUNDS
FORMER MONTROSE FACILITY
HENDERSON, NEVADA
SECOR JOB NO. M0071-001-01

SAMPLE NUMBER	14E-1	14F-1	14F-1	3A-4	3A-5	3A-6
SAMPLE DATE	06/85	06/85	06/85	06/85	06/85	06/85
SAMPLE MEDIUM	SS	SS	SubS	SS/SED	SS/SED	SS/SED
Acenaphthene, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A
Acenapthylene, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A
Aniline, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A
Anthracene, mg/kg	N/A	N/D	N/D	N/D	N/A	N/A
Benzidine,mg/kg	N/A	N/A	N/A	N/A	N/A	N/A
Benzo(a)anthracene, mg/kg	N/A	N/D	N/D	N/D	N/A	N/A
Benzo (a) pyrene, mg/kg	N/A	N/D	N/D	N/D	N/A	N/A
Benzo (b) fluoranthene, mg/kg	N/A	N/D	N/D	N/D	N/A	N/A
Benzo (g,h,i) perylene, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A
Benzoic Acid, mg/kg	N/A	N/D	260	N/D	N/A	N/A
Benzo (k) fluornathene, mg/kg	N/A	N/D	N/D	N/D	N/A	N/A
Benzyl Alcohol, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A
Bis(2-Chloroethoxy)Methane, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A
Bis(2-Chloroethyl)Ether, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A
Bis (2-Chloroisopropyl)Ether, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A
Bis (2-Ethylhexyl)Phthalate, mg/kg	N/A	N/D	N/D	N/D	N/A	N/A
4-Bromophenylphenylether, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A
Butylbenzylphthalate, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A
Chrysene, mg/kg	N/A	N/D	N/D	N/D	N/A	N/A
2-Chloronapthalene, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A
2-Chlorophenol,l mg/kg	N/A	N/D	N/D	N/D	N/A	N/A
4-Chloroaniline, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A
4-Chlorophenylphenylether, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A
4-Chloro-3-Methylphenol, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A
Dibenzo(a,h)anthracene, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A
Dibenzofuran, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A
Dibutylphthalate, mg/kg	N/A	N/D	N/D	N/D	N/A	N/A
3,3'-Dichlorobenzidine, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A
2,4-Dichlorophenol,mg/kg	N/A	N/D	N/D	N/D	N/A	N/A
Diethylphthalate, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A
2,4-Dimethylphenol, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A
SAMPLE LOCATION	Pond 1, East	Tank Farm SEC	Tank Farm SEC	Pond 1, 200 FT. SW	Pond 3, 250 FT. West	Pond 4, 300 FT. NW

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SOURCE: Converse, 1988

TABLE C-1
HISTORICAL SUMMARY OF SOIL AND SEDIMENT SAMPLING
BASE/NEUTRAL and ACID (SEMI-VOLATILE) ORGANIC COMPOUNDS
FORMER MONTROSE FACILITY
HENDERSON, NEVADA
SECOR JOB NO. M0071-001-01

SAMPLE NO.	14E-1	14F-1	14F-1	3A-4	3A-5	3A-6
SAMPLE DATE	06/85	06/85	06/85	06/85	06/85	06/85
SAMPLE MEDIUM	SS	SS	SubS	SS/SED	SS/SED	SS/SED
Dimethylphthalate, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A
2,4-Dinitrotoluene, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A
2,4-Dinitrophenol, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A
2,6-Dinitrotoluene, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A
Di-n-octylphthalate, mg/kg	N/A	N/D	N/D	N/D	N/A	N/A
1,2-Diphenylhydrazine, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A
Fluoranthene, mg/kg	N/A	N/D	N/D	ND	N/A	N/A
Fluorene, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A
Hexachlorobenzene, mg/kg	N/A	N/D	N/D	N/D	N/A	N/A
Hexachlorobutadiene, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A
Hexachlorocyclopentadiene, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A
Hexachloroethane, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A
Indeno(1,2,3-c) pyrene, mg/kg	N/A	N/D	N/D	N/D	N/A	N/A
Isophorone, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A
2-Methyl-4,6-Dinitrophenol,mg/kg	N/A	N/A	N/A	N/A	N/A	N/A
2-Methylnaphthalene, mg/kg	N/A	N/D	N/D	N/D	N/A	N/A
2-Methylphenol, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A
4-Methylphenol, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A
Naphthalene, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A
2-Nitroaniline, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A
3-Nitroaniline, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A
4-Nitroaniline, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A
Nitrobenzene, mg/kg	N/A	N/D	N/D	N/D	N/A	N/A
2-Nitrophenol, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A
4-Nitrophenol, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A
N-Nitrosodimethylamine, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A
N-Nitrosodi-n-propyl-amine, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A
N-Nitrosodiphenylamine,mg/kg	N/A	N/A	N/A	N/A	N/A	N/A
Pentachlorophenol, mg/kg	N/A	N/D	N/D	N/D	N/A	N/A
Phenanthrene, mg/kg	N/A	N/D	N/D	N/D	N/A	N/A
SAMPLE LOCATION	Pond 1, East	Tank Farm, SEC	Tank Farm, SEC	Pond 1, 200 FT. SW	Pond 3, 250 FT. W	Pond 4, 300 FT.NW

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SOURCE: Converse, 1988

TABLE C-1
HISTORICAL SUMMARY OF SOIL AND SEDIMENT SAMPLING
BASE/NEUTRAL and ACID (SEMI-VOLATILE) ORGANIC COMPOUNDS
FORMER MONTROSE FACILITY
HENDERSON, NEVADA
SECOR JOB NO. M0071-001-01

SAMPLE NO.	14E-1	14F-1	14F-1	3A-4	3A-5	3A-6
SAMPLE DATE	06/85	06/85	06/85	06/85	06/85	06/85
SAMPLE MEDIUM	SS	SS	SubS	SS/SED	SS/SED	SS/SED
Phenol, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A
Pyrene, mg/kg	N/A	N/D	N/D	N/D	N/A	N/A
1,2,4-Trichlorobenzene, mg/kg	N/A	N/D	N/D	N/D	N/A	N/A
2,4,5-Trichlorophenol, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A
2,4,6-Trichlorophenol, mg/kg	N/A	N/A	N/A	N/A	N/A	N/A
SAMPLE LOCATION	Pond 1, East	Tank Farm, SEC	Tank Farm, SEC	Pond 1, 200 FT. SW	Pond 3, 250 FT. W	Pond 4, 300 FT.NW

f:\pr171\0101th4A.xls

SOURCE: Converse, 1988

TABLE C-2
Summary of Soil Physical Property Results
Former Montrose Closed Ponds Area, Henderson, Nevada

Sample ID	"Water-Bearing Zone"	"Underlying Sediments"
Sample Depth	50 - 60 feet bgs	70 feet bgs
Moisture Content	32%	65%
Dry Density	89 lbs. per cubic foot	56 lbs. per cubic foot
Specific Gravity	2.59	2.55
Total Organic Carbon (TOC)	<0.07%	<0.05%
Soil Type	SAND with Silt and Gravel	SILT with Sand and Gravel

Source: SECOR, 1997. Phase II Environmental Conditions Investigation, Henderson, Nevada

TABLE C-3
Summary of Soil Physical Properties
Montrose Site Assessment Areas

			Former Tank Farm													Closed Pond 6				
Analysis	**Parameter**	**Location**	**FTF-30**				**FTF-36**					**FTF-39**				**CPA-13**	**CPA-13**	**CPA-13**	**CPA-14A**	**CPA-15A**
		Sample Depth (ft bgs)	**5**	**10**	**20**	**40**	**5**	**10**	**20**	**30**	**40**	**5**	**10**	**20**	**40**	**10**	**20**	**40**	**10**	**10**
		Date	2/16/10	2/16/10	2/16/10	2/17/10	2/23/10	2/23/10	2/23/10	2/23/10	2/23/10	2/17/10	2/17/10	2/17/10	2/17/10	2/1/10	2/1/10	2/1/10	2/1/10	1/26/10
		Units																		
Specific Gravity by ASTM D854	Specific Gravity at 20' Celsius	unitless	2.67	2.68	2.63	2.68	2.74	2.71	2.67	2.69	2.7	2.72	2.7	2.68	2.7	2.64	2.66	2.71	2.65	2.63
Bulk Density by ASTM D2937	Dry Bulk Density	g/cc	1.82	1.64	1.87	1.37	1.64	1.57	1.53	1.5	1.22	1.67	1.69	1.84	1.35	1.99	1.85	1.85	1.83	1.99
Particle Size Summary by ASTM D422	USCS Description	unitless	Coarse Sand	Medium	Coarse Sand	Fine Sand	Medium Sand	Medium Sand	Medium Sand	Medium Sand	Silt	Medium Sand	Medium Sand	Medium Sand	Silt	Gravel	Medium Sand	Silt	Coarse Sand	Medium Sand
	Median Grain Size	mm	3.435	1.854	2.084	0.118	1.787	0.769	0.641	0.498	0.070	1.917	0.871	0.585	0.037	13.251	1.247	0.057	2.11	1.866
	Gravel	%	44.8	34.6	20.6	1.8	31.0	18.5	22.3	7.6	30.8	23.8	16.0	7.6	1.7	70.8	23.3	0.05	28.5	20.3
	Coarse Sand	%	13.9	14.7	30.9	9.4	17.4	19.1	13.4	24.4	9.9	25.6	20.4	24.6	12.0	5.1	20	5	22.9	28.6
	Medium Sand	%	12.6	14.0	18.9	17.3	20.3	19.7	20.0	20.0	2.3	20.3	23.6	21.8	5.2	4.6	21	4.6	17.8	22.1
	Fine Sand	%	12.4	14.3	11.3	33.2	16.5	18.5	23.3	17.7	6.3	14.6	20.1	17.4	15.4	7.2	16.6	20.9	14.3	13
	Silt/Clay	%	16.3	22.4	18.4	38.3	14.8	24.2	21.1	30.4	50.6	15.8	19.9	28.6	65.7	12.3	19.1	69	16.5	16
Moisture Content by ASTM D2216	Moisture Content	% weight	4.8	5.6	3.8	33.2	7.4	9.8	9.4	9.6	37.1	8.7	8.5	7.5	36.0	6.3	5.4	9.1	5.3	4.2
	Volumetric Moisture Content	fraction bulk volume	0.087	0.092	0.07	0.457	0.121	0.154	0.144	0.143	0.453	0.146	0.144	0.139	0.488	0.126	0.101	0.169	0.097	0.083

Notes:

ASTM	American Society for Testing and Materials
ft bgs	feet below ground surface
g/cc	grams per cubic centimeter
mm	millimeters
%	percent
USCS	Unified Soil Classification System

APPENDIX D

BORING LOGS

Logged by:	Date Drilled:	Drilling Contractor:		
Brian K. Loffman	10/05/99	Eagle Drilling Services	Hollow Stem Auger B-90	SB-1

See "Legend to Logs" for sampling method, classifications and laboratory test methods.	Boring Diam. (in.):	Top of Casing Elev. (ft.):	Groundwater Depth. (ft.):	Total Depth (ft.):	Drive Weight (lbs.):	Drop Dist. (in.):
	8"	n/a	∇ ~ 56.00	70	140	30

Well Construction	Depth (ft.)	Sample Type	Blows/6"	Description	OVM Reading (ppmv)	Analysis	Sample No.
				Bare Soil Cover Sands/Gravels			
	5		14-19 21	Gravelly SAND (SW), with some silt, dry, moderate yellowish brown (10YR 5/4), medium dense, no odor or staining – increasing gravel and size	0		
Cement	10		38 50/5"	Clayey SAND (SC), with some gravels, dry, moderate brown (10YR 6/2), very stiff, no odor or staining	0		
	15		50/4"	Silty SAND (SM), with gravels, dry, moderate yellowish brown (10YR 5/4), dense, no odor or staining	0		
	20		50/5"	Gravelly SAND (SW), with trace silt, damp, moderate yellowish brown (10YR 5/4), very dense, no odor or staining Continued next page	0		

The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.

SECOR INTERNATIONAL INCORPORATED
1515 EAST TROPICANA
LAS VEGAS, NEVADA 89119

LOG OF BORING

Montrose Chemical Corporation of California
Former Henderson, Nevada Facility

FIGURE: 1
DATE: 10/05/99
PROJECT NO: 016.09826

boringlog

Brian K. Loffman	10/05/99	Eagle Drilling Services	Hollow Stem Auger B-90	SB-1

See "Legend to Logs" for sampling method, classifications and laboratory test methods.	Boring Diam. (in.):	Top of Casing Elev. (ft.):	Groundwater Depth (ft.):	Total Depth (ft.):	Drive Weight (lbs.):	Drop Dist. (in.):
	8"	n/a	∇ ~ 56.00	70	140	30

Well Construction	Depth (ft.)	Sample Type	Blows/6"	Description	OVM Reading (ppmv)	Analysis	Sample No.
Cement	25		20-24 29	Sandy CLAY (CL), with trace gravel, damp, moderate brown (5YR 4/4), very stiff, no odor or staining	0		
	30		21-28 32	CLAY (CL), with some sand, damp, moderate brown (5YR 4/4), very stiff, no odor or staining	0		
	35		10-12 13	CLAY (CL), with trace sand and gravels, damp moderate brown (5YR 4/4), very stiff, no odor or staining	0		
	40		12-14 17	Increasing sand and gravel (10%/10%) Increase in moisture content no odor or staining	0		
	45		9-9 11	CLAY (CL), with some gravel, moist, moderate yellowish brown (10YR 5/4), stiff, no odor or staining	0		

Continued next page

The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.

SECOR INTERNATIONAL INCORPORATED
1515 EAST TROPICANA
LAS VEGAS, NEVADA 89119

LOG OF BORING

Montrose Chemical Corporation of California
Former Henderson, Nevada Facility
LAS VEGAS, NEVADA

FIGURE: 1
DATE: 10/05/99
PROJECT NO: 016.09826

boringlog

Logged by:	Date Drilled:	Drilling Contractor:		
Brian K. Loffman	10/05/99	Eagle Drilling Services	Hollow Stem Auger B-90	SB-1

See "Legend to Logs" for sampling method, classifications and laboratory test methods.	Boring Diam. (in.):	Top of Casing Elev. (ft.):	Groundwater Depth (ft.):	Total Depth (ft.):	Drive Weight (lbs.):	Drop Dist. (in.):
	8"	n/a	▽ ~ 56.00	70	140	30

Well Construction	Depth (ft.)	Sample Type	Blows/6"	Description	OVM Reading (ppmv)	Analysis	Sample No.
	50		19-24 50/4"	Sandy GRAVEL (GW), with some clay, moist, moderate brown (5YR 4/4), dense, no odor or staining	0		
	55 ▽		24-22 39	CLAY (CL), with some gravel, moist, moderate brown (5YR 4/4), very stiff, moderate odor and no staining	579		
Bentonite	60		24-39 63	CLAY (CL), with cemented nodules, moist, moderate yellowish brown (10YR 5/4), hard, faint odor and no staining	152		
			21-28 22-24	Clayey SAND (SC), with gravels, moist, moderate brown (5YR 4/4), med. dense, no odor or staining	119		
	65		19-17 27-17	CLAY (CL), with trace silt, moist, moderate brown (5YR 4/4), very stiff, no odor or staining	48		
			11-12 19-17	CLAY (CL), with trace gravels, moist, moderate brown (5YR 4/4), very stiff, no odor or staining	52		
			22-27 32-24	- trace gravels	40		
	70			Terminated boring at 70-bgs.			

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SECOR INTERNATIONAL INCORPORATED
1515 EAST TROPICANA
LAS VEGAS, NEVADA 89119

LOG OF BORING

Montrose Chemical Corporation of California
Former Henderson, Nevada Facility
LAS VEGAS, NEVADA

FIGURE: 1
DATE: 10/05/99
PROJECT NO: 018.09826

boringlog

Logged by:	Date Drilled:	Drilling Contractor:	Drilling Equipment:	
Brian K. Loffman	10/05/99	Eagle Drilling Services	Hollow Stem Auger B-90	SB-2

See "Legend to Logs" for sampling method, classifications and laboratory test methods.	Boring Diam. (in.):	Top of Casing Elev. (ft.):	Groundwater Depth (ft.):	Total Depth (ft.):	Drive Weight (lbs.):	Drop Dist. (in.):
	8"	n/a	∇ ~ 56.00	70	140	30

Well Construction	Depth (ft.)	Sample Type	Blows/6"	Description	OVM Reading (ppmv)	Analysis	Sample No.
				Bare Soil Cover Sands/Gravels			
	5		28-28	Sandy Gravel (GW), with some silt, dry, pale yellowish brown (10YR 6/2), med. dense, no odor or staining	0		
Cement	10		50/5"	Gravelly SAND (SW), with some silt, dry, pale yellowish brown (10YR 6/2), very dense, no odor or staining	0		
	15		19-31 34	Gravelly SAND (SW), with some silt, dry, pale yellowish brown (10YR 6/2), dense, no odor or staining	0		
	20		19-24 50/5"	SAND (SP), with some gravel, dry, pale yellowish brown (10YR 6/2), very dense, no odor or staining	0		
				Continued next page			

The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.

SECOR INTERNATIONAL INCORPORATED
1515 EAST TROPICANA
LAS VEGAS, NEVADA 89119

LOG OF BORING

Montrose Chemical Corporation of California
Former Henderson, Nevada Facility
LAS VEGAS, NEVADA

FIGURE: 2
DATE: 10/05/99
PROJECT NO: 018.09826

boringlog

Logged by:	Date Drilled:	Drilling Co.	Drilling Method	Boring No.
Brian K. Loffman	10/05/99	Eagle Drilling Services	Hollow Stem Auger B-90	SB-2

See "Legend to Logs" for sampling method, classifications and laboratory test methods.	Boring Diam. (in.):	Top of Casing Elev. (ft.):	Groundwater Depth (ft.):	Total Depth (ft.):	Drive Weight (lbs.):	Drop Dist. (in.):
	8"	n/a	~ 56.00	70	140	30

Well Construction	Depth (ft.)	Sample Type	Blows/6"	Description	OVM Reading (ppmv)	Analysis	Sample No.
	25		14-18 31	Clayey SAND (SC), with some gravel, dry, pale yellowish brown (10YR 6/2), med. dense, no odor or staining	0		
	30		50/5"	Clayey SAND (SC), with some gravel, dry, pale yellowish brown (10YR 6/2), very dense, no odor or staining	0		
Cement	35		19-23 50/5"	Sandy CLAY (CL), with trace gravels, dry, moderate brown (5YR 4/4), very stiff, no odor or staining	0		
	40		50/6"	- decreasing sand	0		
	45		15-19 22	CLAY (CL), with trace fine sand, damp, moderate brown (5YR 4/4), medium dense, no odor or staining	0		

Continued next page

The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.

SECOR INTERNATIONAL INCORPORATED
1515 EAST TROPICANA
LAS VEGAS, NEVADA 89119

LOG OF BORING

Montrose Chemical Corporation of California
Former Henderson, Nevada Facility
LAS VEGAS, NEVADA

FIGURE: 2
DATE: 10/05/99
PROJECT NO: 018.09826

Logged by:	Date Drilled:	Drilling Contractor:	Drilling Equipment:	
Brian K. Loffman	10/05/99	Eagle Drilling Services	Hollow Stem Auger B-90	SB-2

See "Legend to Logs" for sampling method, classifications and laboratory test methods.	Boring Diam. (in.):	Top of Casing Elev. (ft.):	Groundwater Depth (ft.):	Total Depth (ft.):	Drive Weight (lbs.):	Drop Dist. (in.):
	8"	n/a	▽ ~ 56.00	70	140	30

Well Construction	Depth (ft.)	Sample Type	Blows/6"	Description	OVM Reading (ppmv)	Analysis	Sample No.
	50		13-15 26-37	– Increasing moisture	0		
			21-36 43-53	Sandy CLAY (CL), moist, moderate brown (5YR 4/4), dense, no odor or staining	0		
			23-27	– no sample recovery			
	55 ▽		33-37 39-39	Sandy GRAVEL (GW), with trace silt, wet, pale yellowish brown (10YR 6/2), dense, no odor or staining	0		
			17-28 22-21	Sandy CLAY (CL), trace gravels, moist, moderate brown (5YR 4/4), very stiff, no odor or staining	0		
Bentonite	60						
	65		27- 50/4"	Clayey SAND (SC), with trace gravels, damp, moderate brown (5YR 4/4), very dense, no odor or staining	0		
	70		16-24 35	– decreasing sand	0		
				Terminated boring at 70-bgs.			

The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.

SECOR INTERNATIONAL INCORPORATED
1515 EAST TROPICANA
LAS VEGAS, NEVADA 89119

LOG OF BORING

Montrose Chemical Corporation of California
Former henderson, Nevada Facility
LAS VEGAS, NEVADA

FIGURE: 2
DATE: 10/05/99
PROJECT NO: 018.09826

boringlog

Brian K. Loffman	10/06/99	Eagle Drilling Services	Hollow Stem Auger B-90	SB-3

See "Legend to Logs" for sampling method, classifications and laboratory test methods.	Boring Diam. (in.):	Top of Casing Elev. (ft.):	Groundwater Depth (ft.):	Total Depth (ft.):	Drive Weight (lbs.):	Drop Dist. (in.):
	8"	n/a	∇ ~ 57.00	70	140	30

Well Construction	Depth (ft.)	Sample Type	Blows/6"	Description	OVM Reading (ppmv)	Analysis	Sample No.
				Bare Soil Cover Sands/Gravels			
	5		50/6"	Silty SAND (SM), with gravel, damp, dark yellowish brown (10YR 4/2), very dense, no odor or staining	0		
Cement	10		42 50/3"	Gravelly SAND (GW), with trace silt, dry, moderate yellowish brown (10YR 5/4), very dense, no odor or staining	0		
	15		41-36 33	Silty SAND (SM), with some gravels, dry, pale yellowish brown (10YR 6/2), dense, no odor or staining	0		
	20		39 50/5"	Gravelly SAND (GW), with some silt, dry, pale yellowish brown (10YR 6/2), very dense, no odor or staining	0		
				Continued next page			

The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.

SECOR INTERNATIONAL INCORPORATED
1515 EAST TROPICANA
LAS VEGAS, NEVADA 89119

LOG OF BORING

Montrose Chemical Corporation of California
Former Henderson, Nevada Facility
LAS VEGAS, NEVADA

FIGURE: 3
DATE: 10/06/99
PROJECT NO: 018.09826

boringlog

Brian K. Loffman	10/06/99	Eagle Drilling Services	Hollow Stem Auger B-90	SB-3

See "Legend to Logs" for sampling method, classifications and laboratory test methods.	Boring Diam. (in.):	Top of Casing Elev. (ft.):	Groundwater Depth (ft.):	Total Depth (ft.):	Drive Weight (lbs.):	Drop Dist. (in.):
	8"	n/a	∇ ~ 57.00	70	140	30

Well Construction	Depth (ft.)	Sample Type	Blows/6"	Description	OVM Reading (ppmv)	Analysis	Sample No.
	25		38 50/6"	Clayey SAND (SC), with some gravel, dry, very pale orange (10YR 8/2), very dense, no odor or staining	0		
	30		19-31 46	CLAY (CL), with some sand, damp, moderate brown (5YR 4/4), dense, no odor or staining	0		
Cement	35		19-22 29	Sandy CLAY (CL), with trace gravels, damp, moderate brown (5YR 4/4), very stiff, no odor or staining	0		
	40		17-21 32	- increasing sand	0		
	45		17-21 39	Sandy CLAY (CL), damp, moderate brown (5YR 4/4), very stiff, no odor or staining	0		

Continued next page

The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.

SECOR INTERNATIONAL INCORPORATED
1515 EAST TROPICANA
LAS VEGAS, NEVADA 89119

LOG OF BORING

Montrose Chemical Corporation of California
Former Henderson, Nevada Facility
LAS VEGAS, NEVADA

FIGURE: 3
DATE: 10/06/99
PROJECT NO: 018.09826

boringlog

Logged by:	Date Drilled:	Drilling Co.	Drilling Method	Boring No.
Brian K. Loffman	10/06/99	Eagle Drilling Services	Hollow Stem Auger B-90	SB-3

See "Legend to Logs" for sampling method, classifications and laboratory test methods.	Boring Diam. (in.):	Top of Casing Elev. (ft.):	Groundwater Depth (ft.):	Total Depth (ft.):	Drive Weight (lbs.):	Drop Dist. (in.):
	8"	n/a	▽ ~ 57.00	70	140	30

Well Construction	Depth (ft.)	Sample Type	Blows/6"	Description	OVM Reading (ppmv)	Analysis	Sample No.
	50		13-12 32-38	- decreasing sand	0		
			12-19 31-35	Sandy CLAY (CL), moist, moderate brown (5YR 4/4), very stiff, no odor or staining	0		
	55		21-29 32-41	- increasing sand, trace gravels, moist	0		
	▽		29-31 28-40	Sandy GRAVEL (GW), with some silt, wet, pale yellowish brown (10YR 6/2), dense, no odor or staining	0		
			19-21 17-19	Sandy CLAY (CL), trace gravels, moist, moderate brown (5YR 4/4), very stiff, no odor or staining	0		
Bentonite	60						
	65		19-24 40	CLAY (CL), with some sand and trace gravel, damp, moderate brown (5YR 4/4), dense, no odor or staining	0		
	70		21-22 39	- decreasing sand	0		
				Terminated boring at 70-bgs.			

The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.

SECOR INTERNATIONAL INCORPORATED
1515 EAST TROPICANA
LAS VEGAS, NEVADA 89119

LOG OF BORING

Montrose Chemical Corporation of California
Former Henderson, Nevada Facility
LAS VEGAS, NEVADA

FIGURE: 3
DATE: 10/06/99
PROJECT NO: 018.09828

boringlog

Logged by:	Date Drilled:	Drilling Contractor:	Method/Equipment:	Boring Number:
Brian K. Loffman	10/07/99	Eagle Drilling Services	Hollow Stem Auger B-90	SB-4

See "Legend to Logs" for sampling method, classifications and laboratory test methods.	Boring Diam. (in.):	Top of Casing Elev. (ft.):	Groundwater Depth (ft.):	Total Depth (ft.):	Drive Weight (lbs.):	Drop Dist. (in.):
	8"	n/a	▽ ~ 53.5	70	140	30

Well Construction	Depth (ft.)	Sample Type	Blows/6"	Description	OVM Reading (ppmv)	Analysis	Sample No.
				Bare Soil Cover Sands/Gravels			
	5		50/6"	– no sample recovery (gravels)	0		
Cement	10	■	35 50/3"	Gravelly SAND (SP), with some silt, dry, pale yellowish brown (10YR 6/2), very dense, no odor or staining	0		
	15	■	27 50/3"	Sandy GRAVEL (GW), with trace silt, dry, very pale orange (10YR 8/2), very dense, no odor or staining	0		
	20	■	38 50/6"	Clayey SAND (SC), with some silt, dry, pale yellowish brown (10YR 6/2), very dense, no odor or staining	0		

Continued next page

The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.

SECOR INTERNATIONAL INCORPORATED
1515 EAST TROPICANA
LAS VEGAS, NEVADA 89119

LOG OF BORING

Montrose Chemical Corporation of California
Former Henderson, Nevada Facility
LAS VEGAS, NEVADA

FIGURE: 4
DATE: 10/06/99
PROJECT NO: 018.09826

Logged by:				
Brian K. Loffman	10/07/99	Eagle Drilling Services	Hollow Stem Auger B-90	SB-4

See "Legend to Logs" for sampling method, classifications and laboratory test methods.	Boring Diam. (in.):	Top of Casing Elev. (ft.):	Groundwater Depth (ft.):	Total Depth (ft.):	Drive Weight (lbs.):	Drop Dist. (in.):
	8"	n/a	▽ ~ 53.5	70	140	30

Well Construction	Depth (ft.)	Sample Type	Blows/6"	Description	OVM Reading (ppmv)	Analysis	Sample No.
	25		47 50/6"	Gravelly SAND (SW), with some silt, dry, pale yellowish brown (10YR 6/2), very dense, no odor or staining	0		
	30		25-32 27	Clayey SAND (SC), with some gravel, dry, pale yellowish brown (10YR 6/2), medium dense, no odor or staining	0		
Cement	35		42 50/4"	Clayey SAND (SC), with some gravels, dry, pale yellowish brown (5YR 4/4), dense, no odor or staining	0		
	40		3-6 9	CLAY (CL), with trace fine sand, damp, moderate yellowish brown (10YR 5/4), firm, no odor or staining	0		
	45		7-10 16	SAND (SW), some gravels, damp, moderate brown (5YR 4/4), medium dense, no odor or staining	0		
				Continued next page			

The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.

SECOR INTERNATIONAL INCORPORATED
1515 EAST TROPICANA
LAS VEGAS, NEVADA 89119

LOG OF BORING

Montrose Chemical Corporation of California
Former Henderson, Nevada Facility
LAS VEGAS, NEVADA

FIGURE: 4
DATE: 10/06/99
PROJECT NO: 018.09826

boringlog

Logged by:	Date Drilled:	Drilling Contractor:	Method/Equipment:	Boring Number:
Brian K. Loffman	10/07/99	Eagle Drilling Services	Hollow Stem Auger B-90	SB-4

See "Legend to Logs" for sampling method, classifications and laboratory test methods.	Boring Diam. (in.):	Top of Casing Elev. (ft.):	Groundwater Depth (ft.):	Total Depth (ft.):	Drive Weight (lbs.):	Drop Dist. (in.):
	8"	n/a	~ 53.5	70	140	30

Well Construction	Depth (ft.)	Sample Type	Blows/6"	Description	OVM Reading (ppmv)	Analysis	Sample No.
	50		12-12 13-16	CLAY (CL), with some sand, damp, moderate brown (5YR 4/4), dense, no odor or staining	15		
			10-10 16-18	Sandy GRAVEL (GM), with some silt, wet, moderate brown (5YR 4/4), medium dense, no odor or staining	39		
	55		11-12 15-19	- increasing sand, trace gravels, moist	235		
			13-15 19-24	Sandy CLAY (CL), trace gravels, moist, pale yellowish brown (10YR 6/20), very stiff, faint odor, no staining	98		
			19-21 21-31	Sandy CLAY (CL), trace gravels, moist, moderate brown (5YR 4/4), very stiff, no odor or staining	63		
Bentonite	60						
	65		21-24 39	CLAY (CL), with some sand and trace gravel, damp, moderate brown (5YR 4/4), very stiff, no odor or staining	6.5		
	70		19-29 32	- increasing sand	2.6		
				Terminated boring at 70-bgs.			

The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.

SECOR INTERNATIONAL INCORPORATED
1515 EAST TROPICANA
LAS VEGAS, NEVADA 89119

LOG OF BORING

Montrose Chemical Corporation of California
Former Henderson, Nevada Facility
LAS VEGAS, NEVADA

FIGURE: 4
DATE: 10/06/99
PROJECT NO: 016.09826

boringlog

Logged by:	Date Drilled:	Drilling Contractor:	Drilling Equipment:	
Brian K. Loffman	10/07/99	Eagle Drilling Services	Hollow Stem Auger B-90	SB-5

See "Legend to Logs" for sampling method, classifications and laboratory test methods.	Boring Diam. (in.):	Top of Casing Elev. (ft.):	Groundwater Depth (ft.):	Total Depth (ft.):	Drive Weight (lbs.):	Drop Dist. (in.):
	8"	n/a	▽ ~ 54.00	70	140	30

Well Construction	Depth (ft.)	Sample Type	Blows/6"	Description	OVM Reading (ppmv)	Analysis	Sample No.
				Bare Soil Cover Sands/Gravels			
				Soil sampling and logging started at 50-feet bgs			
	5						
Cement	10						
	15						
	20						
				Continued next page			

The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.

SECOR INTERNATIONAL INCORPORATED
1515 EAST TROPICANA
LAS VEGAS, NEVADA 89119

LOG OF BORING

Montrose Chemical Corporation of California
Former Henderson, Nevada Facility

FIGURE: 5
DATE: 10/07/99
PROJECT NO: 016.09826

boringlog

Logged by:	Date Drilled:	Drilling Contractor:	Method/Equipment:	Boring Number:
Brian K. Loffman	10/07/99	Eagle Drilling Services	Hollow Stem Auger B-90	SB-5

See "Legend to Logs" for sampling method, classifications and laboratory test methods.	Boring Diam. (in.):	Top of Casing Elev. (ft.):	Groundwater Depth (ft.):	Total Depth (ft.):	Drive Weight (lbs.):	Drop Dist. (in.):
	8"	n/a	~ 54.00	70	140	30

Well Construction	Depth (ft.)	Sample Type	Blows/6"	Description	OVM Reading (ppmv)	Analysis	Sample No.
	25			Soil sampling and logging started at 50-feet bgs.			
	30						
Cement	35						
	40						
	45			Continued next page			

The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.

SECOR INTERNATIONAL INCORPORATED
1515 EAST TROPICANA
LAS VEGAS, NEVADA 89119

LOG OF BORING
Montrose Chemical Corporation of California
Former Henderson, Nevada Facility
LAS VEGAS, NEVADA

FIGURE: 5
DATE: 10/05/99
PROJECT NO: 018.09826

boringlog

Logged by:	Date Drilled:	Drilling Contractor:	Hollow Stem Auger B-90	SB-5
Brian K. Loffman	10/07/99	Eagle Drilling Services		

See "Legend to Logs" for sampling method, classifications and laboratory test methods.	Boring Diam. (in.):	Top of Casing Elev. (ft.):	Groundwater Depth (ft.):	Total Depth (ft.):	Drive Weight (lbs.):	Drop Dist. (in.):
	8"	n/a	▽ ~ 54.00	70	140	30

Well Construction	Depth (ft.)	Sample Type	Blows/6"	Description	OVM Reading (ppmv)	Analysis	Sample No.
	50		13-14 9-15	CLAY (CL), with some sand, damp, moderate brown (5YR 4/4), stiff, slight odor no staining	122		
	▽		19-21 21-22	Sandy CLAY (CL), with some silt, damp, moderate brown (5YR 4/4), stiff, heavy odor no staining	455		
	55		24-32 31-19	CLAY (CL), with gravels, moist, moderate brown (5YR 4/4), stiff, heavy odor no staining	686		
			19-16 27-22	Sandy CLAY (CL), trace gravels, moist, pale yellowish brown (10YR 6/20), very stiff, heavy odor, no staining	495		
			12-16 18-22	Sandy CLAY (CL), trace gravels, moist, moderate brown (5YR 4/4), stiff, slight odor or staining	128		
Bentonite	60						
	65		29-32 33	Sandy CLAY (CL), with trace gravel, damp, moderate brown (5YR 4/4), stiff, no odor or staining	29		
	70		19-32 39	- decreasing sand	14		
				Terminated boring at 70-bgs.			

The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.

SECOR INTERNATIONAL INCORPORATED
1515 EAST TROPICANA
LAS VEGAS, NEVADA 89119

LOG OF BORING

Montrose Chemical Corporation of California
Former Henderson, Nevada Facility
LAS VEGAS, NEVADA

FIGURE: 5
DATE: 10/06/99
PROJECT NO: 016.09626

boringlog

Logged by:	Date Drilled:	Drilling Contractor:	Method/Equipment:	Boring Number:
Brian K. Loffman	11/05/99	Eagle Drilling Services	Hollow Stem Auger B-90	SB-6

See "Legend to Logs" for sampling method, classifications and laboratory test methods.	Boring Diam. (in.):	Top of Casing Elev. (ft.):	Groundwater Depth (ft.):	Total Depth (ft.):	Drive Weight (lbs.):	Drop Dist. (in.):
	8"	n/a	∇ ~ 58.00	70	140	30

Well Construction	Depth (ft.)	Sample Type	Blows/6"	Description	OVM Reading (ppmv)	Analysis	Sample No.
				Bare Soil Cover Sands/Gravels			
	5			– contiuous sampling from 50 to 60-feet bgs			
Cement	10	■	50/3"	Gravelly SAND (SP), with some silt, dry, pale yellowish brown (10YR 6/2), very dense, no odor or staining	0		
	15			encountered large cobbles (5 to 6")			
	20			unable to sample due to cobbles broke through cobble layer at 23-feet bgs Continued next page			

The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.

SECOR INTERNATIONAL INCORPORATED
1515 EAST TROPICANA
LAS VEGAS, NEVADA 89119

LOG OF BORING

Montrose Chemical Corporation of California
Former Henderson, Nevada Facility
LAS VEGAS, NEVADA

FIGURE: 6
DATE: 10/06/99
PROJECT NO: 018.09826

boringlog

Logged by:	Date Drilled:	Drilling Contractor:	Method/Equipment:	Boring Number:
Brian K. Loffman	11/05/99	Eagle Drilling Services	Hollow Stem Auger B-90	SB-6

See "Legend to Logs" for sampling method, classifications and laboratory test methods.	Boring Diam. (in.):	Top of Casing Elev. (ft.):	Groundwater Depth (ft.):	Total Depth (ft.):	Drive Weight (lbs.):	Drop Dist. (in.):
	8"	n/a	∇ ~ 58.00	70	140	30

Well Construction	Depth (ft.)	Sample Type	Blows/6"	Description	OVM Reading (ppmv)	Analysis	Sample No.
	25						
	30		37-43 50/3"	Sandy CLAY (CL), with trace gravel, damp, moderate brown (5YR 4/4), hard, no odor or staining	0		
Cement	35						
	40		7-23 27	CLAY (CL), with fine sand, damp, moderate yellowish brown (10YR 5/4), stiff, no odor or staining	0		
	45						

Continued next page

The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.

SECOR INTERNATIONAL INCORPORATED
1515 EAST TROPICANA
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LOG OF BORING

Montrose Chemical Corporation of California
Former Henderson, Nevada Facility
LAS VEGAS, NEVADA

FIGURE: 6
DATE: 10/05/99
PROJECT NO: 018.09826

Logged by:	Date Drilled:	Drilling Contractor:	Method/Equipment:	Boring Number:
Brian K. Loffman	11/05/99	Eagle Drilling Services	Hollow Stem Auger B-90	SB-6

See "Legend to Logs" for sampling method, classifications and laboratory test methods.	Boring Diam. (in.):	Top of Casing Elev. (ft.):	Groundwater Depth (ft.):	Total Depth (ft.):	Drive Weight (lbs.):	Drop Dist. (in.):
	8"	n/a	∇ ~ 58.00	70	140	30

Well Construction	Depth (ft.)	Sample Type	Blows/6"	Description	OVM Reading (ppmv)	Analysis	Sample No.
	50		42-42	CLAY (CL), with some fine sand, damp, moderate yellowish brown (10YR 5/4), very, stiff, no odor or staining	0		
			40-40		10		
	55		45-47		93		
			45-42		155		
	∇		45-48	Sandy CLAY (CL), moist, light brown (5YR 5/6) very stiff, moderate odor no staining	148		
Bentonite	60						
	65		16-31 32	CLAY (CL), with trace sand and gravel, damp, moderate brown (5YR 4/4), very stiff, no odor or staining	14		
	70		32-26 29	CLAY (CL), with trace silt, moist, moderate brown (5YR 4/4), very stiff, no odor or staining	0		
				Terminated boring at 70-bgs.			

The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.

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1515 EAST TROPICANA
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LOG OF BORING

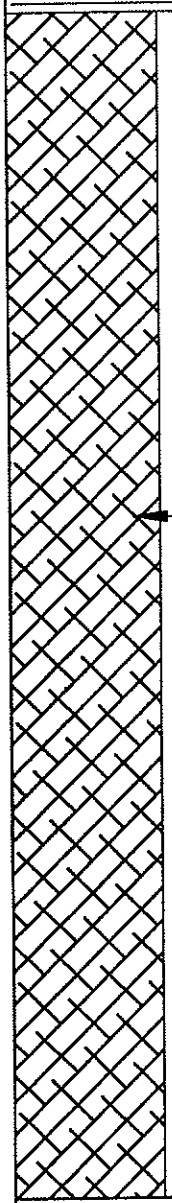
Montrose Chemical Corporation of California
Former Henderson, Nevada Facility
LAS VEGAS, NEVADA

FIGURE: 6
DATE: 10/06/99
PROJECT NO: 018.09626

beringlog

Logged by:	Date Drilled:	Drilling Contractor:	Method/Equipment:	Boring Number:
Brian K. Loffman	11/08/99	Eagle Drilling Services	Hollow Stem Auger B-90	SB-7

See "Legend to Logs" for sampling method, classifications and laboratory test methods.	Boring Diam. (in.):	Top of Casing Elev. (ft.):	Groundwater Depth (ft.):	Total Depth (ft.):	Drive Weight (lbs.):	Drop Dist. (in.):
	8"	n/a	▽ ~ 61.00	70	140	30

Well Construction	Depth (ft.)	Sample Type	Blows/6"	Description	OVM Reading (ppmv)	Analysis	Sample No.
				Bare Soil Cover Sands/Gravels Soil sampling and logging started at 55-feet bgs Continued next page			

Cement

5

10

15

20

The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.

SECOR INTERNATIONAL INCORPORATED
1515 EAST TROPICANA
LAS VEGAS, NEVADA 89119

LOG OF BORING

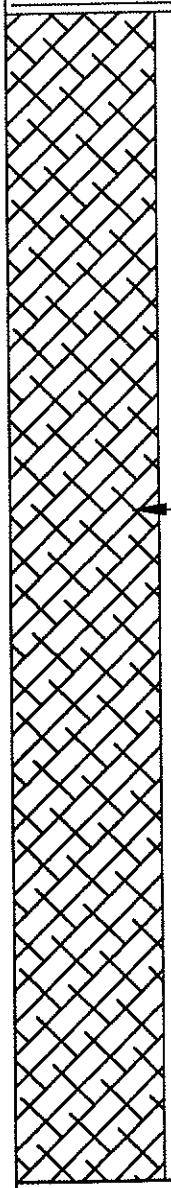
Montrose Chemical Corporation of California
Former Henderson, Nevada Facility

FIGURE: 7
DATE: 10/05/99
PROJECT NO: 018.09826

boringlog

Logged by:	Date Drilled:	Drilling Contractor:	Method/Equipment:	Boring Number:
Brian K. Loffman	11/08/99	Eagle Drilling Services	Hollow Stem Auger B-90	SB-7

See "Legend to Logs" for sampling method, classifications and laboratory test methods.	Boring Diam. (in.):	Top of Casing Elev. (ft.):	Groundwater Depth (ft.):	Total Depth (ft.):	Drive Weight (lbs.):	Drop Dist. (in.):
	8"	n/a	∇ ~ 61.00	70	140	30

Well Construction	Depth (ft.)	Sample Type	Blows/6"	Description	OVM Reading (ppmv)	Analysis	Sample No.
	25			Soil sampling and logging started at 55-feet bgs.			
	30						
Cement	35						
	40						
	45			Continued next page			

The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.

SECOR INTERNATIONAL INCORPORATED
1515 EAST TROPICANA
LAS VEGAS, NEVADA 89119

LOG OF BORING

Montrose Chemical Corporation of California
Former Henderson, Nevada Facility
LAS VEGAS, NEVADA

FIGURE: 7
DATE: 10/05/99
PROJECT NO: 018.09826

boringlog

Logged by:	Date Drilled:	Drilling Contractor:	Method/Equipment:	Boring Number:
Brian K. Loffman	11/08/99	Eagle Drilling Services	Hollow Stem Auger B-90	SB-7

See "Legend to Logs" for sampling method, classifications and laboratory test methods.	Boring Diam. (in.):	Top of Casing Elev. (ft.):	Groundwater Depth (ft.):	Total Depth (ft.):	Drive Weight (lbs.):	Drop Dist. (in.):
	8"	n/a	▽ ~ 61.00	70	140	30

Well Construction	Depth (ft.)	Sample Type	Blows/6"	Description	OVM Reading (ppmv)	Analysis	Sample No.
	50						
	55		42-52	CLAY (CL), with some sand, damp, light brown (5YR 5/6), very stiff, no odor or staining	4.4		
			28-38	Sandy CLAY (CL), with gravels, damp, moderate yellowish brown (10YR 5/4), very stiff, faint odor and no staining	19.2		
			45-80	- increasing sand, trace gravels, moist	34.5		
	60						
Bentonite	▽						
			20-31		76		
			16-19	- decreasing gravel & increasing clay slight odor, no staining	88.1		
	65						
	70		13-21 12	Sandy CLAY (CL) with trace gravels, damp, moderate brown (5YR 4/4), stiff, no odor or staining	2.8		
				Terminated boring at 70-bgs.			

The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.

SECOR INTERNATIONAL INCORPORATED
1515 EAST TROPICANA
LAS VEGAS, NEVADA 89119

LOG OF BORING

Montrose Chemical Corporation of California
Former Henderson, Nevada Facility
LAS VEGAS, NEVADA

FIGURE: 7
DATE: 10/06/99
PROJECT NO: 018.09826

boringlog

Logged by:	Date Drilled:	Drilling Contractor:	Method/Equipment:	Boring Number:
Brian K. Loffman	11/29/99	Eagle Drilling Services	Hollow Stem Auger B-90	SB-8

See "Legend to Logs" for sampling method, classifications and laboratory test methods.	Boring Diam. (in.):	Top of Casing Elev. (ft.):	Groundwater Depth (ft.):	Total Depth (ft.):	Drive Weight (lbs.):	Drop Dist. (in.):
	8"	n/a	▽ ~ 61.00	70	140	30

Well Construction	Depth (ft.)	Sample Type	Blows/6"	Description	OVM Reading (ppmv)	Analysis	Sample No.
				Bare Soil Cover Sands/Gravels			
	5			– contiuous sampling from 50 to 60-feet bgs			
Cement	10						
	15						
	20			encountered large cobbles (5 to 6")			
				broke through cobble layer at 23-feet bgs			
				Continued next page			

The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.

SECOR INTERNATIONAL INCORPORATED
1515 EAST TROPICANA
LAS VEGAS, NEVADA 89119

LOG OF BORING

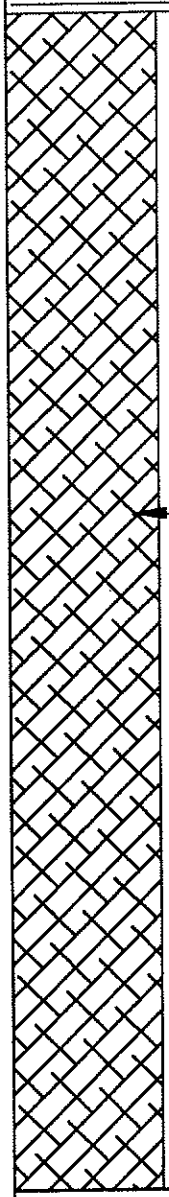
Montrose Chemical Corporation of California
Former Henderson, Nevada Facility
LAS VEGAS, NEVADA

FIGURE: 10
DATE: 11/30/99
PROJECT NO: 018.09826

boringlog

Logged by:	Date Drilled:	Drilling Contractor:	Drilling Equipment:	Boring No.
Brian K. Loffman	11/29/99	Eagle Drilling Services	Hollow Stem Auger B-80	SB-8

See "Legend to Logs" for sampling method, classifications and laboratory test methods.	Boring Diam. (in.):	Top of Casing Elev. (ft.):	Groundwater Depth (ft.):	Total Depth (ft.):	Drive Weight (lbs.):	Drop Dist. (in.):
	8"	n/a	▽ ~ 61.00	70	140	30

Well Construction	Depth (ft.)	Sample Type	Blows/6"	Description	OVM Reading (ppmv)	Analysis	Sample No.
	25						
	30						
	35						
Cement							
	40						
	45						
				Continued next page			

The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.

SECOR INTERNATIONAL INCORPORATED
1515 EAST TROPICANA
LAS VEGAS, NEVADA 89119

LOG OF BORING

Montrose Chemical Corporation of California
Former Henderson, Nevada Facility
LAS VEGAS, NEVADA

FIGURE: 10
DATE: 11/30/99
PROJECT NO: 016.09826

boringlog

Logged by:	Date Drilled:	Drilling Contractor:	Method/Equipment:	Boring Number:
Brian K. Loffman	11/29/99	Eagle Drilling Services	Hollow Stem Auger B-90	SB-8

See "Legend to Logs" for sampling method, classifications and laboratory test methods.	Boring Diam. (in.):	Top of Casing Elev. (ft.):	Groundwater Depth (ft.):	Total Depth (ft.):	Drive Weight (lbs.):	Drop Dist. (in.):
	8"	n/a	▽ ~ 61.00	70	140	30

Well Construction	Depth (ft.)	Sample Type	Blows/6"	Description	OVM Reading (ppmv)	Analysis	Sample No.
	50		50/2"	CLAY (CL), with trace sand, damp, moderate yellowish brown (10YR 5/4), hard no odor or staining	0		
			50/5"	– Increasing sand (15%) no odor or staining	0		
	55		16–16 16–24	CLAY (CL), with trace sand, damp, moderate yellowish brown (10YR 5/4), stiff no odor or staining	0		
			14–15 19–20		0		
			14–23 19–24	Sandy CLAY (CL), with trace gravels, moist, light brown (5YR 5/6), very stiff, no odor or staining	0		
Bentonite	60 ▽		21–29 32–21	Sandy CLAY (CL), with trace gravels, moist, light brown (5YR 5/6), very stiff, no odor or staining	0		
				– increasing sand and gravels no odor or staining	0		
	65		17–25 28	CLAY (CL), with trace sand and gravel, damp, moderate brown (5YR 4/4), very stiff, no odor or staining	0		
	70		35–29 31	CLAY (CL), with trace sand, moist, moderate brown (5YR 4/4), very stiff, no odor or staining	0		
				Terminated boring at 70–bgs.			

The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.

SECOR INTERNATIONAL INCORPORATED
1515 EAST TROPICANA
LAS VEGAS, NEVADA 89119

LOG OF BORING

Montrose Chemical Corporation of California
Former Henderson, Nevada Facility
LAS VEGAS, NEVADA

FIGURE: 10
DATE: 11/30/99
PROJECT NO: 018.09826

boringlog

SUMMARY OF BORING NO. MW-1 UPGRADIENT MONITORING WELL

DATE DRILLED: 5-17-88

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF ACTUAL CONDITIONS ENCOUNTERED.

DEPTH IN FEET	SAMPLES (1)	BLOWS/FT. (2)	MOISTURE	CONSISTENCY	COLOR	DESCRIPTION	SYMBOL (1)	MOISTURE, %	DRY DENSITY, PCF
0					brown	FILL: SILTY SAND and gravel	SM		
						GRAVELLY SAND some silt, partially cemented zones	SW		
5									
10									
						SAND and SILT w/gravel, partially cemented	SM		
15									
						SILTY SAND tr. gravel, partially cemented	SM		
20						---some gravel, some caliche gravel	SM		
25									
						SANDY SILT some gravel, partially cemented	ML		
30						GRAVELLY SAND some silt, w/ cemented nodules	SW		
35									
						SANDY SILT some clay, some gravel, tr. caliche gravel	ML		
40									

GROUNDWATER
91 feet 6 inches after 32 hours

END OF BORING AT 115 FEET

(continued next page)

(1) REFER TO KEY TO SOIL SYMBOLS AND TERMS FOR EXPLANATION OF TEST SYMBOLS

(2) USING LB. DRIVING WEIGHT FALLING 30 INCHES AND INCH DIAMETER SAMPLER

MONTROSE MONITORING WELLS

PROJECT NO. 87-43102-02

DRAWING NO. 1-1

Converse Environmental Consultants Southwest, Inc.

SUMMARY OF BORING NO. MW-1

UPGRADIENT MONITORING WELL

DATE DRILLED: 5-17-88

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF ACTUAL CONDITIONS ENCOUNTERED.

DEPTH IN FEET	SAMPLES (1)	BLOWS/FT. (2)	MOISTURE	CONSISTENCY	COLOR	DESCRIPTION	SYMBOL (1)	MOISTURE, %	DRY DENSITY, PCF
40						SAND and SILT tr. gravel, tr. clay	SM		
45									
50						SILTY CLAY tr. sand	CL		
55						CLAY some silt, tr. sand	CH		
60						SILTY CLAY some sand, tr. gravel, tr. caliche gravel	CL		
65						SAND w/clay pockets, tr. gravel	SC		
70						SAND and SILT w/clay pockets	SM		
75						---tr. gravel			
80						---no gravel, no clay pockets			

GROUNDWATER

91 feet 6 inches after 32 hours

END OF BORING AT 115 FEET

(continued next page)

(1) REFER TO KEY TO SOIL SYMBOLS AND TERMS FOR EXPLANATION OF TEST SYMBOLS

(2) USING LB. DRIVING WEIGHT FALLING 30 INCHES AND INCH DIAMETER SAMPLER

MONTROSE MONITORING WELLS

PROJECT NO. 87-43102-02

DRAWING NO. 1-2

Converse Environmental Consultants Southwest, Inc.

SUMMARY OF BORING NO. MW-1 UPGRADIENT MONITORING WELL

DATE DRILLED: 5-17-88

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF ACTUAL CONDITIONS ENCOUNTERED.

DEPTH IN FEET	SAMPLES (1)	BLOWS/FT. (2)	MOISTURE	CONSISTENCY	COLOR	DESCRIPTION	SYMBOL (1)	MOISTURE, %	DRY DENSITY, PCF
80									
						SILT and CLAY some sand	CL		
85									
90						SILTY CLAY tr. sand	CL		
			▼ water table						
95						---tr. gravel			
100									
						SILTY SAND partially cemented	SM		
105						SILTY CLAY some sand, w/ caliche gravel	CL		
110									
115									
120									

▼ GROUNDWATER
91 feet 6 inches after 32 hours

END OF BORING AT 115 FEET

(1) REFER TO KEY TO SOIL SYMBOLS AND TERMS FOR EXPLANATION OF TEST SYMBOLS

(2) USING LB. DRIVING WEIGHT FALLING 30 INCHES AND INCH DIAMETER SAMPLER

MONTROSE MONITORING WELLS

PROJECT NO. 87-43102-02

DRAWING NO. 1-3

Converse Environmental Consultants Southwest, Inc.

DATE DRILLED: 5-12-88

SUMMARY OF BORING NO. MW-2

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF ACTUAL CONDITIONS ENCOUNTERED.

DOWNGRADIENT EAST MONITORING WELL

DEPTH IN FEET	SAMPLES (1)	BLOWS/FT. (2)	MOISTURE	CONSISTENCY	COLOR	DESCRIPTION	SYMBOL (1)	MOISTURE, %	DRY DENSITY, PCF
0					brown	SAND and GRAVEL some silt	GM		
5									
						---partially cemented			
10									
15						SILTY SAND some gravel; w/ clay, partially cemented	SM		
20						GRAVELLY SAND w/ silt, slightly cemented	GM		
						SAND and SILT some gravel, w/ clay	SM		
25						SANDY SILT some gravel, w/ clay	ML		
30						SILTY CLAY w/ sand, tr. gravel	CL		
35						---some sand			
40									

GROUNDWATER
52 feet after 8 days

END OF BORING AT 68 FEET

(1) REFER TO KEY TO SOIL SYMBOLS AND TERMS FOR EXPLANATION OF TEST SYMBOLS

(2) USING LB. DRIVING WEIGHT FALLING 30 INCHES AND INCH DIAMETER SAMPLER

(continued next page)

MONTROSE MONITORING WELLS

PROJECT NO. 87-43102-02

DRAWING NO. 1-4

Converse Environmental Consultants Southwest, Inc.

DATE DRILLED: 5-12-88

SUMMARY OF BORING NO. MW-2

THIS SUMMARY APPLIES ONLY AT THE LOCATION AND AT THE TIME OF LOGGING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF ACTUAL CONDITIONS ENCOUNTERED.

DOWNGRADIENT EAST MONITORING WELL

DEPTH IN FEET	SAMPLES (1)	BLOWS/FT. (2)	MOISTURE	CONSISTENCY	COLOR	DESCRIPTION	SYMBOL (1)	MOISTURE, %	DRY DENSITY, PCF
40						SILTY SAND w/ gravel, w/ clay	SM		
45						SANDY SILT w/ clay, tr. gravel	ML		
						CLAYEY SILT w/ sand	ML		
50			▼ water table						
55						SILTY CLAY some gravel, w/ sand	CL		
60						SANDY CLAY some silt, w/ gravel	CL		
65						SILTY CLAY w/ sand, tr. gravel	CL		
70									
75									
80									

GROUNDWATER 52 feet after 8 days

END OF BORING AT 68 FEET

(1) REFER TO KEY TO SOIL SYMBOLS AND TERMS FOR EXPLANATION OF TEST SYMBOLS

(2) USING LB. DRIVING WEIGHT FALLING 30 INCHES AND INCH DIAMETER SAMPLER

MONTROSE MONITORING WELLS

PROJECT NO. 87-43102-02

DRAWING NO. 1-5

Converse Environmental Consultants Southwest, Inc.

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SUMMARY OF BORING NO. MW-3 DOWNGRADIENT CENTER MONITORING WELL

DATE DRILLED: 5-20-88

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF ACTUAL CONDITIONS ENCOUNTERED.

DEPTH IN FEET	SAMPLES (1)	BLOWS/FT. (2)	MOISTURE	CONSISTENCY	COLOR	DESCRIPTION	SYMBOL (1)	MOISTURE, %	DRY DENSITY, PCF
0					brown	FILL: SILTY SAND w/gravel	SM		
						GRAVELLY SAND w/silt ---partially cemented zones ---occasional boulders	SW		
25						SANDY GRAVEL some silt, partially cemented zones	GM		
						GRAVELLY SAND some silt	SW		
30						SANDY GRAVEL some silt, slightly cemented zones	GM		
35						GRAVELLY SAND some silt, with silty clay lenses	SW		
						SILTY CLAY some sand, trace gravel	CL		
40									

GROUNDWATER
52 feet after 16 hours

END OF BORING AT 62 FEET

(1) REFER TO KEY TO SOIL SYMBOLS AND TERMS FOR EXPLANATION OF TEST SYMBOLS

(2) USING LB. DRIVING WEIGHT FALLING 30 INCHES AND INCH DIAMETER SAMPLER

(continued next page)

MONTROSE MONITORING WELLS

PROJECT NO. 87-43102-02

DRAWING NO. 1-6

Converse Environmental Consultants Southwest, Inc.

DATE DRILLED: 5-20-88

SUMMARY OF BORING NO. MW-3

DOWNGRADIENT CENTER MONITORING WELL

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF ACTUAL CONDITIONS ENCOUNTERED.

DEPTH IN FEET	SAMPLES (1)	BLOWS/FT. (2)	MOISTURE	CONSISTENCY	COLOR	DESCRIPTION	SYMBOL (1)	MOISTURE, %	DRY DENSITY, PCF
40									
45									
						SANDY SILT tr. gravel	ML		
50						---sand and gravel lenses, some clay pockets			
			water table						
55						SILTY CLAY some sand, tr. gravel	CL		
60									
65									
70									
75									
80									

GROUNDWATER
52 feet after 16 hours

END OF BORING AT 62 FEET

(1) REFER TO KEY TO SOIL SYMBOLS AND TERMS FOR EXPLANATION OF TEST SYMBOLS

(2) USING LB. DRIVING WEIGHT FALLING 30 INCHES AND INCH DIAMETER SAMPLER

MONTROSE MONITORING WELLS

PROJECT NO. 87-43102-02

DRAWING NO. 1-7

Converse Environmental Consultants Southwest, Inc.

DATE DRILLED: 5-19-88

SUMMARY OF BORING NO. MW-4

THIS SUMMARY APPLIES ONLY AT THE LOCATION AND AT THE TIME OF LOGGING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF ACTUAL CONDITIONS ENCOUNTERED.

DOWNGRADIENT WEST MONITORING WELL

DEPTH IN FEET	SAMPLES (1)	BLOWS/FT. (2)	MOISTURE	CONSISTENCY	COLOR	DESCRIPTION	SYMBOL (1)	MOISTURE, %	DRY DENSITY, PCF
0					brown	FILL: SILTY SAND and gravel	SM		
						SAND and GRAVEL w/ silt, occasional boulders	GM		
5									
						GRAVELLY SAND some silt, partially cemented zones	GM		
10									
						SAND and GRAVEL some silt, occasional boulders ---partially cemented	GM		
15									
20						---uncemented			
25									
30						SANDY SILT w/ gravel	ML		
35						SILTY CLAY some sand, tr. gravel	CL		
40									

GROUNDWATER
52 feet after 4 days

END OF BORING AT 69 FEET

(continued next page)

(1) REFER TO KEY TO SOIL SYMBOLS AND TERMS FOR EXPLANATION OF TEST SYMBOLS

(2) USING LB. DRIVING WEIGHT FALLING 30 INCHES AND INCH DIAMETER SAMPLER

MONTROSE MONITORING WELLS

PROJECT NO. 87-43102-02

Converse Environmental Consultants Southwest, Inc.

DRAWING NO. 1-8

DATE DRILLED: 5-19-88

SUMMARY OF BORING NO. MW-4

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF ACTUAL CONDITIONS ENCOUNTERED.

DOWNGRADIENT WEST MONITORING WELL

DEPTH IN FEET	SAMPLES (1)	BLOWS/FT. (2)	MOISTURE	CONSISTENCY	COLOR	DESCRIPTION	SYMBOL (1)	MOISTURE, %	DRY DENSITY, PCF
40						---w/ gravel			
45						---w/ sand, w/ gravel			
						SAND and GRAVEL some silt	GM		
50			▼ water table						
						SAND and SILT some clay, tr. gravel	ML		
55						CLAYEY SILT some sand, w/ caliche gravel, partially cemented zones	ML		
60						SILTY SAND some clay pockets, tr. gravel	SM		
65									
70									
75									
80									

GROUNDWATER 52 feet after 4 days

END OF BORING AT 69 FEET

(1) REFER TO KEY TO SOIL SYMBOLS AND TERMS FOR EXPLANATION OF TEST SYMBOLS

(2) USING LB. DRIVING WEIGHT FALLING 30 INCHES AND INCH DIAMETER SAMPLER

MONTROSE MONITORING WELLS

PROJECT NO. 87-43102-02

DRAWING NO. 1-9

Converse Environmental Consultants Southwest, Inc.

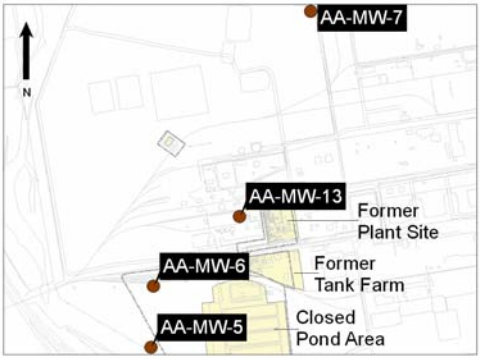
Montrose Chemical Corporation Henderson, NV

Figure B-1

Lithologic and well construction log: AA-MW-5

Northing 2675532.399
Easting 824350.008
LS Elev. (ft) 1843.11
Ref. Pnt. Top of case
Ref. Pnt. Elev. (ft) 1845.70
Total Depth (ft) 66
Depth to Water (ft) 55.49
Date 9/5/2009 - 9/6/2006

Drill Method RotoSonic
Sampling Method N/A
Diameter of Casing 4"
Type of Casing PVC Schd 40
Slot Size 0.010"
Filter #10-20 Sand



Depth (Feet Below Land Surface)	Lithologic Log	USCS	Lithologic Description	Well Construction	Comments
0		SP	SAND, with Silt, trace Gravel & Cobbles, light brownish-gray, (7.5YR, 6/2), loose, dry; sand ranges from coarse-grained to medium-grained, predominantly medium-grained.		Monument Vault 8" diameter bore hole Bentonite grout from 0 - 22 feet bls 4" ID Blank PVC casing from 0 - 30.5 feet bls
5					
10					
15		SP	SAND, with Silt, with Gravel, (7.5YR, 7/2), loose, slightly moist; sand, fine-grained to medium grained.		
20		SM	Silty SAND, 80% sand, 20% silt, brown, (7.5YR, 5/2) with multicolored grains, loose, slightly moist; sand, predominantly fine-grained. At 25- to 28 feet: hard, cemented caliche layer, white, (7.5YR, 8/1).		Bentonite chips from 22 - 25 feet bls # 60 Sand from 25 - 27 feet bls 10x20 Sand filter pack from 27 - 60.5 feet bls
25					
30		ML	Sandy SILT, 60% sand, 40% silt, brown, (7.5YR, 5/3), loose to firm, slightly moist; sand, fine-grained. At 37 feet: color change to brown, (7.5YR, 4/3).		

HARGIS + ASSOCIATES, INC.
HYDROGEOLOGY · ENGINEERING

PID = Photo Ionization Detector
FID = Flame Ionization Detector
> = greater than

Logged By JCY
Checked By BRW

Lithologic and well construction log: AA-MW-5

Figure B-1

Depth (Feet Below Land Surface)	Log Lithologic	USCS	Lithologic Description	Well Construction	Comments
35					
40		ML	SILT with Sand, 90% silt, 10% sand, brown, (7.5YR, 4/3), soft, nonplastic.		
45					
50					0.010" slot 4" ID PVC screen from 30.5 - 60.5 bls
55		SM	Silty SAND, 80% sand, 20% silt, brown, (7.5YR, 4/4); sand, medium-grained, angular. Caliche nodules.		
		ML	CLAYEY-SILT, trace Sand, dark yellowish brown, (10YR, 4/4), hard, low plasticity.		
60		CL	SILTY-CLAY, trace Sand, reddish-brown, (5YR, 5/4), hard, moderate plasticity. Caliche.		Bentonite chips from 60.5 - 66.5 feet bls
					4" ID PVC DNAPL trap from 60.5 - 64 feet bls
65					Flush threaded end cap
					Total Depth = 66 feet bls

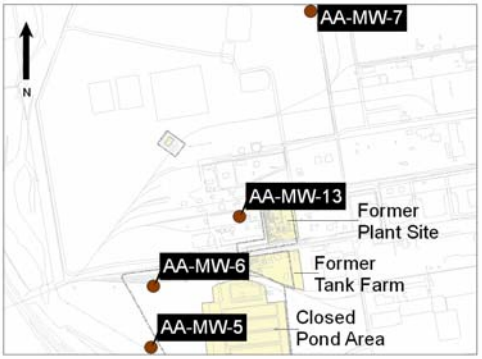
Montrose Chemical Corporation Henderson, NV

Figure B-2

Lithologic and well construction log: AA-MW-6

Northing 6716227.712
Easting 824377.866
LS Elev. (ft) 1826.36
Ref. Pnt. Top of casing
Ref. Pnt. Elev. (ft) 1829.13
Total Depth (ft) 70
Depth to Water (ft) 36.25
Date 9/7/2006 - 9/7/2006

Drill Method RotoSonic
Sampling Method N/A
Diameter of Casing 4"
Type of Casing PVC Schd 40
Slot Size 0.020"
Filter #10-20 Sand



Depth (Feet Below Land Surface)	Lithologic Log	USCS	Lithologic Description	Well Construction	Comments
0		SW	SAND, with Gravel & Cobbles, trace Silt, 85% sand, 10% gravel & cobbles, 5% silt, brown, (7.5YR, 5/3), loose, dry; sand, coarse-grained grading to fine-grained.		Monument Vault 8" diameter bore hole
5					
10		SP	SAND, with Silt, trace Gravel, 85% sand, 10% silt, 5% gravel, brown, (7.5YR, 4/3), loose, dry; sand ranges from coarse-grained to fine-grained. At 21- to 22.5 feet: color change to reddish-brown, (5YR, 5/4).		Bentonite grout from 0 - 28 feet bls 4" Blank PVC casing from 0 - 36.5 feet bls
15					
20					
25		SM	Silty SAND, 80% sand, 20% silt, pinkish-gray, (7.5YR, 7/2), loose, dry; sand ranges from coarse-grained to fine-grained, predominantly fine-grained. Caliche.		
30		ML	Sandy SILT, 60% silt, 40% sand, (7.5YR, 4/4), loose, slightly moist; sand, very fine-grained, sand fraction decreases with depth throughout this interval.		Bentonite chips from 28 - 31 feet bls # 60 Sand from 31 - 33 feet bls

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PID = Photo Ionization Detector
FID = Flame Ionization Detector
> = greater than

Logged By JCY
Checked By BRW

Lithologic and well construction log: AA-MW-6

Figure B-2

Depth (Feet Below Land Surface)	Log Lithologic	USCS	Lithologic Description	Well Construction	Comments
35					10x20 Sand filter pack from 33 - 66.5 feet bls
			CLAYEY-SILT, trace Sand, brown, (7.5YR, 4/4), moderately dense, moderate to low plasticity.		
40					
45					
		ML			
50					0.010" slot 4" PVC screen from 36.5 - 66.5 bls
55					
60			SILTY-CLAY, reddish-brown, (5YR, 5/4), dense, hard, moderate plasticity.		
65		CL			Bentonite chips from 66.5 - 70 feet bls
					4" PVC DNAPL trap from 66.5 - 69.5 feet bls
70					Flush threaded end cap
					Total depth = 70 feet bls

HARGIS + ASSOCIATES, INC.
HYDROGEOLOGY · ENGINEERING

PID = Photo Ionization Detector
FID = Flame Ionization Detector
> = greater than

Logged By JCY
Checked By BRW

SECOR INTERNATIONAL INCORPORATED
LOG OF EXPLORATORY BORING

Project No. 018.71004.011 Date Drilled: 09/20/00 Logged By: M.R., Revised CP/gg.	Tot. Depth (ft.): 129 Drive wt. (lbs): 140 Drop Dist. (in.): 30 Casing Elev. (ft): N/A	Ground Elev. (ft.): N/A Groundwater Elev (ft.): ▽ 56 ▼ 119	BORING No. **CP-1** Sheet 1 of 6
Drilling Co: Water Development Drilling Method: Dresser Boring Dia. (in.): 12	Remarks: 4-inch well.		

Well Construction	Depth (ft.)	Sample Type	Blows per 6 in.	Graphic Log	Description	Volatile Reading (ppmv)	Sample Analysis	Sample Designation
Expandable, locking cap	5				WELL VAULT: Above ground well vault.			
	0				GRAVEL AND SAND: (SP) Bare, Soil cover, sands with gravels.			
					GRAVEL AND SAND: NOTE: Well is 4-inch nominal diameter, schedule 40 PVC blank and slotted (0.020-inch mill cut slots) casing.			
	-5		14-18,21		SANDS WITH GRAVELS: (SW) With some silt, dry, moderate yellowish brown (10YR 5/4), medium dense, no odor or staining.	0		
					SANDS WITH GRAVELS: - increasing gravel and size.			
Blank 40 Schedule PVC Casing	-10		38, 50/5"		CLAYEY SAND: (SC) With some gravels, dry, moderate brown (10YR 6/2), very stiff, no odor or staining.	0		
Concrete/ Grout	-15		50/4"		SILTY SAND: (SM) With gravels, dry, moderate yelowish brown (10YR 5/4), dense, no odor or staining.	0		
	-20		50/5"		GRAVEL AND SAND: (SW) With trace sile, damp, moderate yellowish brown, (10YR 5/4), very dense, no odor or staining.	0		

SECOR INTERNATIONAL INCORPORATED
LOG OF EXPLORATORY BORING

Project No. 018.71004.011
Date Drilled: 09/20/00
Logged By: M.R., Revised CP/gg.

Casing Elev. (ft): N/A
Groundwater Elev (ft.):
56
119

BORING No. **CP-1**
Sheet 2 of 6

Remarks: 4-inch well.

Well Construction	Depth (ft.)	Sample Type	Blows per 6 in.	Graphic Log	Description	Volatile Reading (ppmv)	Sample Analysis	Sample Designation
	-25		20-24,28		SANDY CLAY: (CL) With trace gravel, damp, moderate brown (5YR 4/4), very stiff, no odor or staining.	0		
	-30		21-28,32		CLAY: (CL) With some sand, damp, moderate brown (5YR 4/4), very stiff, no odor or staining.	0		
Blank 40 Schedule PVC Casing	-35		10-12,13		CLAY: (CL) With trace sand and gravels, damp, moderate brown (5YR 4/4), very stiff, no odor or staining.	0		
	-40		12-14,17		GRAVEL AND SAND: (SP) Increasing sand and gravel (10%/10%). Increase in moisture content, no odor or staining.	0		
	-45		9-8,11		CLAY: (CL) With some gravel, moist, moderate ywllowish brown (10YR 5/4), stiff, no odor or staining.			

SECOR INTERNATIONAL INCORPORATED
LOG OF EXPLORATORY BORING

Project No. 018.71004.011
Date Drilled: 09/20/00
Logged By: M.R., Revised CP/gg.

Casing Elev. (ft): N/A
Groundwater Elev (ft.):
56
119

BORING No. **CP-1**
Sheet 3 of 6

Remarks: 4-inch well.

Well Construction	Depth (ft.)	Sample Type	Blows per 6 in.	Graphic Log	Description	Volatile Reading (ppmv)	Sample Analysis	Sample Designation
Concrete/ Grout	-50		10-24,50/4		GRAVEL AND SAND: (GW) Sandy gravel with some clay, moist, moderate brown (5YR 4/4), dense, no odor or staining.	0		
	-55		24-22,39		CLAY: (CL) With some gravel, moist, moderate brown (5YR 4/4), very stiff, moderate odor and no staining.	570		
	-60		24-39,63		CLAY: (CL) With cemented nodules, moist, moderate yellowish brown (10YR 5/4), hard, faint odor and no staining.	162		
			21-28, 22-24		CLAYEY SAND: (SC) With gravels, moist, moderate yellowish brown (10YR 5/4), medium dense, no odor or staining.	489		
	-65		19-17, 27-17		CLAY: (CL) With trace milt, moist, moderate brown (5YR 4/4), very stiff, no odor or staining.			
			11-12, 19-17		CLAY: (CL) With trace silt, moist, moderate brown (5YR 4/4), very stiff, no odor or staining.	52		
			22-27, 32-34		CLAY: - trace gravels.	40		
					CLAY: (CL) With trace silt, moist, moderate brown (5YR 4/4), very stiff, no odor or staining.			
Blank 40 Schedule PVC Casing	-70				~~CLAY: (CL) With little silt and trace sands. Moderate yellowish~~ brown (10YR 5/4) to light brown (5YR 5/6), medium plasticity, firm, moist, strong odors. Fine sand grains. Trace gypsum lenses up to 1/8" in thickness. Decrease in odors around 77' bgs.			

SECOR INTERNATIONAL INCORPORATED
LOG OF EXPLORATORY BORING

Project No. 018.71004.011
Date Drilled: 09/20/00
Logged By: M.R., Revised CP/gg.

Casing Elev. (ft): N/A
Groundwater Elev (ft.):
56
119

BORING No. **CP-1**
Sheet 4 of 6

Remarks: 4-inch well.

Well Construction	Depth (ft.)	Sample Type	Blows per 6 in.	Graphic Log	Description	Volatile Reading (ppmv)	Sample Analysis	Sample Designation
	-75					49		
	-80				CLAY: (CL) With little silt, trace sands and trace gravels. Light brown (5YR 6/4) to light brown (5YR 5/6). high plasticity, soft to firm, moist.	13.3		
					CLAY: (CL) With trace sand. Light brown (5YR 5/6), low to medium plasticity, stiff to very stiff, moist, no odor. Less than 5% fine to medium grained sands.			
Concrete/ Grout	-85				SILTY CLAY: (CL) Light brown (5YR 5/6), low plasticity, very stiff to hard, dry to slightly moist, no odor.	9		
	-90	C			CLAY: (CL) With some silt and trace sand. Light brown (5YR 5/6) to moderate brown (5RY 4/4), medium plasticity, hard, moist. Thin gypsum lenses up to 1/8" in thickness.	0		CP-1-90
					SILTY CLAY: (CL) With trace sands and trace gravels. Light brown (5YR 5/6) to moderate brown (5YR 4/4), low to medium plasticity, hard, no odor. Less than 5% fine to coarse grained sands. Less than 1% subangular gravels up to 3/4" in diameter.			
	-95				CLAY: (CL) With some silt and trace sand. As described above. At 93.5 to 93.7-feet bgs, encounter greasy-like, black or dark grey speckles up to 1/16" in diameter. Speckles appear subangular and comprise approximately 2% of the matrix.	13.3		
					SAND: (SP) Moderate brown (5YR 3/4), poorly graded, loose, very			

SECOR INTERNATIONAL INCORPORATED
LOG OF EXPLORATORY BORING

Project No. 018.71004.011
Date Drilled: 09/20/00
Logged By: M.R., Revised CP/gg.

Casing Elev. (ft): N/A
Groundwater Elev (ft.): 56 / 119

BORING No. **CP-1**
Sheet 5 of 6

Remarks: 4-inch well.

Well Construction	Depth (ft.)	Sample Type	Blows per 6 in.	Graphic Log	Description	Volatile Reading (ppmv)	Sample Analysis	Sample Designation
	-100				moist, staining?, coarse sand grains			
					SAND and CLAY lenses: (SP and CL)	6547		
					SAND: (SP) Moderate brown (5YR 3/4), poorly graded, loose, wet, very strong odors, staining. Coarse grained sands. Grades into silty sand. (Slippery orangish-brownish liquid in sandy matrix. After sand was placed in sample jar, the unknown liquid oxidized to a red color.)			
					SILTY CLAY: (CL) With some sand. Light brown (5YR 5/6) to moderate brown (5YR 4/4), low to medium plasticity, hard, slightly moist.			
	-105				SANDY CLAY: (CL) With trace gravels. Light brown (5YR 5/6) to moderate brown (5YR 4/4), medium plasticity, stiff to hard, moist. Fine to medium grained sands. Subangular to subrounded gravels up to 1/2" in diameter. Trace gypsum lenses.	80		
Bentonite Chips								
Blank 40 Schedule PVC Casing	-110	C			SANDY CLAY: (CL to SC) With trace gravels. Same color, medum to high plasticity (CL), very stiff (CL)/dense (SC), moist. subrounded gravels up to 1.5" in diameter.	0		CP-1-110
No. 3 Sand Pack	-115				SANDY CLAY: (CL) Same color, medium to high plasticity, very stiff, moist.	0		
					CLAYEY SAND WITH SILT: (SM) With trace gravels. Same color, moderately sorted, coarse to medium grained sands, loose, very moist to wet. Subangular gravels up to 1.5" in diameter.			
40 Schedule 0.02 Slotted Screen	-120				SANDY CLAY: and SILTY SAND with little clay lenses.	0		
					CLAYEY SAND WITH SILT: (SM) As described above.			
					CLAY: (CL) With some silt and trace sand. Light brown (5YR 5/6) to moderate brown (5YR 4/4), high plasticity, firm, moist.			
					SAND: (SP) Pale orange (10YR 8/2), poorly graded, loose, moist, fine grained sands.			
Cap	-125				CLAY: (CL) With some silt and trace sand. As described above.			

SECOR INTERNATIONAL INCORPORATED
LOG OF EXPLORATORY BORING

Project No. 018.71004.011
Date Drilled: 09/20/00
Logged By: M.R., Revised CP/gg.

Casing Elev. (ft): N/A
Groundwater Elev (ft.):
56
119

BORING No. **CP-1**
Sheet 6 of 6

Remarks: 4-inch well.

Well Construction	Depth (ft.)	Sample Type	Blows per 6 in.	Graphic Log	Description	Volatile Reading (ppmv)	Sample Analysis	Sample Designation
	-130	C			Boring terminated at 129 feet bgs.	0		CP-1-128

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Borehole/Well Construction Log

Project Name: Former Montrose Facility - Henderson, NV	Project Number: 60263286	**Borehole Number:**	**CP-02**
Borehole Location: Olin Facility; 18 feet west of CP-01	*Northing:* 26716403.56	*Easting:* 825269.38	Sheet *1* of *7*
Drilling Agency: Cascade Drilling Co.	Driller: D.Mitchell/V.Godoy		
Drilling Equipment: CME-85/ Sonic	Date Started: 12/10/2012	Total Depth (feet):	115.0
Drilling Method: HSA/Sonic	Number of Samples: 0	Date Finished: 12/14/2012	Depth to Bedrock (feet): NE
Drilling Fluid: NA	Borehole Diameter (in): 20	Depth to Water: *Drilling (FT BGS):* 46.0	*Static (FT TOC):* 36.25
Completion Information: Flush Mount Completion. LCS conductor casing from 0 - 82 ft bgs. Well screened from 92 to 102 ft bgs. Sump from 102 to 107 ft bgs.		Elevation (feet MSL) : *Ground:* 1825.22	*Top of Casing:* 1824.50
		Logged By: K.CarrGreen	Checked By: B. Dean

Depth (feet)	Samples: Number	Type	Blow Count	Percent Recovery	Time	Field Analyses: FID (ppm) Sample/Background	PID (ppm) Sample/Background	Additional Tests	Log: Graphic	USCS or Rock Type	Lithologic Description	Well Construction Diagram	Remarks
													December 10, 2012.
													Hand augered first five feet below ground surface. Lithology logged from samples and from cuttings.
										SM	SILTY SAND WITH GRAVEL: Light yellowish brown (10YR 6/4); 50% sand, 30% fine to coarse gravel, 20% fines (nonplastic); strong cementation, dry. 12-inch diameter subrounded boulder.		
5			--	--	1100	--	--						HSA pilot boring advanced with 8-inch auger and bore with 18-inch auger.
			30 50/2	60	1223	2.9	0.2						
10										SM	SILTY SAND WITH GRAVEL: Light yellowish brown (10YR 6/4); 55% sand (15% fine sand, 15% medium sand, 25% coarse sand), 25% fine to coarse gravel, 20% fines (nonplastic); strong cementation, dry.		No odor.
			13 24 25	100	1231	3	0			SM	SILTY SAND WITH GRAVEL: Light yellowish brown (10YR 6/4); 55% sand (15% fine sand, 15% medium sand, 25% coarse sand), 30% fine to coarse		
15													

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Borehole/Well Construction Log (Continuation Sheet)

Project Name: Former Montrose Facility - Henderson, NV	Project Number: 60263286	Borehole Number: CP-02
Borehole Location: Olin Facility; 18 feet west of CP-01		Sheet 2 of 7

Depth (feet)	Samples: Number	Samples: Type	Samples: Blow Count	Samples: Percent Recovery	Samples: Time	Field Analysis: FID (ppm) Sample/Background	Field Analysis: PID (ppm) Sample/Background	Field Analysis: Additional Tests	Log: Graphic	Log: USCS or Rock Type	Lithologic Description	Well Construction Diagram	Remarks
										GM	subrounded gravel, 15% fines (nonplastic); moderate cementation, moist. SILTY GRAVEL: Crushed subangular gravel interbedded with 2 - 3 inch layers of SILTY SAND (Same as above).		No odor.
			12 23 29	100	1240	2.8	0.4						
20										SM	SILTY SAND WITH GRAVEL: Light yellowish brown (10YR 6/4); 55% sand (15% fine sand, 15% medium sand, 25% coarse sand), 25% fine to coarse subrounded gravel, 20% fines (nonplastic); moderate cementation, wet.		
			21 16 11	100	1243	2.7	0.2						
											CALICHE or Crushed Gypsum		
25										SM	SILTY SAND: Brown (7.5YR 5/4); 70% sand (50% fine sand, 10% medium sand, 10% coarse sand), 30% fines (nonplastic); weak cementation, moist.		
										ML	SANDY SILT: Brown (7.5YR 5/4); 75% fines (5% clay), 25% fine sand; hard, low toughness, nonplastic, moist.		
			8 14 17	100	1250	3.2	0.1						Few fine interveinal calcareous masses. Few redoximorphic features. No odor.
30													

AECOM

Borehole/Well Construction Log (Continuation Sheet)

Project Name: Former Montrose Facility - Henderson, NV	Project Number: 60263286	Borehole Number: CP-02
Borehole Location: Olin Facility; 18 feet west of CP-01		Sheet 3 of 7

Depth (feet)	Samples: Number	Samples: Type	Samples: Blow Count	Samples: Percent Recovery	Samples: Time	Field Analysis: FID (ppm) Sample/Background	Field Analysis: PID (ppm) Sample/Background	Field Analysis: Additional Tests	Log: Graphic	Log: USCS or Rock Type	Lithologic Description	Well Construction Diagram	Remarks
										SM	SILTY SAND WITH GRAVEL: Brown (7.5YR 5/4); 55% sand, 30% rounded to angular gravel, 15% fines; weak cementation, moist.		
35			10 27 17	65	1256	2.7	0						
										ML	SILT WITH SAND: Reddish brown (5YR 5/4); 80% fines (10% clay), 20% fine sand; soft, low toughness, nonplastic, moist.		
			2 3 4	100	1303	2.2	0						No odor.
40													
			1 2 3 7	100	1311	2.8	0.2			ML	SILT: Reddish brown (5YR 5/4); 90% fines (10% clay), 10% fine sand; soft, nonplastic, moist.		Common 0.5 to 1-inch caliche nodules.
45													
			1 2 3	100	1320	12.1	3.5			ML	SANDY SILT: Reddish brown (5YR 5/4) ; 75% fines (15% clay), 25% fine to coarse sand; soft, nonplastic, low toughness, wet.		Slight chemical odor.
50													

AECOM

Borehole/Well Construction Log (Continuation Sheet)

Project Name: Former Montrose Facility - Henderson, NV	Project Number: 60263286	Borehole Number: CP-02
Borehole Location: Olin Facility; 18 feet west of CP-01		Sheet 4 of 7

Depth (feet)	Samples: Number	Type	Blow Count	Percent Recovery	Time	Field Analysis: FID (ppm) Sample/Background	PID (ppm) Sample/Background	Additional Tests	Log: Graphic	USCS or Rock Type	Lithologic Description	Well Construction Diagram	Remarks
			4										
				100	--	--	--			SP ML	POORLY GRADED SAND: Reddish brown (5YR 4/4); 95% sand (75% coarse angular sand), 5% fines (nonplastic); weak cementation, wet.		
										GP	SANDY SILT: Same as at 49 feet bgs but with 0.5-inch caliche layer.		
				100	1340	12.2	8.6				POORLY GRADED GRAVEL WITH SAND: 70% rounded medium black gravels, 25% sand, 5% fines (nonplastic).		
55			4 4 5 4	100	1356	30.2	4.6			CL	LEAN CLAY WITH SAND: Reddish brown (5YR 5/4); 75% fines (30% clay), 20% fine to coarse sand, 5% fine gravel; medium plasticity, medium toughness, moist.		
										SC SP-SC	CLAYEY SAND WITH GRAVEL: Reddish brown (5YR 5/3); 60% fine to coarse sand, 10% fine gravel, 30% fines (plastic); weak cementation, wet.		Slight chemical odor.
			4 16 17 19	100	1403	18.2	9.9			SC CL	POORLY GRADED SAND WITH CLAY: Reddish brown (5YR 5/3); 90% fine to coarse sand, 10% fines (plastic); weak cementation, wet. Percent fines increase with depth.		
											CLAYEY SAND: Reddish brown (5YR 5/3); 70% fine to coarse sand, 30% fines (plastic); weak cementation, wet.		
			3 7 5	100	1415	--	--			SC SP CL	SANDY CLAY: Brown (7.5YR 5/4); 70% fines (30% clay), 30% sand; medium plasticity, low toughness, firm, wet.		
60											CLAYEY SAND WITH GRAVEL: Reddish brown (5YR 5/3); 40% fine to coarse sand, 30% fine gravel, 30% fines (plastic); weak cementation, wet.		
			19 17 23	100	1431	28.2	13.4			CL	POORLY GRADED SAND: Dark reddish brown (5YR 3/3); 90% sand (70% coarse angular sand), 5% fine angular gravel, 5% fines; weak cementation, wet.		Slight chemical odor. 2-inch caliche nodules.
											SANDY CLAY: Brown (7.5YR 5/4); 70% fines (35% clay), 30% sand; medium plasticity, medium toughness, hard, wet.		
			3 4 6 7	100	1440	34	13.5			GC ML	LEAN CLAY WITH SAND: Reddish brown (5YR 5/4); 80% fines (32% clay), 15% fine sand, 5% fine black gravel; medium toughness, medium plasticity, firm, moist. Many caliche nodules, up to 2-inches in diameter.		
65			2 4 5 4	100	0754	85	34			CL	CLAYEY GRAVEL WITH SAND: Brown (7.5YR 5/4); 30% fine rounded black gravel, 25% sand, 45% fines (plastic); Many caliche nodules; weak cementation, moist.		December 11, 2012. Slight chemical odor.
			6 3	100	0806	57	28			CL	SILT WITH SAND: Brown (7.5YR 5/4); 85% fines (20% clay), 15% fine sand; firm, low toughness, low plasticity, slow dilatancy, moist.		

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Borehole/Well Construction Log (Continuation Sheet)

Project Name: Former Montrose Facility - Henderson, NV	Project Number: 60263286	Borehole Number: CP-02
Borehole Location: Olin Facility; 18 feet west of CP-01		Sheet 5 of 7

Depth (feet)	Samples: Number	Samples: Type	Samples: Blow Count	Samples: Percent Recovery	Samples: Time	Field Analysis: FID (ppm) Sample/Background	Field Analysis: PID (ppm) Sample/Background	Field Analysis: Additional Tests	Log: Graphic	Log: USCS or Rock Type	Lithologic Description	Well Construction Diagram	Remarks
			4 5							ML	LEAN CLAY: Reddish brown (5YR 5/4); 90% fines (25% clay), 10% fine sand; firm (sticky), no dilatancy, low plasticity, moist.		
			2 2 4 5	100	0829	46	27			ML	LEAN CLAY: Reddish brown (5YR 5/4); 90% fines (35% clay), 10% fine sand; firm (sticky), no dilatancy, medium plasticity, medium toughness, wet.		Slight chemical odor.
70											SILT: Reddish brown (5YR 5/4); 90% fines (10% clay), 10% fine sand; hard, rapid dilatancy, nonplastic, low toughness, moist.		
										CL-ML	SILT WITH SAND: Reddish brown (5YR 5/4); 85% fines (10% clay), 15% fine sand; hard, slow dilatancy, nonplastic, hard, moist.		No odor.
											SILTY CLAY: Reddish brown (5YR 5/4); 90% fines (20% clay), 10% fine sand; hard, low plasticity, moist. very sticky. Logged from auger cuttings.		
			2 6 9 8	0	0854	--	--						
75													
			2 4 5 5	100	0924	19	9			CL-ML	SILTY CLAY WITH CALICHE AND SAND: Reddish brown (5YR 5/4); 85% fines (25% clay), 15% fine sand; hard, low plasticity, moist. Percent clay increases with depth.		
80													
			2 3 7 8	100	0943	9.6	6.3						Many fine to medium caliche nodules.
											Fine to medium caliche nodules interbedded with cemented layers.		10-inch LCS conductor casing set at 82 feet bgs.
			--	100									December 13, 2012.
										CL	LEAN CLAY: Reddish brown (5YR 5/4); 95% fines (40% clay), 5% fine sand; hard, medium toughness, medium plasticity, no dilatancy, moist. No caliche		Slight chemical odor.
85													

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Borehole/Well Construction Log (Continuation Sheet)

Project Name: Former Montrose Facility - Henderson, NV	Project Number: 60263286	Borehole Number: CP-02
Borehole Location: Olin Facility; 18 feet west of CP-01		Sheet 6 of 7

Depth (feet)	Samples: Number	Samples: Type	Samples: Blow Count	Samples: Percent Recovery	Samples: Time	Field Analysis: FID (ppm) Sample/Background	Field Analysis: PID (ppm) Sample/Background	Field Analysis: Additional Tests	Log: Graphic	Log: USCS or Rock Type	Lithologic Description	Well Construction Diagram	Remarks
											after 84.4 feet.		
										ML	SILT WITH SAND: Reddish brown (5YR 5/4); 85% fines (15% clay),15% fine sand; hard, low plasticity, slow dilatancy, moist.		
			--	100	0936	101	68			CL	LEAN CLAY : Reddish brown (5YR 5/4); 95% fines (40% clay), 5% fine sand; hard, medium toughness, medium plasticity, moist. INTERBEDDED with cemented caliche layers 2 to 4-inch thick.		
			--	100									
90			--	100		65	34						Moderate chemical odor.
			--	100		112	122			SC	CLAYEY SAND WITH GRAVEL: Brown (7.5 YR 5/3); 40% fine to coarse sand, 40% fines (plastic), 20% fine rounded gravel; moderate cementation, wet.		
						1644	978			CL	LEAN CLAY WITH SAND: Brown (7.5 5/4); 85% fines (40% clay), 15% fine sand; firm, medium plasticity, medium toughness, moist. Large Caliche mass		
					1246	1398	1150			GC	CLAYEY GRAVEL WITH SAND: 40% fine to medium subrounded black and red gravel, 30% sand, 30% fines (plastic); weak cementation, moist		
95			--	100		251	266			CH	FAT CLAY WITH SAND: Dark brown (7.5 YR 4/3); 80% fines (46% clay), 20% fine sand; hard, high toughness, high plasticity, moist. INTERBEDDED with cemented caliche nodules, 1 to 4 inches thick.		Moderate chemical odor.
						476	420						
						1178	1500						
						107	92			CL	LEAN CLAY: Light reddish brown (5YR 6/4); 90% fines (40% clay), 10% fine sand; hard, medium plasticity, high toughness, moist. INTERBEDDED with cemented caliche nodules.		
			--	100	1330	112	95						
100						159	109						Moderate chemical odor.
						15.1	22.7						
						103	61						

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Borehole/Well Construction Log
(Continuation Sheet)

Project Name: Former Montrose Facility - Henderson, NV	Project Number: 60263286	Borehole Number: CP-02
Borehole Location: Olin Facility; 18 feet west of CP-01		Sheet 7 of 7

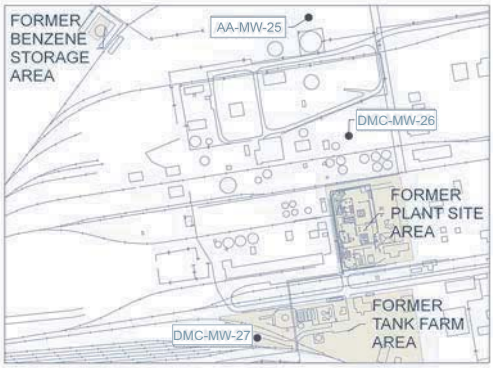
Depth (feet)	Samples: Number	Samples: Type	Samples: Blow Count	Samples: Percent Recovery	Samples: Time	Field Analysis: FID (ppm) Sample/Background	Field Analysis: PID (ppm) Sample/Background	Field Analysis: Additional Tests	Log: Graphic	Log: USCS or Rock Type	Lithologic Description	Well Construction Diagram	Remarks
			--	100									
105					1405	10	6						Slight chemical odor.
			--	100									
110					1410	67	102			CH	FAT CLAY WITH SAND: Dark brown (7.5YR 4/4); 80% fines (47% clay), 15% fine sand, 5% black angular fine gravel; hard, high toughness, high plasticity, moist.		Slight chemical odor.
			--	100									
115						42	37				Borehole terminated by field geologist. TD = 115 feet bgs. Total Depth = 115.0 feet		

Henderson Groundwater Treatment System Henderson, Nevada

Lithologic and well construction log: DMC-MW-27

Northing 26716410.684
Easting 825272.679
LS Elev. (ft) 1824.97
Ref. Pnt. Top of casing
Ref. Pnt. Elev. (ft) 1827.278
Total Depth (ft) 265
Depth to Water (ft) N/A
Date 05/17/2009 - 05/27/2009

Drill Method RotoSonic
Sampling Method Continuous
Diameter of Casing 4 inch
Type of Casing Steel
Slot Size 0.010"
Filter 10x20 Sand



Depth (Feet Below Land Surface)	PID/FID (ppm)	Lithologic Log	USCS	Lithologic Description	Well Construction	Comments
0	1.7/ 0.1		SM	Gravelly Silty SAND occasional Cobbles, 70% sand, 15% gravel, 15% silt, brown (7.5YR, 5/4), loose, no odor; sand, coarse- grading to fine-grained.		Monument Vault (MP ~ 2.31 feet above land surface)
	1.1/ 0.2					
5	1.9/ 0.0		SM	Silty SAND with Gravel, occasional Cobbles, 75% sand, 15% silt, 10% gravel and cobbles, light brown (7.5YR, 6/3) with multicolored grains, loose/firm, no odor; sand, coarse- grading to fine-grained.		4" ID Schedule 40 Mild Steel casing (0 -230 feet bls)
	3.0/ 0.0					
10	3.5/ 0.0		SM	Silty Gravelly SAND, occasional Cobbles, 55%sand, 30% gravel & cobbles, 15% silt, light brown (7.5YR, 6/3) with multicolored grains, loose/firm, no odor; sand, coarse- grading to fine-grained. At 17': boulder.		
	3.1/ 0.0					
	2.8/ 0.0					
15	3.8/ 0.0					
	3.3/ 0.0					
20	4.7/ 0.0					Cement Grout (0 - 220 feet bls)
	4.4/ 0.0					
	2.4/ 0.0					
25	3.1/ 0.5		ML	Sandy SILT, 60% silt, 40% sand, brown (7.5YR, 5/4), moderately dense, slightly moist, no odor; sand, very fine-grained grading to silt.		10" diameter borehole (0 - 180 feet bls)
	0.1/ 0.0		SM	Silty Gravelly SAND, occasional Cobbles, 55%sand, 30% gravel & cobbles, 15% silt, light brown (7.5YR, 6/3) with multicolored grains, loose/firm, no odor; sand, coarse- grading to fine-grained.		
30	0.7/ 0.4		ML	Sandy SILT, 60% silt, 40% sand, brown (7.5YR, 5/4), moderately dense, slightly moist, no odor; sand, very fine-grained grading to silt.		
	0.7/ 0.0					
	1.6/ 1.0					
35				Clayey silt stringers present this interval.		

PID = Photo Ionization Detector
FID = Flame Ionization Detector
> = greater than

Logged By JCY
Checked By DAT

Lithologic and well construction log: DMC-MW-27

Depth (Feet Below Land Surface)	PID/FID (ppm)	Log Lithologic	USCS	Lithologic Description	Well Construction	Comments
	11.2/ 12.7			At 33'-33.5': Caliche, dense, tight, well cemented.		
	8.5/ 15.5		ML	Sandy CLAYEY SILT, brown (7.5YR, 5/4), soft, plastic, no odor.		
40	6.4/ 5.8					
	27.2/ 32.1		ML	Muddy Creek Formation. CLAYEY SILT, brown (7.5YR, 5/4), moderately dense, plastic, no odor, caliche nodules.		
	33/ 55					
45	27.1/ 58		ML	Sandy CLAYEY SILT, 70% clayey silt, 30% sand, brown (7.5YR, 4/4), firm/moderately dense, low/moderate plasticity; sand, coarse-grained grading to silt, coarser with depth this interval.		
	58/ 161			49'-50': Silty SAND, 85% sand, 15% silt, loose, sand, coarse-grained grading to medium-grained.		
50	61/ 159		ML	CLAYEY SILT with Sand, brown (7.5YR, 5/4), soft/moderately dense, plastic, abundant caliche nodules.		
	15/ 22					
	58/ 146		ML	At 53': stringer of caliche nodules.		
55	52.8/ 115		ML	CLAYEY SILT, strong brown (7.5YR, 4/6), dense, plastic, caliche nodules present.		
	47.1/ 121		SM	CLAYEY SILT, brown (7.5YR, 5/4), moderately dense, plastic, approximately 40% caliche nodules.		
60	59/ 190		ML	Silty SAND, 85% sand, 15% silt, loose, sand, coarse-grained grading to medium-grained.		
	82/ 170		ML	CLAYEY SILT, brown (7.5YR, 5/4), moderately dense, plastic, approximately 40% caliche nodules.		
	112/ 236		ML	Sandy CLAYEY SILT, 60% clayey silt, 40% sand, soft, non-plastic/low plasticity; sand, very fine-grained grading to silt.		
65	228/ 350			CLAYEY SILT, strong brown (7.5YR, 4/6), dense, plastic, caliche nodules present.		
	190/ 160					
70	200/ 200		ML	CLAYEY SILT with Sand, brown (7.5YR, 5/4), soft, moderately plastic; sand, very fine-grained grading to silt.		
	280/ 570		ML	CLAYEY SILT, brown (7.5YR, 5/3), very dense, plastic, caliche nodules present.		
	290/ 565					
75	190/ 100		ML	Sandy CLAYEY SILT, brown (7.5YR, 5/4), firm/moderately dense, non-plastic.		
	120/ 127		ML-CL	CLAYEY SILT/SILTY CLAY, reddish brown (5YR, 4/4), dense, plastic.		
80	100/ 41			At 84'-87': caliche nodules, color change to light reddish brown (5YR, 6/3).		
	70/ 75			CLAYEY SILT, trace Sand, reddish brown (5YR,		

PID = Photo Ionization Detector
FID = Flame Ionization Detector
> = greater than

Logged By JCY
Checked By DAT

Lithologic and well construction log: DMC-MW-27

Depth (Feet Below Land Surface)	PID/FID (ppm)	Log Lithologic	USCS	Lithologic Description	Well Construction	Comments
	15/ 24		ML	5/4), dense, moderately plastic; sand, very fine-grained grading to silt.		
85	58/ 79		ML-CL	CLAYEY SILT/SILTY CLAY, reddish brown (5YR, 4/4), dense, plastic, caliche nodules present. At 99': stringer of caliche nodules. At 104': stringer of caliche nodules.		
	190/ 200					
90	290/ 360					
	380/ 600					
	1490/ 1850					
95	1550/ 1800					
	1060/ 1200					
100	406/ 300					
	442/ 450					
	640/ 880					
105	57/ 70		ML	CLAYEY SILT, trace Sand, brown (7.5YR, 5/4), soft/firm, low plasticity; sand, very fine-grained grading to silt.		
	3.6/ 4.3					
110	2.0/ 2.1					
	2.7/ 0.0		ML	CLAYEY SILT, reddish brown (5YR, 5/4), moderately dense, plastic, caliche nodules.		
	0.1/ 0.4					
115	2.9/ 3.4					
	1.7/ 0.6					
120	1.8/ 0.7					
	2.2/ 0.3					
	6.8/ 4.6		SM	Silty SAND, 60% sand, 40% silt, brown, (7.5YR, 5/3), firm; sand, fine-grained grading to silt.		
125	1.3/ 0.1		ML	CLAYEY SILT, trace Sand, brown (7.5YR, 5/4), soft/firm, low plasticity; sand, very fine-grained grading to silt.		
	1.6/ 0.2					
130	2.9/					

PID = Photo Ionization Detector
FID = Flame Ionization Detector
> = greater than

Logged By JCY
Checked By DAT

Lithologic and well construction log: DMC-MW-27

Depth (Feet Below Land Surface)	PID/FID (ppm)	Log Lithologic	USCS	Lithologic Description	Well Construction	Comments
130	2.3		ML	CLAYEY SILT, reddish brown (5YR, 5/4), moderately dense, plastic, caliche nodules.		
	2.0/ 0.1					
	2.8/ 0.1					
135	1.1/ 0.0		ML	CLAYEY SILT, trace Sand, brown (7.5YR, 5/4), soft/firm, low plasticity; sand, very fine-grained grading to silt.		
	2.1/ 0.0		ML			
			ML	CLAYEY SILT, reddish brown (5YR, 5/4), moderately dense, plastic, caliche nodules.		
140	2.0/ 0.0		ML	CLAYEY SILT, trace Sand, brown (7.5YR, 5/4), soft/firm, low plasticity; sand, very fine-grained grading to silt.		
	2.1/ 0.1		ML			
	2.0/ 0.0		ML	CLAYEY SILT, reddish brown (5YR, 5/4), moderately dense, plastic, caliche nodules.		
145	11.8/ 13.1		ML	CLAYEY SILT, trace Sand, brown (7.5YR, 5/4), soft/firm, low plasticity; sand, very fine-grained grading to silt.		
	8.4/ 14.1					
150	11.0/ 11.2			CLAYEY SILT, reddish brown (5YR, 5/4), moderately dense, plastic, caliche nodules.		
	>10000/ 5000			CLAYEY SILT, trace Sand, brown (7.5YR, 5/4), soft/firm, low plasticity; sand, very fine-grained grading to silt.		
	6.4/ 7.1					
155	3.0/ 3.2		ML-CL	CLAYEY SILT/SILTY CLAY, brown (7.5YR, 4/4), very dense/hard, plastic, contains caliche nodules.		
	7.0/ 2.3					
160	7.5/ 4.5					
	4.4/ 3.0					
	7.6/ 3.2					
165	6.9/ 2.7					
	4.6/ 2.9		ML-CL	CLAYEY SILT/SILTY CLAY, brown (7.5YR, 4/4), very dense/hard, plastic, contains caliche nodules.		
170	4.2/ 3.1			At 175': color change to reddish brown (5YR, 5/4).		
	4.9/ 3.2					
	5.3/ 2.7					
175	7.9/ 2.3					

PID = Photo Ionization Detector
FID = Flame Ionization Detector
> = greater than

Logged By JCY
Checked By DAT

Lithologic and well construction log: DMC-MW-27

Depth (Feet Below Land Surface)	PID/FID (ppm)	Log Lithologic	USCS	Lithologic Description	Well Construction	Comments
	3.6/ 0.4		ML	At 178': sand fraction decreasing with depth: 179': sandy silt, occasional gravel.		8" diameter borehole (180 - 265 feet bls)
180	3.1/ 0.9		ML	CLAYEY SILT, trace Sand, reddish brown (5YR, 5/4), hard, plastic, very slightly moist.		
	61/ 36		ML	Sandy SILT, 60% silt, 40% sand, brown (7.5YR, 5/4), dense, non-plastic, slightly moist; sand, medium-grained grading to silt.		
	1.1/ 3.4		ML	Sandy CLAYEY SILT, 60% clayey silt, 40% sand, brown (7.5YR, 5/4), dense, non-plastic, slightly moist; sand, medium-grained grading to silt.		
185	70/ 18		SM-ML	Clayey Silty SAND/Sandy CLAYEY SILT, brown (7.5YR, 4/3), dense, moderately plastic, slightly moist, no odor; sand, coarse-grained grading to silt, occasional gravel.		
	13.3/ 2.4					
190	3.8/ 0.1					
	13.5/ 3.2					
195	1.1/ 0.1					
	0.3/ 0.0		SM-ML	Clayey Silty SAND/Sandy CLAYEY SILT, with Gravel, brown (7.5YR, 4/3), dense, moderately plastic, slightly moist, no odor; sand, coarse-grained grading to silt.		
200	0.1/ 3.4					
	0.1/ 0.6					
	2.2/ 1.6					
205	2.1/ 2.6					
	1.6/ 2.2					
210	1.5/ 2.9		SM	Silty-Clayey Gravelly SAND, 35% sand, 35% gravel, 30% silty clay, dark brown (7.5YR, 4/3), dense, no odor; sand, coarse-grained grading to silt, sub-angular/angular.		
	3.1/ 1.5		ML	Sandy CLAYEY SILT with Gravel, 50% clayey silt, 40% sand, 10% gravel, brown (7.5YR, 4/3), moderately dense, low/moderate plasticity; sand, ranges from coarse-grained to silt, predominantly fine-grained, angular to sub-angular.		
215	7.8/ 4.1		ML	Sandy CLAYEY SILT with Gravel, 50% clayey silt, 40% sand, 10% gravel, brown (7.5YR, 4/3), very dense, tight, low/moderate plasticity, very slightly moist to dry, coarse-grained fraction increases with depth this interval; sand, ranges from coarse-grained to silt, predominantly fine-grained, angular to sub-angular.		Bentonite Pellets (220 - 225 feet bls)
	2.5/ 5.3					
	2.8/ 6.8					
220	16.1/ 24.3					
	1.2/ 4.3					
	0.8/ 6.3					
225						

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FID = Flame Ionization Detector
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Lithologic and well construction log: DMC-MW-27

Depth (Feet Below Land Surface)	PID/FID (ppm)	Log Lithologic	USCS	Lithologic Description	Well Construction	Comments
225						#60 Sand (225 - 227 feet bls)
	0.7/ 2.0					
	4.8/ 5.6					
230	4.6/ 10.2					
	1.1/ 3.2		SW	SAND with Silt, 90% sand, 10% silt, multicolored, loose, coarse- grading to fine-grained, angular/sub-angular, basalt, grains of caliche.		
	1.2/ 2.0					
235			ML	Sandy CLAYEY SILT with Gravel, 50% clayey silt, 40% sand, 10% gravel, brown (7.5YR, 4/3), very dense, tight, low/moderate plasticity, very slightly moist to dry, coarse-grained fraction increases with depth this interval; sand, ranges from coarse-grained to silt, predominantly fine-grained, angular to sub-angular. At 238'-241': cobbles, basalt.		10x20 Sand Filter Pack (227 - 260 feet bls)
	0.6/ 2.2					
	2.5/ 0.2					
240	1.6/ 0.8					
	2.4/ 0.0		SW	SAND with Silt, 90% sand, 10% silt, multicolored, loose, coarse- grading to fine-grained, angular/sub-angular, basalt, grains of caliche.		
	2.5/ 0.0		ML	Gravelly Sandy CLAYEY SILT, Cobbles, 45% clayey silt, 20% sand, 20% cobbles, 15% gravel, brown (7.5YR, 5/3), with multicolored grains, dense, tight, slightly moist, silt/sandy silt matrix, sand, very fine-grained grading to silt, gravel, cobbles predominantly comprised of angular basalt.		4" ID 0.010" Stainless Steel (230 - 260 feet bls)
245	2.3/ 0.0					
	33/ 14.7					
250	8.3/ 6.2					
	2.6/ 0.4					
	7.5/ 1.5					
255	1.5/ 0.0					
	11.0/ 2.9		SM	Silty SAND, 85% sand, 15% silt, brown (7.5YR, 4/3), loose, sand, predominantly coarse-grained.		
260	1.0/ 0.0		SM	Silty SAND, 70% sand, 30% silt, brown (7.5YR, 5/3), hard, well endurated; sand, predominantly medium-grained.		4" ID Stainless Steel Silt Trap (260 - 265 feet bls)
	2.3/ 3.4		SM	Silty SAND, 85% sand, 15% silt, brown (7.5YR, 4/3), loose, sand, predominantly coarse-grained.		
265			SM	Silty SAND, 70% sand, 30% silt, brown (7.5YR, 5/3), hard, well indurated; sand, predominantly medium-grained. At 263': basalt cobble.		Flush - Threaded End Cap Total depth = 265 feet bls
270						

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this label, it is due to the quality of
the original."

Geraghty & Miller, Inc.

WELL LOG

Well No.: H-13

Project: Stauffer Chemical Company

Date Completed: 10/26/79

Location: Henderson, Nevada

Description	Depth Below Land Surface (feet)
Sand, silty to clayey, grayish-brown, very fine to very coarse (poorly sorted), and gravel, pebbles, cobbles, and boulders, rounded to subangular; also with layers of caliche and caliche-cemented sand and gravel	0 - 38
Clay, silty, to silt, clayey, light-brown; with traces of sand and gravel in matrix; also, with occasional thin layers of sand, reworked caliche, and caliche (Muddy Creek Formation) Notes: caliche layers, 80'-86'; water at 80', rose to 65'	38 - 86
Sand, silty, brown, very fine to very coarse (poorly sorted), and gravel (Muddy Creek Formation) Notes: second water zone at 86', water rose to 55'	86 - 88

000276

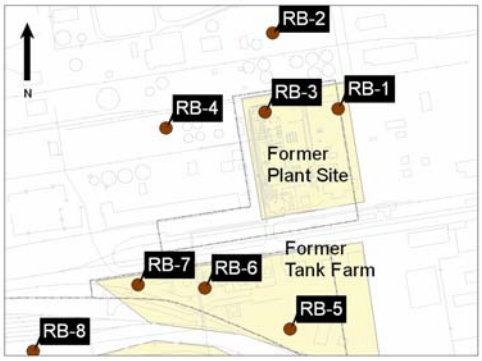
Montrose Chemical Corporation Henderson, NV

Figure B-15

Lithologic log for: RB-05

Northing 26716346.087
Easting 825742.560
LS Elev. (ft) 1824.68
Ref. Pnt. N/A
Ref. Pnt. Elev. (ft) N/A
Total Depth (ft) 150
Depth to Water (ft) N/A
Date 10/02/06 - 10/03/06

Drill Method RotoSonic
Sampling Method N/A
Diameter of Casing N/A
Type of Casing N/A
Slot Size N/A
Filter N/A



Depth (Feet Below Land Surface)	PID/FID (ppm)	Lithologic Log	USCS	Lithologic Description	Comments
0	722/ 1.2		SP	SAND with Silt, trace Gravel, 85% sand, 10% silt, 5% gravel, brown (7.5YR, 5/4), loose, slightly moist; sand ranges from coarse- to fine-grained, predominantly fine-grained, angular, occasional basalt cobble. At 20 feet hard conglomerate, silica cement appears.	PID instrument down (0 - 6 feet bls)
	111.5/ 0.15				
5	326/ -				
	0.4/ 1.52				
10	0.2/ 1.87				8" diameter bore hole
	0.9/ 2.40				
	1.2/ 1.84				
15	1.3/ 3.04				
	7.9/ 3.20				
20	3.9/ 6.95				
	7.9/ 0.81		SM-SP / SM	Silty SAND, 80% sand, 20% silt, pale brown (10YR, 8/3). Sand is fine grained grading to silt.	
	4.1/ 1.09		SM	Silty SAND, 60% sand, 40% silt, brown (7.5YR, 5/4). Sand is very fine grained grading to silt, angular contains veins of caliche.	
25	3.5/ 2.70		SM	Silty SAND, 70% sand, 30% silt, light brown (7.5YR, 7/4). Sand is moist, very fine grained grading to silt. Contains concretions of caliche.	
	2.8/ 1.67		SP	Silty SAND, 85% sand, 15% silt, brown (7.5YR 5/4). Dense, moist. Sand is very fine grained grading to silt contains grains of caliche.	
30	2.5/ 1.45			SAND with silt, 90% sand, 10% silt, brown (7.5YR 5/4). Loose, moist, angular, medium sized grains.	
	2.4/ 1.40			Silty SAND, 85% sand, 15% silt brown (7.5YR 5/4).	

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Lithologic log for: RB-05

Figure B-15

Depth (Feet Below Land Surface)	PID/FID (ppm)	Log Lithologic	USCS	Lithologic Description	Comments
35	1.4/ 2.87		SM	Loose to medium density, sand is very fine grained grading to silt.	
	1.4/ 1.87		SP	SAND with trace of silt, 95% Sand 5% silt, light brown (7.5YR 6/3). Loose sand angular medium sized grains.	
	20.8/ 3.50		SM	Clayey-silty SAND, 80% Sand 20% Clayey silt, brown (7.5YR 5/4). Moderately dense, angular sand is fine grained grading to silt.	
40	2.0/ 1.67		SM	Clayey-silty SAND 60% sand, 40% clayey silt, brown (7.5YR 5/4). Moderately dense, angular sand is fine grained grading to silt.	
	2.1/ 4.09		SM	At 41 feet nodules of caliche appear.	
	1.1/ 4.86		SM	Silty SAND 80% sand 20% silt, brown (7.5YR 5/3). Dense, sand medium grained	
45	4.1/ 4.97		SM	Silty SAND 60% sand, 40% silt, brown (7.5YR 5/4). Moderately dense, sand is very fine grained grading to silt.	
	0.0/ 3.98		ML	Sandy SILT 80% silt, 20% sand, brown (7.5YR 6/4). Moderately dense, sand very fine grained grading to silt, caliche nodules present.	
50	245/ 9.45		ML	Sandy clayey-SILT 70% silt, 30% sand, brown (7.5YR 5/4). very dense, plasticity low to none caliche nodules present.	
	107/ 19.25		SM	Silty SAND 75% sand, 25% silt, light brown (7.5YR 4/3). Soft, sand is fine grained grading to silt.	
	279/ 7.26		ML	Sandy clayey-SILT 80% clayey-silt, 20% sand, brown (7.5YR 5/4). Dense, plasticity moderate to high, caliche nodules present.	
55	47/ 4.9		ML	55-56 feet is a clayey-silt	
	208/ 16.7		ML	Silty SAND 60% sand, 40% silt, light brown (7.5YR 6/4). Sand is very fine grained. Caliche nodules present.	
60	380/ 26.42		SM	Silty SAND 80% sand, 20% silt, brown (7.5YR 5/4) soft, sand is fine grained.	
	247/ 9625		SM	SAND with silt 90% sand 10% silt, multicolored grains. Loose, grains ranging from coarse to fine grained, angular.	
	40.4/ 16.47		SP	Sandy SILT 70% silt, 30% sand, brown (7.5YR 5/4). Dense moderate plasticity, sand is fine grained grading to silt.	
65	9.34/ 48.12		ML	Silty SAND 80% sand 20% silt brown (7.5YR 5/3) loose, sand is medium grained, angular.	
	9.8/ 170		ML	Sandy clayey-SILT 80% silt, 20% sand, brown (7.5YR 5/3). Dense, moderate plasticity, caliche nodules present. Veins of black material present.	
	14.7/ 49.6		SM		
70	9.7/ 211		ML		
	26/ 180		ML		
75	6.8/ 86		ML		
	72/		ML		

Lithologic log for: RB-05

Figure B-15

Depth (Feet Below Land Surface)	PID/FID (ppm)	Log Lithologic	USCS	Lithologic Description	Comments
	309				
80	82/ 427		ML	Clayey-SILT with trace sand, 95% silt, 5% sand, brown (7.5YR 5/4). Dense, moderate plasticity. Caliche nodules present. Layers/stringers of silty-clay.	
	38.5/ 92.0				
	22.7/ 3.62				
85	30.8/ 2.81		ML	Clayey-SILT 100% silt, brown (7.5YR 4/4). Dense, moderate plasticity. Caliche nodules present. Layers/stringers of silty-clay.	
	1.6/ 2.83				
90	0.0/ 1.42				
	0.0/ 2.03		ML	Clayey-SILT 100% silt, brown (7.5YR 5/4). Dense, moderate plasticity. Caliche nodules present.	
	0.0/ 0.54		ML	Clayey-SILT 100% silt, brown (7.5YR 4/4). Dense, moderate plasticity. Caliche nodules present. Layers/stringers of silty-clay.	
95	0.3/ 1.01		ML	Sandy clayey-SILT 85% silt, 15% sand, pale brown (10YR 6/3). Dense moderate plasticity.	
	1.3/ 1.12				
100	1.4/ 0.84		ML	Clayey SILT 100% silt, brown (7.5YR 5/3). Dense, moderate plasticity. Caliche nodules present. Rusty looking/oxidized grains present. Manganese veins present.	
	2.5/ 0.87				
	1.4/ 0.88		SM	Silty SAND 60% sand, 40% silt , brown (7.5YR 5/3) loose to moderate density, sand medium grained grading to silt. Caliche concretions present.	
105	1.7/ 0.73		ML	Clayey-SILT 100% silt pale brown (10YR 6/3) Dense, moderate to high plasticity.	
	1.2/ 0.80		ML	Clayey-SILT 100% silt brown (7.5YR 5/3) Dense, moderate to high plasticity.	
110	3.1/ 1.37		SM	Sandy SILT 60% silt, 40% sand brown (7.5YR 5/3). Dense, non plastic, sand is very fine grained grading to silt. Caliche nodules present.	
	3.2/ 1.20				
	1.2/ 0.76		ML	Clayey-SILT 100% silt, brown (7.5YR 5/3). Dense moderate to high plasticity, caliche nodules present.	
115	2.2/ 1.16			No recovery	
120	0.7/ 0.57			Clayey-SILT 100% silt, brown (7.5YR 5/3). Dense moderate to high plasticity, caliche nodules present.	
	1.86/ 1.02				

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Lithologic log for: RB-05

Figure B-15

Depth (Feet Below Land Surface)	PID/FID (ppm)	Log Lithologic	USCS	Lithologic Description	Comments
	2.8/ 0.61		ML		
125	2.1/ 0.94				
	2.65/ 1.90				
			SM	Gravelly-silty-SAND, cobbles, 55% sand, 20% silt, 15% gravel. 10% cobbles, brown (7.5YR 5/3) with multicolored grains. Loose, sand coarse to fine grained, predominately fine grained. 4" cobble basaly, sub-rounded, thich (1/4") coat of caliche. Gravel is also coated or partially coated with caliche.	
130	3.6/ 1.22				
	0.8/ 0.87				
	1.8/ 0.97			Clayey-SILT 100% silt, brown (7.5YR 5/3). Dense, moderate to high plasticity. Caliche nodules present.	
135	1.7/ 1.73				
	1.9/ 0.70				
140	1.5/ 0.97		ML		
	2.4/ 0.95				
	2.3/ 1.07				
145	2.1/ 1.12				
	2.8/ 0.40				
150	2.6/ 0.91				Total Depth = 150 feet bls

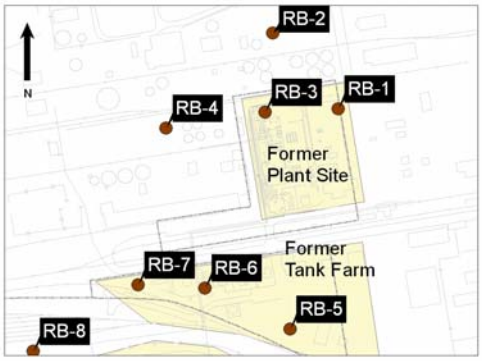
Montrose Chemical Corporation Henderson, NV

Figure B-16

Lithologic log for: RB-06

Northing 26716485.637
Easting 825461.127
LS Elev. (ft) 1823.00
Ref. Pnt. N/A
Ref. Pnt. Elev. (ft) N/A
Total Depth (ft) 150
Depth to Water (ft) N/A
Date 10/04/06 - 10/05/06

Drill Method RotoSonic
Sampling Method N/A
Diameter of Casing N/A
Type of Casing N/A
Slot Size N/A
Filter N/A



Depth (Feet Below Land Surface)	PID/FID (ppm)	Lithologic Log	USCS	Lithologic Description	Comments
0	0.9/ 1.79		SP	Gravelly SAND with Silt, Cobbles, 70% sand, 15% gravel, 10% silt, 5% cobbles, pale brown, (10YR, 6/3), loose, slightly moist; sand, predominantly fine-grained, angular, cobbles & gravel, basalt, sub-angular, coated with caliche. From 3- to 6 feet: light brown (7.5YR, 6/4) From 6- to 8 feet: brown (7.5YR, 5/4)	8" diameter bore hole
	0.9/ 1.86				
5	1.1/ 1.90				
	0.8/ 2.11				
10	0.2/ 2.16				
	0.7/ 3.01				
	0.6/ 2.11				
15	0.5/ 1.47		SP	Gravelly SAND, trace Silt, occasional Cobbles, brown (7.5YR, 4/3) with multi-colored grains, loose, slightly moist; sand, coarse-grained grading to fine-grained, predominantly medium-grained, angular, basalt.	
	0.5/ 1.49				
20	0.7/ 4.62				
	0.5/ 5.08				
	1.2/ 5.20				
25	0.9/ 10.01		SP	SAND with Silt, 90% sand, 10% silt, (7.5YR, 6/4), loose, slightly moist; sand ranges from coarse-grained to fine-grained, predominantly fine-grained, angular. At 27- to 28 feet: caliche nodules.	
	0.8/ 12.6		SM	Silty SAND, 60% sand, 40% silt, strong brown,(7.5YR, 5/6), moderately dense, slightly moist; sand, fine-grained grading to silt.	
30	1.2/ 17.91				
	3.4/ 30.12				

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Lithologic log for: RB-06

Figure B-16

Depth (Feet Below Land Surface)	PID/FID (ppm)	Log Lithologic	USCS	Lithologic Description	Comments
	0.5/ 11.21		SP	SAND, trace Silt, 95% sand, 5% silt, light brown (7.5YR, 6/4), loose, slightly moist; sand, predominantly fine-grained, angular.	
35	1.1/ 14.60		ML		
			SP	Sandy SILT, 80% silt, 20% sand, (7.5YR, 5/4), moderately dense, low plasticity.	
	5.5/ 30.6		ML	Gravelly SAND, trace Silt, occasional Cobbles, brown (7.5YR, 4/3) with multi-colored grains, loose, slightly moist; sand, coarse-grained grading to fine-grained, predominantly medium-grained, angular, basalt.	
40	2.7/ 24.7		ML	CLAYEY-SILT, strong brown, (7.5YR, 5/6), moderately dense, moderate- to high plasticity.	
	4.1/ 20.05				
	11.1/ 60.04			CLAYEY-SILT, strong brown, (7.5YR, 5/6), moderately dense, moderate plasticity.	
45	11.5/ 87.75		SM	Silty SAND, 85% sand, 15% silt, brown (7.5YR, 5/4), loose to moderately dense, sand, predominantly medium-grained.	
	7.4/ 76.4		ML	CLAYEY-SILT with Sand, (7.5YR, 5/4), soft, moderately plastic. Caliche nodules.	
50	3.1/ 55.17		ML	Sandy SILT, 60% silt, 40% sand, brown, (7.5YR, 5/4), soft, plasticity: low- to none. Caliche nodules.	
	41.9/ 163		SP	Gravelly SAND with Silt, 75% sand, 15% gravel, 10% silt, (7.5YR, 3/4) with multi-colored grains, loose, wet, strong chemical odor; sand ranges from coarse-grained to fine-grained, predominantly medium grained, angular, basalt.	
	84.4/ 470		ML	CLAYEY-SILT, brown, (7.5YR, 4/4), dense to moderately dense, moderate- to high plasticity, chemical odor. caliche nodules. At 56- to 57.5 feet: Caliche. Light brown, (7.5YR, 6/3), Caliche nodules in a matrix of caliche with texture of clayey-silt.	
55	94.0/ 175				
	35.6/ 93.0				
60	147/ 532				
	238/ 1167				
	299/ 3075		ML	CLAYEY-SILT, brown, (7.5YR, 5/4), dense, moderately plastic, chemical odor. Caliche nodules.	
65	480/ 3165				
	346/ 1646				
70	481/ 3556				
	674/ 4015		ML	Sandy SILT, 60% silt, 40% sand, (7.5YR, 5/4), loose to moderately dense, non-plastic.	
	1211/ 4921			CLAYEY-SILT, brown, (7.5YR, 5/4), dense, moderately plastic, chemical odor. Caliche nodules. At 75.5- to 76 feet: lenses/blebs of very fine-grained sand, light yellowish-brown.	
75	530/ 5636				

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Lithologic log for: RB-06

Figure B-16

Depth (Feet Below Land Surface)	PID/FID (ppm)	Log Lithologic	USCS	Lithologic Description	Comments
	456/ 4548		ML		
80	1235/ 3500				
	1201/ 8102				
	1653/ >10000		ML	Sandy CLAYEY-SILT, 85% clayey-silt, 15% sand, (7.5YR, 6/4), with finely disseminated caliche grains, gravel-sized fragments/nodules of caliche.	
85	1331/ 5075				
	807/ 7957		ML	Sandy CLAYEY-SILT, 85% clayey-silt, 15% sand, brown, (7.5YR, 5/3), moderately dense, moderate- to high plasticity. Occasional caliche nodules and layers of caliche nodules throughout this interval.	
90	868/ 6798				
	3862/ >10000				
	4976/ >10000		ML	CLAYEY-SILT, brown, (7.5YR, 5/3), dense, moderate- to high plasticity. Occasional caliche nodules.	
95	727/ 4926				
	339/ 1604		ML	Sandy SILT, 60% silt, 40% sand, (7.5YR, 5/3), moderately dense, non-plastic.	
100	472/ 2112		ML	CLAYEY-SILT, brown, (7.5YR, 5/3), dense, moderate- to high plasticity. Occasional caliche nodules. At 103- to 105 feet, 109- to 111.5 feet: Sandy Silt, 60% sand, 40% silt.	DNAPL detected at 101 feet bls (stained FLuTE ribbon) PID/FID (ppm) = 2956/8144
	335/ 1720				
	314/ 781				
105	386/ 2326				
	223/ 1152				
110	566/ 2760				
	376/ 2180				
	55/ 521				
115	138/ 427			CLAYEY-SILT, reddish-brown, (5YR, 5/4), soft to moderately dense, moderate plasticity, contains concretions, caliche nodules. At 137- to 137.5': soft mudstone	
	29.3/ 45.2				
120	1.9/ 6.53				

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Lithologic log for: RB-06

Figure B-16

Depth (Feet Below Land Surface)	PID/FID (ppm)	Log Lithologic	USCS	Lithologic Description	Comments
	19.6/ 20.72				
	11.7/ 34.3				
125					
	1.0/ 2.66				
	0.3/ 1.65				
130	0.8/ 5.2				
	49.0/ 83.0		ML		
	4.8/ 3.51				
135					
	68.8/ 157				
	7.4/ 12.43				
140	1.2/ 0.72				
	2.4/ 0.72				
	1.1/ 0.99				
145					
	1.4/ 5.81				
	0.4/ 0.40				
150	2.8/ 8.02				Total Depth = 150 feet bls

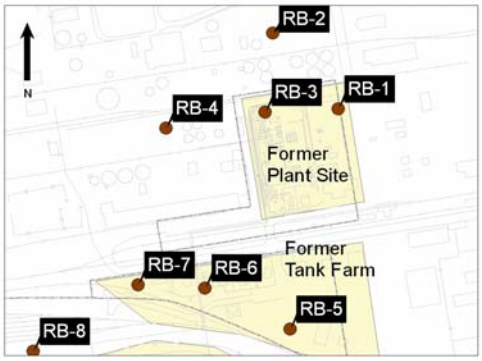
Montrose Chemical Corporation Henderson, NV

Figure B-17

Lithologic log for: RB-07

Northing 26716495.356
Easting 825238.561
LS Elev. (ft) 1822.14
Ref. Pnt. N/A
Ref. Pnt. Elev. (ft) N/A
Total Depth (ft) 150
Depth to Water (ft) N/A
Date 10/09/06 - 10/10/06

Drill Method RotoSonic
Sampling Method N/A
Diameter of Casing N/A
Type of Casing N/A
Slot Size N/A
Filter N/A



Depth (Feet Below Land Surface)	PID/FID (ppm)	Lithologic Log	USCS	Lithologic Description	Comments
0			SP	Gravelly SAND, with Silt, occasional Cobbles, 70% sand, 15% gravel, 10% silt, 5% cobbles, brown, (7.5YR, 5/4), loose, dry- to slightly moist; sand, very fine-grained, angular, gravel & cobbles coated with caliche. At 25- to 25.5': hard layer of caliche.	
	5.4/ 0.74				
	5.4/ 0.68				
5	5.2/ 0.79		SP	SAND, with Silt, trace Gravel, 85% sand, 10% silt, 5% gravel, brown, (7.5YR, 5/3) with multicolored grains, loose, slightly moist; sand, predominantly medium-grained, coarse fraction coated with caliche.	
	2.6/ 0.70				
10	0.8/ 0.90				8" diameter bore hole
	0.5/ 0.90				
	0.2/ 0.08			Gravelly SAND, trace Silt, 75% sand, 20% gravel, 5% silt, brown, (7.5YR, 5/3), loose, slightly moist; sand, predominantly medium-grained, angular; coarse fraction, angular, coated with caliche.	
15	0.4/ 1.03				
	0.6/ 0.96				
20	3.3/ 0.86		SM		
	2.8/ 2.16				
	3.8/ 2.62				
25	0.2/ 1.68				
	4.4/ 2.63			SAND, with Silt, 90% sand, 10% silt, brown, (7.5YR, 5/3), loose to moderately dense, slightly moist; sand, predominantly fine-grained. At 32.5- to 33 feet: caliche layer.	
30	6.3/ 2.16		SP		
	1.1/ 1.27				

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Lithologic log for: RB-07

Figure B-17

Depth (Feet Below Land Surface)	PID/FID (ppm)	Log Lithologic	USCS	Lithologic Description	Comments
	0.5/ 1.3				
35			ML	SILT with Sand, brown, (7.5YR, 5/4), soft to moderately dense, low plasticity.	
	4.8/ 4.57				
	0.0/ 3.56		SP	SAND, with Silt, 90% sand, 10% silt, brown, (7.5YR, 5/3), dense, weakly cemented; slightly moist; sand, predominantly fine-grained.	
40	1.2/ 2.93				
	0.3/ 5.61		ML	CLAYEY-SILT, brown (7.5YR, 4/4), soft, moderate- to high plasticity. Finely disseminated caliche throughout this interval. At 45.5- to 46 feet: caliche-rich zone.	
	2.3/ 8.23				
45	2.2/ 10.12		ML	Sandy CLAYEY-SILT, 85% clayey-silt, 15% sand, brown (7.5YR, 4/4), soft, moderate- to high plasticity; sand, fine-grained grading to silt.	
	3.3/ 44.40		SW	Gravelly SAND, occasional Cobbles, 15% gravel, 80% sand, <5% cobbles, brown, (7.5YR, 5/4), with multicolored grains, loose, wet; sand, coarse-grained grading to fine-grained, angular, basalt, coarse fraction coated with caliche.	
50	4.9/ 49.55		ML	CLAYEY-SILT, brown, (7.5YR, 5/4), moderately dense to dense, moderate- to high plasticity, caliche nodules present, caliche-rich zone from 51.5- to 52 feet.	
	5.8/ 98.35				
	16.2/ 97.46		ML	Sandy SILT, 60% sand, 40% silt, brown (7.5YR, 4/4), soft, low plasticity; sand, fine-grained grading to silt.	
55	23.6/ 195		ML	Sandy CLAYEY-SILT, 20% sand, 80% clayey-silt, (7.5YR, 6/3), soft, moderate- to high plasticity: sand, coarse-grained grading to silt, predominantly fine-grained.	
	34.7/ 165				
60	15.7/ 193				
	24.3/ 231		ML	CLAYEY-SILT brown, (7.5YR, 5/4), moderately dense, low plasticity.	
	27.9/ 239				
65	12.8/ 120		SM	Silty SAND, 60% sand, 40% silt, brown, (7.5YR, 5/4), soft; sand, fine-grained grading to silt.	
	9.6/ 75.23		SP	SAND, trace Silt, 95% sand, 5% silt, dark brown, (7.5YYR, 3/2) with multicolored grains, loose; sand, medium-grained to coarse-grained, angular, basalt.	
70	6.5/ 38.32			CLAYEY-SILT, brown, (7.5YR, 5/3) dense, moderate- to high plasticity, Manganese grains, caliche nodules.	
	75.8/ 905				
	163/ 1403				
75	194/ 1128				

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Lithologic log for: RB-07

Figure B-17

Depth (Feet Below Land Surface)	PID/FID (ppm)	Log Lithologic	USCS	Lithologic Description	Comments
	103/ 408		ML		
80	50.8/ 163				
	41.3/ 245				
	36.6/ 162				
85	150/ 201				
	135/ 467				
90	273/ 669		ML	Sandy CLAYEY-SILT, (7.5YR, 5/4), dense, moderate plasticity. At 90 feet: caliche nodules.	
	443/ 1355		ML	CLAYEY-SILT, brown, (7.5YR, 5/3) dense, moderate- to high plasticity, Manganese grains, caliche nodules.	
	1106/ 3518		ML	Sandy CLAYEY-SILT, (7.5YR, 5/4), dense, moderate plasticity. At 90 feet: caliche nodules.	
95	3101/ 4706			CLAYEY-SILT, brown, (7.5YR, 5/3) dense, moderate- to high plasticity, Manganese grains, caliche nodules.	
	787/ 1151		ML		
100	708/ 1960				
	4079/ 6195		ML	CLAYEY-SILT, brown, (7.5YR, 5/3), dense to very dense, weakly cemented, concretions present.	
	1153/ 3663				
105	198/ 955		ML	CLAYEY-SILT, brown, (7.5YR, 5/3) dense, moderate- to high plasticity, manganese grains, caliche nodules. At 105.5- to 106.5 feet: caliche nodules.	
	202/ 518				
110	33.8/ 80.20				
	13.1/ 29.36				
	7.2/ 14.01				
115	1.1/ 0.35				
	0.7/ 0.46				
120	0.4/ 0.54				

Lithologic log for: RB-07

Figure B-17

Depth (Feet Below Land Surface)	PID/FID (ppm)	Log Lithologic	USCS	Lithologic Description	Comments
	0.5/ 1.90				
	0.1/ 0.35			Sandy CLAYEY-SILT, 85% clayey-silt, 15% sand, (7.5YR, 4/4), dense, moderate to high plasticity. Thin layers and stringers of caliche grains and nodules present throughout this interval.	
125	0.9 0.90				
	0.1/ 0.46		ML		
130	0.1/ 0.45				
	0.1/ 0.83				
	0.2/ 0.62			CLAYEY-SILT with Sand, 90% clayey-silt, 10% sand, brown, (7.5YR, 5/3), moderately dense to dense, low to moderate plasticity. Caliche stringers throughout this interval.	
135	1.3/ 3.52				
	0.5/ 0.47				
140	0.2/ 0.46				
	0.7/ 0.68		ML		
	1.0/ 1.20				
145	0.7/ 0.45				
	0.2/ 0.26				
150	0.2/ 0.41				Total Depth = 150 feet bls

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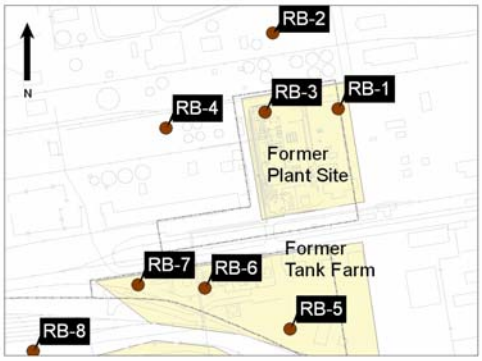
Figure B-18

Lithologic log for: RB-08

Northing 26716270.746
Easting 824890.496
LS Elev. (ft) 1825.33
Ref. Pnt. N/A
Ref. Pnt. Elev. (ft) N/A
Total Depth (ft) 150
Depth to Water (ft) N/A
Date 10/11/06 - 10/12/06

Drill Method RotoSonic
Sampling Method N/A
Diameter of Casing N/A
Type of Casing N/A
Slot Size N/A
Filter N/A



Depth (Feet Below Land Surface)	PID/FID (ppm)	Lithologic Log	USCS	Lithologic Description	Comments
0	1.2/ 1.02		SP	SAND, with Silt, with Gravel & Cobbles, brown, (7.5YR, 5/3), loose, slightly moist; sand ranges from fine-grained to coarse-grained, predominantly medium-grained, angular, basalt.	8" diameter bore hole
	1.1/ 0.82				
5	1.7/ 0.47				
	1.4/ 0.63				
10	0.5/ 0.78				
	0.1/ 0.40				
	0.1/ 0.67				
15	0.5/ 0.59				
	0.3/ 0.76				
20	0.2/ 0.30				
	0.30/ 1.60				
	0.5/ 0.70				
25	0.70/ 3.01		ML	Sandy SILT, 85% silt, 15% sand, brown, (7.5YR, 5/4), loose to moderately dense, plasticity: moderate to none, slightly moist; sand, very fine-grained grading to silt. At 32 feet: concretions.	
	0.9/ 2.07				
30	0.8/ 2.22				
	1.2/ 5.47				

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Lithologic log for: RB-08

Figure B-18

Depth (Feet Below Land Surface)	PID/FID (ppm)	Log Lithologic	USCS	Lithologic Description	Comments
	0.7/ 4.35				
35	1.3/ 3.40		SM	Silty SAND, 85% sand, 15% silt, brown (7.5YR, 5/3), loose; sand, coarse-grained and fine-grained, angular to subangular.	
	0.9/ 7.02		ML	Sandy SILT, 60% 40% silt, brown, (7.5YR, 5/3), loose to moderately dense, moderately plastic.	
40	0.3/ 4.97			CLAYEY-SILT, trace Sand, 95% clayey-silt, 5% sand, brown, (7.5YR, 4/4) dense, moderate- to high plasticity. Caliche nodules present.	
	3.0/ 13.25		ML		
	0.5/ 10.22				
45	0.2/ 7.52		SM	Silty SAND, 85% sand, 15% silt, brown (7.5YR, 5/3), loose; sand, coarse-grained and fine-grained, angular to subangular.	
	4.0/ 8.77		ML	CLAYEY-SILT, trace Sand, 95% clayey-silt, 5% sand, brown, (7.5YR, 4/4) dense, moderate- to high plasticity. Caliche nodules present.	
50	0.5/ 4.52				
	0.5/ 2.68				
	1.7/ 2.62		SM	Sandy SILT, trace Gravel, 75% silt, 20% sand, 5% gravel, brown, (7.5YR, 5/3) with multicolored grains, soft, moderate- to high plasticity; sand ranges from coarse-grained to fine-grained. Concretions.	
55	0.1/ 1.27				
	0.6/ 1.62		ML	Sandy CLAYEY-SILT, 85% clayey-silt, 15% sand, brown, (7.5YR, 5/4), soft to medium- dense, moderately plastic, slightly moist; sand ranges from coarse-grained to fine-grained, predominantly fine-grained. Pockets of rusty-colored, fine-grained sand (< 1/8-inch diameter) within this interval. Manganese grains.	
60	1.1/ 2.90				
	0.3/ 8.20				
	2.6/ 16.92			CLAYEY-SILT, brown, (7.5YR, 5/4), dense to very dense, high plasticity.	
65	3.4/ 13.97			At 68 feet: caliche nodules.	
	0.3/ 8.79			At 77 feet: gradational contact with caliche layer.	
			ML		
70	0.1/ 1.72				
	0.9/ 1.24				
	11.1/ 1.27				
75	0.8/ 0.47				

Lithologic log for: RB-08

Figure B-18

Depth (Feet Below Land Surface)	PID/FID (ppm)	Log Lithologic	USCS	Lithologic Description	Comments
	0.2/ 0.74				
			ML	Comprised of caliche. Texturally: clayey-silt, pink, (7.5YR, 7/3). Approximately 90% caliche.	
80	1.6/ 0.46				
	0.8/ 0.64		ML	CLAYEY-SILT, brown, (7.5YR, 5/4), dense, high plasticity. At 80.5- to 81 feet: caliche nodules.	
	0.6/0.45				
85					
	0.1/ 0.55		ML	Comprised of ~ 50% caliche, 50% clayey-silt. Texturally: clayey-silt, pink, (7.5YR, 7/3). Caliche fraction decreases with depth throughout this interval.	
	0.2/0.90				
90	0.1/ 0.84			CLAYEY-SILT, brown, (7.5YR, 5/4), moderately dense to dense, moderate to high plasticity. Caliche nodules in .5-foot layers and stringers throughout this interval.	
	0.2/ 0.70				
	0.5/ 0.78				
95	0.4/ 0.74				
	0.2/ 0.82				
100	0.1/ 1.12				
	0.4/ 0.65				
	0.6/ 1.24				
105	0.4/ 1.21				
	0.1/ 0.70		ML		
110	0.1/ 0.50				
	0.7/ -				
	1.3/ -				
115	0.8/ -				Hydrogen exhausted in FID, no FID readings from 112 to 120 feet
	0.4/ -				
120	1.2/ -				

Lithologic log for: RB-08

Figure B-18

Depth (Feet Below Land Surface)	PID/FID (ppm)	Log Lithologic	USCS	Lithologic Description	Comments
	0.6/ 0.48				
	0.3/ 0.25				
125	0.4/ 0.54				
	0.1/ 0.51			Sandy CLAYEY-SILT, brown, (7.5YR, 5/4), soft to moderately dense, moderate to high plasticity; Caliche nodules in .5-foot layers and stringers throughout this interval.	
130	0.5/ 0.56				
	0.4/ 0.36				
	0.4/ 0.64				
135	0.3/ 0.62				
	0.2/ 0.86		ML		
140	0.1/ 0.68				
	0.2/ 1.20				
	0.1/ 0.66				
145	0.5/ 0.84				
	0.2/ 1.05				
150	0.1/ 0.42				Total Depth = 150 feet bls

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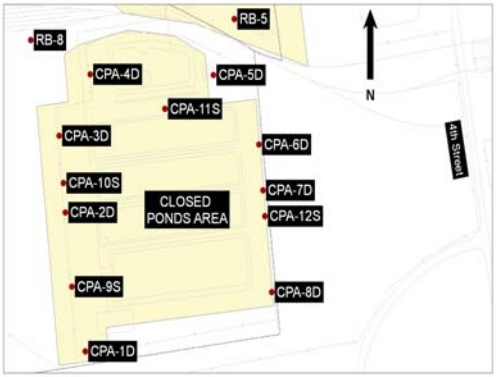
Figure B-22

Lithologic log for: CPA-01D

Northing 26715156.048
Easting 825118.866
LS Elev. (ft) 1849.27
Ref. Pnt. N/A
Ref. Pnt. Elev. (ft) N/A
Total Depth (ft) 50
Depth to Water (ft) N/A
Date 11/7/2006

Drill Method RotoSonic
Sampling Method N/A
Diameter of Casing N/A
Type of Casing N/A
Slot Size N/A
Filter N/A



Depth (Feet Below Land Surface)	PID/FID (ppm)	Lithologic Log	USCS	Lithologic Description	Comments
0			SP	Gravelly SAND, with Silt, 50% sand, 40% gravel, 10% silt, pale brown, (10YR, 6/3) with multicolored grains, loose, dry; sand, coarse-grained grading to fine-grained.	
5			SM	Gravelly Silty SAND, 65% sand, 20% silt, 15% gravel, pinkish-gray, (7.5YR, 6/2), loose, dry; sand, coarse-grained to fine-grained, angular.	
			SP	SAND, trace Gravel, trace Silt, 90% sand, 5% gravel, 5% silt, light brown, (7.5YR, 6/4), loose, dry; sand, coarse-grained grading to fine-grained.	
			GP		
10			SP	Sandy GRAVEL, trace Silt, 65% gravel, 30% sand, 5% silt, pinkish-gray, (7.5YR, 6/2) with multicolored grains, loose, dry; sand, coarse-grained to fine-grained.	
				Gravelly SAND, with Silt, 75% sand, 15% gravel, 10% silt, light brown, (7.5YR, 6/3) with multi-colored grains, loose, dry; sand, coarse-grained grading to fine-grained. Coarser with depth throughout this interval.	
15			SM	Silty SAND, trace gravel, 65% sand, 30% silt, 5% gravel, light brown, (7.5YR, 6/3), loose, dry/slightly moist; sand, predominantly fine-grained.	
20			ML	Sandy SILT, 80% silt, 20% sand, light brown, (7.5YR, 6/4), loose/soft, low plasticity, dry/slightly moist; sand, medium-grained to fine-grained.	
25					

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Lithologic log for: CPA-01D

Figure B-22

Depth (Feet Below Land Surface)	PID/FID (ppm)	Log Lithologic	USCS	Lithologic Description	Comments
			SP	Silty SAND, trace Gravel, 75% sand, 20% silt, 5% gravel, brown, (7.5YR, 5/3), loose, dry/slightly moist; sand, fine-grained to coarse-grained.	
30			SM	Silty SAND, trace Gravel, 75% sand, 20% silt, 5% gravel, brown, (7.5YR, 5/3), loose, dry/slightly moist; sand, coarse-grained to fine-grained.	
35			SP	SAND, with gravel, trace Silt, occasional Cobble, 85% sand, 10% gravel, 5% silt, brown, (7.5YR, 5/4), loose, dry/slightly moist; sand, coarse-grained to fine-grained, predominantly fine-grained.	
40			CL	SILTY CLAY, brown, (7.5YR, 5/4), soft, low plasticity, slightly moist.	
45					
50					Total Depth = 50 feet

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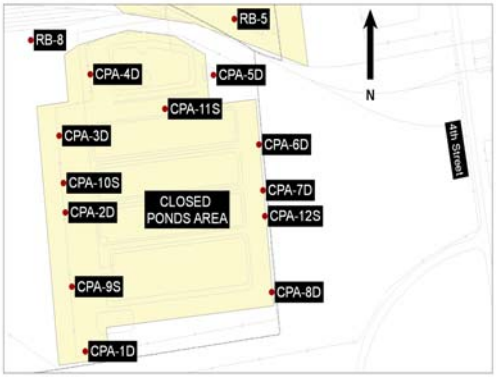
Figure B-23

Lithologic log for: CPA-02D

Northing 26715653.837
Easting 825034.969
LS Elev. (ft) 1841.622
Ref. Pnt. N/A
Ref. Pnt. Elev. (ft) N/A
Total Depth (ft) 50
Depth to Water (ft) N/A
Date 11/14/2006

Drill Method RotoSonic
Sampling Method N/A
Diameter of Casing N/A
Type of Casing N/A
Slot Size N/A
Filter N/A



Depth (Feet Below Land Surface)	PID/FID (ppm)	Lithologic Log	USCS	Lithologic Description	Comments
0			SP	SAND, trace Silt, trace Gravel, 90% sand, 5% silt, 5% gravel, brown, (7.5YR, 5/4), loose, slightly moist, no odor; sand, coarse-grained to fine-grained, predominantly fine-grained. Gravel increases with depth throughout this interval.	
5	0.24/ 8.01				
10	0.56/ 9.23		SP	Gravelly SAND, with Cobbles, trace Silt, 55% sand, 30% gravel, 10% cobbles, 5% silt, brown, (7.5YR, 5/4), loose, slightly moist, no odor; sand, coarse-grained to fine-grained, predominantly fine-grained. Coarse-grained fraction is coated with caliche.	
15	27.7/ 4.81		SP	SAND with Gravel, trace Silt, 85% sand, 10% gravel, 5% silt, brown, (7.5YR, 5/4), loose, slightly moist, no odor; sand, coarse-grained to fine-grained, predominantly fine-grained.	
20	0.31/ 11.98		SP	SAND with Gravel, trace Silt, 85% sand, 10% gravel, 5% silt, pink, (7.5YR, 7/3), loose, slightly moist no odor; sand, coarse-grained to fine-grained, predominantly fine-grained. Disseminated fine-grained caliche throughout this interval.	
25	6.7/ 31.30				

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Lithologic log for: CPA-02D

Figure B-23

Depth (Feet Below Land Surface)	PID/FID (ppm)	Log Lithologic	USCS	Lithologic Description	Comments
30	14.32/ 35.18		SM	Silty SAND, 60% sand, 40% silt, pink, (7.5YR, 7/3), firm to moderately dense, dry, no odor; sand, very fine-grained grading to silt. 32- to 33 feet: well cemented, hard.	
35	20.43/ 15.68		SP	SAND with Gravel, occasional cobbles, 85% sand, 10% gravel, 5% cobbles, light brown, (7.5YR, 6/3), loose, slightly moist no odor; sand, coarse-grained to fine-grained, predominantly fine-grained. Fragments of well-cemented sand within this interval.	
40	12.43/ 52.78		ML	Sandy SILT, 60% silt, 40% sand, brown, (7.5YR, 4/4), moderately dense, slightly moist, no odor; sand, very fine-grained grading to silt. Stringers of clayey-silt, this interval, fragments of moderately well-cemented silt this interval.	
45	16.37/ 102.48		ML	Silty SAND, 60%sand, 40% silt, brown, (7.5YR, 4/4), firm, slightly moist, no odor; sand, very fine-grained grading to silt. 46 feet: caliche fragments.	
50	19.91/ 84.82				Total Depth = 50 feet

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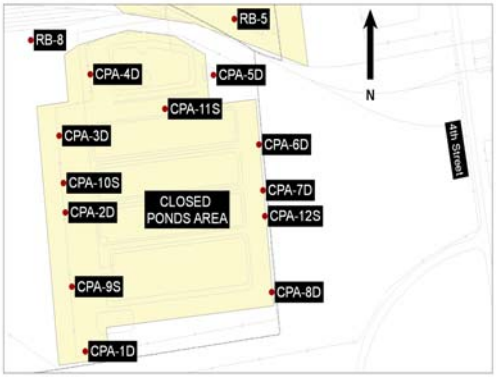
Figure B-24

Lithologic log for: CPA-03D

Northing 26715927.604
Easting 825009.427
LS Elev. (ft) 1836.068
Ref. Pnt. N/A
Ref. Pnt. Elev. (ft) N/A
Total Depth (ft) 50
Depth to Water (ft) N/A
Date 11/15/2006

Drill Method RotoSonic
Sampling Method N/A
Diameter of Casing N/A
Type of Casing N/A
Slot Size N/A
Filter N/A



Depth (Feet Below Land Surface)	PID/FID (ppm)	Lithologic Log	USCS	Lithologic Description	Comments
0			SP	Gravelly SAND, trace Silt, occasional Cobbles, 70% sand, 25% gravel & cobbles, 5% silt, light brown, (7.5YR, 6/4), loose, slightly moist, no odor; sand, coarse-grained to fine-grained, predominantly fine-grained, angular, basalt, coarse-grained fraction coated with caliche. 5- to 15 feet: disseminated caliche.	
5	0.01/ 4.92				
10	0.00/ 3.69				
15	0.00/ 3.94		SM	SAND with Silt, 90% sand, 10% silt, light gray, (7.5YR, 7/1), dense, weakly cemented, dry; sand, very fine-grained. Disseminated caliche throughout this interval.	
20	2.30/ 5.20		SP	Gravelly SAND, with Silt, 55% sand, 40% gravel, 5% silt, light brown, (7.5YR, 6/3), loose, slightly moist, no odor; sand, coarse-grained to fine-grained, predominantly fine-grained, angular, basalt. Coarse fraction coated with caliche. 21- to 23 feet: occasional cobbles.	
25	3.50/ 5.10			Gravelly SAND, trace Silt, occasional Cobbles, 70% sand, 25% gravel & cobbles, 5% silt, light brown, (7.5YR, 6/4), loose, slightly moist, no odor; sand, coarse-grained to fine-grained, predominantly fine-grained, angular, basalt, coarse-grained fraction coated with caliche. Disseminated caliche throughout this interval.	

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Lithologic log for: CPA-03D

Figure B-24

Depth (Feet Below Land Surface)	PID/FID (ppm)	Log Lithologic	USCS	Lithologic Description	Comments
30	1.40/ 5.23		SP		
35	6.70/ 8.28				
			ML	Sandy SILT, 60% silt, 40% sand, brown, (7.5YR, 5/4), loose to firm, slightly moist, no odor; sand, very fine-grained grading to silt.	
			SP	Gravelly SAND, trace Silt, occasional Cobbles, 70% sand, 25% gravel & cobbles, 5% silt, light brown, (7.5YR, 6/4), loose, slightly moist, no odor; sand, coarse-grained to fine-grained, predominantly fine-grained, angular, basalt, coarse-grained fraction coated with caliche. Disseminated caliche throughout this interval.	
40	0.05/ No FID		ML		
			ML	CLAYEY-SILT, brown, (7.5YR, 4/4), firm to moderately dense, moderate to high plasticity, moist, no odor.	
45	0.00/ No FID		ML	CLAYEY-SILT, brown, (7.5YR, 4/4) mottled with light brown, (7.5YR, 6/3), mottling is due to abundant caliche present this interval; firm to moderately dense, moderate to high plasticity, moist, no odor.	
				CLAYEY-SILT, brown, (7.5YR, 4/4), firm to moderately dense, moderate to high plasticity, moist, no odor.	
50	1.52/ No FID				Total Depth = 50 feet

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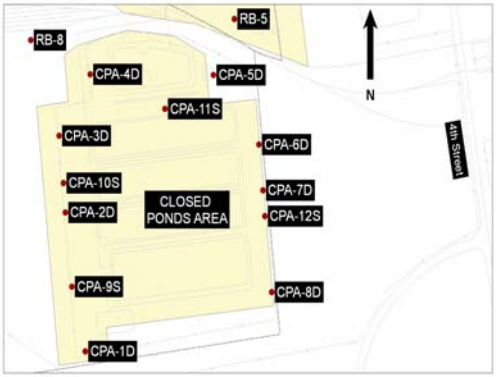
Figure B-25

Lithologic log for: CPA-4D

Northing 26716148.184
Easting 825139.123
LS Elev. (ft) 1831.336
Ref. Pnt. N/A
Ref. Pnt. Elev. (ft) N/A
Total Depth (ft) 50
Depth to Water (ft) N/A
Date 11/16/06

Drill Method RotoSonic
Sampling Method N/A
Diameter of Casing N/A
Type of Casing N/A
Slot Size N/A
Filter N/A



Depth (Feet Below Land Surface)	PID/FID (ppm)	Lithologic Log	USCS	Lithologic Description	Comments
0			SP	Gravelly SAND, trace Silt, occasional Cobbles, 75% sand, 15% gravel, 5% silt, 5% cobbles, brown (7.5YR 5/3), loose, slightly moist; sand, coarse- to fine-grained, predominantly fine grained, coarse-grained fraction coated with caliche.	
5	0.4/ 10.75				
10	1.2/ 8.40		SP	Sandy GRAVEL and Cobbles, trace Silt, 45% sand, 40% gravel and cobbles, 5% silt, light brown (7.5YR 6/3), loose, slightly moist; sand, coarse- to fine-grained, predominantly fine-grained, cobbles ~ 6-inch, basalt, coated with caliche.	
15	3.5/ 14.75		SP	Gravelly SAND, trace Silt, occasional Cobbles, 75% sand, 15% gravel, 5% silt, 5% cobbles, brown (7.5YR 5/3), loose, slightly moist; sand, coarse- to fine-grained, predominantly fine grained, coarse-grained fraction coated with caliche.	
20	1.9/ 64.28				
25	1.5/ 68.32		SP-SM	Caliche Zone, 100% caliche	
			SP		
			SP-SM	SAND, trace silt, 95% sand, 5% silt, pink, (7.5YR 8/3), slightly moist; sand, very fine-grained.	
				Caliche Zone, 100% caliche	

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Lithologic log for: CPA-4D

Figure B-25

Depth (Feet Below Land Surface)	PID/FID (ppm)	Log Lithologic	USCS	Lithologic Description	Comments
30	7.9/ 31.72		SP	SAND, trace silt, 95% sand, 5% silt, brown, (7.5YR 5/4), slightly moist; sand, very fine-grained. At 28-feet: gravel stringer. At 29-feet: Clayey silt stringer.	
			SP	SAND, with gravel, trace silt, 85% sand, 10% gravel, 5% silt, brown (7.5YR 5/4), very weakly cemented; sand, fine-grained.	
35	32.30/ 134		ML	Sandy SILT, 60% silt, 40% sand, brown 7.5YR 5/4), soft to moderately dense, low to no plasticity, slightly moist; sand, very fine-grained, caliche nodules.	
40	41.5/ 164		SM	Silty SAND, 60% sand, 40% silt, brown (7.5YR 5/4), loose, slightly moist. At 38-feet: Caliche stringer	
45	30.2/ 248		ML	Clayey SILT, 100% silt, brown (7.5YR 5/4), soft, moist, moderate to high plasticity.	
50	28.0/ 322				Total Depth = 50 feet

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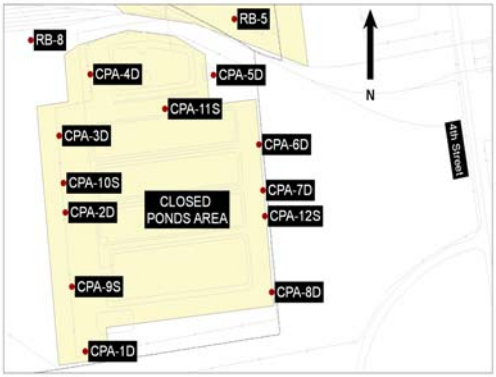
Figure B-26

Lithologic log for: CPA-05D

Northing 26716146.116
Easting 825656.044
LS Elev. (ft) 1829.135
Ref. Pnt. N/A
Ref. Pnt. Elev. (ft) N/A
Total Depth (ft) 50
Depth to Water (ft) N/A
Date 11/16/2006

Drill Method RotoSonic
Sampling Method N/A
Diameter of Casing N/A
Type of Casing N/A
Slot Size N/A
Filter N/A



Depth (Feet Below Land Surface)	PID/FID (ppm)	Lithologic Log	USCS	Lithologic Description	Comments
0	1.8/ 3.13		SP	Gravelly SAND, with Silt, occasional Cobbles, 65% sand, 15% gravel, 5% silt, 5% cobbles, brown, (7.5YR, 5/3), firm to loose, very weakly cemented, slightly moist; sand, coarse-grained to fine-grained, predominantly fine-grained.	
5	1.8/ 6.34		SP	Gravelly SAND trace Silt, occasional Cobbles, 75% sand, 15% gravel, 5% silt, 5% cobbles, brown, (7.5YR, 5/3), loose, slightly moist; sand, coarse-grained to fine grained, predominantly fine-grained, angular.	
10	2.3/ 6.30				
15	7.8/ 11.63		SP	Gravelly SAND, trace Silt, occasional Cobbles, 75% sand, 15% gravel, 5% silt, 5% cobbles, brown, (7.5YR, 5/3), loose, slightly moist; sand, coarse-grained to fine grained, predominantly fine-grained, approximately 30% of sand consists of coarse-grained, angular basalt fragments.	
20	2.6/ 8.34				
			SM	Silty SAND, 60% sand, 40% silt, light brown, (7.5YR, 6/4), firm, slightly moist; sand, very fine-grained grading to silt.	
25	5.5/ 36.28		SP	SAND with Silt, 95% sand, 5% silt, light brown, (7.5YR, 6/3), firm to loose, very weakly cemented, slightly moist; sand, very fine-grained grading to silt. Abundant disseminated caliche.	

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Lithologic log for: CPA-05D

Figure B-26

Depth (Feet Below Land Surface)	PID/FID (ppm)	Log Lithologic	USCS	Lithologic Description	Comments
30	5.9/ 34.40		ML	Sandy SILT, 60% silt, 40% sand, brown, (7.5YR, 5/4), firm, low plasticity.	
			SP	SAND with Silt, 95% sand, 5% silt, light brown, (7.5YR, 6/3), firm to loose, very weakly cemented, slightly moist; sand, very fine-grained grading to silt. Abundant disseminated caliche.	
35	8.31/ 27.28		ML	Sandy SILT, 60% sand, 40% silt, brown, (7.5YR, 5/4), firm to medium-dense, moderate- to high plasticity.	
40	19.2/ 22.40		SP	SAND with Silt, trace Gravel, 85% sand, 10% silt, 5% gravel, brown, (7.5YR, 5/4) with multicolored grains, loose, slightly moist; sand, coarse-grained grading to fine-grained, predominantly medium-grained.	
45	5.6/ 55.78		ML	CLAYEY-SILT, brown, (7.5YR, 4/4), firm to moderately dense, moderate- to high plasticity. Caliche nodules.	
50	6.2/ 48.7				Total Depth = 50 feet

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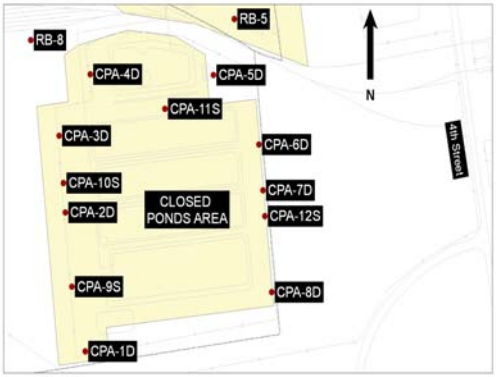
Figure B-27

Lithologic log for: CPA-06D

Northing 26715896.352
Easting 825846.18
LS Elev. (ft) 1835.056
Ref. Pnt. N/A
Ref. Pnt. Elev. (ft) N/A
Total Depth (ft) 50
Depth to Water (ft) N/A
Date 11/17/2006

Drill Method RotoSonic
Sampling Method N/A
Diameter of Casing N/A
Type of Casing N/A
Slot Size N/A
Filter N/A



Depth (Feet Below Land Surface)	PID/FID (ppm)	Lithologic Log	USCS	Lithologic Description	Comments
0			SP	Gravelly SAND, trace Silt, 80% sand, 15% gravel, 5% silt, brown (7.5YR 5/4), loose, slightly moist; sand, coarse- to fine-grained, predominantly fine-grained. At 5-feet: begin occasional cobbles	
5	1.8/ 6.84				
10	1.2/ 5.03		SP	Gravelly SAND, trace Silt, occasional Cobbles, 75% sand, 15% gravel, 5% silt, 5% cobbles, brown (7.5YR 5/4), loose; sand, coarse- to fine-grained, predominantly fine-grained. Approximately 20% sand fraction is coarse-grained (~1/8-inch) angular basalt fragments. At 14-feet: well cemented sand fragments/concretion. At 15-20-feet: sand, finer with depth in this interval.	
15	3.5/ 11.08				
20	26.1/ 54.23		SM	Silty SAND trace Gravel, 75% sand, 20% silt, 5% gravel, light brown (7.5YR 6/4), very weakly cemented, slightly moist; sand, coarse- to fine-grained, predominantly fine-grained. Accumulations of fine-grained sand-textured material (white 7.5YR 8/1) does not react to HCl. Poorly developed gypsum crystals occurrences.	
25	15.50/ 38.32				

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Lithologic log for: CPA-06D

Figure B-27

Depth (Feet Below Land Surface)	PID/FID (ppm)	Log Lithologic	USCS	Lithologic Description	Comments
			ML	Clayey SILT 100% silt brown (7.5YR 4/4), soft to firm, slightly moist, moderate to high plasticity.	
30	13.10/ 21.34		ML	Sandy SILT, 60% silt, 40% sand, brown (7.5YR 4/4), moderately dense, dry to slightly moist; sand, fine-grained to silt. Abundant caliche nodules.	
			SP	Gravelly SAND, trace Silt, occasional Cobbles, 75% sand, 15% gravel, 5% silt, 5% cobbles, brown (7.5YR 5/4), loose; sand, coarse- to fine-grained, predominantly fine-grained. Approximately 20% sand fraction is coarse-grained (~1/8-inch) angular, basalt fragments.	
			ML		
35	14.6/ 22.38		SP	Clayey SILT, 100% silt brown (7.5YR 4/4), moderately dense, moderate to high plasticity. At 34-feet: thin (~1/8-inch) layers of caliche	
			SP	Gravelly SAND, trace Silt, occasional Cobbles, 75% sand, 15% gravel, 5% silt, 5% cobbles, brown (7.5YR 5/4), loose; sand, coarse- to fine-grained, predominantly fine-grained. Approximately 20% sand fraction is coarse-grained (~1/8-inch) angular, basalt fragments.	
			SM		
40	6.4/ 9.78		SP		
			ML	SAND trace Silt, 95% sand, 5% silt; sand, medium-grained.	
			SM	Silty SAND, 60% sand, 40% silt, brown (7.5YR 4/4), soft, low to moderate plasticity.	
45	5.5/ 47.34		ML	SAND trace Silt, 95% sand, 5% silt; sand, medium-grained. Contains concretions/cemented sand. Caliche nodules present. Clayey SILT, 100% silt, brown (7.5YR 4/4), moderately dense, moderate to high plasticity. Silty SAND, 70% sand, 30% silt, brown (7.5YR 4/4), loose to firm; sand, fine-grained to silt.	
50	6.7/ 36.40			Clayey SILT, 100% silt, brown (7.5 YR 4/4) dense, moderate to high plasticity, caliche nodules present.	Total Depth = 50 feet

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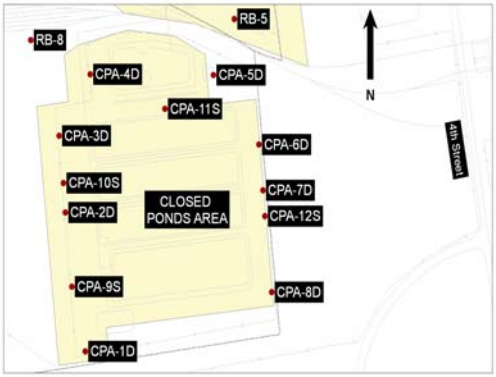
Figure B-28

Lithologic log for: CPA-07D

Northing 26715733.381
Easting 825861.975
LS Elev. (ft) 1839.015
Ref. Pnt. N/A
Ref. Pnt. Elev. (ft) N/A
Total Depth (ft) 50
Depth to Water (ft) N/A
Date 11/27/06

Drill Method RotoSonic
Sampling Method N/A
Diameter of Casing N/A
Type of Casing N/A
Slot Size N/A
Filter N/A



Depth (Feet Below Land Surface)	PID/FID (ppm)	Lithologic Log	USCS	Lithologic Description	Comments
0			SW-SM	SAND, with Gravel, with Silt, 80% sand, 10% gravel, 10% silt, brown (7.5YR 5/4), loose, dry; sand, coarse- to fine-grained.	
5	0.38/ 0.88				
10	3.5/ 1.25				
15	3.83/ 4.40				
20	31.2/ 21.0		SM	Silty SAND, trace Gravel, 65% sand, 30% silt, 5% gravel, light brown (7.5Yr 6/4), loose, dry; sand, coarse- to fine-grained, predominantly fine-grained. At 23.5-24-feet: Caliche	
25	24.6/ 10.5				

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Lithologic log for: CPA-07D

Figure B-28

Depth (Feet Below Land Surface)	PID/FID (ppm)	Log Lithologic	USCS	Lithologic Description	Comments
30	4.42/ 3.6				
35	4.46/ 3.89		ML	Sandy SILT, 70% silt, 30% sand, light brown (7.5YR 6/4), moist; sand, very fine-grained.	
40	10.5/ 39.2		SM	Silty SAND, 65% sand, 35% silt, brown (7.5YR 4/4), loose, moist; sand, coarse- to fine-grained, predominantly fine-grained.	
			ML	SILT, trace Sand, 95% silt, 5% sand, brown (7.5YR 4/4), soft, moist, non plastic.	
45	23.5/ 25.4		SM	Silty SAND, 65% sand, 35% silt, brown (7.5YR 4/4); sand, coarse- to fine-grained, predominantly fine-grained.	
			ML	SILT, trace Sand, 95% silt, 5% sand, brown (7.5YR 4/4), hard, moist, non plastic.	
50	18.9/ 29.3				Total Depth = 50 feet

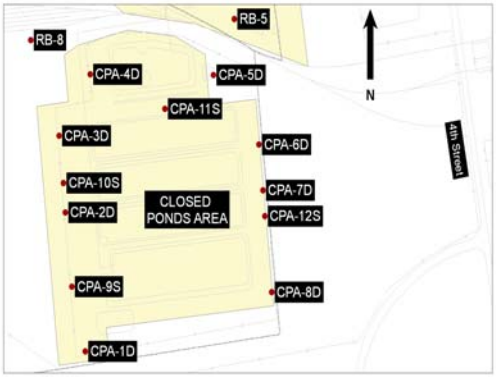
Montrose Chemical Corporation Henderson, NV

Figure B-29

Lithologic log for: CPA-08D

Northing 26715367.709
Easting 825898.552
LS Elev. (ft) 1845.296
Ref. Pnt. N/A
Ref. Pnt. Elev. (ft) N/A
Total Depth (ft) 50
Depth to Water (ft) N/A
Date 11/27/06

Drill Method RotoSonic
Sampling Method N/A
Diameter of Casing N/A
Type of Casing N/A
Slot Size N/A
Filter N/A



Depth (Feet Below Land Surface)	PID/FID (ppm)	Lithologic Log	USCS	Lithologic Description	Comments
0			SW-SM	SAND, with Gravel, with silt, 80% sand, 10% gravel, 10% silt, brown (7.5YR 5/4), loose, dry; sand, coarse- to fine-grained, predominantly fine-grained.	
5	4.3/ 2.5				
10	4.9/ 0.75				
15	5.6/ 0.20				
			SM	Silty SAND, trace Gravel, 55% sand, 40% silt, 5% gravel, brown (7.5YR 5/4), hard; sand, coarse- to fine-grained, predominantly fine-grained, abundant caliche.	
20	5.60/ 0.70		ML	SILT, with Sand, 90% silt, 10% sand, brown (7.5YR 5/4), hard, dry, non plastic; sand, fine-grained, caliche present.	

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Lithologic log for: CPA-08D

Figure B-29

Depth (Feet Below Land Surface)	PID/FID (ppm)	Log Lithologic	USCS	Lithologic Description	Comments
25	5.43/ -				At 25-50 feet: FID flame out, high winds may be keeping flame from staying lit.
			ML	Sandy SILT, 70% silt, 30%, brown (7.5YR 5/4), hard, dry, non plastic; sand, fine-grained.	
30	5.74/ -				
35	5.48/ -				
			SM	Silty SAND, trace Gravel, 60% sand, 35% silt, 5% gravel, brown (7.5YR 5/4), loose; sand, fine-grained.	
40	7.03/ -				
			ML	Sandy SILT, 60% silt, 40% sand, brown (7.5YR 5/4), moist, firm, low plasticity; sand, medium- to fine-grained, predominantly fine-grained.	
45	7.36/ -				
50	7..32/ -				Total Depth = 50 feet

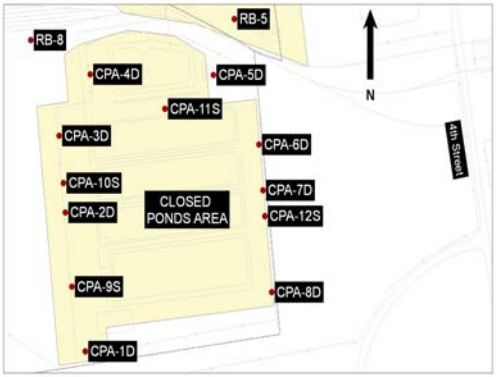
Montrose Chemical Corporation Henderson, NV

Figure B-30

Lithologic log for: CPA-09S

Northing 26715387.515
Easting 825063.356
LS Elev. (ft) 1845.013
Ref. Pnt. N/A
Ref. Pnt. Elev. (ft) N/A
Total Depth (ft) 10
Depth to Water (ft) N/A
Date 11/7/2006

Drill Method RotoSonic
Sampling Method N/A
Diameter of Casing N/A
Type of Casing N/A
Slot Size N/A
Filter N/A



Depth (Feet Below Land Surface)	PID/FID (ppm)	Lithologic Log	USCS	Lithologic Description	Comments
0			SP	Gravelly SAND, 80% sand, 20% gravel, multi-colored grains, loose, dry; sand, coarse-grained grading to fine-grained, angular to subangular.	
			SM	Silty SAND, trace Gravel, 80% sand, 15% silt, 5% gravel, light brown, (7.5YR, 6/3), loose, dry; sand, coarse-grained to fine-grained, gravel, coarse-grained to fine-grained.	
			SP	Gravelly SAND, 60% sand, 40% gravel, light brown, (7.5YR, 6/3), loose, dry; sand, coarse-grained to fine-grained, gravel, coarse-grained to fine-grained.	
5	0.1/ 1.21		SM	Silty SAND, trace Gravel, 80% sand, 15% silt, 5% gravel, (7.5YR, 6/3), loose, dry; sand, coarse-grained to fine-grained, occasional cobbles.	
10	0.8/ 0.81				Total Depth = 10 feet

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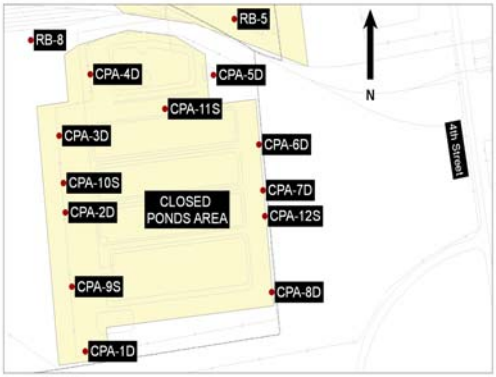
Figure B-31

Lithologic log for: CPA-10S

Northing 26715759.01
Easting 825027.708
LS Elev. (ft) 1839.793
Ref. Pnt. N/A
Ref. Pnt. Elev. (ft) N/A
Total Depth (ft) 10
Depth to Water (ft) N/A
Date 11/15/2006

Drill Method RotoSonic
Sampling Method N/A
Diameter of Casing N/A
Type of Casing N/A
Slot Size N/A
Filter N/A



Depth (Feet Below Land Surface)	PID/FID (ppm)	Lithologic Log	USCS	Lithologic Description	Comments
0	0.10/ 3.31		SP	Gravelly SAND, trace Silt, occasional Cobbles, 60% sand, 30% gravel, 5% silt, 5% cobbles, brown, (7.5YR, 5/3), loose, slightly moist, no odor; sand, coarse-grained to fine-grained, predominantly fine-grained, angular, basalt, coarse-grained fraction coated with caliche.	
5	1.60/ 5.58		SP	Gravelly SAND, trace Silt, 75% sand, 20% gravel, 5% silt, light brown, (7.5YR, 6/3), loose, slightly moist, no odor; sand, coarse-grained to fine-grained, predominantly fine-grained, angular, basalt. At 9.5- to 9.75 feet: basalt fragments coated with caliche.	
10	0.04/ 3.64				Total Depth = 10 feet

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FIGURE B-32

SOIL BORING CPA-11S

Power lines traversing directly overhead of the proposed soil boring CPA-11S location prevented the use of a drill rig in this area. Hand auguring was attempted at this location; no lithologic information was recorded.

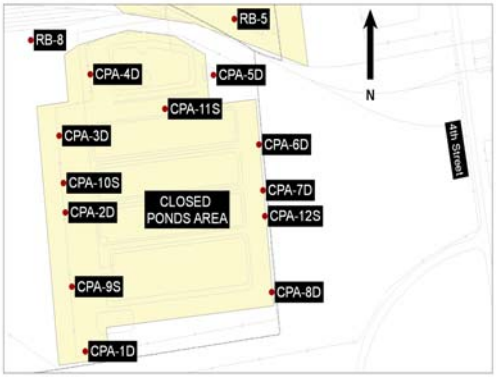
Montrose Chemical Corporation Henderson, NV

Figure B-33

Lithologic log for: CPA-12S

Northing 26715640.226
Easting 825869.966
LS Elev. (ft) 1841.301
Ref. Pnt. N/A
Ref. Pnt. Elev. (ft) N/A
Total Depth (ft) 10
Depth to Water (ft) N/A
Date 11/15/2006

Drill Method RotoSonic
Sampling Method N/A
Diameter of Casing N/A
Type of Casing N/A
Slot Size N/A
Filter N/A



Depth (Feet Below Land Surface)	PID/FID (ppm)	Lithologic Log	USCS	Lithologic Description	Comments
0				Gravelly SAND, trace Silt, 80% sand, 15% gravel, 5% silt, brown, (7.5YR, 5/3), loose, slightly moist; sand, coarse-grained grading to fine-grained, predominantly fine-grained.	
5	8.7/ 26.90		SP		
10	6.3/ 19.38				Total Depth = 10 feet

Geosyntec consultants
2100 Main St
Suite 150
Huntington Beach, CA 92648
Tel: (714) 969-0800
Fax: (714) 969-0820

GS FORM: WELL BORE 01/04

BOREHOLE LOG

BORING	**AA-MW-20**	**SHEET**	**1 OF 5**
START DRILL DATE	Jun 16, 08	**ELEVATION DATA:**	
FINISH DRILL DATE	Jun 17, 08	**GROUND SURF.**	1813.63
LOCATION	Henderson, NV	**TOP OF CASING**	1816.23
PROJECT	Montrose CPA	**DATUM**	
NUMBER	HW0989C		

DEPTH (ft-bgs)	DESCRIPTION (1) Unit/Formation, Mem. (2) USCS Name (3) Color (4) Moisture (5) Percent Grain Size (6) Plasticity (7) Density/Consistency (8) Structure (9) Other (Mineralization, Discoloration, Odor, etc.)	GRAPHIC LOG	WELL LOG	GROUNDWATER OR STRUCTURE	ELEVATION (ft)	SAMPLE NO.	TYPE	BLOWS PER 6"	RECOVERY (%)	PID READING (ppm)	TIME (00:00)	COMMENTS (1) Rig Behavior (2) Air Monitoring
	Boring location cleared to 5' bgs with hand auger.				1813							
					1812							
	Poorly Graded SAND with Silt and Gravel (SP-SM): reddish brown (5YR 5/3); moist; 75% fine- to coarse-grained sand, 15% subrounded fine to coarse gravel (≤6 cm), 10% Silt; unconsolidated.				1811							
					1810							
	@ 4' bgs: Cobbles (≤13 cm).				1809							
5					1808					6.8		
					1807							
					1806							
					1805							
					1804							
10					1803					2.0		
					1802							
					1801							
					1800							
					1799							
15					1798					1.1		
					1797							
					1796							
	@ 18' bgs: Poorly Graded SAND with Silt and Gravel (SP-SM): cobble size decreases to ≤9 cm.				1795							
					1794							
20					1793					1.9		
	@ 20.5' bgs: Silty SAND (SM): reddish brown (5YR 5/3); moist; 75% fine- to coarse-grained sand, 15% Silt, 10% fine to coarse subrounded to subangular gravel (≤5 cm); unconsolidated.				1792							
					1791							
	SILT (ML): light reddish brown (5YR 6/3); moist; 90% clay, 10% fine-grained sand; firm.				1790							
					1789							
25	@ 25 bgs: SILT (ML): caliche nodules / fragments (≤2 cm).				1788					0.1		
					1787							
					1786							
	Well Graded SAND (SW): dark reddish gray (5YR 4/2); moist; 90% fine- to coarse-grained sand, 5% silt, 5% fine gravel (≤2 cm); caliche nodules (≤2 cm); unconsolidated.			▽	1785							
30					1784							

CONTRACTOR	Boart Longyear	**NORTHING**	26716567.82
EQUIPMENT		**EASTING**	824824.72
DRILL MTHD	Sonic	**COORDINATE SYSTEM:**	
DIAMETER	8 inch	Nevada State Plane NAD83 East	
LOGGER	K. Gadley	**REVIEWER**	G. Williams

NOTES: Complete core, field screened for DNAPL with FLUTE Ribbon, PID head-space readings, and visual observations. No indications of DNAPL observed.

SEE KEY SHEET FOR SYMBOLS AND ABBREVIATIONS

Geosyntec consultants
2100 Main St
Suite 150
Huntington Beach, CA 92648
Tel: (714) 969-0800
Fax: (714) 969-0820

GS FORM: WELL BORE 01/04

BOREHOLE LOG

BORING	**AA-MW-20**	**SHEET**	**2 OF 5**
START DRILL DATE	Jun 16, 08	**ELEVATION DATA:**	
FINISH DRILL DATE	Jun 17, 08	**GROUND SURF.**	1813.63
LOCATION	Henderson, NV	**TOP OF CASING**	1816.23
PROJECT	Montrose CPA	**DATUM**	
NUMBER	HW0989C		

DEPTH (ft-bgs)	DESCRIPTION (1) Unit/Formation, Mem. (2) USCS Name (3) Color (4) Moisture (5) Percent Grain Size (6) Plasticity (7) Density/Consistency (8) Structure (9) Other (Mineralization, Discoloration, Odor, etc.)	GRAPHIC LOG	WELL LOG	GROUNDWATER OR STRUCTURE	ELEVATION (ft)	SAMPLE NO.	TYPE	BLOWS PER 6"	RECOVERY (%)	PID READING (ppm)	TIME (00:00)	COMMENTS (1) Rig Behavior (2) Air Monitoring
	SILT (ML): reddish brown (5YR 5/3); wet; 95% silt, 5% fine-grained sand; non-plastic; firm; caliche fragments (≤2 cm).				1783					0.3		
					1782							
	@ 32' bgs: SILT (ML): low plasticity.				1781							
	Poorly Graded SAND (SP): reddish gray (5YR 5/2); wet; 95% fine- to medium-grained sand, 5% silt; unconsolidated.				1780							
					1779							
35	SILT (ML): reddish brown (5YR 5/3); wet; 95% silt, 5% fine-grained sand; firm; caliche fragments (≤2 cm).				1778					3.9		
					1777							
	Lean CLAY (CL): reddish brown (5YR 5/3); wet; 100% Clay; low to medium plasticity; firm; caliche fragments (≤2 cm).				1776							
	@ 37.5' bgs: Approximate 3" layer of weathered caliche.				1775							
					1774							
40	SILT (ML): reddish brown (5YR 5/3); wet; 100% Silt; non-plastic; firm; caliche nodules (≤2.5 cm).				1773					33.1		Stop drilling @ 40' bgs on 6.16.08 Resume drilling on 6.17.08
					1772							
	@ 42' bgs: SILT (ML): increased clay; medium plasticity.				1771							
					1770							
					1769							
45					1768					133		
					1767							
	@ 47' bgs: SILT (ML): 95% silt, 5% fine-grained sand.				1766							
					1765							
					1764							
50					1763					112		
					1762							
					1761							
					1760							
					1759							
55	@ 55' bgs: SILT (ML): reddish brown (5YR 5/3); low plasticity; slightly firm.				1758					266		
					1757							
	@ 57' bgs: SILT (ML): non-plastic to low plasticity; firm.				1756							
					1755							
60					1754							

CONTRACTOR	Boart Longyear	**NORTHING**	26716567.82
EQUIPMENT		**EASTING**	824824.72
DRILL MTHD	Sonic	**COORDINATE SYSTEM:**	
DIAMETER	8 inch	Nevada State Plane NAD83 East	
LOGGER	K. Gadley	**REVIEWER**	G. Williams

NOTES: Complete core, field screened for DNAPL with FLUTE Ribbon, PID head-space readings, and visual observations. No indications of DNAPL observed.

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Geosyntec consultants
2100 Main St
Suite 150
Huntington Beach, CA 92648
Tel: (714) 969-0800
Fax: (714) 969-0820

GS FORM: WELL BORE 01/04

BOREHOLE LOG

BORING	**AA-MW-20**	**SHEET**	**3 OF 5**
START DRILL DATE	Jun 16, 08	**ELEVATION DATA:**	
FINISH DRILL DATE	Jun 17, 08	**GROUND SURF.**	1813.63
LOCATION	Henderson, NV	**TOP OF CASING**	1816.23
PROJECT	Montrose CPA	**DATUM**	
NUMBER	HW0989C		

DEPTH (ft-bgs)	DESCRIPTION (1) Unit/Formation, Mem. (2) USCS Name (3) Color (4) Moisture (5) Percent Grain Size (6) Plasticity (7) Density/Consistency (8) Structure (9) Other (Mineralization, Discoloration, Odor, etc.)	GRAPHIC LOG	WELL LOG	GROUNDWATER OR STRUCTURE	ELEVATION (ft)	SAMPLE NO.	TYPE	BLOWS PER 6"	RECOVERY (%)	PID READING (ppm)	TIME (00:00)	COMMENTS (1) Rig Behavior (2) Air Monitoring
	@ 60' bgs: SILT (ML): 90% silt, 10% fine-grained sand.				1753					324		
	@ 61' bgs: SILT (ML): caliche nodules increase to ≤3 cm.				1752							
					1751							
					1750							
					1749							
65					1748					104		
	@ 66' bgs: SILT (ML): irregular shaped caliche nodules (≤7.5 cm).				1747							
					1746							
					1745							
					1744							
70					1743					88.3		
					1742							
	@ 72' bgs: SILT (ML): reddish brown (5YR 5/3).				1741							
					1740							
					1739							
75	Caliche layer from 75-75.5' bgs.				1738					48.1		
					1737							
					1736							
	@ 78' bgs: SILT (ML): reddish gray (5YR 5/2); wet; 90% silt, 10% fine-grained sand; non-plastic; hard; irregular shaped caliche fragments (≤5.5 cm).				1735							
					1734							
80					1733					82.5		
					1732							
					1731							
					1730							
					1729							
85					1728					488		
					1727							
	Lean CLAY (CL): reddish brown (5YR 5/3); wet; 100% clay; non-plastic; soft.				1726							
	SILT (ML): reddish brown (5YR 4/3); wet; 100% silt; non-plastic; very firm.				1725							
90					1724							

CONTRACTOR	Boart Longyear	**NORTHING**	26716567.82
EQUIPMENT		**EASTING**	824824.72
DRILL MTHD	Sonic	**COORDINATE SYSTEM:**	Nevada State Plane NAD83 East
DIAMETER	8 inch		
LOGGER	K. Gadley	**REVIEWER**	G. Williams

NOTES: Complete core, field screened for DNAPL with FLUTE Ribbon, PID head-space readings, and visual observations. No indications of DNAPL observed.

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Geosyntec consultants
2100 Main St
Suite 150
Huntington Beach, CA 92648
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GS FORM: WELL BORE 01/04

BOREHOLE LOG

BORING	**AA-MW-20**	**SHEET**	**4 OF 5**
START DRILL DATE	Jun 16, 08	**ELEVATION DATA:**	
FINISH DRILL DATE	Jun 17, 08	**GROUND SURF.**	1813.63
LOCATION	Henderson, NV	**TOP OF CASING**	1816.23
PROJECT	Montrose CPA	**DATUM**	
NUMBER	HW0989C		

DEPTH (ft-bgs)	DESCRIPTION (1) Unit/Formation, Mem. (2) USCS Name (3) Color (4) Moisture (5) Percent Grain Size (6) Plasticity (7) Density/Consistency (8) Structure (9) Other (Mineralization, Discoloration, Odor, etc.)	GRAPHIC LOG	WELL LOG	GROUNDWATER OR STRUCTURE	ELEVATION (ft)	SAMPLE NO.	TYPE	BLOWS PER 6"	RECOVERY (%)	PID READING (ppm)	TIME (00:00)	COMMENTS (1) Rig Behavior (2) Air Monitoring
					1723					932		
					1722							
	@ 91.5' bgs: SILT (ML): caliche nodules (≤14 cm).				1721							
	@ 93' bgs: SILT (ML): low plasticity.				1720							
	Lean CLAY (CL): reddish gray (5YR 5/2); wet; 95% clay, 5% fine-grained sand; low plasticity; hard; caliche nodules (≤3.5 cm).				1719							
95					1718					10.1		
	SILT (ML): reddish gray (5YR 5/2); wet; 100% silt; non-plastic; firm; irregular shaped caliche fragments (≤5 cm).				1717							
					1716							
	@ 98' bgs: SILT (ML): trace fine-grained sand; caliche nodules increase to ≤15 cm.				1715							
					1714							
100					1713					470		
	@ 100.5'-101' bgs: Caliche layer. @ 101' bgs: SILT (ML): reddish gray (5YR 5/2); wet; 100% silt; non-plastic; firm; irregular shaped caliche fragments (≤5 cm).				1712							
					1711							
					1710							
					1709							
105					1708					1372		
					1707							
					1706							
	@ 108' bgs: SILT (ML): caliche ≤5 cm.				1705							
					1704							
110					1703					250		
					1702							
					1701							
	@ 113' bgs: Caliche layer ~1.5" thick.				1700							
	Lean CLAY (CL): reddish brown (5YR 5/4); wet; 95% clay, 5% fine-grained sand; medium plasticity; firm; caliche nodule (≤5 cm).				1699							
115	Poorly Graded SAND with Clay (SP): reddish brown (5YR 4/3); wet; fine- to medium-grained sand, trace fine gravel; low density @ 114.5' bgs.				1698					402		
					1697							
	SILT (ML): reddish brown (5YR 5/4); wet; 100% silt; firm; low to medium plasticity ~1.5" caliche bed @ 117.5" bgs; irregular shaped caliche nodules (≤8 cm).				1696							
					1695							
120					1694							

CONTRACTOR	Boart Longyear	**NORTHING**	26716567.82
EQUIPMENT		**EASTING**	824824.72
DRILL MTHD	Sonic	**COORDINATE SYSTEM:**	
DIAMETER	8 inch	Nevada State Plane NAD83 East	
LOGGER	K. Gadley	**REVIEWER**	G. Williams

NOTES: Complete core, field screened for DNAPL with FLUTE Ribbon, PID head-space readings, and visual observations. No indications of DNAPL observed.

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Geosyntec consultants
2100 Main St
Suite 150
Huntington Beach, CA 92648
Tel: (714) 969-0800
Fax: (714) 969-0820

GS FORM: WELL BORE 01/04

BOREHOLE LOG

BORING AA-MW-20 **SHEET** 5 **OF** 5
START DRILL DATE Jun 16, 08
FINISH DRILL DATE Jun 17, 08
LOCATION Henderson, NV
PROJECT Montrose CPA
NUMBER HW0989C

ELEVATION DATA:
GROUND SURF. 1813.63
TOP OF CASING 1816.23
DATUM

DEPTH (ft-bgs)	DESCRIPTION (1) Unit/Formation, Mem. (2) USCS Name (3) Color (4) Moisture (5) Percent Grain Size (6) Plasticity (7) Density/Consistency (8) Structure (9) Other (Mineralization, Discoloration, Odor, etc.)	GRAPHIC LOG	WELL LOG	GROUNDWATER OR STRUCTURE	ELEVATION (ft)	SAMPLE NO.	TYPE	BLOWS PER 6"	RECOVERY (%)	PID READING (ppm)	TIME (00:00)	COMMENTS (1) Rig Behavior (2) Air Monitoring
					1693					305		
					1692							
					1691							
					1690							
					1689							
125					1688					173		
					1687							
	@ 127' bgs: SILT (ML): 95% silt, 5% fine-grained sand.				1686							
					1685							
	@ 129' bgs: SILT (ML): no sand.				1684							
130					1683					902		
					1682							
					1681							
	Silty SAND (SM): light reddish brown (5YR 6/4); wet; 65% fine-grained sand, 35% silt; dense; caliche nodules (≤5 cm).				1680							
					1679							
135					1678					306		
	SILT (ML): light reddish brown (5YR 6/3); wet; 95% silt, 5% fine grained sand; non-plastic; firm; irregular shaped caliche nodules (≤9 cm).				1677							
					1676							
					1675							
	@ 139' bgs: SILT (ML): with increasing Clay.				1674							
140					1673					289		
					1672							
					1671							
					1670							
					1669							
145	@ 145' bgs: SILT (ML): low plasticity; no sand.				1668					315		
					1667							
					1666							
					1665							
	Boring terminated @ 150' bgs.				1664					404		
150												

CONTRACTOR Boart Longyear
EQUIPMENT
DRILL MTHD Sonic
DIAMETER 8 inch
LOGGER K. Gadley

NORTHING 26716567.82
EASTING 824824.72
COORDINATE SYSTEM: Nevada State Plane NAD83 East
REVIEWER G. Williams

NOTES: Complete core, field screened for DNAPL with FLUTE Ribbon, PID head-space readings, and visual observations. No indications of DNAPL observed.

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2100 Main St
Suite 150
Huntington Beach, CA 92648
Tel: (714) 969-0800
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GS FORM: WELL BORE 01/04

BOREHOLE LOG

BORING	**AA-MW-21**	**SHEET**	**1 OF 5**
START DRILL DATE	Jul 1, 08	**ELEVATION DATA:**	
FINISH DRILL DATE	Jul 1, 08	**GROUND SURF.**	1820.24
LOCATION	Henderson, NV	**TOP OF CASING**	1820.24
PROJECT	Montrose CPA	**DATUM**	
NUMBER	HW0989C		

DEPTH (ft-bgs)	DESCRIPTION (1) Unit/Formation, Mem. (2) USCS Name (3) Color (4) Moisture (5) Percent Grain Size (6) Plasticity (7) Density/Consistency (8) Structure (9) Other (Mineralization, Discoloration, Odor, etc.)	GRAPHIC LOG	WELL LOG	GROUNDWATER OR STRUCTURE	ELEVATION (ft)	SAMPLE NO.	TYPE	BLOWS PER 6"	RECOVERY (%)	PID READING (ppm)	TIME (00:00)	COMMENTS (1) Rig Behavior (2) Air Monitoring
	Boring location cleared to 5' bgs with hand auger.				1819							
					1818							
	Poorly Graded SAND with Silt (SP-SM): reddish brown (5YR 4/4); moist; 80% fine- to medium-grained sand, 10% silt, 10% fine gravel; unconsolidated.				1817							
					1816							
5	Silty SAND (SM): dark reddish brown (5YR 3/4); moist; 70% fine- to medium-grained sand, 30% silt; medium density.				1815					4.4		
					1814							
	Silty SAND with Gravel (SM): reddish brown (5YR 5/4); moist; 70% fine- to coarse-grained sand, 15% fine to coarse gravel, 15% silt; unconsolidated.				1813							
					1812							
					1811							
10					1810					1.6		
					1809							
					1808							
					1807							
					1806							
15	@ 15' bgs: Silty SAND with Gravel (SM): as above, trace cobbles (≤9 cm).				1805					6.4		
					1804							
					1803							
	@17.5' bgs: Silty SAND with Gravel (SM): as above, no cobbles.				1802							
					1801							
20					1800					1.2		
					1799							
					1798							
					1797							
					1796							
25					1795					11.8		
	SILT (ML): reddish brown (5YR 5/4); moist; 90% silt, 10% fine-grained sand; non-plastic; firm.				1794							
					1793							
	Poorly Graded SAND with Silt (SP-SM): reddish brown (5YR 4/4); moist; 80% fine- to medium-grained sand, 10% silt, 10% fine-grained gravel; unconsolidated.				1792							
					1791							
30	SILT (ML): reddish brown (5YR 5/4); moist;											

CONTRACTOR	Boart Longyear	**NORTHING**	26716594.46
EQUIPMENT		**EASTING**	825815.46
DRILL MTHD	Sonic	**COORDINATE SYSTEM:**	
DIAMETER	8 inch	Nevada State Plane NAD83 East	
LOGGER	K. Gadley	**REVIEWER**	G. Williams

NOTES: Complete core, field screened for DNAPL with FLUTE Ribbon, PID head-space readings, and visual observations. No indications of DNAPL observed.

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Suite 150
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GS FORM: WELL BORE 01/04

BOREHOLE LOG

BORING	**AA-MW-21**	**SHEET**	**2 OF 5**
START DRILL DATE	Jul 1, 08	**ELEVATION DATA:**	
FINISH DRILL DATE	Jul 1, 08	**GROUND SURF.**	1820.24
LOCATION	Henderson, NV	**TOP OF CASING**	1820.24
PROJECT	Montrose CPA	**DATUM**	
NUMBER	HW0989C		

DEPTH (ft-bgs)	DESCRIPTION (1) Unit/Formation, Mem. (2) USCS Name (3) Color (4) Moisture (5) Percent Grain Size (6) Plasticity (7) Density/Consistency (8) Structure (9) Other (Mineralization, Discoloration, Odor, etc.)	GRAPHIC LOG	WELL LOG	GROUNDWATER OR STRUCTURE	ELEVATION (ft)	SAMPLE NO.	TYPE	BLOWS PER 6"	RECOVERY (%)	PID READING (ppm)	TIME (00:00)	COMMENTS (1) Rig Behavior (2) Air Monitoring
	90% silt, 10% fine-grained sand; non-plastic; firm.									11.3		
	@ 30' bgs: Poorly Graded SAND with Silt (SP-SM): reddish brown (5YR 5/4); moist; 80% fine- to medium-grained sand, 10% silt, 10% fine-grained gravel; unconsolidated.				1789							
	Silty SAND (SM): reddish brown (5YR 4/3); moist; 70% fine-grained sand, 30% silt; medium density.				1788							
35	SILT (ML): reddish brown (5YR 5/4); moist; 90% silt, 10% fine-grained sand; non-plastic; firm.				1787					9.5		
	@ 37' bgs: Sandy SILT (ML): light reddish brown (5YR 6/3); moist; 60% silt, 40% fine- to medium-grained sand; non-plastic; soft.				1786							
40	@ 40' bgs: SILT (ML): with Clay.				1785					0.2		
	Silty SAND (SM): reddish brown (5YR 4/3); moist; 65% fine-grained sand, 35% silt; medium density.				1784							
45	Poorly Graded SAND with Silt (SP-SM): dark reddish brown (5YR 3/3); moist; 90% fine- to medium-grained sand with trace coarse-grained sand, 10% silt; unconsolidated.				1783					3.6		
50				∇	1782					1.8		
	@ 53' bgs: Poorly Graded SAND with Silt (SP-SM): wet.				1781							
55	SILT (ML): reddish brown (5YR 5/4); wet; 95% silt, 5% fine-grained sand and irregular shaped caliche nodules; medium plasticity; firm.				1780					12.3		
60	Poorly Graded SAND with Silt (SP-SM): dark				1779							

CONTRACTOR	Boart Longyear	**NORTHING**	26716594.46
EQUIPMENT		**EASTING**	825815.46
DRILL MTHD	Sonic	**COORDINATE SYSTEM:**	
DIAMETER	8 inch	Nevada State Plane NAD83 East	
LOGGER	K. Gadley	**REVIEWER**	G. Williams

NOTES: Complete core, field screened for DNAPL with FLUTE Ribbon, PID head-space readings, and visual observations. No indications of DNAPL observed.

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GS FORM: WELL BORE 01/04

BOREHOLE LOG

BORING AA-MW-21 **SHEET** 3 **OF** 5
START DRILL DATE Jul 1, 08
FINISH DRILL DATE Jul 1, 08
LOCATION Henderson, NV
PROJECT Montrose CPA
NUMBER HW0989C

ELEVATION DATA:
GROUND SURF. 1820.24
TOP OF CASING 1820.24
DATUM

DEPTH (ft-bgs)	DESCRIPTION (1) Unit/Formation, Mem. (2) USCS Name (3) Color (4) Moisture (5) Percent Grain Size (6) Plasticity (7) Density/Consistency (8) Structure (9) Other (Mineralization, Discoloration, Odor, etc.)	GRAPHIC LOG	WELL LOG	GROUNDWATER OR STRUCTURE	ELEVATION (ft)	SAMPLE NO.	TYPE	BLOWS PER 6"	RECOVERY (%)	PID READING (ppm)	TIME (00:00)	COMMENTS (1) Rig Behavior (2) Air Monitoring
	reddish brown (5YR 3/3); wet; 90% fine- to medium-grained sand and coarse-grained sand, 10% silt; unconsolidated.				1759					15.5		
	Lean CLAY (CL): reddish brown (5YR 4/4); wet; non-plastic to low plasticity; stiff; trace irregular shaped caliche nodules (≤6 cm).				1758							
					1757							
					1756							
65	Sandy SILT (ML): reddish brown (5YR 5/4); wet; 70% silt, 30% fine-grained sand; non-plastic; stiff.				1755					30.3		
					1754							
	@ 67' bgs: SILT (ML): reddish brown (5YR 5/4); wet; 95% silt, 5% fine-grained sand and caliche nodules (≤7 cm); non-plastic; very stiff.				1753							
					1752							
					1751							
70					1750					32.9		
	@ 71' bgs: Sandy SILT (ML) with Clay: reddish brown (5YR 4/4); wet; 70% silt, 30% fine-grained sand; non-plastic; stiff.				1749							
	@ 72' bgs: SILT (ML): reddish brown (5YR 5/4); wet; 100% silt; non-plastic to low plasticity; very stiff.				1748							
					1747							
	@ 74' bgs: SILT (ML): caliche nodules (≤3 cm).				1746							
75					1745					35.6		
					1744							
	Lean CLAY (CL): reddish brown (5YR 5/4); wet; 100% clay; low to medium plasticity; very stiff.				1743							
					1742							
					1741							
80					1740					70.9		
					1739							
					1738							
					1737							
					1736							
85					1735					9.0		
	SILT (ML): reddish brown (5YR 5/4); wet; 100% silt; non-plastic to low plasticity; very stiff.				1734							
					1733							
					1732							
	Silty SAND (SM): reddish brown (5YR 5/3); wet; 60% fine-grained sand, 40% silt and clay;				1731							
90												

CONTRACTOR Boart Longyear
EQUIPMENT
DRILL MTHD Sonic
DIAMETER 8 inch
LOGGER K. Gadley
REVIEWER G. Williams

NORTHING 26716594.46
EASTING 825815.46
COORDINATE SYSTEM: Nevada State Plane NAD83 East

NOTES: Complete core, field screened for DNAPL with FLUTE Ribbon, PID head-space readings, and visual observations. No indications of DNAPL observed.

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Geosyntec consultants
2100 Main St
Suite 150
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BOREHOLE LOG

BORING	**AA-MW-21**	**SHEET**	**4 OF 5**
START DRILL DATE	Jul 1, 08	**ELEVATION DATA:**	
FINISH DRILL DATE	Jul 1, 08	**GROUND SURF.**	1820.24
LOCATION	Henderson, NV	**TOP OF CASING**	1820.24
PROJECT	Montrose CPA	**DATUM**	
NUMBER	HW0989C		

DEPTH (ft-bgs)	DESCRIPTION (1) Unit/Formation, Mem. (2) USCS Name (3) Color (4) Moisture (5) Percent Grain Size (6) Plasticity (7) Density/Consistency (8) Structure (9) Other (Mineralization, Discoloration, Odor, etc.)	GRAPHIC LOG	WELL LOG	GROUNDWATER OR STRUCTURE	ELEVATION (ft)	SAMPLE NO.	TYPE	BLOWS PER 6"	RECOVERY (%)	PID READING (ppm)	TIME (00:00)	COMMENTS (1) Rig Behavior (2) Air Monitoring
	unconsolidated.									37.9		
	@ 90' bgs: SILT (ML): reddish brown (5YR 5/4); wet; 100% silt; non-plastic to low plasticity; very stiff.				1729							
					1728							
					1727							
					1726							
	@ 94' bgs: SILT (ML): caliche nodules (≤2.5 cm).											
95					1725					19.9		
					1724							
					1723							
					1722							
					1721							
	@ 99' bgs: SILT (ML): reddish brown (5YR 4/4); wet; 95% silt, 5% fine-grained sand; medium plasticity; stiff.											
100					1720					96.6		
	@ 100.5' bgs: Sandy SILT (ML): 70% silt, 30% fine-grained sand.				1719							
	@ 101.5' bgs: SILT (ML): reddish brown (5YR 4/3); wet; low plasticity; stiff; caliche nodules (≤5 cm).				1718							
					1717							
					1716							
	Silty SAND (SM): reddish brown (5YR 4/4); wet; 60% fine-grained sand, 40% silt; dense; caliche nodules (≤4 cm).											
105					1715					26.2		
	SILT (ML): reddish brown (5YR 4/3); wet; low plasticity; stiff; caliche nodules (≤5 cm).				1714							
					1713							
					1712							
					1711							
110					1710					39		
					1709							
					1708							
					1707							
	@ 113' bgs: Sandy SILT (ML): reddish brown (5YR 4/3); wet; 70% silt, 30% fine-grained sand; non-plastic; stiff; caliche nodules (≤3 cm).				1706							
115					1705					46.7		
					1704							
					1703							
	Silty SAND (SM): reddish brown (5YR 4/4); wet; 60% fine-grained sand, 40% silt; dense; caliche nodules (≤4 cm).				1702							
					1701							
120	SILT (ML): reddish brown (5YR 5/3); wet; 90% silt, 10% fine-grained sand; non-plastic; stiff.											

CONTRACTOR	Boart Longyear	**NORTHING**	26716594.46
EQUIPMENT		**EASTING**	825815.46
DRILL MTHD	Sonic	**COORDINATE SYSTEM:**	
DIAMETER	8 inch	Nevada State Plane NAD83 East	
LOGGER	K. Gadley	**REVIEWER**	G. Williams

NOTES: Complete core, field screened for DNAPL with FLUTE Ribbon, PID head-space readings, and visual observations. No indications of DNAPL observed.

SEE KEY SHEET FOR SYMBOLS AND ABBREVIATIONS

Geosyntec consultants
2100 Main St
Suite 150
Huntington Beach, CA 92648
Tel: (714) 969-0800
Fax: (714) 969-0820

GS FORM: WELL BORE 01/04

BOREHOLE LOG

BORING AA-MW-21 **SHEET** 5 **OF** 5
START DRILL DATE Jul 1, 08
FINISH DRILL DATE Jul 1, 08
LOCATION Henderson, NV
PROJECT Montrose CPA
NUMBER HW0989C

ELEVATION DATA:
GROUND SURF. 1820.24
TOP OF CASING 1820.24
DATUM

DEPTH (ft-bgs)	DESCRIPTION (1) Unit/Formation, Mem. (2) USCS Name (3) Color (4) Moisture (5) Percent Grain Size (6) Plasticity (7) Density/Consistency (8) Structure (9) Other (Mineralization, Discoloration, Odor, etc.)	GRAPHIC LOG	WELL LOG	GROUNDWATER OR STRUCTURE	ELEVATION (ft)	SAMPLE NO.	TYPE	BLOWS PER 6"	RECOVERY (%)	PID READING (ppm)	TIME (00:00)	COMMENTS (1) Rig Behavior (2) Air Monitoring
										0.7		
					1699							
					1698							
	@ 122' bgs: Sandy SILT (ML): reddish brown (5YR 4/3); wet; 70% silt, 30% fine-grained sand; non-plastic; stiff.				1697							
					1696							
	@ 124' bgs: SILT (ML): reddish brown (5YR 4/3); wet; 100% silt; low plasticity; stiff.											
125					1695					1.9		
					1694							
					1693							
					1692							
					1691							
130					1690					0.9		
					1689							
					1688							
					1687							
					1686							
135	@135' bgs: SILT (ML): irregular shaped caliche nodules (≤15 cm).				1685					16.9		
					1684							
					1683							
					1682							
	@ 138' bgs: Sandy SILT (ML): reddish brown (5YR 4/3); wet; 70% silt, 30% fine-grained sand; non-plastic; stiff.				1681							
140	@ 140' bgs: SILT (ML): reddish brown (5YR 4/3); wet; 100% silt; low plasticity; stiff.				1680					5.4		
					1679							
					1678							
					1677							
					1676							
145					1675					9.1		
					1674							
					1673							
					1672							
					1671							
	TD at 150' bgs.									0.3		
150												

CONTRACTOR Boart Longyear
EQUIPMENT
DRILL MTHD Sonic
DIAMETER 8 inch
LOGGER K. Gadley
NORTHING 26716594.46
EASTING 825815.46
COORDINATE SYSTEM: Nevada State Plane NAD83 East
REVIEWER G. Williams

NOTES: Complete core, field screened for DNAPL with FLUTE Ribbon, PID head-space readings, and visual observations. No indications of DNAPL observed.

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Geosyntec consultants
2100 Main St
Suite 150
Huntington Beach, CA 92648
Tel: (714) 969-0800
Fax: (714) 969-0820

GS FORM: WELL BORE 01/04

BOREHOLE LOG

BORING	**AA-MW-22**	**SHEET**	**1 OF 5**
START DRILL DATE	Jun 24, 08	**ELEVATION DATA:**	
FINISH DRILL DATE	Jun 25, 08	**GROUND SURF.**	1822.02
LOCATION	Henderson, NV	**TOP OF CASING**	1824.58
PROJECT	Montrose CPA	**DATUM**	
NUMBER	HW0989C		

DEPTH (ft-bgs)	DESCRIPTION (1) Unit/Formation, Mem. (2) USCS Name (3) Color (4) Moisture (5) Percent Grain Size (6) Plasticity (7) Density/Consistency (8) Structure (9) Other (Mineralization, Discoloration, Odor, etc.)	GRAPHIC LOG	WELL LOG	GROUNDWATER OR STRUCTURE	ELEVATION (ft)	SAMPLE NO.	TYPE	BLOWS PER 6"	RECOVERY (%)	PID READING (ppm)	TIME (00:00)	COMMENTS (1) Rig Behavior (2) Air Monitoring
	Boring location cleared to 5' bgs with hand auger.				1821							
					1820							
					1819							
	Silty SAND (SM): reddish gray (5YR 5/2); moist; 80% fine- to coarse-grained sand, 15% silt, 5% fine gravel and trace cobbles (≤9 cm); unconsolidated.				1818							
5					1817					0.2		
					1816							
					1815							
					1814							
					1813							
10					1812					0.5		
	Silty SAND (SM): reddish brown (5YR 4/3); moist; 75% fine- to coarse-grained sand, 25% silt, trace fine to coarse gravel; unconsolidated.				1811							
					1810							
					1809							
					1808							
15					1807					1.1		
	Silty SAND (SM): dark reddish gray (5YR 5/2); moist; 85% fine- to coarse-grained sand, 15% silt, trace fine to coarse gravel and trace cobbles (≤8.5 cm); unconsolidated.				1806							
					1805							
					1804							
					1803							
20	Silty SAND (SM): reddish brown (5YR 4/3); moist; 70% fine- to coarse-grained sand, 25% silt, 5% fine- to coarse-grained gravel; loose.				1802					2.0		
					1801							
	Well Graded SAND with Silt and Gravel (SW-SM): reddish brown (5YR 5/3); moist; 75% fine- to coarse-grained sand, 15% fine to coarse gravel and trace cobbles (≤11 cm), 10% silt; unconsolidated.				1800							
					1799							
	Well Graded SAND with Silt (SW-SM): reddish brown (5YR 5/3); moist; 85% fine- to coarse-grained sand, 10% silt, 5% fine to coarse gravel; unconsolidated.				1798							
25					1797					1.2		
					1796							
	Well Graded SAND with Silt and Gravel (SW-SM): reddish brown (5YR 5/3); moist; 75% fine- to coarse-grained sand, 15% fine to coarse gravel and trace cobbles (≤11 cm), 10% silt; unconsolidated.				1795							
					1794							
	Sandy SILT (ML): light reddish- brown (5YR 6/3); moist; 60% silt, 40% fine- to coarse-grained sand; soft.				1793							
30												

CONTRACTOR	Boart Longyear	**NORTHING**	26716510.08
EQUIPMENT		**EASTING**	826019.40
DRILL MTHD	Sonic	**COORDINATE SYSTEM:**	Nevada State Plane NAD83 East
DIAMETER	8 inch		
LOGGER	K. Gadley	**REVIEWER**	G. Williams

NOTES: Complete core, field screened for DNAPL with FLUTE Ribbon, PID head-space readings, and visual observations. No indications of DNAPL observed.

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Geosyntec consultants
2100 Main St
Suite 150
Huntington Beach, CA 92648
Tel: (714) 969-0800
Fax: (714) 969-0820

GS FORM: WELL BORE 01/04

BOREHOLE LOG

BORING	**AA-MW-22**	**SHEET**	**2 OF 5**
START DRILL DATE	Jun 24, 08	**ELEVATION DATA:**	
FINISH DRILL DATE	Jun 25, 08	**GROUND SURF.**	1822.02
LOCATION	Henderson, NV	**TOP OF CASING**	1824.58
PROJECT	Montrose CPA	**DATUM**	
NUMBER	HW0989C		

DEPTH (ft-bgs)	DESCRIPTION (1) Unit/Formation, Mem. (2) USCS Name (3) Color (4) Moisture (5) Percent Grain Size (6) Plasticity (7) Density/Consistency (8) Structure (9) Other (Mineralization, Discoloration, Odor, etc.)	GRAPHIC LOG	WELL LOG	GROUNDWATER OR STRUCTURE	ELEVATION (ft)	SAMPLE NO.	TYPE	BLOWS PER 6"	RECOVERY (%)	PID READING (ppm)	TIME (00:00)	COMMENTS (1) Rig Behavior (2) Air Monitoring
	Silty SAND (SM): reddish brown (5YR 5/4); 70% fine- to coarse-grained sand, 25% silt, 5% fine to coarse gravel and cobbles; unconsolidated.				1791					0.7		
					1790							
					1789							
	Sandy SILT (ML): light reddish brown (5YR 6/3); moist; 60% silt, 40% fine- to coarse-grained sand; soft.				1788							
35	Silty SAND (SM): reddish brown (5YR 4/3); moist; 65% fine-grained sand, 35% silt; medium density. @ 36' bgs: Silty SAND (SM): trace clay.				1787					0.3		
					1786							
					1785							
					1784							
					1783							
40					1782					0.0		
	Poorly Graded SAND with Silt (SP-SM): dark reddish brown (5YR 3/3); 90% fine- to medium-grained sand with trace coarse-grained sand, 10% silt; unconsolidated.				1781							
					1780							
	Silty SAND (SM): reddish brown (5YR 4/4); moist; 70% fine-grained sand, 30% silt; medium density.				1779							
					1778							
45	Poorly Graded SAND with Silt (SP-SM): dark reddish brown (5YR 3/3); 90% fine- to medium-grained sand with trace coarse-grained sand, 10% silt; unconsolidated.				1777					13.8		
					1776							
	Silty SAND (SM): reddish brown (5YR 4/4); moist; 70% fine-grained sand, 30% silt; medium density. @ 43' bgs: Silty SAND (SM): trace clay.			∇	1775							
					1774							
	Sandy SILT (ML): reddish brown (5YR 4/4); wet; 70% silt and trace clay, 30% fine- to medium-grained sand; low plasticity; firm.				1773							
50	@ 48' bgs: Sandy SILT (ML): no clay; non-plastic.				1772					5.5		
	@ 49' bgs: Sandy SILT (ML): trace clay; low plasticity.				1771							
	@ 50' bgs: Sandy SILT (ML): irregular shaped caliche nodules (≤7.5 cm).				1770							
					1769							
	@ 53' bgs: SILT (ML): reddish brown (5YR 5/4); wet; 90% silt, 10% fine-grained sand; non-plastic; firm.				1768							
55					1767					0.0		
	@ 55' bgs: SILT (ML): low plasticity; trace irregular shaped caliche nodules (≤5 cm).				1766							
	@ 56' bgs: SILT (ML): reddish brown (5YR 5/4); wet; 95% silt, 5% fine-grained sand; medium plasticity; firm; irregular shaped caliche.				1765							
					1764							
	Poorly Graded SAND with Silt (SP-SM): dark reddish brown (5YR 5/3); wet; 90% fine- to medium-grained sand, 10% silt and coarse-grained sand; unconsolidated.				1763							
60												

CONTRACTOR	Boart Longyear	**NORTHING**	26716510.08
EQUIPMENT		**EASTING**	826019.40
DRILL MTHD	Sonic	**COORDINATE SYSTEM:**	Nevada State Plane NAD83 East
DIAMETER	8 inch		
LOGGER	K. Gadley	**REVIEWER**	G. Williams

NOTES: Complete core, field screened for DNAPL with FLUTE Ribbon, PID head-space readings, and visual observations. No indications of DNAPL observed.

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Geosyntec consultants
2100 Main St
Suite 150
Huntington Beach, CA 92648
Tel: (714) 969-0800
Fax: (714) 969-0820

GS FORM: WELL BORE 01/04

BOREHOLE LOG

BORING	**AA-MW-22**	**SHEET**	**3 OF 5**
START DRILL DATE	Jun 24, 08	**ELEVATION DATA:**	
FINISH DRILL DATE	Jun 25, 08	**GROUND SURF.**	1822.02
LOCATION	Henderson, NV	**TOP OF CASING**	1824.58
PROJECT	Montrose CPA	**DATUM**	
NUMBER	HW0989C		

DEPTH (ft-bgs)	DESCRIPTION (1) Unit/Formation, Mem. (2) USCS Name (3) Color (4) Moisture (5) Percent Grain Size (6) Plasticity (7) Density/Consistency (8) Structure (9) Other (Mineralization, Discoloration, Odor, etc.)	GRAPHIC LOG	WELL LOG	GROUNDWATER OR STRUCTURE	ELEVATION (ft)	SAMPLE NO.	TYPE	BLOWS PER 6"	RECOVERY (%)	PID READING (ppm)	TIME (00:00)	COMMENTS (1) Rig Behavior (2) Air Monitoring
	Clayey SAND (SC): reddish brown (5YR 5/4); wet; 65% fine- to medium-grained sand, 35% clay and trace silt; non-plastic; dense; caliche nodules (≤2.5 cm).				1761					0.9		
	SILT (ML): reddish brown (5YR 5/4); wet; 95% silt, 5% fine-grained sand; non-plastic; stiff; irregular shaped caliche nodules (≤6.5 cm).				1760							
	@ 62.5' bgs: Sandy SILT (ML): reddish brown (5YR 4/4); wet; 70% silt and clay, 30% fine-grained sand; non-plastic; stiff.				1759							
65	Clayey SAND with Silt (SC): reddish brown (5YR 5/4); wet; 75% fine- to medium-grained sand, 25% silt and clay; non-plastic; dense.				1758							
	Sandy SILT (ML): light reddish brown (5YR 6/4); wet; 60% silt, 40% fine-grained sand; firm; non-plastic.				1757					5.1		
					1756							
					1755							
					1754							
					1753							
70	@ 70' bgs: Sandy SILT (ML): 70% silt, 30% fine-grained sand.				1752					7.8		
	@ 71' bgs: SILT (ML): reddish brown (5YR 5/4); wet; 95% silt, 5% fine-grained sand; non-plastic; very stiff; caliche nodules (≤2.5 cm).				1751							
	@ 73' bgs: SILT (ML): 100% silt.				1750							
					1749							
					1748							
75					1747					16.5		
	Poorly Graded SAND with Silt (SP-SM): dark reddish brown (5YR 3/3); wet; 90% fine- to medium-grained sand and trace coarse-grained sand,10% silt; unconsolidated.				1746							
	SILT (ML): reddish brown (5YR 4/4); wet; 100% silt; non-plastic; very stiff; caliche nodules (≤2.5 cm).				1745							
					1744							
					1743							
80	Silty SAND (SM): reddish brown (5YR 5/3); wet; 60% fine-grained sand and trace medium-grained sand, 40% silt; medium density.				1742					17.5		
	Sandy SILT (ML): reddish brown (5YR 4/4); wet; 70% silt, 30% fine-grained sand; low to medium plasticity; firm.				1741							
					1740							
	Silty SAND (SM): reddish brown (5YR 5/4); wet; 60% fine-grained sand and trace medium-grained sand, 40% silt; dense.				1739							
					1738							
85	SILT (ML): reddish brown (5YR 5/4); wet; 90% silt, 10% fine-grained sand; non-plastic to low plasticity; stiff.				1737					80.9		
					1736							
	@ 87' bgs: SILT (ML): reddish brown (5YR 5/3); non-plastic.				1735							
					1734							
					1733							
90												

CONTRACTOR	Boart Longyear	**NORTHING**	26716510.08
EQUIPMENT		**EASTING**	826019.40
DRILL MTHD	Sonic	**COORDINATE SYSTEM:**	Nevada State Plane NAD83 East
DIAMETER	8 inch		
LOGGER	K. Gadley	**REVIEWER**	G. Williams

NOTES: Complete core, field screened for DNAPL with FLUTE Ribbon, PID head-space readings, and visual observations. No indications of DNAPL observed.

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Geosyntec consultants
2100 Main St
Suite 150
Huntington Beach, CA 92648
Tel: (714) 969-0800
Fax: (714) 969-0820

GS FORM: WELL BORE 01/04

BOREHOLE LOG

BORING	**AA-MW-22**	**SHEET**	**4 OF 5**
START DRILL DATE	Jun 24, 08	**ELEVATION DATA:**	
FINISH DRILL DATE	Jun 25, 08	**GROUND SURF.**	1822.02
LOCATION	Henderson, NV	**TOP OF CASING**	1824.58
PROJECT	Montrose CPA	**DATUM**	
NUMBER	HW0989C		

DEPTH (ft-bgs)	DESCRIPTION (1) Unit/Formation, Mem. (2) USCS Name (3) Color (4) Moisture (5) Percent Grain Size (6) Plasticity (7) Density/Consistency (8) Structure (9) Other (Mineralization, Discoloration, Odor, etc.)	GRAPHIC LOG	WELL LOG	GROUNDWATER OR STRUCTURE	ELEVATION (ft)	SAMPLE NO.	TYPE	BLOWS PER 6"	RECOVERY (%)	PID READING (ppm)	TIME (00:00)	COMMENTS (1) Rig Behavior (2) Air Monitoring
					1731					20.9		
					1730							
	Silty SAND (SM): light reddish brown (5YR 6/3); wet; 65% silt, 35% fine-grained sand; firm.				1729							
					1728							
95	SILT (ML): reddish brown (5YR 5/4); wet; 90% silt, 10% fine-grained sand; non-plastic to low plasticity; stiff.				1727					13.3		
					1726							
					1725							
					1724							
					1723							
100					1722					1.9		
					1721							
					1720							
	@ 102' bgs: Sandy SILT (ML): reddish brown (5YR 4/3); wet; 70% silt, 30% fine-grained sand; non-plastic; stiff; caliche nodules (≤2.5 cm).				1719							
					1718							
105	@ 104' bgs: SILT (ML): reddish brown (5YR 4/3); wet; 100% silt; low plasticity; stiff; caliche nodules (≤5 cm).				1717					51.2		
					1716							
	Silty SAND (SM): reddish brown (5YR 4/4); wet; 60% fine-grained sand, 40% silt; dense; caliche nodules (≤2.5 cm).				1715							
					1714							
	SILT (ML): reddish brown (5YR 4/4); wet; 95% silt, 5% fine-grained sand; medium plasticity; stiff; caliche nodules (≤4 cm).				1713							
110	@ 108' bgs: SILT (ML): reddish brown (5YR 4/3); wet; 100% silt; low plasticity; stiff; caliche nodules (≤2.5 cm).				1712					0.1		
					1711							
					1710							
					1709							
					1708							
115					1707					0.0		
	@ 115' bgs: Sandy SILT (ML): reddish brown (5YR 4/3); wet; 70% silt, 30% fine-grained sand; non-plastic; stiff; caliche nodules (≤2.5 cm).				1706							
	@ 116' bgs: SILT (ML): reddish brown (5YR 5/3); wet; 95% silt, 5% fine-grained sand; non-plastic; stiff.				1705							
					1704							
					1703							
120	@ 119' bgs: Sandy SILT (ML): light reddish brown (5YR 6/4); wet; 70% silt, 30%											

CONTRACTOR	Boart Longyear	**NORTHING**	26716510.08
EQUIPMENT		**EASTING**	826019.40
DRILL MTHD	Sonic	**COORDINATE SYSTEM:**	
DIAMETER	8 inch	Nevada State Plane NAD83 East	
LOGGER	K. Gadley	**REVIEWER**	G. Williams

NOTES: Complete core, field screened for DNAPL with FLUTE Ribbon, PID head-space readings, and visual observations. No indications of DNAPL observed.

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2100 Main St
Suite 150
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GS FORM: WELL BORE 01/04

BOREHOLE LOG

BORING	**AA-MW-22**	**SHEET**	**5 OF 5**
START DRILL DATE	Jun 24, 08	**ELEVATION DATA:**	
FINISH DRILL DATE	Jun 25, 08	**GROUND SURF.**	1822.02
LOCATION	Henderson, NV	**TOP OF CASING**	1824.58
PROJECT	Montrose CPA	**DATUM**	
NUMBER	HW0989C		

DEPTH (ft-bgs)	DESCRIPTION (1) Unit/Formation, Mem. (2) USCS Name (3) Color (4) Moisture (5) Percent Grain Size (6) Plasticity (7) Density/Consistency (8) Structure (9) Other (Mineralization, Discoloration, Odor, etc.)	GRAPHIC LOG	WELL LOG	GROUNDWATER OR STRUCTURE	ELEVATION (ft)	SAMPLE NO.	TYPE	BLOWS PER 6"	RECOVERY (%)	PID READING (ppm)	TIME (00:00)	COMMENTS (1) Rig Behavior (2) Air Monitoring
	fine-grained sand; non-plastic; stiff.									0.9		
	@ 120' bgs: SILT (ML): reddish brown (5YR 5/4); wet; 100% silt; medium plasticity; stiff.				1701							
					1700							
					1699							
	@ 123' bgs: SILT (ML): 95% silt, 5% fine-grained sand.				1698							
	@ 123.5' bgs: SILT (ML): reddish brown (5YR 5/4); wet; 100% silt; medium plasticity; stiff; irregular shaped caliche nodules (≤6.5 cm).				1697					2.2		
125					1696							
					1695							
					1694							
					1693							
130					1692					56.2		
					1691							
					1690							
					1689							
					1688							
	Clayey SAND (SC): dark reddish gray (5YR 4/2); wet; 80% fine- to medium-grained sand and trace coarse-grained sand, 15% clay, 5% fine gravel; unconsolidated.				1687					62.2		
135					1686							
	SILT (ML): reddish brown (5YR 5/4); wet; 100% silt; medium plasticity; stiff; irregular shaped caliche nodules (≤5 cm).				1685							
					1684							
					1683							
140					1682					80.2		
					1681							
					1680							
					1679							
					1678							
145					1677					195		
					1676							
	@ 146' bgs: SILT (ML): 95% silt, 5% fine-grained sand.				1675							
					1674							
	@ 150' bgs: SILT (ML): 100% silt. TD @ 150' bgs.				1673							
150										4.9		

CONTRACTOR	Boart Longyear	**NORTHING**	26716510.08
EQUIPMENT		**EASTING**	826019.40
DRILL MTHD	Sonic	**COORDINATE SYSTEM:**	Nevada State Plane NAD83 East
DIAMETER	8 inch		
LOGGER	K. Gadley	**REVIEWER**	G. Williams

NOTES: Complete core, field screened for DNAPL with FLUTE Ribbon, PID head-space readings, and visual observations. No indications of DNAPL observed.

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Suite 150
Huntington Beach, CA 92648
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GS FORM: WELL BORE 01/04

BOREHOLE LOG

BORING	**AA-MW-23**	**SHEET**	**1 OF 5**
START DRILL DATE	Jun 19, 08	**ELEVATION DATA:**	
FINISH DRILL DATE	Jun 19, 08	**GROUND SURF.**	1812.64
LOCATION	Henderson, NV	**TOP OF CASING**	1812.32
PROJECT	Montrose CPA	**DATUM**	
NUMBER	HW0989C		

DEPTH (ft-bgs)	DESCRIPTION (1) Unit/Formation, Mem. (2) USCS Name (3) Color (4) Moisture (5) Percent Grain Size (6) Plasticity (7) Density/Consistency (8) Structure (9) Other (Mineralization, Discoloration, Odor, etc.)	GRAPHIC LOG	WELL LOG	GROUNDWATER OR STRUCTURE	ELEVATION (ft)	SAMPLE NO.	TYPE	BLOWS PER 6"	RECOVERY (%)	PID READING (ppm)	TIME (00:00)	COMMENTS (1) Rig Behavior (2) Air Monitoring
	Boring location cleared to 5' bgs with hand auger.				1812							
					1811							
	Silty SAND (SM): reddish brown (5YR 5/3); moist; 75% fine- to coarse-grained sand, 15% silt, 10% fine to coarse subrounded to subangular gravel and cobbles (≤13 cm); unconsolidated.				1810							
					1809							
					1808							
5	@ 5' bgs: Silty SAND (SM): reddish brown (5YR 5/4); no cobbles.				1807					27.7		
					1806							
					1805							
					1804							
					1803							
10	@ 10' bgs: Poorly Graded SAND with Silt (SP-SM): increased fine gravel; 80% sand, 10% silt, 10% gravel.				1802					151		
					1801							
	@ 12' bgs: Poorly Graded SAND with Silt (SP-SM): cobbles (≤9.5 cm).				1800							
					1799							
					1798							
15	Well Graded SAND (SW): reddish brown (5YR 5/4); moist; 85% fine- to medium-grained sand with trace coarse-grained sand,10% fine to coarse gravel (≤6.5 cm), 5% silt; unconsolidated.				1797					93.4		
					1796							
					1795							
	Well Graded SAND (SW): reddish gray (5YR 5/2); moist; 85% fine- to coarse-grained sand, 10% fine to coarse gravel and cobbles (≤7.5 cm), 5% silt; unconsolidated.				1794							
					1793							
20	Poorly Graded SAND with Silt (SP/SM): dark reddish gray (5YR 4/2); moist; 80% fine-grained sand with trace medium sand, 10% fine gravel, 10% silt. Grades to SW @ 21' bgs.				1792					145		
					1791							
					1790							
	Poorly Graded SAND (SP): light reddish brown (5YR 6/4); moist; fine- to medium-grained sand with coarse to fine gravel and cobbles (≤10 cm); unconsolidated.				1789							
					1788							
25	@ 23-24' bgs: weathered caliche; pinkish white (5YR 8/2).				1787					187		
	SILT (ML): light reddish brown (5YR 6/4); moist; 90% silt, 10% fine-grained sand; firm.				1786							
	Lean CLAY (CL): dark reddish gray (5YR 4/2); moist; 95% silt, 5% fine-grained sand; medium plasticity; firm.				1785							
					1784							
	Well Graded SAND with Silt and Gravel (SW-SM): reddish brown (5YR 6/2); moist; 70% fine- to coarse-grained sand, 20% fine to				1783							
30												

CONTRACTOR	Boart Longyear	**NORTHING**	26716921.89
EQUIPMENT		**EASTING**	826663.28
DRILL MTHD	Sonic	**COORDINATE SYSTEM:**	
DIAMETER	8 inch	Nevada State Plane NAD83 East	
LOGGER	K. Gadley	**REVIEWER**	G. Williams

NOTES: Complete core, field screened for DNAPL with FLUTE Ribbon, PID head-space readings, and visual observations. No indications of DNAPL observed.

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Geosyntec consultants
2100 Main St
Suite 150
Huntington Beach, CA 92648
Tel: (714) 969-0800
Fax: (714) 969-0820

GS FORM: WELL BORE 01/04

BOREHOLE LOG

BORING	**AA-MW-23**	**SHEET**	**2 OF 5**
START DRILL DATE	Jun 19, 08	**ELEVATION DATA:**	
FINISH DRILL DATE	Jun 19, 08	**GROUND SURF.**	1812.64
LOCATION	Henderson, NV	**TOP OF CASING**	1812.32
PROJECT	Montrose CPA	**DATUM**	
NUMBER	HW0989C		

DEPTH (ft-bgs)	DESCRIPTION (1) Unit/Formation, Mem. (2) USCS Name (3) Color (4) Moisture (5) Percent Grain Size (6) Plasticity (7) Density/Consistency (8) Structure (9) Other (Mineralization, Discoloration, Odor, etc.)	GRAPHIC LOG	WELL LOG	GROUNDWATER OR STRUCTURE	ELEVATION (ft)	SAMPLE NO.	TYPE	BLOWS PER 6"	RECOVERY (%)	PID READING (ppm)	TIME (00:00)	COMMENTS (1) Rig Behavior (2) Air Monitoring
	coarse subrounded to subangular gravel, 10% silt.				1782					294		
	Lean CLAY (CL): reddish brown (5YR 5/3); moist; 90% silt, 10% fine-grained sand; low plasticity; firm.				1781							
	SILT (ML): light reddish brown (5YR 6/4); moist; trace fine-grained sand; non-plastic; firm.				1780							
	Silty SAND (SM): reddish brown (5YR 5/3); moist, 60% fine-grained sand, 40% silt; very dense.				1779							
35	Sandy SILT (ML): yellowish red (5YR 4/6); moist; 65% silt, 35% fine-grained sand; non-plastic; trace subrounded caliche nodules (≤2.5 cm).			▽	1778					729		
	@ 34' bgs: SILT (ML): yellowish red (5YR 4/6); moist; 100% silt; low plasticity; firm.				1777							
	@ 36' bgs: Sandy SILT (ML): yellowish red (5YR 4/6); moist; 65% silt, 35% fine-grained sand; non-plastic; irregular shaped caliche nodules (≤10 cm).				1776							
40	Poorly Graded SAND (SP): reddish brown (5YR 4/3); wet; fine- to coarse-grained sand; trace fine gravel; low density.				1775					55.5		
	Sandy SILT (ML): yellowish red (5YR 4/6); wet; 65% silt, 35% fine-grained sand; non-plastic; caliche nodules (≤2.5 cm).				1774							
	Silty SAND (SM): reddish brown (5YR 5/4); wet; 65% fine-grained sand and trace medium-grained sand, 35% silt; irregular shaped caliche nodules (≤2.5 cm).				1773							
45	Sandy SILT (ML): reddish brown (5YR 5/4); wet; trace clay; non-plastic; very firm; irregular shaped caliche nodules (≤6.5 cm).				1772					39.3		
	@ 43' bgs: SILT with Sand (ML): light reddish brown (5YR 6/4); wet; 80% silt, 20% fine-grained sand and trace medium-grained sand; non-plastic to low plasticity; very firm; caliche nodules (≤2.5 cm).				1771							
	@ 46' bgs: SILT (ML): trace coarse-grained sand.				1770							
50	@ 47' bgs: SILT (ML): reddish brown (5YR 5/4); wet; non-plastic; very firm; caliche nodules (≤1.5 cm).				1769					10.8		
	@ 49' bgs: SILT (ML): reddish brown (5YR 5/4); wet; 95% silt, 5% fine-grained sand; low-plasticity; very firm; caliche nodules (≤0.5 cm).				1768							
	@ 50' bgs: Sandy SILT (ML): reddish brown (5YR 5/4); wet; 70% silt, 30% fine-grained sand; non-plastic; very firm; caliche nodules (≤1 cm).				1767							
55	@ 50.5' bgs: SILT (ML): reddish brown (5YR 5/4); wet; 95% silt, 5% fine-grained sand; low plasticity; very firm; caliche nodules (≤2 cm).				1766					345		
					1765							
					1764							
					1763							
					1762							
					1761							
					1760							
					1759							
					1758							
					1757							
					1756							
					1755							
					1754							
60					1753							

CONTRACTOR	Boart Longyear	**NORTHING**	26716921.89
EQUIPMENT		**EASTING**	826663.28
DRILL MTHD	Sonic	**COORDINATE SYSTEM:**	
DIAMETER	8 inch	Nevada State Plane NAD83 East	
LOGGER	K. Gadley	**REVIEWER**	G. Williams

NOTES: Complete core, field screened for DNAPL with FLUTE Ribbon, PID head-space readings, and visual observations. No indications of DNAPL observed.

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Geosyntec consultants
2100 Main St
Suite 150
Huntington Beach, CA 92648
Tel: (714) 969-0800
Fax: (714) 969-0820

GS FORM: WELL BORE 01/04

BOREHOLE LOG

BORING	**AA-MW-23**	**SHEET**	**3 OF 5**
START DRILL DATE	Jun 19, 08	**ELEVATION DATA:**	
FINISH DRILL DATE	Jun 19, 08	**GROUND SURF.**	1812.64
LOCATION	Henderson, NV	**TOP OF CASING**	1812.32
PROJECT	Montrose CPA	**DATUM**	
NUMBER	HW0989C		

DEPTH (ft-bgs)	DESCRIPTION (1) Unit/Formation, Mem. (2) USCS Name (3) Color (4) Moisture (5) Percent Grain Size (6) Plasticity (7) Density/Consistency (8) Structure (9) Other (Mineralization, Discoloration, Odor, etc.)	GRAPHIC LOG	WELL LOG	GROUNDWATER OR STRUCTURE	ELEVATION (ft)	SAMPLE NO.	TYPE	BLOWS PER 6"	RECOVERY (%)	PID READING (ppm)	TIME (00:00)	COMMENTS (1) Rig Behavior (2) Air Monitoring
					1752					644		
					1751							
					1750							
	Silty SAND (SM): reddish brown (5YR 4/3); wet; fine-grained sand; dense; caliche nodules (<2 cm).				1749							
					1748							
65	Well Graded SAND (SW): dark reddish gray (5YR 4/2); wet; 85% fine- to coarse-grained sand,10% subangular to subrounded gravel, 5% silt; low density.				1747					10		
	SILT (ML): reddish brown (5YR 5/4); trace fine-grained sand; low-plasticity; very firm.				1746							
	Clayey SAND (SC): dark reddish gray (5YR 4/2); wet; fine- to medium-grained sand; non-plastic to low plasticity; firm.				1745							
					1744							
	Poorly Graded SAND with Silt (SP-SM): dark reddish brown (5YR 3/2); 90% fine- to medium-grained sand, 10% silt; low density.				1743							
70	SILT (ML): reddish brown (5YR 4/2); wet; 95% silt, 5% fine-grained sand; non-plastic; very firm.				1742					7.4		
	@ 70.5' bgs: SILT (ML): no sand.				1741							
	@ 73' bgs: SILT (ML): low plasticity.				1740							
					1739							
					1738							
75					1737					10.9		
					1736							
					1735							
					1734							
					1733							
80	Lean CLAY (CL): reddish brown (5YR 5/3); wet; non-plastic to low plasticity; hard.				1732					26.9		
					1731							
					1730							
	Silty SAND (SM): reddish brown (5YR 4/4); wet; 70% fine-grained sand, 30% silt; very dense.				1729							
					1728							
85	Well Graded SAND (SW): dark reddish brown; wet; 85% fine- to coarse-grained sand, 10% subangular to subrounded gravel, 5% silt; low density.				1727					10.2		
	Silty SAND (SM): dark reddish gray (5YR 4/2); wet; 70% fine- to medium-grained sand, 25% silt, 5% fine gravel; low density.				1726							
					1725							
	SILT (ML): reddish brown (5YR 5/3); wet; 100% silt; non-plastic; very firm.				1724							
90					1723							

CONTRACTOR	Boart Longyear	**NORTHING**	26716921.89
EQUIPMENT		**EASTING**	826663.28
DRILL MTHD	Sonic	**COORDINATE SYSTEM:**	
DIAMETER	8 inch	Nevada State Plane NAD83 East	
LOGGER	K. Gadley	**REVIEWER**	G. Williams

NOTES: Complete core, field screened for DNAPL with FLUTE Ribbon, PID head-space readings, and visual observations. No indications of DNAPL observed.

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Geosyntec consultants
2100 Main St
Suite 150
Huntington Beach, CA 92648
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Fax: (714) 969-0820

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BOREHOLE LOG

BORING	**AA-MW-23**	**SHEET 4 OF 5**	
START DRILL DATE	Jun 19, 08	**ELEVATION DATA:**	
FINISH DRILL DATE	Jun 19, 08	**GROUND SURF.**	1812.64
LOCATION	Henderson, NV	**TOP OF CASING**	1812.32
PROJECT	Montrose CPA	**DATUM**	
NUMBER	HW0989C		

DEPTH (ft-bgs)	DESCRIPTION (1) Unit/Formation, Mem. (2) USCS Name (3) Color (4) Moisture (5) Percent Grain Size (6) Plasticity (7) Density/Consistency (8) Structure (9) Other (Mineralization, Discoloration, Odor, etc.)	GRAPHIC LOG	WELL LOG	GROUNDWATER OR STRUCTURE	ELEVATION (ft)	SAMPLE NO.	TYPE	BLOWS PER 6"	RECOVERY (%)	PID READING (ppm)	TIME (00:00)	COMMENTS (1) Rig Behavior (2) Air Monitoring
					1722					N/A		
					1721							
					1720							
					1719							
					1718							
95					1717					107		
					1716							
					1715							
	Volcanic Ash.				1714							
	SILT (ML): reddish brown (5YR 4/2); wet; 100% silt; non-plastic; very firm.				1713							
100	Volcanic Ash.				1712					10.6		
	SILT (ML): reddish brown (5YR 4/2); wet; 95% silt, 5% fine-grained sand, non-plastic; very firm.				1711							
					1710							
					1709							
					1708							
105					1707					121		
					1706							
					1705							
					1704							
	Lean CLAY (CL): reddish brown (5YR 5/3); wet; low plasticity; very firm.				1703							
110	SILT (ML): reddish brown (5YR 5/3); wet; 100% silt; non-plastic; very firm.				1702					216		
					1701							
					1700							
	@ 112.5' bgs: Approximate 2" caliche (weathered) layer.				1699							
					1698							
115					1697					299		
					1696							
					1695							
					1694							
120					1693							

CONTRACTOR	Boart Longyear	**NORTHING**	26716921.89
EQUIPMENT		**EASTING**	826663.28
DRILL MTHD	Sonic	**COORDINATE SYSTEM:**	
DIAMETER	8 inch	Nevada State Plane NAD83 East	
LOGGER	K. Gadley	**REVIEWER**	G. Williams

NOTES: Complete core, field screened for DNAPL with FLUTE Ribbon, PID head-space readings, and visual observations. No indications of DNAPL observed.

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2100 Main St
Suite 150
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GS FORM: WELL BORE 01/04

BOREHOLE LOG

BORING	**AA-MW-23**	**SHEET 5 OF 5**	
START DRILL DATE	Jun 19, 08	**ELEVATION DATA:**	
FINISH DRILL DATE	Jun 19, 08	**GROUND SURF.**	1812.64
LOCATION	Henderson, NV	**TOP OF CASING**	1812.32
PROJECT	Montrose CPA	**DATUM**	
NUMBER	HW0989C		

DEPTH (ft-bgs)	DESCRIPTION (1) Unit/Formation, Mem. (2) USCS Name (3) Color (4) Moisture (5) Percent Grain Size (6) Plasticity (7) Density/Consistency (8) Structure (9) Other (Mineralization, Discoloration, Odor, etc.)	GRAPHIC LOG	WELL LOG	GROUNDWATER OR STRUCTURE	ELEVATION (ft)	SAMPLE NO.	TYPE	BLOWS PER 6"	RECOVERY (%)	PID READING (ppm)	TIME (00:00)	COMMENTS (1) Rig Behavior (2) Air Monitoring
					1692					N/A		
					1691							
	@ 122' bgs: SILT (ML): trace fine-grained sand.				1690							
					1689							
					1688							
125	@ 125' bgs: Sandy SILT (ML): reddish brown (5YR); wet; 70% silt, 30% fine-grained sand; non-plastic; very firm.				1687					111		
					1686							
	@ 127.5' bgs: SILT (ML): reddish brown (5YR 4/4); wet; non-plastic; very firm.				1685							
					1684							
					1683							
130	@ 130' bgs: SILT (ML): trace fine-grained sand and irregular shaped caliche nodules (≤6.5 cm).				1682					94.3		
					1681							
					1680							
	@ 133' bgs: Sandy SILT (ML): reddish brown (5YR 5/4); wet; 70% silt, 30% fine-grained sand; non-plastic; very firm.				1679							
					1678							
135	@ 135' bgs: SILT (ML): light reddish brown (5YR 6/3); wet; non-plastic; very firm; irregular shaped caliche nodules (≤5 cm).				1677					74.1		
					1676							
	@ 137' bgs: SILT (ML): reddish brown (5YR 5/4).				1675							
					1674							
					1673							
140					1672					77.8		
					1671							
					1670							
	@ 142.5' bgs: SILT (ML): caliche nodules increase to ≤9 cm.				1669							
					1668							
145					1667					16.4		
					1666							
					1665							
	@ 148' bgs: SILT (ML): trace fine-grained sand.				1664							
	Borehole TD = 150' bgs.				1663					29.9		
150												

CONTRACTOR	Boart Longyear	**NORTHING**	26716921.89
EQUIPMENT		**EASTING**	826663.28
DRILL MTHD	Sonic	**COORDINATE SYSTEM:**	
DIAMETER	8 inch	Nevada State Plane NAD83 East	
LOGGER	K. Gadley	**REVIEWER**	G. Williams

NOTES: Complete core, field screened for DNAPL with FLUTE Ribbon, PID head-space readings, and visual observations. No indications of DNAPL observed.

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Geosyntec consultants
2100 Main St
Suite 150
Huntington Beach, CA 92648
Tel: (714) 969-0800
Fax: (714) 969-0820

GS FORM: WELL BORE 01/04

BOREHOLE LOG

BORING	**AA-MW-24**	**SHEET**	**1 OF 4**
START DRILL DATE	Jun 11, 08	**ELEVATION DATA:**	
FINISH DRILL DATE	Jun 11, 08	**GROUND SURF.**	1851.03
LOCATION	Henderson, NV	**TOP OF CASING**	1853.58
PROJECT	Montrose CPA	**DATUM**	
NUMBER	HW0989C		

DEPTH (ft-bgs)	DESCRIPTION (1) Unit/Formation, Mem. (2) USCS Name (3) Color (4) Moisture (5) Percent Grain Size (6) Plasticity (7) Density/Consistency (8) Structure (9) Other (Mineralization, Discoloration, Odor, etc.)	GRAPHIC LOG	WELL LOG	GROUNDWATER OR STRUCTURE	ELEVATION (ft)	SAMPLE NO.	TYPE	BLOWS PER 6"	RECOVERY (%)	PID READING (ppm)	TIME (00:00)	COMMENTS (1) Rig Behavior (2) Air Monitoring
	Boring location cleared to 5' bgs with hand auger.				1850							
					1849							
	Silty SAND (SM): reddish brown (5YR 5/3); moist; 75% fine- to coarse-grained sand; 15% silt, 10% fine- to coarse-grained gravel and subrounded to subangular rock fragments (≤3.5 cm); unconsolidated.				1848							
					1847							
5					1846					0.7		
					1845							
	@ 6' bgs: color changes to reddish brown (5YR 5/4); increase in fine-grained gravel.				1844							
					1843							
					1842							
10					1841					0		
	@ 10' bgs: Poorly Graded SAND with Silt and Gravel (SP-SM): 75% sand, 15% silt,10% gravel; rock fragment / cobble size increases to ≤7.5 cm.				1840							
					1839							
	@ 12' bgs: Silty SAND with Gravel (SM): light reddish brown (5YR 6/3); 70% sand, 15% silt, 15% gravel; cobble size increases to ≤12 cm.				1838							
					1837							
15					1836					4.7		
					1835							
					1834							
	Sandy SILT (ML): reddish brown (5YR 5/4); moist; 55% silt, 35% fine- to coarse-grained sand, 10% gravel; trace medium to coarse gravel (≤3 cm).				1833							
					1832							
20					1831					5		
	Silty SAND (SM): light reddish brown (5YR 6/3); moist; 65% fine-grained sand, 30% silt, 5% fine to medium gravel (≤2 cm); unconsolidated.				1830							
					1829							
					1828							
					1827							
25					1826					17.9		
	@ 25' bgs: Silty SAND (SM): 55% fine-grained sand, 40% silt, 5% fine to medium gravel; (≤2 cm); silt increases.				1825							
					1824							
	Poorly Graded SAND with Silt and Gravel (SP-SM): pinkish gray (5YR 7/2); moist; fine-grained sand with trace fine to medium gravel with subrounded to subangular cobbles (≤8 cm); unconsolidated.				1823							
					1822							
30												

CONTRACTOR	Boart Longyear	**NORTHING**	26715179.28
EQUIPMENT		**EASTING**	825495.58
DRILL MTHD	Sonic	**COORDINATE SYSTEM:**	
DIAMETER	8 inch		Nevada State Plane NAD83 East
LOGGER	K. Gadley	**REVIEWER**	G. Williams

NOTES:

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Geosyntec consultants
2100 Main St
Suite 150
Huntington Beach, CA 92648
Tel: (714) 969-0800
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GS FORM: WELL BORE 01/04

BOREHOLE LOG

BORING	**AA-MW-24**	**SHEET**	**2 OF 4**
START DRILL DATE	Jun 11, 08	**ELEVATION DATA:**	
FINISH DRILL DATE	Jun 11, 08	**GROUND SURF.**	1851.03
LOCATION	Henderson, NV	**TOP OF CASING**	1853.58
PROJECT	Montrose CPA	**DATUM**	
NUMBER	HW0989C		

DEPTH (ft-bgs)	DESCRIPTION (1) Unit/Formation, Mem. (2) USCS Name (3) Color (4) Moisture (5) Percent Grain Size (6) Plasticity (7) Density/Consistency (8) Structure (9) Other (Mineralization, Discoloration, Odor, etc.)	GRAPHIC LOG	WELL LOG	GROUNDWATER OR STRUCTURE	ELEVATION (ft)	SAMPLE NO.	TYPE	BLOWS PER 6"	RECOVERY (%)	PID READING (ppm)	TIME (00:00)	COMMENTS (1) Rig Behavior (2) Air Monitoring
										1.4		
	@ 31' bgs: Silty SAND with Gravel (SM): cobble size decreases to ≤6 cm.				1820							
					1819							
					1818							
					1817							
35					1816					1.3		
					1815							
	Silty SAND with Gravel (SM): light reddish brown (5YR 6/3); moist; 65% fine- to coarse-grained sand, 25% subrounded to subangular gravel, 10% silt; unconsolidated.				1814							
					1813							
					1812							
	Sandy SILT (ML): light reddish brown (5YR 6/3); moist; silt with fine- to medium-grained sand; trace medium gravel; unconsolidated.				1811							
40	@ 40' bgs: Sandy SILT (ML): pinkish white (5YR 8/2); grades to silt.				1810					3.8		
	@ 41' bgs: Sandy SILT (ML): reddish brown (5YR 5/3).				1809							
	Silty SAND with Gravel (SM): reddish gray (5YR 5/2); moist; 65% fine- to coarse-grained subrounded to subangular sand, 20% gravel, 15% silt.				1808							
					1807							
45	Silty SAND (SM): light reddish brown (5YR 6/3); moist; 65% fine- to medium-grained sand; 25% silt, 10% medium subrounded to subangular gravel; unconsolidated.				1806					1.9		
					1805							
	@ 46' bgs: Silty SAND (SM): 60% fine- to medium-grained sand; 30% silt, 10% medium subrounded to subangular gravel; silt increases.				1804							
					1803							
	@ 47' bgs: Silty SAND (SM): gravel size increases to ≤4 cm.				1802							
50	@ 49' bgs: Silty SAND (SM): 55% fine- to medium-grained sand; 40% silt, 5% medium subrounded to subangular gravel; silt increases.				1801					1.6		
					1800							
					1799							
					1798							
					1797							
55	SILT (ML): reddish gray (5YR 5/2); moist; 95% silt, 5% fine-grained sand; firm; non-plastic; caliche fragments (≤2.5 cm).				1796					0.5		
					1795							
					1794							
					1793							
					1792							
60												

CONTRACTOR	Boart Longyear	**NORTHING**	26715179.28
EQUIPMENT		**EASTING**	825495.58
DRILL MTHD	Sonic	**COORDINATE SYSTEM:**	
DIAMETER	8 inch	Nevada State Plane NAD83 East	
LOGGER	K. Gadley	**REVIEWER**	G. Williams

NOTES:

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Geosyntec consultants
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Suite 150
Huntington Beach, CA 92648
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GS FORM: WELL BORE 01/04

BOREHOLE LOG

BORING	**AA-MW-24**	**SHEET**	**3 OF 4**
START DRILL DATE	Jun 11, 08	**ELEVATION DATA:**	
FINISH DRILL DATE	Jun 11, 08	**GROUND SURF.**	1851.03
LOCATION	Henderson, NV	**TOP OF CASING**	1853.58
PROJECT	Montrose CPA	**DATUM**	
NUMBER	HW0989C		

DEPTH (ft-bgs)	DESCRIPTION (1) Unit/Formation, Mem. (2) USCS Name (3) Color (4) Moisture (5) Percent Grain Size (6) Plasticity (7) Density/Consistency (8) Structure (9) Other (Mineralization, Discoloration, Odor, etc.)	GRAPHIC LOG	WELL LOG	GROUNDWATER OR STRUCTURE	ELEVATION (ft)	SAMPLE NO.	TYPE	BLOWS PER 6"	RECOVERY (%)	PID READING (ppm)	TIME (00:00)	COMMENTS (1) Rig Behavior (2) Air Monitoring
	@ 60' bgs: SILT (ML): medium plasticity; caliche (≤1 cm) and less adundant.				1790					6.7		
					1789							
					1788							
	@ 63' bgs: SILT (ML): low plasticity.				1787							
65	@ 65' bgs: SILT (ML): 90% silt, 10% fine-grained sand.				1786					0.6		
					1785							
					1784							
					1783							
					1782							
70	@ 70' bgs: SILT (ML): reddish brown (5YR 5/4); increase in moisture; trace fine-grained sand; low plasticity to non-plastic; firm.			∇	1781					2.9		
					1780							
					1779							
					1778							
					1777							
75					1776					1.7		
					1775							
					1774							
					1773							
					1772							
80					1771					1.9		
					1770							
					1769							
					1768							
					1767							
85	@ 85' bgs: SILT (ML): yellowish red (5YR 4/4); increased clay content.				1766					0.3		
					1765							
					1764							
					1763							
					1762							
90												

CONTRACTOR	Boart Longyear	**NORTHING**	26715179.28
EQUIPMENT		**EASTING**	825495.58
DRILL MTHD	Sonic	**COORDINATE SYSTEM:**	
DIAMETER	8 inch		Nevada State Plane NAD83 East
LOGGER	K. Gadley	**REVIEWER**	G. Williams

NOTES:

SEE KEY SHEET FOR SYMBOLS AND ABBREVIATIONS

Geosyntec consultants
2100 Main St
Suite 150
Huntington Beach, CA 92648
Tel: (714) 969-0800
Fax: (714) 969-0820

GS FORM: WELL BORE 01/04

BOREHOLE LOG

BORING	**AA-MW-24**	**SHEET 4 OF 4**	
START DRILL DATE	Jun 11, 08	**ELEVATION DATA:**	
FINISH DRILL DATE	Jun 11, 08	**GROUND SURF.**	1851.03
LOCATION	Henderson, NV	**TOP OF CASING**	1853.58
PROJECT	Montrose CPA	**DATUM**	
NUMBER	HW0989C		

DEPTH (ft-bgs)	DESCRIPTION (1) Unit/Formation, Mem. (2) USCS Name (3) Color (4) Moisture (5) Percent Grain Size (6) Plasticity (7) Density/Consistency (8) Structure (9) Other (Mineralization, Discoloration, Odor, etc.)	GRAPHIC LOG	WELL LOG	GROUNDWATER OR STRUCTURE	ELEVATION (ft)	SAMPLE NO.	TYPE	BLOWS PER 6"	RECOVERY (%)	PID READING (ppm)	TIME (00:00)	COMMENTS (1) Rig Behavior (2) Air Monitoring
										1.1		
	@ 91' bgs: SILT (ML): caliche nodules (≤4 cm).				1760							
					1759							
					1758							
					1757							
95	As above, color change to reddish brown (5YR 5/4).				1756					0.7		
					1755							
					1754							
					1753							
					1752							
100					1751					1		
					1750							
					1749							
					1748							
					1747							
105	@ 105' bgs: SILT with Sand (ML): reddish brown (5YR 5/3); moist; 85% silt, 15% fine-grained sand; non-plastic to low plasticity; firm; caliche nodules (≤5 cm).				1746					1.3		
					1745							
					1744							
	Lean CLAY with Sand (CL): light reddish brown (5YR 6/8); moist; 80% clay, 20% fine-grained sand; low to medium plasticity; firm; caliche nodules (≤5 cm).				1743							
					1742							
110	@ 109 to 109.5' bgs: caliche layer and caliche decreases with depth after 109.5' bgs.				1741					0.9		
					1740							
					1739							
					1738							
					1737							
115					1736					0.2		
					1735							
	TD at 116' bgs.				1734							
					1733							
					1732							
120												

CONTRACTOR	Boart Longyear	**NORTHING**	26715179.28
EQUIPMENT		**EASTING**	825495.58
DRILL MTHD	Sonic	**COORDINATE SYSTEM:**	
DIAMETER	8 inch	Nevada State Plane NAD83 East	
LOGGER	K. Gadley	**REVIEWER**	G. Williams

NOTES:

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2100 Main St
Suite 150
Huntington Beach, CA 92648
Tel: (714) 969-0800
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GS FORM: WELL BORE 01/04

BOREHOLE LOG

BORING CPA-13
START DRILL DATE Feb 1, 10
FINISH DRILL DATE Feb 3, 10
LOCATION Montrose\Henderson
PROJECT CPA
NUMBER HW0989E

ELEVATION DATA:
GROUND SURF. (Ft) 1850.70
TOP OF CASING (Ft)
DATUM Ft above MSL

DEPTH (ft-bgs)	DESCRIPTION (1) Unit/Formation, Mem. (2) USCS Name (3) Color (4) Moisture (5) Percent Grain Size (6) Plasticity (7) Density/Consistency (8) Structure (9) Other (Mineralization, Discoloration, Odor, etc.)	GRAPHIC LOG	WELL LOG	GROUNDWATER OR STRUCTURE	ELEVATION (ft)	SAMPLE NO.	TYPE	BLOWS PER 6"	RECOVERY (%)	PID READING (ppm)	TIME (00:00)	COMMENTS (1) Rig Behavior (2) Air Monitoring
	SAND (SP); brown (10YR 5/3); dry; fine-to coarse-grained sand; fine to coarse gravel with subrounded cobbles (≤ 9 cm); trace silt; (15,80,5); loose.				1850							
					1849							
					1848							
					1847							
					1846							
5					1845							
					1844							
					1843							
					1842							
					1841							
10					1840	CPA-13-10	X			0.6		
					1839							
					1838							
					1837							
					1836							
15					1835					1.0		
					1834							
					1833							
					1832							
					1831							
20	SILTY SAND (SM); pale brown (10YR 6/3); dry; fine-grained sand with gravel; trace fine gravel; (5,55, 40); slightly dense.				1830	CPA-13-20	X			0.8		
					1829							
					1828							
					1827							
	SAND (SP); yellowish brown (10YR 4/4); dry; fine-to coarse-grained sand; trace fine to coarse gravel and cobbles (≤ 6 cm); (5,85,10); with silt; loose.				1826							
25					1825					1.1		

CONTRACTOR Boart Longyear
EQUIPMENT
DRILL MTHD Rotosonic
DIAMETER 7 inches
LOGGER Kyle Gadley
REVIEWER A. Barnes, P.G.

NORTHING 26715268.38
EASTING 825217.23
COORDINATE SYSTEM:
NAD83 CA SP Zn6, ft

NOTES:

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2100 Main St
Suite 150
Huntington Beach, CA 92648
Tel: (714) 969-0800
Fax: (714) 969-0820

GS FORM: WELL BORE 01/04

BOREHOLE LOG

BORING CPA-13
START DRILL DATE Feb 1, 10
FINISH DRILL DATE Feb 3, 10
LOCATION Montrose\Henderson
PROJECT CPA
NUMBER HW0989E

ELEVATION DATA:
GROUND SURF. (Ft) 1850.70
TOP OF CASING (Ft)
DATUM Ft above MSL

DEPTH (ft-bgs)	DESCRIPTION (1) Unit/Formation, Mem. (2) USCS Name (3) Color (4) Moisture (5) Percent Grain Size (6) Plasticity (7) Density/Consistency (8) Structure (9) Other (Mineralization, Discoloration, Odor, etc.)	GRAPHIC LOG	WELL LOG	GROUNDWATER OR STRUCTURE	ELEVATION (ft)	SAMPLE NO.	TYPE	BLOWS PER 6"	RECOVERY (%)	PID READING (ppm)	TIME (00:00)	COMMENTS (1) Rig Behavior (2) Air Monitoring
30					1824, 1823, 1822, 1821, 1820, 1819, 1818, 1817, 1816, 1815, 1814, 1813, 1812, 1811, 1810, 1809, 1808, 1807, 1806, 1805, 1804, 1803, 1802, 1801, 1800, 1799					0.7		
35	SAND (SP); yellowish brown (10YR 4/4); dry; fine- to coarse-grained sand; trace fine to coarse gravel and cobbles (≤ 4 cm); (5,85,10); with silt; loose.									6.3		
	SILT (ML); light yellowish brown (10YR 6/4); partially cemented; moist; trace fine-grained sand (0,5,95); slightly dense.											
40	SILTY SAND (SM); dark yellowish brown (10YR 4/4); moist; fine- to medium-grained sand.									8.1		
	SAND (SP); brown (10YR 5/3); moist; fine-grained sand; trace fine gravel and subrounded cobbles (≤ 4 cm); trace silt; (5,90,5).					CPA-13-40	X					
45										0.6		
	SILTY SAND (SM); dark yellowish brown (10YR 4/4); moist; fine-grained sand (0,60,40); dense weathered caliche fragments (< 0.5 cm) to caliche fragments (≤ 7 cm).											
	Becomes weathered caliche, white (10YR 8/1).											
50	SILT (ML); yellowish brown (10YR 5/4); moist; (0,5,95); trace sand; dense; irregular-shaped caliche fragments (≤ 6 cm).									0.8		
						CPA-13-50	X					

CONTRACTOR Boart Longyear
EQUIPMENT
DRILL MTHD Rotosonic
DIAMETER 7 inches
LOGGER Kyle Gadley
REVIEWER A. Barnes, P.G.

NORTHING 26715268.38
EASTING 825217.23
COORDINATE SYSTEM:
NAD83 CA SP Zn6, ft

NOTES:

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2100 Main St
Suite 150
Huntington Beach, CA 92648
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Fax: (714) 969-0820

GS FORM: WELL BORE 01/04

BOREHOLE LOG

BORING CPA-13
START DRILL DATE Feb 1, 10
FINISH DRILL DATE Feb 3, 10
LOCATION Montrose\Henderson
PROJECT CPA
NUMBER HW0989E

ELEVATION DATA:
GROUND SURF. (Ft) 1850.70
TOP OF CASING (Ft)
DATUM Ft above MSL

DEPTH (ft-bgs)	DESCRIPTION (1) Unit/Formation, Mem. (2) USCS Name (3) Color (4) Moisture (5) Percent Grain Size (6) Plasticity (7) Density/Consistency (8) Structure (9) Other (Mineralization, Discoloration, Odor, etc.)	GRAPHIC LOG	WELL LOG	GROUNDWATER OR STRUCTURE	ELEVATION (ft)	SAMPLE NO.	TYPE	BLOWS PER 6"	RECOVERY (%)	PID READING (ppm)	TIME (00:00)	COMMENTS (1) Rig Behavior (2) Air Monitoring
					1798							
	SILTY SAND (SM); dark yellowish brown (10YR 4/4); moist; (0,60,40); dense.				1797					0.6		
55	CLAY (CL) with Sand; brown (10YR 4/3); moist; fine-grained sand; firm; (0,15,85); medium to high plasticity. Large concretion at 55-55.5 ft.				1796							
					1795					0.4		
					1794							
					1793							
					1792							
60	SAND (SP); brown (10YR 5/3); wet; fine-grained sand; trace fine to coarse gravel; with silt; (5,85,10); slightly dense; weathered caliche fragments (≤ 3 cm).				1791							
					1790	CPA-13-60				0.6		
					1789							
					1788							
					1787							
65	CLAY (CL); dark yellowish brown (10YR 4/4); wet; trace fine-grained sand; (0,5,95); medium to high plasticity; caliche nodules (≤ 9 cm); firm.				1786							
					1785							
					1784							
					1783							
					1782							
70					1781							
					1780							
					1779							
					1778							
					1777							
75	SILT (ML); dark yellowish brown (10YR 4/4); wet; trace fine-grained sand; (0,5,95); non-plastic to low plasticity; caliche nodules (≤ 9 cm); firm.				1776							
					1775					0.5		
					1774							
					1773							

CONTRACTOR Boart Longyear
EQUIPMENT
DRILL MTHD Rotosonic
DIAMETER 7 inches
LOGGER Kyle Gadley
REVIEWER A. Barnes, P.G.

NORTHING 26715268.38
EASTING 825217.23
COORDINATE SYSTEM:
NAD83 CA SP Zn6, ft

NOTES:

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Geosyntec consultants
2100 Main St
Suite 150
Huntington Beach, CA 92648
Tel: (714) 969-0800
Fax: (714) 969-0820

GS FORM: WELL BORE 01/04

BOREHOLE LOG

BORING CPA-13
START DRILL DATE Feb 1, 10
FINISH DRILL DATE Feb 3, 10
LOCATION Montrose\Henderson
PROJECT CPA
NUMBER HW0989E

ELEVATION DATA:
GROUND SURF. (Ft) 1850.70
TOP OF CASING (Ft)
DATUM Ft above MSL

DEPTH (ft-bgs)	DESCRIPTION (1) Unit/Formation, Mem. (2) USCS Name (3) Color (4) Moisture (5) Percent Grain Size (6) Plasticity (7) Density/Consistency (8) Structure (9) Other (Mineralization, Discoloration, Odor, etc.)	GRAPHIC LOG	WELL LOG	GROUNDWATER OR STRUCTURE	ELEVATION (ft)	SAMPLE NO.	TYPE	BLOWS PER 6"	RECOVERY (%)	PID READING (ppm)	TIME (00:00)	COMMENTS (1) Rig Behavior (2) Air Monitoring
					1772							
					1771							
80					1770					0.3		
					1769							
					1768							
					1767							
					1766							
85					1765					0.7		
					1764							
					1763							
					1762							
					1761							
90					1760					0.5		
					1759							
					1758							
					1757							
					1756							
95	CLAY (CL); yellowish brown (10YR 5/6); trace fine-grained sand (0,5,95); medium to high plasticity; firm.				1755					0.8		
					1754							
					1753							
					1752							
					1751							
100					1750					0.7		
					1749							
					1748							
	SILT (SM); yellowish brown (10YR 5/6); wet; trace fine-grained sand (0,5,95); medium to				1747							

CONTRACTOR Boart Longyear
EQUIPMENT
DRILL MTHD Rotosonic
DIAMETER 7 inches
LOGGER Kyle Gadley
REVIEWER A. Barnes, P.G.

NORTHING 26715268.38
EASTING 825217.23
COORDINATE SYSTEM:
NAD83 CA SP Zn6, ft

NOTES:

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Geosyntec consultants
2100 Main St
Suite 150
Huntington Beach, CA 92648
Tel: (714) 969-0800
Fax: (714) 969-0820

GS FORM: WELL BORE 01/04

BOREHOLE LOG

BORING CPA-13
START DRILL DATE Feb 1, 10
FINISH DRILL DATE Feb 3, 10
LOCATION Montrose\Henderson
PROJECT CPA
NUMBER HW0989E

ELEVATION DATA:
GROUND SURF. (Ft) 1850.70
TOP OF CASING (Ft)
DATUM Ft above MSL

DEPTH (ft-bgs)	DESCRIPTION (1) Unit/Formation, Mem. (2) USCS Name (3) Color (4) Moisture (5) Percent Grain Size (6) Plasticity (7) Density/Consistency (8) Structure (9) Other (Mineralization, Discoloration, Odor, etc.)	GRAPHIC LOG	WELL LOG	GROUNDWATER OR STRUCTURE	ELEVATION (ft)	SAMPLE NO.	TYPE	BLOWS PER 6"	RECOVERY (%)	PID READING (ppm)	TIME (00:00)	COMMENTS (1) Rig Behavior (2) Air Monitoring
	high plasticity; firm.				1746							
105					1745					0.7		
					1744							
					1743							
					1742							
					1741							
110					1740					0.6		
					1739							
					1738							
	CLAY (CL); yellowish brown (10YR 5/6); trace fine-grained sand (0,5,95); medium to high plasticity; firm.				1737							
					1736							
115					1735					0.6		
					1734							
					1733							
					1732							
					1731					0.8		
120	TD at 120 ft bgs.				1730							
					1729							
					1728							
					1727							
					1726							
125					1725							
					1724							
					1723							
					1722							
130					1721							

CONTRACTOR Boart Longyear
EQUIPMENT
DRILL MTHD Rotosonic
DIAMETER 7 inches
LOGGER Kyle Gadley
NORTHING 26715268.38
EASTING 825217.23
COORDINATE SYSTEM: NAD83 CA SP Zn6, ft
REVIEWER A. Barnes, P.G.

NOTES:

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Geosyntec consultants
2100 Main St
Suite 150
Huntington Beach, CA 92648
Tel: (714) 969-0800
Fax: (714) 969-0820

GS FORM: WELL BORE 01/04

BOREHOLE LOG

BORING CPA-14A
START DRILL DATE Jan 28, 10
FINISH DRILL DATE Jan 29, 10
LOCATION Montrose\Henderson
PROJECT CPA
NUMBER HW0989E

ELEVATION DATA:
GROUND SURF. (Ft) 1849.72
TOP OF CASING (Ft)
DATUM Ft above MSL

DEPTH (ft-bgs)	DESCRIPTION (1) Unit/Formation, Mem. (2) USCS Name (3) Color (4) Moisture (5) Percent Grain Size (6) Plasticity (7) Density/Consistency (8) Structure (9) Other (Mineralization, Discoloration, Odor, etc.)	GRAPHIC LOG	WELL LOG	GROUNDWATER OR STRUCTURE	ELEVATION (ft)	SAMPLE NO.	TYPE	BLOWS PER 6"	RECOVERY (%)	PID READING (ppm)	TIME (00:00)	COMMENTS (1) Rig Behavior (2) Air Monitoring
	SAND (SP); light yellowish brown (10YR 6/4); dry; fine- to coarse-grained sand; fine to coarse subangular gravel; trace cobbles (≤ 8 cm); (10,85,5); trace silt.				1849							
					1848							
					1847							
					1846							
					1845							
5					1844							
					1843							
					1842							
					1841							
					1840							
10					1839	CPA-14A-10	X			0.5		
					1838							
					1837							
					1836							
					1835							
15					1834					1.0		
					1833							
					1832							
					1831							
					1830							
20					1829	CPA-14A-20	X			0.2		
					1828							
	Cobble size increases (≤ 12 cm).				1827							
					1826							
					1825							
25					1824					0.1		

CONTRACTOR Boart Longyear
EQUIPMENT
DRILL MTHD Rotosonic
DIAMETER 7 inches
LOGGER Kyle Gadley
REVIEWER A. Barnes, P.G.

NORTHING 26715148.00
EASTING 825165.48
COORDINATE SYSTEM: NAD83 CA SP Zn6, ft

NOTES: Boring advanced at 25^0 from horizontal (depths are in linear feet). Sample locations are feet below ground surface.

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Geosyntec consultants
2100 Main St
Suite 150
Huntington Beach, CA 92648
Tel: (714) 969-0800
Fax: (714) 969-0820

GS FORM: WELL BORE 01/04

BOREHOLE LOG

BORING CPA-14A
START DRILL DATE Jan 28, 10
FINISH DRILL DATE Jan 29, 10
LOCATION Montrose\Henderson
PROJECT CPA
NUMBER HW0989E

ELEVATION DATA:
GROUND SURF. (Ft) 1849.72
TOP OF CASING (Ft)
DATUM Ft above MSL

DEPTH (ft-bgs)	DESCRIPTION (1) Unit/Formation, Mem. (2) USCS Name (3) Color (4) Moisture (5) Percent Grain Size (6) Plasticity (7) Density/Consistency (8) Structure (9) Other (Mineralization, Discoloration, Odor, etc.)	GRAPHIC LOG	WELL LOG	GROUNDWATER OR STRUCTURE	ELEVATION (ft)	SAMPLE NO.	TYPE	BLOWS PER 6"	RECOVERY (%)	PID READING (ppm)	TIME (00:00)	COMMENTS (1) Rig Behavior (2) Air Monitoring
					1823							
					1822							
					1821							
					1820							
30					1819	CPA-14A-30				0.6		
					1818							
					1817							
					1816							
					1815							
35	SAND (SP); pale brown (10YR 7/3); moist; fine- to coarse-grained sand; trace fine gravel and cobbles (≤ 8 cm); (5,85,10); unconsolidated.				1814					1.9		
					1813							
					1812							
					1811							
					1810							
40					1809	CPA-14A-40				1.5		
					1808							
					1807							
					1806							
					1805							
45					1804					2.8		
	SILT (ML); pale brown (10YR 7/3); moist; trace fine-grained sand; (0,5,95); non-plastic; slightly dense.				1803							
					1802							
					1801							
					1800							
50	SAND (SP); brown (10YR 5/3); moist; fine-grained sand; trace medium- to coarse-grained sand and fine gravel; trace silt (5,90,5); unconsolidated.				1799	CPA-14A-50				3.2		
					1798							

CONTRACTOR Boart Longyear
EQUIPMENT
DRILL MTHD Rotosonic
DIAMETER 7 inches
LOGGER Kyle Gadley
REVIEWER A. Barnes, P.G.

NORTHING 26715148.00
EASTING 825165.48
COORDINATE SYSTEM:
NAD83 CA SP Zn6, ft

NOTES: Boring advanced at 25^0 from horizontal (depths are in linear feet). Sample locations are feet below ground surface.

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GS FORM: WELL BORE 01/04

BOREHOLE LOG

BORING CPA-14A
START DRILL DATE Jan 28, 10
FINISH DRILL DATE Jan 29, 10
LOCATION Montrose\Henderson
PROJECT CPA
NUMBER HW0989E

ELEVATION DATA:
GROUND SURF. (Ft) 1849.72
TOP OF CASING (Ft)
DATUM Ft above MSL

DEPTH (ft-bgs)	DESCRIPTION (1) Unit/Formation, Mem. (2) USCS Name (3) Color (4) Moisture (5) Percent Grain Size (6) Plasticity (7) Density/Consistency (8) Structure (9) Other (Mineralization, Discoloration, Odor, etc.)	GRAPHIC LOG	WELL LOG	GROUNDWATER OR STRUCTURE	ELEVATION (ft)	SAMPLE NO.	TYPE	BLOWS PER 6"	RECOVERY (%)	PID READING (ppm)	TIME (00:00)	COMMENTS (1) Rig Behavior (2) Air Monitoring
					1797							
					1796							
					1795							
55	Increased silt (5,85,10); irregular-shaped caliche nodules (≤ 6 cm)				1794					3.1		
					1793							
					1792							
					1791							
					1790							
60					1789					4.2		
					1788							
					1787							
					1786							
					1785							
65					1784					2.9		
					1783							
					1782							
					1781							
					1780							
70	SILT (ML); pale brown (10YR 7/3); moist; trace fine-grained sand; partially cemented; (0,5,95); non-plastic; slightly dense.				1779					3.5		
					1778							
					1777							
					1776							
					1775							
75	SAND (SP); brown (10YR 5/3); moist; fine- to coarse-grained sand; trace fine to coarse subangular to subrounded gravel; trace silt (5,90,5); unconsolidated.				1774					0.1		Stop drilling on 1-28-2010. Resume drilling on 1-29-2010
					1773							
					1772							

CONTRACTOR Boart Longyear
EQUIPMENT
DRILL MTHD Rotosonic
DIAMETER 7 inches
LOGGER Kyle Gadley
REVIEWER A. Barnes, P.G.

NORTHING 26715148.00
EASTING 825165.48
COORDINATE SYSTEM:
NAD83 CA SP Zn6, ft

NOTES: Boring advanced at 25^0 from horizontal (depths are in linear feet). Sample locations are feet below ground surface.

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GS FORM: WELL BORE 01/04

BOREHOLE LOG

BORING CPA-14A
START DRILL DATE Jan 28, 10
FINISH DRILL DATE Jan 29, 10
LOCATION Montrose\Henderson
PROJECT CPA
NUMBER HW0989E

ELEVATION DATA:
GROUND SURF. (Ft) 1849.72
TOP OF CASING (Ft)
DATUM Ft above MSL

DEPTH (ft-bgs)	DESCRIPTION (1) Unit/Formation, Mem. (2) USCS Name (3) Color (4) Moisture (5) Percent Grain Size (6) Plasticity (7) Density/Consistency (8) Structure (9) Other (Mineralization, Discoloration, Odor, etc.)	GRAPHIC LOG	WELL LOG	GROUNDWATER OR STRUCTURE	ELEVATION (ft)	SAMPLE NO.	TYPE	BLOWS PER 6"	RECOVERY (%)	PID READING (ppm)	TIME (00:00)	COMMENTS (1) Rig Behavior (2) Air Monitoring
					1771							
					1770							
80					1769					0.7		
	Cobbles (≤ 8 cm)				1768							
					1767							
					1766							
					1765							
85					1764					0.3		
	SILT (ML); dark yellowish brown (10YR 4/4); trace fine-grained sand; (0,5,95); weathered caliche fragments; firm.				1763							
					1762							
					1761							
					1760							
90	Becomes weathered caliche; very pale brown (10YR 8/2); standard reaction with HCL.				1759					0.1		
					1758							
					1757							
					1756							
	SILT (ML); dark yellowish brown (10YR 4/4); moist; trace fine-grained sand; (0,5,95); weathered caliche fragments; firm.				1755							
95					1754					0.2		
	SAND (SP); pale brown (10YR 6/3); moist; fine- to coarse-grained sand; fine gravel; trace coarse gravel with silt; (15,75, 10).				1753							
					1752							
					1751					1.4		
					1750							
100					1749					0.0		
					1748							
	SILT (ML); dark yellowish brown (10YR 4/4); moist; trace fine-grained sand; (0,5,95); weathered caliche fragments; firm.				1747							
					1746							

CONTRACTOR Boart Longyear
EQUIPMENT
DRILL MTHD Rotosonic
DIAMETER 7 inches
LOGGER Kyle Gadley
REVIEWER A. Barnes, P.G.

NORTHING 26715148.00
EASTING 825165.48
COORDINATE SYSTEM:
NAD83 CA SP Zn6, ft

NOTES: Boring advanced at 25^0 from horizontal (depths are in linear feet). Sample locations are feet below ground surface.

SEE KEY SHEET FOR SYMBOLS AND ABBREVIATIONS

Geosyntec consultants
2100 Main St
Suite 150
Huntington Beach, CA 92648
Tel: (714) 969-0800
Fax: (714) 969-0820

GS FORM: WELL BORE 01/04

BOREHOLE LOG

BORING CPA-14A
START DRILL DATE Jan 28, 10
FINISH DRILL DATE Jan 29, 10
LOCATION Montrose\Henderson
PROJECT CPA
NUMBER HW0989E

ELEVATION DATA:
GROUND SURF. (Ft) 1849.72
TOP OF CASING (Ft)
DATUM Ft above MSL

DEPTH (ft-bgs)	DESCRIPTION (1) Unit/Formation, Mem. (2) USCS Name (3) Color (4) Moisture (5) Percent Grain Size (6) Plasticity (7) Density/Consistency (8) Structure (9) Other (Mineralization, Discoloration, Odor, etc.)	GRAPHIC LOG	WELL LOG	GROUNDWATER OR STRUCTURE	ELEVATION (ft)	SAMPLE NO.	TYPE	BLOWS PER 6"	RECOVERY (%)	PID READING (ppm)	TIME (00:00)	COMMENTS (1) Rig Behavior (2) Air Monitoring
105	SAND (SP); pale brown (10YR 6/3); fine- to coarse-grained sand with fine gravel; trace coarse gravel; silt; (15,75, 10).				1745					0.1		
					1744							
	SILT (ML); dark yellowish brown (10YR 4/4); moist; trace fine-grained sand; (0,5,95); weathered caliche fragments; firm.				1743							
					1742							
					1741							
					1740							
110					1739					0.0		
					1738							
	No caliche.				1737							
					1736							
					1735							
115					1734					0.0		
					1733							
					1732							
					1731							
					1730							
120					1729					0.0		
					1728							
					1727							
					1726							
					1725							
125	TD at 125 linear feet at 25^0 from horizontal.				1724					0.0		
					1723							
					1722							
					1721							
130					1720							

CONTRACTOR Boart Longyear
EQUIPMENT
DRILL MTHD Rotosonic
DIAMETER 7 inches
LOGGER Kyle Gadley
NORTHING 26715148.00
EASTING 825165.48
COORDINATE SYSTEM: NAD83 CA SP Zn6, ft
REVIEWER A. Barnes, P.G.

NOTES: Boring advanced at 25^0 from horizontal (depths are in linear feet). Sample locations are feet below ground surface.

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Fax: (714) 969-0820

GS FORM: WELL BORE 01/04

BOREHOLE LOG

BORING CPA-15A
START DRILL DATE Jan 26, 10
FINISH DRILL DATE Jan 26, 10
LOCATION Montrose\Henderson
PROJECT CPA
NUMBER HW0989D

ELEVATION DATA:
GROUND SURF. (Ft) 1849.89
TOP OF CASING (Ft)
DATUM Ft above MSL

DEPTH (ft-bgs)	DESCRIPTION (1) Unit/Formation, Mem. (2) USCS Name (3) Color (4) Moisture (5) Percent Grain Size (6) Plasticity (7) Density/Consistency (8) Structure (9) Other (Mineralization, Discoloration, Odor, etc.)	GRAPHIC LOG	WELL LOG	GROUNDWATER OR STRUCTURE	ELEVATION (ft)	SAMPLE NO.	TYPE	BLOWS PER 6"	RECOVERY (%)	PID READING (ppm)	TIME (00:00)	COMMENTS (1) Rig Behavior (2) Air Monitoring
	SAND (SP); dark grayish brown (10YR 4/2); wet; fine-to coarse-grained sand with cobbles (≤ 9 cm); (15,75,10) slightly dense.				1849							
					1848							
					1847							
					1846							
5					1845							
					1844							
					1843							
					1842							
					1841							
					1840							
10	SAND (SP); yellowish brown (10YR 5/4); dry; fine-to coarse-grained sand with cobbles (≤ 8 cm); (15,75,10)				1839	CPA-15A-10				0.9		
					1838							
					1837							
					1836							
15					1835					0.6		
					1834							
					1833							
					1832							
					1831							
20					1830					0.5		
					1829							
					1828							
					1827							
					1826							
25	SAND (SP); yellowish brown (10YR 5/4); moist; fine-to coarse-grained sand; trace fine gravel; trace silt; (5,90,5); unconsolidated.				1825					0.7		
					1824							

CONTRACTOR Boart Longyear
EQUIPMENT
DRILL MTHD Rotosonic
DIAMETER 7 inches
LOGGER Kyle Gadley
REVIEWER A. Barnes, P.G.

NORTHING 26715160.41
EASTING 825261.85
COORDINATE SYSTEM: NAD83 CA SP Zn6, ft

NOTES: Drilling at 30^0 from horizontal (depth in linear feet). Sample locations are feet blow ground surface.

SEE KEY SHEET FOR SYMBOLS AND ABBREVIATIONS

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GS FORM: WELL BORE 01/04

BOREHOLE LOG

BORING CPA-15A
START DRILL DATE Jan 26, 10
FINISH DRILL DATE Jan 26, 10
LOCATION Montrose\Henderson
PROJECT CPA
NUMBER HW0989D

ELEVATION DATA:
GROUND SURF. (Ft) 1849.89
TOP OF CASING (Ft)
DATUM Ft above MSL

DEPTH (ft-bgs)	DESCRIPTION (1) Unit/Formation, Mem. (2) USCS Name (3) Color (4) Moisture (5) Percent Grain Size (6) Plasticity (7) Density/Consistency (8) Structure (9) Other (Mineralization, Discoloration, Odor, etc.)	GRAPHIC LOG	WELL LOG	GROUNDWATER OR STRUCTURE	ELEVATION (ft)	SAMPLE NO.	TYPE	BLOWS PER 6"	RECOVERY (%)	PID READING (ppm)	TIME (00:00)	COMMENTS (1) Rig Behavior (2) Air Monitoring
					1823							
					1822							
					1821							
					1820							
30					1819	CPA-15A-30				0.8		
					1818							
					1817							
					1816							
					1815							
35										0.9		
					1814							
					1813							
					1812							
					1811							
					1810							
40	Trace cobbles (≤ 10 cm)									0.5		
					1809	CPA-15A-40						
					1808							
	Same as above with silt (5,80,15).											
					1807							
					1806							
					1805							
45										0.8		
					1804							
					1803							
					1802							
					1801							
					1800							
50										0.4		
					1799	CPA-15A-50						
					1798							

CONTRACTOR Boart Longyear
EQUIPMENT
DRILL MTHD Rotosonic
DIAMETER 7 inches
LOGGER Kyle Gadley
REVIEWER A. Barnes, P.G.

NORTHING 26715160.41
EASTING 825261.85
COORDINATE SYSTEM:
NAD83 CA SP Zn6, ft

NOTES: Drilling at 30^0 from horizontal (depth in linear feet). Sample locations are feet blow ground surface.

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GS FORM: WELL BORE 01/04

BOREHOLE LOG

BORING CPA-15A
START DRILL DATE Jan 26, 10
FINISH DRILL DATE Jan 26, 10
LOCATION Montrose\Henderson
PROJECT CPA
NUMBER HW0989D

ELEVATION DATA:
GROUND SURF. (Ft) 1849.89
TOP OF CASING (Ft)
DATUM Ft above MSL

DEPTH (ft-bgs)	DESCRIPTION (1) Unit/Formation, Mem. (2) USCS Name (3) Color (4) Moisture (5) Percent Grain Size (6) Plasticity (7) Density/Consistency (8) Structure (9) Other (Mineralization, Discoloration, Odor, etc.)	GRAPHIC LOG	WELL LOG	GROUNDWATER OR STRUCTURE	ELEVATION (ft)	SAMPLE NO.	TYPE	BLOWS PER 6"	RECOVERY (%)	PID READING (ppm)	TIME (00:00)	COMMENTS (1) Rig Behavior (2) Air Monitoring
					1797							
					1796							
55					1795					0.7		
					1794							
	SILTY SAND (SM); light yellowish brown (10YR 6/4); moist; fine-grained sand (0,60,40), firm.				1793							
	SAND (SP); yellowish brown (10YR 4/4); moist; fine-to coarse-grained sand; trace fine to coarse gravel; trace silt (5,85,10).				1792							
					1791							
60					1790					0.7		
					1789							
					1788							
					1787							
					1786							
	SILTY SAND (SM); brown (10YR 4/3); moist; fine-grained sand; (0,70,30), dense.				1785							
65										0.8		
					1784							
	SAND (SP); yellowish brown (10YR 5/4); moist; fine-to coarse-grained sand; trace fine gravel; unconsolidated.				1783							
					1782							
					1781							
70					1780					0.5		
					1779							
					1778							
					1777							
					1776							
75					1775					0.8		
					1774							
	Becomes brown (10YR 4/3) with silt (5,80,15).				1773							
					1772							

CONTRACTOR Boart Longyear
EQUIPMENT
DRILL MTHD Rotosonic
DIAMETER 7 inches
LOGGER Kyle Gadley
REVIEWER A. Barnes, P.G.

NORTHING 26715160.41
EASTING 825261.85
COORDINATE SYSTEM:
NAD83 CA SP Zn6, ft

NOTES: Drilling at 30^0 from horizontal (depth in linear feet). Sample locations are feet blow ground surface.

SEE KEY SHEET FOR SYMBOLS AND ABBREVIATIONS

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GS FORM: WELL BORE 01/04

BOREHOLE LOG

BORING CPA-15A
START DRILL DATE Jan 26, 10
FINISH DRILL DATE Jan 26, 10
LOCATION Montrose\Henderson
PROJECT CPA
NUMBER HW0989D

ELEVATION DATA:
GROUND SURF. (Ft) 1849.89
TOP OF CASING (Ft)
DATUM Ft above MSL

DEPTH (ft-bgs)	DESCRIPTION (1) Unit/Formation, Mem. (2) USCS Name (3) Color (4) Moisture (5) Percent Grain Size (6) Plasticity (7) Density/Consistency (8) Structure (9) Other (Mineralization, Discoloration, Odor, etc.)	GRAPHIC LOG	WELL LOG	GROUNDWATER OR STRUCTURE	ELEVATION (ft)	SAMPLE NO.	TYPE	BLOWS PER 6"	RECOVERY (%)	PID READING (ppm)	TIME (00:00)	COMMENTS (1) Rig Behavior (2) Air Monitoring
					1771							
					1770							
80	SILT (ML); dark yellowish brown (10YR 4/4); moist; trace fine-grained sand; non-plastic; (0,5,95), firm Becomes pale brown (10YR 6/3) at 81 ft.				1769					0.3		
					1768							
					1767							
					1766							
85	SAND (SP); dark yellowish brown (10YR 4/4); moist; fine-to coarse-grained sand; trace fine gravel; unconsolidated.				1765					0.7		
					1764							
					1763							
					1762							
					1761							
90					1760					0.4		
					1759							
					1758							
					1757							
					1756							
95					1755					0.3		
					1754							
					1753							
					1752							
	SILTY SAND (SM); brown (10YR 5/3); moist; fine-grained sand (0,60,40), dense.				1751					0.1		
100	TD at 100 linear feet @ 30^0 from horizontal.				1750							
					1749							
					1748							
					1747							
					1746							

CONTRACTOR Boart Longyear
EQUIPMENT
DRILL MTHD Rotosonic
DIAMETER 7 inches
LOGGER Kyle Gadley
REVIEWER A. Barnes, P.G.

NORTHING 26715160.41
EASTING 825261.85
COORDINATE SYSTEM: NAD83 CA SP Zn6, ft

NOTES: Drilling at 30^0 from horizontal (depth in linear feet). Sample locations are feet blow ground surface.

SEE KEY SHEET FOR SYMBOLS AND ABBREVIATIONS

Logged By:	Date Drilled:	Drilling Contractor:	Method/Equipment:	Boring Number:
CAROLE FARR	**12/19/96**	**WEST HAZMAT**	**HSA CME 75**	**FTF-1**

See "Legend to Logs" for sampling method, classifications and laboratory test methods	Boring Diam.(in.):	Ground Elev.(ft.):	Groundwater Elevation (ft.):	Total Depth (ft.):	Drive wt.(lbs.):	Drop Dist.(in.):
	4	**1819.95**		**10.0**	**140**	**30**

Well Construction	Depth (ft.)	Sample Type	Blows/6"	Description	PID Reading (ppmV)	Soil pH (S.U.)	Sample Depth (ft.)
Bentonite			9 12	POORLY GRADED SAND (SP) WITH GRAVEL, light brown (10YR5/4), dry, fine grained, 5-10% silt, loose to medium dense, approx. 20% gravel, subangular	4	8	1-2
	5		>50/6" >50/6"	-Color change to moderate yellowish brown (10YR5/4), very dense	6	8	5-6
Sluff	10		>50/6" >50/6"		7	8	9-10
				Boring terminated at 10 feet below ground surface (bgs). Backfilled on 12/19/96.			

The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.

Project No. **M0071-001-01** Date

Log of Boring

Figure

26 (sheet 1 of 1)

Logged By:	Date Drilled:	Drilling Contractor:	Method/Equipment:	Boring Number:
CAROLE FARR	12/19/96	WEST HAZMAT	HSA CME 75	FTF-2

See "Legend to Logs" for sampling method, classifications and laboratory test methods	Boring Diam.(in.):	Ground Elev.(ft.):	Groundwater Elevation (ft.):	Total Depth (ft.):	Drive wt.(lbs.):	Drop Dist.(in.):
	4	1820.18	▽ ▼	10.0	140	30

Well Construction	Depth (ft.)	Sample Type	Blows/6"	Description	PID Reading (ppmV)	Soil pH (S.U.)	Sample Depth (ft.)
Bentonite			28 32	POORLY GRADED SAND WITH GRAVEL (SP), moderate yellowish brown (10YR5/4), dry, fine grained, 5-10% silt, dense, approx. 30% gravel, subangular			1-2
	5		45 >50/6"	-Dense to very dense	6	8	5-6
Sluff	10		38 >50/6"		6	7-8	9-10
				Boring terminated at 10 feet below ground surface (bgs). Backfilled on 12/19/96.			

The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.

Project No. **M0071-001-01** Date

Log of Boring

Figure

27 (sheet 1 of 1)

Logged By:	Date Drilled:	Drilling Contractor:	Method/Equipment:	Boring Number:
CAROLE FARR	12/19/96	WEST HAZMAT	HSA CME 75	FTF-3

See "Legend to Logs" for sampling method, classifications and laboratory test methods	Boring Diam.(in.):	Ground Elev.(ft.):	Groundwater Elevation (ft.):	Total Depth (ft.):	Drive wt.(lbs.):	Drop Dist.(in.):
	4	1820.85		10.0	140	30

Well Construction	Depth (ft.)	Sample Type	Blows/6"	Description	PID Reading (ppmV)	Soil pH (S.U.)	Sample Depth (ft.)
Bentonite			19 18	POORLY GRADED SAND WITH GRAVEL (SP), moderate yellowish brown (10YR5/4), dry, fine grained, 5-10% silt, dense, approx. 20% gravel, subangular	7	5	1-2
	5		>50/6" >50/6"	-Very dense	10	4	5-6
				-Color change to light brown (5YR5/6), orange mottling			
Sluff	10		>50/6" >50/6"		6	5	9-10
				Boring terminated at 10 feet below ground surface (bgs). Backfilled on 12/19/96.			

The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.

Project No. **M0071-001-01** Date

Log of Boring

Figure

28 (sheet 1 of 1)

Logged By:	Date Drilled:	Drilling Contractor:	Method/Equipment:	Boring Number:
CAROLE FARR	12/19/96	WEST HAZMAT	HSA CME 75	FTF-4

See "Legend to Logs" for sampling method, classifications and laboratory test methods	Boring Diam.(in.):	Ground Elev.(ft.):	Groundwater Elevation (ft.):	Total Depth (ft.):	Drive wt.(lbs.):	Drop Dist.(in.):
	4	1819.56		10.5	140	30

Well Construction	Depth (ft.)	Sample Type	Blows/6"	Description	PID Reading (ppmV)	Soil pH (S.U.)	Sample Depth (ft.)
Bentonite			19 23	POORLY GRADED SAND WITH GRAVEL (SP), moderate yellowish brown (10YR5/4), dry, fine to medium grained, dense, approx. 20% gravel, 5-10% silt, subangular	6	7	1-2
				-Color change to grayish orange (10YR7/4)			
	5		23 34	-Very dense -No silt, medium grained	50	7-8	5-6
Sluff	10		19 23 31		30	7	9-10
				Boring terminated at 10.5 feet below ground surface (bgs). Backfilled on 12/19/96.			

The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.

Project No. **M0071-001-01** Date

Log of Boring

Figure

29 (sheet 1 of 1)

Logged By:	Date Drilled:	Drilling Contractor:	Method/Equipment:	Boring Number:
CAROLE FARR	**12/19/96**	**WEST HAZMAT**	**HSA CME 75**	**FTF-5**

See "Legend to Logs" for sampling method, classifications and laboratory test methods	Boring Diam.(in.):	Ground Elev.(ft.):	Groundwater Elevation (ft.):	Total Depth (ft.):	Drive wt.(lbs.):	Drop Dist.(in.):
	4	**1822.64**	▽ ▼	**10.0**	**140**	**30**

Well Construction	Depth (ft.)	Sample Type	Blows/6"	Description	PID Reading (ppmV)	Soil pH (S.U.)	Sample Depth (ft.)
Bentonite			22 26	POORLY GRADED SAND WITH GRAVEL (SP), grayish orange (10YR7/4), dry, fine grained, dense, approx. 20% gravel, subangular, approx. 20% silt	2.5	8	1-2
	5		50/6" >50/6"	-Color change to light brown (5YR5/6), few silt, very dense	2	8	5-6
Sluff	10		>50/6" >50/6"	-Color change to dark yellowish orange (10YR6/6)	2	8	9-10
				Boring terminated at 10 feet below ground surface (bgs). Backfilled on 12/19/96.			

The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.

Project No. **M0071-001-01** Date

Log of Boring

Figure

30 (sheet 1 of 1)

Logged By:	Date Drilled:	Drilling Contractor:	Method/Equipment:	Boring Number:
CAROLE FARR	12/19/96	WEST HAZMAT	HSA CME 75	FTF-6

See "Legend to Logs" for sampling method, classifications and laboratory test methods	Boring Diam.(in.):	Ground Elev.(ft.):	Groundwater Elevation (ft.):	Total Depth (ft.):	Drive wt.(lbs.):	Drop Dist.(in.):
	4	1821.91	▽ ▼	10.0	140	30

Well Construction	Depth (ft.)	Sample Type	Blows/6"	Description	PID Reading (ppmV)	Soil pH (S.U.)	Sample Depth (ft.)
Bentonite			30 27	POORLY GRADED SAND WITH GRAVEL (SP), moderate yellowish brown (10YR5/4), dry, medium grained, very dense, approx. 20% gravel, subangular	4	9	1-2
	5		>50/6" >50/6"	-Color change to dark yellowish orange (10YR6/6)	5	8	5-6
Sluff	10		>50/6" >50/6"	-Few silt	6	8	9-10
				Boring terminated at 10 feet below ground surface (bgs). Backfilled on 12/19/96.			

The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.

Project No. **M0071-001-01** Date

Log of Boring

Figure

31 (sheet 1 of 1)

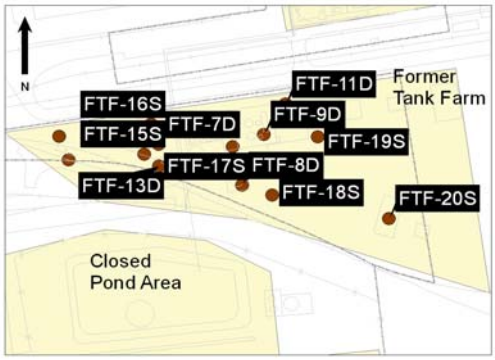
Montrose Chemical Corporation Henderson, NV

Figure B-50

Lithologic log for: FTF-07D

Northing 26716483.573
Easting 825399.646
LS Elev. (ft) 1822.82
Ref. Pnt. N/A
Ref. Pnt. Elev. (ft) N/A
Total Depth (ft) 50
Depth to Water (ft) N/A
Date 12/04/2006

Drill Method RotoSonic
Sampling Method N/A
Diameter of Casing N/A
Type of Casing N/A
Slot Size N/A
Filter N/A



Depth (Feet Below Land Surface)	PID/FID (ppm)	Lithologic Log	USCS	Lithologic Description	Comments
0			SW-SM	SAND with Silt, trace Gravel, 85% sand, 10% silt, 5% gravel, brown (7.5YR 5/4), dry, loose; sand, coarse- to fine-grained, predominantly fine-grained. At 2-feet: trace cobble At 5 to 6-feet: lots of concrete, white (7.5 YR 8/1)	
5	46.7/ 68.72				
			SW	SAND, trace Gravel, 95% sand, 5% gravel, brown (7.5YR 4/4), some multicolored grains (reddish brown), dry, loose; sand, coarse- to fine-grained, predominantly fine-grained. At 10 to 14-feet: trace silt	
10	74.6/ 52.48				
15	1292/ 862				
20	>10000/ 27400				

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Lithologic log for: FTF-07D

Figure B-50

Depth (Feet Below Land Surface)	PID/FID (ppm)	Log Lithologic	USCS	Lithologic Description	Comments
25	>10000/ 15000				
			SM	Silty SAND, 60% sand, 40% silt, strong brown (7.5YR 5/6), dry, loose; sand, coarse- to fine-grained, predominantly fine-grained. At 25 to 27-feet: color is light brown (7.5YR 6/4)	
30	>10000/ 22400				
35	>10000/ 32400		SW	SAND, trace Silt, 95% sand, 5% silt, strong brown (7.5 YR 4/6), some multicolored grains, dry, loose; sand, coarse- to fine-grained, predominantly fine-grained, sub-angular.	
			ML	SILT, 100% Silt, strong brown (7.5YR 4/6), dry, loose, non-plastic, non cohesive.	
40	>10000/ 11200				
			ML	SILT, 100% silt, brown (7.5YR, 5/4), moist, low plasticity, very soft, cohesive.	
45	>10000/ 13600				
			ML	CLAYEY SILT with Sand, 85% silt, 15% sand, strong brown (7.5YR 4/6), moist, moderate plasticity, soft, cohesive.	
50	>10000/ 10900				Total Depth = 50 feet bls

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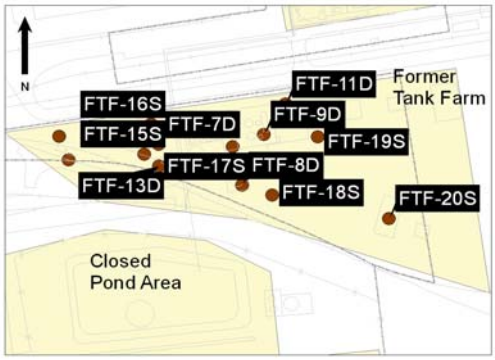
Figure B-51

Lithologic log for: FTF-08D

Northing 26716399.045
Easting 825563.503
LS Elev. (ft) 1823.91
Ref. Pnt. N/A
Ref. Pnt. Elev. (ft) N/A
Total Depth (ft) 50
Depth to Water (ft) N/A
Date 12/04/2006

Drill Method RotoSonic
Sampling Method N/A
Diameter of Casing N/A
Type of Casing N/A
Slot Size N/A
Filter N/A



Depth (Feet Below Land Surface)	PID/FID (ppm)	Lithologic Log	USCS	Lithologic Description	Comments
0			SW	SAND trace Silt, trace Gravel, 98% sand, 1% silt, 1% gravel, multicolored grains, dry, loose; sand, coarse- to fine-grained, predominantly fine-grained.	
5	3.4/ 14.55		SW-SM	SAND with Silt, with Gravel, 80% sand, 10% silt, 10% gravel, brown (7.5YR 5/4), dry, loose; sand, coarse- to fine-grained, predominantly fine-grained. Trace cobbles up to 6-inches.	
10	2.4/ 6.85				
15	10.2/ 19.39		SW	SAND with Gravel, 80% sand, 20% gravel, brown (7.5 YR 5/4), dry, loose; sand, coarse- to fine-grained, predominantly fine-grained.	
20	2.9/ 6.82		SW	SAND with Gravel, trace Silt, 80% sand, 15% gravel, 5% silt, strong brown (7.5 YR 4/6), dry, loose; sand, coarse- to fine-grained, predominantly fine-grained.	

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Lithologic log for: FTF-08D

Figure B-51

Depth (Feet Below Land Surface)	PID/FID (ppm)	Log Lithologic	USCS	Lithologic Description	Comments
25	3.7/ 6.11		SM	Silty SAND, 85% sand, 15% silt, brown (7.5YR, 5/4), dry, loose; sand, coarse- to fine-grained.	
			ML	SILT, 100% silt, brown (7.5YR, 5/4), dry, loose, plasticity: low- to none, slightly cohesive.	
30	3.1/ 9.78		SP	SAND with Gravel, trace Silt, 85% sand, 10% gravel, 5% silt, brown (7.5YR 4/4), dry, loose; sand, coarse- to fine-grained, predominantly fine-grained.	
35	19.5/ 32.84				
40	4.8/ 17.37		ML	CLAYEY SILT, 100% silt, brown (7.5YR, 5/4), moist, low plasticity, caliche nodules. At 49-feet: trace amounts of sand	
45	7.0/ 7.90				
50	14.4/ 20.39				Total Depth = 50 feet bls

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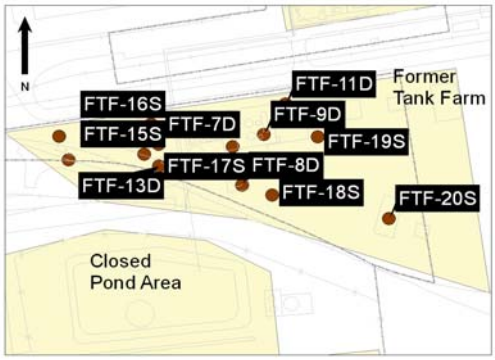
Figure B-52

Lithologic log for: FTF-09D

Northing 26716504.094
Easting 825606.368
LS Elev. (ft) 1821.96
Ref. Pnt. N/A
Ref. Pnt. Elev. (ft) N/A
Total Depth (ft) 50
Depth to Water (ft) N/A
Date 11/29/2006

Drill Method RotoSonic
Sampling Method N/A
Diameter of Casing N/A
Type of Casing N/A
Slot Size N/A
Filter N/A



Depth (Feet Below Land Surface)	PID/FID (ppm)	Lithologic Log	USCS	Lithologic Description	Comments
0			SW-SM	SAND with Silt, with Gravel, 80% sand, 10% silt, 10% gravel, brown (7.5YR 4/4), dry, loose; sand, coarse- to fine-grained, predominantly fine-grained. At 7-feet: cobbles up to 6-inches	
5	2100/ 1750				
10	2105/ 17618				
			SM	Silty SAND with Gravel, 65% sand, 25% silt, 10% gravel, brown (7.5 YR 4/3), dry, loose; sand, coarse- to fine-grained, predominantly fine-grained.	
15	5630/ 2800				
			SW-SM	SAND with Silt, with Gravel, 80% sand, 10% silt, 10% gravel, brown (7.5YR 4/4), dry, loose; sand, coarse- to fine-grained, predominantly fine-grained. Trace cobbles up to 6-inches.	
20	4050/ 2670				
				Silty SAND, 60% sand, 40% silt, brown (7.5YR 4/3), dry, loose; sand, coarse- to fine-grained, predominantly fine-grained.	

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Lithologic log for: FTF-09D

Figure B-52

Depth (Feet Below Land Surface)	PID/FID (ppm)	Log Lithologic	USCS	Lithologic Description	Comments
25	8841/ 3100		SM		
30	3161/ -				FID Down (30-50 feet bls)
35	1987/ -		ML	Sandy SILT, 60% silt, 40% sand, brown (7.5YR 4/3), dry, loose, hard, non plastic; sand, coarse- to fine-grained, predominantly fine-grained.	
40	3613/ -		ML	SILT, 100% silt, brown (7.5YR 4/3), moist, soft, moderate plasticity. Hardens with depth.	
45	2499/ -				
50	120/ -				Total Depth = 50 feet bls

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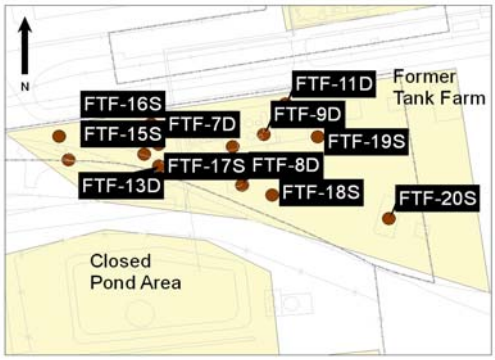
Figure B-53

Lithologic log for: FTF-10D

Northing 26716512.394
Easting 825537.769
LS Elev. (ft) 1821.87
Ref. Pnt. N/A
Ref. Pnt. Elev. (ft) N/A
Total Depth (ft) 50
Depth to Water (ft) N/A
Date 11/30/2006

Drill Method RotoSonic
Sampling Method N/A
Diameter of Casing N/A
Type of Casing N/A
Slot Size N/A
Filter N/A



Depth (Feet Below Land Surface)	PID/FID (ppm)	Lithologic Log	USCS	Lithologic Description	Comments
0			SW-SM	SAND with Silt with Gravel, 80% sand, 10% silt, 10% gravel, brown (7.5YR 4/4), dry, loose; sand, coarse- to fine-grained, predominantly fine-grained, trace cobble, max size 8-inches.	
5	14.1/ 3.98				
10	5.9/ 5.01				
15	41.9/ 29.97				
20	29.5/ 16.23				

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Lithologic log for: FTF-10D

Figure B-53

Depth (Feet Below Land Surface)	PID/FID (ppm)	Log Lithologic	USCS	Lithologic Description	Comments
25	76.4/ 60.85				
30	112/ 84.35		SM	Silty SAND, trace Gravel, 65% sand, 30% silt, 5% gravel, brown (7.5YR 4/4), dry, loose; sand, coarse- to fine-grained, predominantly fine-grained. At 26.5-29-feet: caliche.	
35	72.4/ 35.6		ML	Sandy SILT, 75% silt, 25% sand, brown (7.5YR 4/4), dry, loose, hard, non plastic; sand, fine-grained.	
40	384/ 268		ML	SILT, trace sand, 95% silt, 5% sand, brown (7.5YR 4/4), moist, firm, low plasticity. AT 49.5-50-feet: fine- to medium-grained sand stringers.	
45	625/ 518				
50	112/ 52.48				Total Depth = 50 feet bls

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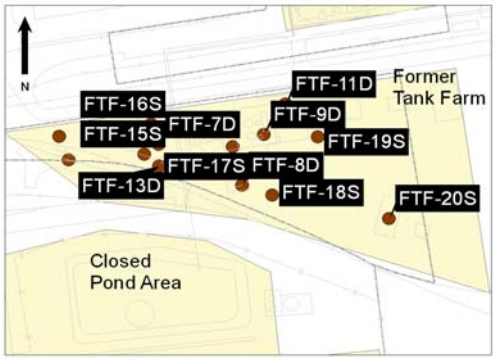
Figure B-54

Lithologic log for: FTF-11D

Northing 26716566.606
Easting 825648.418
LS Elev. (ft) 1820.71
Ref. Pnt. N/A
Ref. Pnt. Elev. (ft) N/A
Total Depth (ft) 50
Depth to Water (ft) N/A
Date 12/06/2006 - 12/07/2006

Drill Method RotoSonic
Sampling Method N/A
Diameter of Casing N/A
Type of Casing N/A
Slot Size N/A
Filter N/A



Depth (Feet Below Land Surface)	PID/FID (ppm)	Lithologic Log	USCS	Lithologic Description	Comments
0			SP	SAND, with Silt, 90% sand, 10% silt, brown (7.5YR 5/3), slightly moist, no odor; sand, coarse- to very fine-grained, predominantly very fine-grained.	
5	1.4/ 9.06		SP	SAND, with Gravel, trace Silt, 85% sand, 10% gravel, 5% silt, brown (7.5YR 5/3), slightly moist, no odor; sand, coarse- to fine-grained, predominantly fine-grained. At 9-10-feet: basalt boulder/cobble.	
10	1.8/ 7.40		SP	Gravelly SAND, trace Silt, occasional Cobbles, 70% sand, 20% gravel, 5% silt, 5% cobbles, brown (7.5YR 5/4); sand, coarse- to fine-grained, predominantly medium-to fine-grained, coarse-grain fraction covered in caliche.	
15	1.7/ 35.02		SW	Gravelly SAND, trace Silt, occasional Cobbles, 70% sand, 20% gravel, 5% silt, 5% cobbles, brown (7.5YR 5/4); sand, coarse- to fine-grained, predominantly medium-to fine-grained, coarse-grain fraction covered in caliche, more evenly distributed grain size.	
20	3.6/ 52.57		SP	Gravelly SAND, trace Silt, occasional Cobbles, 70% sand, 20% gravel, 5% silt, 5% cobbles, brown (7.5YR 5/4); sand, coarse- to fine-grained, predominantly medium-to fine-grained, coarse-grain fraction covered in caliche.	

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Lithologic log for: FTF-11D

Figure B-54

Depth (Feet Below Land Surface)	PID/FID (ppm)	Log Lithologic	USCS	Lithologic Description	Comments
25	5.2/ 28.78				
30	4.2/ 19.48		SM	Silty SAND, 60% sand, 40% silt, brown (7.5YR 5/4), soft to firm; sand, very fine-grained to silt.	
			SP	SAND, with Silt, with Gravel, 80% sand, 10% silt, 10% gravel, brown (7.5YR 5/4), loose; sand, coarse- to fine-grained, predominantly medium-grained, angular.	
35	8.6/ 32.40		ML	Clayey SILT, 100% silt, brown (7.5YR 5/3), soft, moderate to high plasticity, gravel sized grains of caliche present.	
40	44.8/ 221		SM-SP	Silty SAND grading to a SAND with Silt, grains are coarser with depth in this interval.	
45	1478/ >100000		ML	Clayey SILT, 100% silt, brown (7.5YR 5/3), soft, moderate to high plasticity, grains of caliche ranging from medium-grained sand texture to ~ 2-inch diameter.	
50	375/ 1700				Total Depth = 50 feet bls

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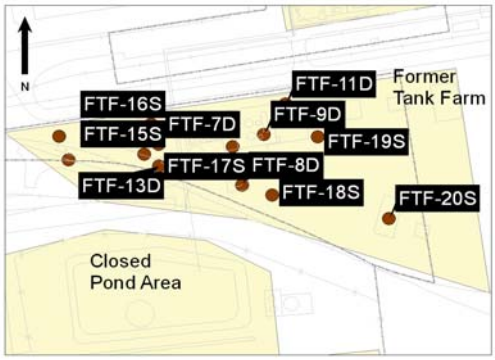
Figure B-55

Lithologic log for: FTF-12D

Northing 26716451.693
Easting 825223.297
LS Elev. (ft) 1824.92
Ref. Pnt. N/A
Ref. Pnt. Elev. (ft) N/A
Total Depth (ft) 50
Depth to Water (ft) N/A
Date 11/28/2006

Drill Method RotoSonic
Sampling Method N/A
Diameter of Casing N/A
Type of Casing N/A
Slot Size N/A
Filter N/A



Depth (Feet Below Land Surface)	PID/FID (ppm)	Lithologic Log	USCS	Lithologic Description	Comments
0			SW-SM	SAND, with Silt, trace Gravel, trace, Cobbles, 80% sand, 10% silt, 5% gravel, 5% cobbles, brown (7.5YR 4/3), dry, loose; sand, coarse- to fine-grained, predominantly fine-grained, cobble up to 3-inches.	
5	3.7/ 0.9				
10	4.30/ 1.75				
15	4.41/ 1.31				
20	4.50/ 1.60				

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Lithologic log for: FTF-12D

Figure B-55

Depth (Feet Below Land Surface)	PID/FID (ppm)	Log Lithologic	USCS	Lithologic Description	Comments
25	0.7/ 2.45				
30	4.36/ 1.40		ML	Sandy SILT, 60% silt, 40% sand, strong brown (7.5YR 4/6), dry, loose; sand, medium- to fine-grained, predominantly fine-grained.	
35	5.73/ 3.64		SW-SM	SAND, with Silt, trace Gravel, trace, Cobbles, 80% sand, 10% silt, 5% gravel, 5% cobbles, brown (7.5YR 4/3), dry, loose; sand, coarse- to fine-grained, predominantly fine-grained, cobble up to 3-inches.	
			ML	Sandy SILT, 60% silt, 40% sand, strong brown (7.5YR 4/6), dry, loose; sand, medium- to fine-grained, predominantly fine-grained.	
40	0.67/ 4.47		ML	SILT, with Sand, 90% silt, 10% sand, brown (7.5YR 4/4), moist, soft, moderate plasticity; sand, fine- to very fine-grained, trace clay.	
45	0.82/ 20.10		ML	Sandy SILT, 80% silt, 20% sand, brown (7.5YR 4/4), moist, loose, non plastic; sand, fine-grained.	
			SM	Silty SAND, 60% sand, 40% silt, brown (7.5YR 4/4), moist, loose; sand, coarse- to fine-grained, predominantly fine grained.	
50	0.97/ 90.5		SP-SM	SAND with Silt, 90% sand, 10% silt, dark brown (7.5YR 3/4) loose; sand, coarse- to fine-grained, predominantly fine-grained.	Total Depth = 50 feet bls

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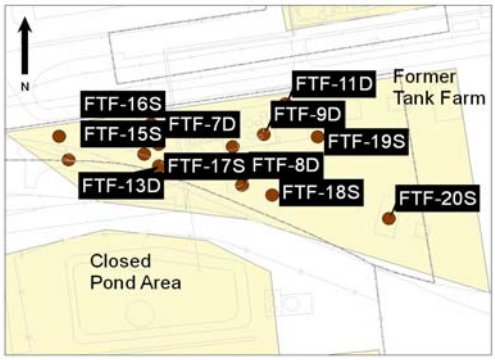
Figure B-56

Lithologic log for: FTF-13D

Northing 26716439.113
Easting 825400.797
LS Elev. (ft) 1823.97
Ref. Pnt. N/A
Ref. Pnt. Elev. (ft) N/A
Total Depth (ft) 50
Depth to Water (ft) N/A
Date 11/30/2006

Drill Method RotoSonic
Sampling Method N/A
Diameter of Casing N/A
Type of Casing N/A
Slot Size N/A
Filter N/A



Depth (Feet Below Land Surface)	PID/FID (ppm)	Lithologic Log	USCS	Lithologic Description	Comments
0			SW	SAND, with Gravel, trace Silt, 85% sand, 10% gravel, 5% silt, brown (7.5YR 4/4), dry, loose; sand, medium- to fine-grained, predominantly medium-grained, trace cobble up to 6-inch.	
5	3.3/ 1.60				
10	2.2/ 1.18				
15	3.7/ 1.41				
20	0.38/ 0.62		SM	Silty SAND, trace Gravel, 70% sand, 25% silt, 5% gravel, brown (7.5YR 5/4), dry, loose; sand, coarse- to fine-grained, predominantly fine-grained.	

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Lithologic log for: FTF-13D

Figure B-56

Depth (Feet Below Land Surface)	PID/FID (ppm)	Log Lithologic	USCS	Lithologic Description	Comments
25	4.48/ 6.31				
30	6.3/ 6.38		ML	Sandy SILT, 70% silt, 30% sand, brown (7.5YR 4/4), moist, hard, non plastic; sand, medium- to fine-grained, predominantly fine-grained.	
35	2.9/ 5.25				
40	4.2/ 2.56		ML	SILT, trace Sand, 95% silt, 5% sand, brown (7.5YR 5/4), soft, moderate plasticity; sand, fine grained, gravel sized caliche present.	
45	7.1/ 5.43		ML	SILT, trace Sand, 95% silt, 5% sand, brown (7.5YR 5/4), hard, non plastic; sand, fine grained, gravel sized caliche present.	
50	37.4/ 33.43				Total Depth = 50 feet bls

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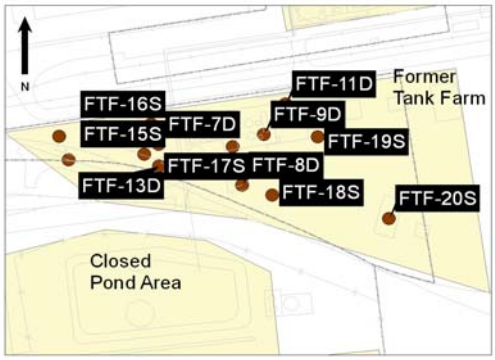
Figure B-57

Lithologic log for: FTF-14S

Northing 26716500.126
Easting 825204.769
LS Elev. (ft) 1822.26
Ref. Pnt. N/A
Ref. Pnt. Elev. (ft) N/A
Total Depth (ft) 10
Depth to Water (ft) N/A
Date 11/29/2006

Drill Method RotoSonic
Sampling Method N/A
Diameter of Casing N/A
Type of Casing N/A
Slot Size N/A
Filter N/A



Depth (Feet Below Land Surface)	PID/FID (ppm)	Lithologic Log	USCS	Lithologic Description	Comments
0	0.40/ 2.52		SW-SM	SAND, with Silt, with Gravel, 80% sand, 10% silt, 10% gravel, brown (7.5YR 5/4), loose, dry; sand, coarse-to fine-grained, predominantly fine-grained. At 0-3.5-feet: Trace cobbles to 3.5-inch.	
5	2.40/ 3.28				
10	8.8/ 2.73				Total Depth = 10 feet bls

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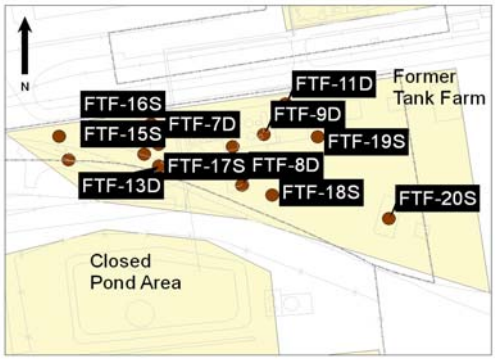
Figure B-58

Lithologic log for: FTF-15S

Northing 26716463.629
Easting 825371.388
LS Elev. (ft) 1823.35
Ref. Pnt. N/A
Ref. Pnt. Elev. (ft) N/A
Total Depth (ft) 10
Depth to Water (ft) N/A
Date 11/29/2006

Drill Method RotoSonic
Sampling Method N/A
Diameter of Casing N/A
Type of Casing N/A
Slot Size N/A
Filter N/A



Depth (Feet Below Land Surface)	PID/FID (ppm)	Lithologic Log	USCS	Lithologic Description	Comments
0	1.34/ 4.21		SW-SM	SAND, with Silt, with Gravel, 80% sand, 10% silt, 10% gravel, brown (7.5YR 5/4), loose, dry; sand, coarse-to fine-grained. At 1-2-feet: 4-inch cobble.	
5	6.91/ 3.23				
10	2.73/ 3.25				Total Depth = 10 feet bls

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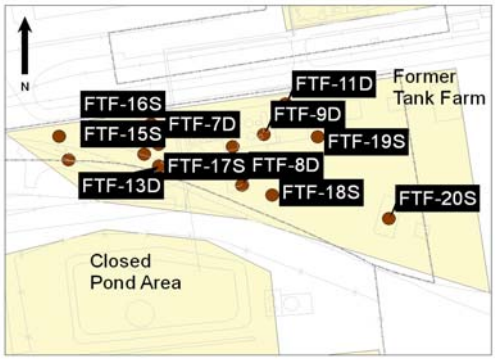
Figure B-59

Lithologic log for: FTF-16S

Northing 26716525.322
Easting 825384.525
LS Elev. (ft) 1821.85
Ref. Pnt. N/A
Ref. Pnt. Elev. (ft) N/A
Total Depth (ft) 10
Depth to Water (ft) N/A
Date 11/29/2006

Drill Method RotoSonic
Sampling Method N/A
Diameter of Casing N/A
Type of Casing N/A
Slot Size N/A
Filter N/A



Depth (Feet Below Land Surface)	PID/FID (ppm)	Lithologic Log	USCS	Lithologic Description	Comments
0	2.3/ 2.55		SW-SM	SAND, with Silt, with Gravel, 80% sand, 10% silt, 10% gravel, brown (7.5YR 5/4), loose, dry; sand, coarse-to fine-grained, predominantly fine-grained.	
5	29.15/ 30.23				
10	191/ 148				Total Depth = 10 feet bls

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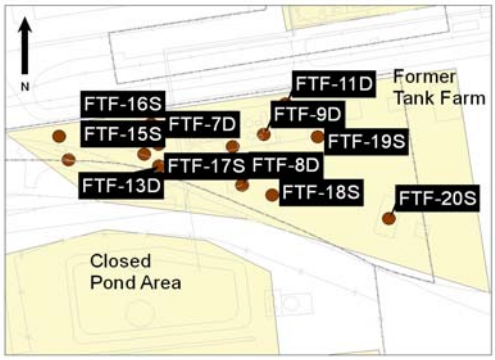
Figure B-60

Lithologic log for: FTF-17S

Northing 26716479.011
Easting 825545.227
LS Elev. (ft) 1821.99
Ref. Pnt. N/A
Ref. Pnt. Elev. (ft) N/A
Total Depth (ft) 10
Depth to Water (ft) N/A
Date 11/29/2006

Drill Method RotoSonic
Sampling Method N/A
Diameter of Casing N/A
Type of Casing N/A
Slot Size N/A
Filter N/A



Depth (Feet Below Land Surface)	PID/FID (ppm)	Lithologic Log	USCS	Lithologic Description	Comments
0	0.78/ 2.73		SW-SM	SAND, with Silt, with Gravel, 80% sand, 10% silt, 10% gravel, brown (7.5YR 5/4), loose, dry; sand, coarse-to fine-grained, predominantly fine-grained.	
5	2.35/ 3.72				
10	2.90/ 4.78				Total Depth = 10 feet bls

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HYDROGEOLOGY · ENGINEERING

PID = Photo Ionization Detector
FID = Flame Ionization Detector
> = greater than

Logged By JCY
Checked By BRW

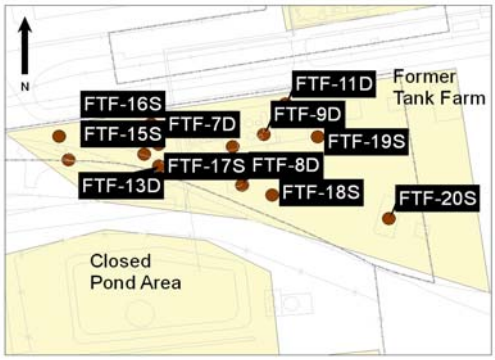
Montrose Chemical Corporation Henderson, NV

Figure B-61

Lithologic log for: FTF-18S

Northing 26716378.701
Easting 825622.815
LS Elev. (ft) 1824.62
Ref. Pnt. N/A
Ref. Pnt. Elev. (ft) N/A
Total Depth (ft) 10
Depth to Water (ft) N/A
Date 12/01/2006

Drill Method RotoSonic
Sampling Method N/A
Diameter of Casing N/A
Type of Casing N/A
Slot Size N/A
Filter N/A



Depth (Feet Below Land Surface)	PID/FID (ppm)	Lithologic Log	USCS	Lithologic Description	Comments
0	3.75/ 1.22		SW-SM	SAND, with Silt, trace Gravel, 85% sand, 10% silt, 5% gravel, brown (7.5YR 5/4), loose, dry; sand, coarse-to fine-grained, predominantly fine-grained.	
5	4.31/ 1.50				
10	4.70/ 1.59				Total Depth = 10 feet bls

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PID = Photo Ionization Detector
FID = Flame Ionization Detector
> = greater than

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Checked By BRW

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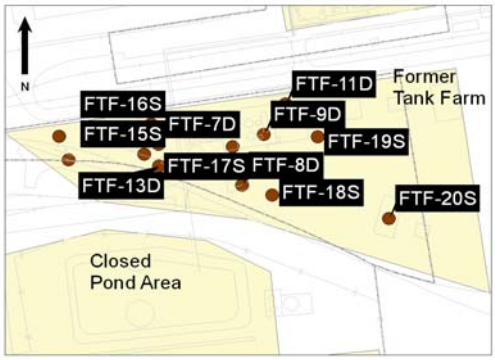
Figure B-62

Lithologic log for: FTF-19S

Northing 26716499.458
Easting 825711.634
LS Elev. (ft) 1822.10
Ref. Pnt. N/A
Ref. Pnt. Elev. (ft) N/A
Total Depth (ft) 10
Depth to Water (ft) N/A
Date 12/01/2006

Drill Method RotoSonic
Sampling Method N/A
Diameter of Casing N/A
Type of Casing N/A
Slot Size N/A
Filter N/A



Depth (Feet Below Land Surface)	PID/FID (ppm)	Lithologic Log	USCS	Lithologic Description	Comments
0	6.40/ 1.45		SM	Silty SAND occasional Cobbles, 80% sand, 15% silt, 5% cobbles, brown (7.5YR 5/4), loose, dry; sand, coarse-to fine-grained, predominantly fine-grained.	
5	3.65/ 1.47				
10	4.05/ 2.14				Total Depth = 10 feet bls

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PID = Photo Ionization Detector
FID = Flame Ionization Detector
> = greater than

Logged By JCY
Checked By BRW

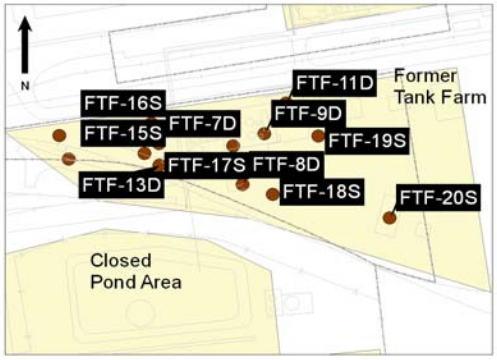
Montrose Chemical Corporation Henderson, NV

Figure B-63

Lithologic log for: FTF-20S

Northing 26716330.540
Easting 825851.415
LS Elev. (ft) 1826.63
Ref. Pnt. N/A
Ref. Pnt. Elev. (ft) N/A
Total Depth (ft) 10
Depth to Water (ft) N/A
Date 12/01/2006

Drill Method RotoSonic
Sampling Method N/A
Diameter of Casing N/A
Type of Casing N/A
Slot Size N/A
Filter N/A



Depth (Feet Below Land Surface)	PID/FID (ppm)	Lithologic Log	USCS	Lithologic Description	Comments
0			ASPHALT	Asphalt sub-grade.	
	3.16/ 1.25			SAND, with Silt, trace Gravel, 85% sand, 10% silt, 5% gravel, brown (7.5YR 5/4), loose, dry; sand, coarse-to fine-grained, predominantly fine-grained.	
5	3.77/ 0.65		SW-SM		
10	3.79/ 0.42				Total Depth = 10 feet bls

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PID = Photo Ionization Detector
FID = Flame Ionization Detector
> = greater than

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Checked By BRW

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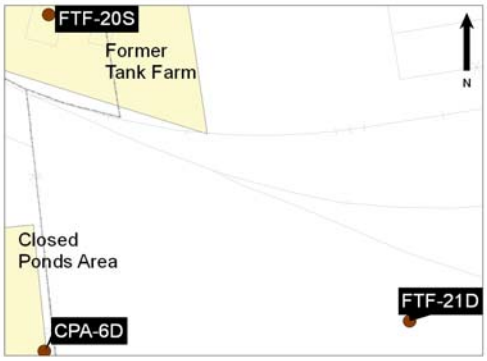
Figure B-64

Lithologic log for: FTF-21D

Northing
Easting
LS Elev. (ft)
Ref. Pnt. N/A
Ref. Pnt. Elev. (ft) N/A
Total Depth (ft) 50
Depth to Water (ft) N/A
Date 11/7/2006

Drill Method RotoSonic
Sampling Method N/A
Diameter of Casing N/A
Type of Casing N/A
Slot Size N/A
Filter N/A



Depth (Feet Below Land Surface)	PID/FID (ppm)	Lithologic Log	USCS	Lithologic Description	Comments
0				SAND, with Silt, with Gravel, 80% sand, 10% silt, 10% gravel, light brown, (7.5YR, 6/3), loose, dry, no odor; sand, coarse-grained grading to fine-grained, sub-angular to angular.	
5	0.4/ 0.22				
10	0.8/ 0.33				
15	3.1/ 0.4		SP		
20	0.4/ 0.74				

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PID = Photo Ionization Detector
FID = Flame Ionization Detector
> = greater than

Logged By JCY
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Lithologic log for: FTF-21D

Figure B-64

Depth (Feet Below Land Surface)	PID/FID (ppm)	Log Lithologic	USCS	Lithologic Description	Comments
25	0.8/ 0.97				
30	0.7/ 0.46				
			ML	Sandy SILT, 60% sand, 40% silt, pinkish-gray, (7.5YR, 7/2), loose to weakly cemented, dry, no odor; sand, fine-grained.	
35	2.3/ 0.50		CL-ML	CLAYEY-SILT/SILTY-CLAY, brown, (7.5YR, 5/4), soft, moderate plasticity, slightly moist, no odor; caliche nodules.	
40	0.6/ 0.74		CL-ML	SILTY CLAY/CLAYEY-SILT, very pale brown, (7.5YR, 7/3), soft, low to moderate plasticity, slightly moist; no odor; caliche nodules.	
45	1.1/ 1.01		CL-ML	SILTY CLAY/CLAYEY-SILT, very pale brown, (7.5YR, 7/3), moderately stiff to stiff, moderate plasticity, slightly moist; no odor; caliche nodules.	
50	0.4/ 0.85				Total Depth = 50 feet bls

Geosyntec consultants
2100 Main St
Suite 150
Huntington Beach, CA 92648
Tel: (714) 969-0800
Fax: (714) 969-0820

GS FORM: WELL BORE 01/04

BOREHOLE LOG

BORING FTF-28
START DRILL DATE Feb 17, 10
FINISH DRILL DATE Feb 17, 10
LOCATION Henderson, NV
PROJECT Montrose FTF
NUMBER HW0989E

ELEVATION DATA:
GROUND SURF. (Ft)
TOP OF CASING (Ft) 1826.07
DATUM Ft above MSL

DEPTH (ft-bgs)	DESCRIPTION (1) Unit/Formation, Mem. (2) USCS Name (3) Color (4) Moisture (5) Percent Grain Size (6) Plasticity (7) Density/Consistency (8) Structure (9) Other (Mineralization, Discoloration, Odor, etc.)	GRAPHIC LOG	WELL LOG	GROUNDWATER OR STRUCTURE	ELEVATION (ft)	SAMPLE NO.	TYPE	BLOWS PER 6"	RECOVERY (%)	PID READING (ppm)	TIME (00:00)	COMMENTS (1) Rig Behavior (2) Air Monitoring
	SAND with Gravel (SP); brown (10YR 5/3); dry; fine- to coarse-grained sand, fine to coarse subrounded to subangular gravel, trace silt; (10,85,5); loose											
1												
2												
3	@ 3' - becomes moist											
4												
5												
	Total Depth at 5.75 ft bgs											
6												
7												
8												
9												
10												

CONTRACTOR WDC Exploration & Wells
EQUIPMENT
DRILL MTHD 3-inch Hand Auger
DIAMETER 10 inches
LOGGER Kyle Gadley
REVIEWER A. Barnes, P.G.

NORTHING 26716391.04
EASTING 824366.03
COORDINATE SYSTEM: NAD83 CA SP Zn6, ft

NOTES: Boring advanced with a hand auger

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Suite 150
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GS FORM: WELL BORE 01/04

BOREHOLE LOG

BORING FTF-29
START DRILL DATE Feb 15, 10
FINISH DRILL DATE Feb 15, 10
LOCATION Henderson, NV
PROJECT Montrose FTF
NUMBER HW0989E

ELEVATION DATA:
GROUND SURF. (Ft) 1822.49
TOP OF CASING (Ft) 1822.60
DATUM Ft above MSL

DEPTH (ft-bgs)	DESCRIPTION (1) Unit/Formation, Mem. (2) USCS Name (3) Color (4) Moisture (5) Percent Grain Size (6) Plasticity (7) Density/Consistency (8) Structure (9) Other (Mineralization, Discoloration, Odor, etc.)	GRAPHIC LOG	WELL LOG	GROUNDWATER OR STRUCTURE	ELEVATION (ft)	SAMPLE NO.	TYPE	BLOWS PER 6"	RECOVERY (%)	PID READING (ppm)	TIME (00:00)	COMMENTS (1) Rig Behavior (2) Air Monitoring
	SAND with Gravel (SP); dark yellowish brown (10YR 4/6); moist; fine- to coarse-grained sand, fine to coarse subrounded to subangular gravel, trace silt; (15,80,5); loose											
1												
	@ 1.5' - Cobbles (≤ 10 cm)											
2												
3												
4												
5												
	Total Depth at 5.75 ft bgs											
6												
7												
8												
9												
10												

CONTRACTOR WDC Exploration & Wells
EQUIPMENT
DRILL MTHD 3-inch Hand Auger
DIAMETER 10 inches
LOGGER Kyle Gadley
REVIEWER A. Barnes, P.G.

NORTHING 26716564.90
EASTING 824384.58
COORDINATE SYSTEM: NAD83 CA SP Zn6, ft

NOTES: Boring advanced with a hand auger

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Suite 150
Huntington Beach, CA 92648
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GS FORM: WELL BORE 01/04

BOREHOLE LOG

BORING FTF-30
START DRILL DATE Feb 16, 10
FINISH DRILL DATE Feb 17, 10
LOCATION Henderson, NV
PROJECT Montrose FTF
NUMBER HW0989E

ELEVATION DATA:
GROUND SURF. (Ft) 1821.64
TOP OF CASING (Ft) 1821.77
DATUM Ft above MSL

DEPTH (ft-bgs)	DESCRIPTION (1) Unit/Formation, Mem. (2) USCS Name (3) Color (4) Moisture (5) Percent Grain Size (6) Plasticity (7) Density/Consistency (8) Structure (9) Other (Mineralization, Discoloration, Odor, etc.)	GRAPHIC LOG	WELL LOG	GROUNDWATER OR STRUCTURE	ELEVATION (ft)	SAMPLE NO.	TYPE	BLOWS PER 6"	RECOVERY (%)	PID READING (ppm)	TIME (00:00)	COMMENTS (1) Rig Behavior (2) Air Monitoring
	SAND with Silt and Gravel (SP); brown (10YR 5/3); dry; fine- to coarse-grained sand; fine to coarse subrounded to subangular gravel; (10,80,10); loose											Boring location cleared to 5 ft bgs with hand auger
5										0.0		
	@ 9' becomes moist											
10										0.4		
	@ 14' becomes (10,85,5)											
15										0.0		
20										0.0		
25										0.0		
30												

CONTRACTOR WDC Exploration & Wells
EQUIPMENT
DRILL MTHD Sonic
DIAMETER 7 inches
LOGGER Kyle Gadley
REVIEWER A. Barnes, P.G.

NORTHING 26716617.39
EASTING 824653.09
COORDINATE SYSTEM: NAD83 CA SP Zn6, ft

NOTES: The 5-10' interval was advanced with HSA and the drilling method was switched to sonic due to poor recovery. The soil core was field screened with FLUTe ribbon for the presence of dense non-aqueous pha liquids (NAPL). No indication of NAPL was observed.

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GS FORM: WELL BORE 01/04

BOREHOLE LOG

BORING FTF-30 **SHEET** 2 **OF** 2
START DRILL DATE Feb 16, 10
FINISH DRILL DATE Feb 17, 10
LOCATION Henderson, NV
PROJECT Montrose FTF
NUMBER HW0989E

ELEVATION DATA:
GROUND SURF. (Ft) 1821.64
TOP OF CASING (Ft) 1821.77
DATUM Ft above MSL

DEPTH (ft-bgs)	DESCRIPTION (1) Unit/Formation, Mem. (2) USCS Name (3) Color (4) Moisture (5) Percent Grain Size (6) Plasticity (7) Density/Consistency (8) Structure (9) Other (Mineralization, Discoloration, Odor, etc.)	GRAPHIC LOG	WELL LOG	GROUNDWATER OR STRUCTURE	ELEVATION (ft)	SAMPLE NO.	TYPE	BLOWS PER 6"	RECOVERY (%)	PID READING (ppm)	TIME (00:00)	COMMENTS (1) Rig Behavior (2) Air Monitoring
	SILTY SAND (SM); dark yellowish brown (10YR 4/4); moist; fine-grained sand; (0,60,40); dense									0.0		
	SILT (ML); dark yellowish brown (10YR 4/6); moist; trace fine-grained sand; (0,5,95); non-plastic; weathered caliche fragments (≤ 9 cm); slightly dense											
35	SAND (SP); dark yellowish brown (10YR 4/4); moist; fine- to medium-grained sand; (5,90,5); trace silt and fine gravel and cobbles (≤ 9cm); firm									0.0		
40				▽						0.0		
	SILT (ML); dark yellowish brown (10YR 4/6); wet; trace fine-grained sand; (0,5,95); non-plastic; weathered caliche nodules (≤ 9 cm); firm											
	Total Depth at 42 ft bgs											
45												
50												
55												
60												

CONTRACTOR WDC Exploration & Wells
EQUIPMENT
DRILL MTHD Sonic
DIAMETER 7 inches
LOGGER Kyle Gadley
REVIEWER A. Barnes, P.G.

NORTHING 26716617.39
EASTING 824653.09
COORDINATE SYSTEM: NAD83 CA SP Zn6, ft

NOTES: The 5-10' interval was advanced with HSA and the drilling method was switched to sonic due to poor recovery. The soil core was field screened with FLUTe ribbon for the presence of dense non-aqueous pha liquids (NAPL). No indication of NAPL was observed.

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GS FORM: WELL BORE 01/04

BOREHOLE LOG

BORING FTF-31
START DRILL DATE Feb 16, 10
FINISH DRILL DATE Feb 17, 10
LOCATION Henderson, NV
PROJECT Montrose FTF
NUMBER HW0989E

ELEVATION DATA:
GROUND SURF. (Ft) 1813.02
TOP OF CASING (Ft) 1813.06
DATUM Ft above MSL

DEPTH (ft-bgs)	DESCRIPTION (1) Unit/Formation, Mem. (2) USCS Name (3) Color (4) Moisture (5) Percent Grain Size (6) Plasticity (7) Density/Consistency (8) Structure (9) Other (Mineralization, Discoloration, Odor, etc.)	GRAPHIC LOG	WELL LOG	GROUNDWATER OR STRUCTURE	ELEVATION (ft)	SAMPLE NO.	TYPE	BLOWS PER 6"	RECOVERY (%)	PID READING (ppm)	TIME (00:00)	COMMENTS (1) Rig Behavior (2) Air Monitoring
	SAND with Gravel (SP); brown (10YR 5/3); dry; fine- to coarse-grained sand, fine subrounded to subangular gravel, trace silt; (10,85,5); loose											
1												
2	@ 2' - becomes moist											
3	@ 3' - cobbles (≤10 cm)											
4												
5												
	Total Depth at 5.75 ft bgs											
6												
7												
8												
9												
10												

CONTRACTOR WDC Exploration & Wells
EQUIPMENT
DRILL MTHD 3-inch Hand Auger
DIAMETER 10 inches
LOGGER Kyle Gadley
REVIEWER A. Barnes, P.G.

NORTHING 26716620.12
EASTING 824900.12
COORDINATE SYSTEM: NAD83 CA SP Zn6, ft

NOTES: Boring advanced with a hand auger

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GS FORM: WELL BORE 01/04

BOREHOLE LOG

BORING FTF-32
START DRILL DATE Feb 16, 10
FINISH DRILL DATE Feb 16, 10
LOCATION Henderson, NV
PROJECT Montrose FTF
NUMBER HW0989E

ELEVATION DATA:
GROUND SURF. (Ft)
TOP OF CASING (Ft) 1813.27
DATUM Ft above MSL

DEPTH (ft-bgs)	DESCRIPTION 1) Unit/Formation, Mem. 2) USCS Name 3) Color 4) Moisture 5) Percent Grain Size 6) Plasticity 7) Density/Consistency 8) Structure 9) Other (Mineralization, Discoloration, Odor, etc.)	GRAPHIC LOG	WELL LOG	GROUNDWATER OR STRUCTURE	ELEVATION (ft)	SAMPLE: SAMPLE NO.	SAMPLE: TYPE	SAMPLE: BLOWS PER 6"	SAMPLE: RECOVERY (%)	SAMPLE: PID READING (ppm)	SAMPLE: TIME (00:00)	COMMENTS 1) Rig Behavior 2) Air Monitoring
	SAND with Gravel (SP); brown (10YR 5/3); dry; fine- to medium-grained sand, fine to coarse subrounded to subangular gravel, trace silt; (15,80,5); loose											
1												
	@ 1.5' - becomes moist											
2												
	@ 2.5' - cobbles (≤10 cm)											
3												
4												
5												
	Total Depth at 5.75 ft bgs											
6												
7												
8												
9												
10												

CONTRACTOR WDC Exploration & Wells
EQUIPMENT
DRILL MTHD 3-inch Hand Auger
DIAMETER 10 inches
LOGGER Kyle Gadley
REVIEWER A. Barnes, P.G.

NORTHING 26716658.51
EASTING 825198.97
COORDINATE SYSTEM:
NAD83 CA SP Zn6, ft

NOTES: Boring advanced with a hand auger

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Tel: (714) 969-0800
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GS FORM: WELL BORE 01/04

BOREHOLE LOG

BORING FTF-33
START DRILL DATE Feb 23, 10
FINISH DRILL DATE Feb 23, 10
LOCATION Henderson, NV
PROJECT Montrose FTF
NUMBER HW0989E

ELEVATION DATA:
GROUND SURF. (Ft)
TOP OF CASING (Ft) 1813.36
DATUM Ft above MSL

DEPTH (ft-bgs)	DESCRIPTION (1) Unit/Formation, Mem. (2) USCS Name (3) Color (4) Moisture (5) Percent Grain Size (6) Plasticity (7) Density/Consistency (8) Structure (9) Other (Mineralization, Discoloration, Odor, etc.)	GRAPHIC LOG	WELL LOG	GROUNDWATER OR STRUCTURE	ELEVATION (ft)	SAMPLE NO.	TYPE	BLOWS PER 6"	RECOVERY (%)	PID READING (ppm)	TIME (00:00)	COMMENTS (1) Rig Behavior (2) Air Monitoring
	SAND (SP); brown (10YR 4/3); moist; fine- to medium-grained sand; trace silt; fine to coarse subrounded to subangular gravel; (5,90,5); loose											Boring location cleared to 5 ft bgs with hand auger
5	@ 5' - Increased gravel (15,80,5)									1.7		
10										2.4		
	@ 12' trace subrounded cobbles (≤ 11cm)											
15										1.3		
20										0.5		
	SILT (ML); yellowish brown (10YR 4/4); moist; trace fine-grained sand (0,5,95); non-plastic; small; soft; non-calcareous crystals											
	@ 23' - weathered caliche fragments (≤ 3cm)											
25	@ 25' - caliche fragments increased to ≤ 6cm									2.7		
30												

CONTRACTOR WDC Exploration & Wells
EQUIPMENT
DRILL MTHD Sonic
DIAMETER 7 inches
LOGGER Kyle Gadley
NORTHING 26716547.53
EASTING 824871.56
COORDINATE SYSTEM: NAD83 CA SP Zn6, ft
REVIEWER A. Barnes, P.G.

NOTES: The soil core was field screened with FLUTe ribbon for the presence of non-aqueous phase liquids (NAPL). No indication of NAPL was observed.

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Suite 150
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GS FORM: WELL BORE 01/04

BOREHOLE LOG

BORING FTF-33
START DRILL DATE Feb 23, 10
FINISH DRILL DATE Feb 23, 10
LOCATION Henderson, NV
PROJECT Montrose FTF
NUMBER HW0989E

ELEVATION DATA:
GROUND SURF. (Ft)
TOP OF CASING (Ft) 1813.36
DATUM Ft above MSL

DEPTH (ft-bgs)	DESCRIPTION (1) Unit/Formation, Mem. (2) USCS Name (3) Color (4) Moisture (5) Percent Grain Size (6) Plasticity (7) Density/Consistency (8) Structure (9) Other (Mineralization, Discoloration, Odor, etc.)	GRAPHIC LOG	WELL LOG	GROUNDWATER OR STRUCTURE	ELEVATION (ft)	SAMPLE NO.	TYPE	BLOWS PER 6"	RECOVERY (%)	PID READING (ppm)	TIME (00:00)	COMMENTS (1) Rig Behavior (2) Air Monitoring
										3.3		
35	CLAY (CL); dark yellowish brown (10YR 4/6); moist; trace fine-grained sand; (0,5,95); medium to high plasticity; firm									2.4		
	SAND (SP) with Gravel; dark yellowish brown (10YR 4/4); fine- to coarse-grained sand; trace silt; fine to coarse subrounded to subangular gravel; wet; slightly dense											
40										2.1		
	Total Depth at 40 ft bgs											
45												
50												
55												
60												

CONTRACTOR WDC Exploration & Wells
EQUIPMENT
DRILL MTHD Sonic
DIAMETER 7 inches
LOGGER Kyle Gadley
NORTHING 26716547.53
EASTING 824871.56
COORDINATE SYSTEM: NAD83 CA SP Zn6, ft
REVIEWER A. Barnes, P.G.

NOTES: The soil core was field screened with FLUTe ribbon for the presence of non-aqueous phase liquids (NAPL). No indication of NAPL was observed.

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GS FORM: WELL BORE 01/04

BOREHOLE LOG

BORING FTF-34
START DRILL DATE Feb 18, 10
FINISH DRILL DATE Feb 22, 10
LOCATION Henderson, NV
PROJECT Montrose FTF
NUMBER HW0989E

ELEVATION DATA:
GROUND SURF. (Ft) 1812.99
TOP OF CASING (Ft) 1813.03
DATUM Ft above MSL

DEPTH (ft-bgs)	DESCRIPTION (1) Unit/Formation, Mem. (2) USCS Name (3) Color (4) Moisture (5) Percent Grain Size (6) Plasticity (7) Density/Consistency (8) Structure (9) Other (Mineralization, Discoloration, Odor, etc.)	GRAPHIC LOG	WELL LOG	GROUNDWATER OR STRUCTURE	ELEVATION (ft)	SAMPLE NO.	TYPE	BLOWS PER 6"	RECOVERY (%)	PID READING (ppm)	TIME (00:00)	COMMENTS (1) Rig Behavior (2) Air Monitoring
	Gravelly SAND (SW); dark yellowish brown (10YR 4/4); moist; fine- to coarse-grained sand; fine to coarse subrounded to subangular gravel; trace silt; (20,75,5); loose; reacts with HCL											Boring location cleared to 5 ft bgs with hand auger
5										1.9		
10										2.0		
	@ 13' - Cobbles ≤ 12cm											
15										2.6		
20	SILTY SAND (SM); dark yellowish brown (10YR 4/6); moist; fine-grained sand; (0,70,30); slightly dense									2.0		
	Gravelly SAND (SP); dark yellowish brown (10YR 4/4); moist; fine- to coarse-grained sand, trace fine subrounded gravel; trace silt; (15,80,5); loose Trace cobbles @ 22'											
25	SILT (ML); brown (7.5Y 4/4); trace fine-grained sand; (0,5,95); moist; non-plastic to low plasticity; irregular-shaped caliche nodules; firm									2.5		
	SILTY SAND (SM)); dark yellowish brown (10YR 4/6); moist; fine-grained sand; (0,60,40); trace irregular-shaped caliche nodules (≤ 3 cm); dense									3.1		Drill bit seized in borehole at ~ 30 ft bgs
30	CLAY (CL); dark yellowish brown (10YR 4/4);											

CONTRACTOR WDC Exploration & Wells
EQUIPMENT
DRILL MTHD Sonic
DIAMETER 7 inches
LOGGER Kyle Gadley
NORTHING 26716537.73
EASTING 825128.37
COORDINATE SYSTEM: NAD83 CA SP Zn6, ft
REVIEWER A. Barnes, P.G.

NOTES: The soil core was field screened with FLUTe ribbon for the presence of non-aqueous phase liquids (NAPL). No indication of NAPL was observed.

SEE KEY SHEET FOR SYMBOLS AND ABBREVIATIONS

Geosyntec consultants
2100 Main St
Suite 150
Huntington Beach, CA 92648
Tel: (714) 969-0800
Fax: (714) 969-0820

GS FORM: WELL BORE 01/04

BOREHOLE LOG

BORING FTF-34 **SHEET** 2 **OF** 2
START DRILL DATE Feb 18, 10
FINISH DRILL DATE Feb 22, 10
LOCATION Henderson, NV
PROJECT Montrose FTF
NUMBER HW0989E

ELEVATION DATA:
GROUND SURF. (Ft) 1812.99
TOP OF CASING (Ft) 1813.03
DATUM Ft above MSL

DEPTH (ft-bgs)	DESCRIPTION (1) Unit/Formation, Mem. (2) USCS Name (3) Color (4) Moisture (5) Percent Grain Size (6) Plasticity (7) Density/Consistency (8) Structure (9) Other (Mineralization, Discoloration, Odor, etc.)	GRAPHIC LOG	WELL LOG	GROUNDWATER OR STRUCTURE	ELEVATION (ft)	SAMPLE NO.	TYPE	BLOWS PER 6"	RECOVERY (%)	PID READING (ppm)	TIME (00:00)	COMMENTS (1) Rig Behavior (2) Air Monitoring
	moist; trace fine-grained sand; (0,5,95); medium to high plasticity; firm									1.2		
	SAND (SP); dark yellowish brown (10YR 3/4); moist; fine-grained sand; trace subrounded fine gravel; trace silt; (5,90,5); slightly dense											
	SILTY SAND (SM); dark yellowish brown (10YR 4/6); moist; fine-grained sand; (0,60,40); trace irregular-shaped caliche nodules (≤ 4 cm); dense											
35	SILT (ML); yellowish brown (10YR 5/4); moist; trace fine-grained sand; (0,5,95); non-plastic; firm									2.0		
	SILTY SAND (SM); dark yellowish brown (10YR 4/6); wet; fine-grained sand; (0,60,40); irregular-shaped caliche nodules; dense			∇								
	SAND (SP); dark yellowish brown (10YR 4/4); fine- to medium-grained sand; trace silt and fine gravel; (5,90,5); slightly dense											
40	Total Depth at 40 ft bgs									0.8		
45												
50												
55												
60												

CONTRACTOR WDC Exploration & Wells
EQUIPMENT
DRILL MTHD Sonic
DIAMETER 7 inches
LOGGER Kyle Gadley
NORTHING 26716537.73
EASTING 825128.37
COORDINATE SYSTEM: NAD83 CA SP Zn6, ft
REVIEWER A. Barnes, P.G.

NOTES: The soil core was field screened with FLUTe ribbon for the presence of non-aqueous phase liquids (NAPL). No indication of NAPL was observed.

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2100 Main St
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GS FORM: WELL BORE 01/04

BOREHOLE LOG

BORING FTF-35
START DRILL DATE Feb 18, 10
FINISH DRILL DATE Feb 18, 10
LOCATION Henderson, NV
PROJECT Montrose FTF
NUMBER HW0989E

ELEVATION DATA:
GROUND SURF. (Ft)
TOP OF CASING (Ft) 1813.47
DATUM Ft above MSL

DEPTH (ft-bgs)	DESCRIPTION (1) Unit/Formation, Mem. (2) USCS Name (3) Color (4) Moisture (5) Percent Grain Size (6) Plasticity (7) Density/Consistency (8) Structure (9) Other (Mineralization, Discoloration, Odor, etc.)	GRAPHIC LOG	WELL LOG	GROUNDWATER OR STRUCTURE	ELEVATION (ft)	SAMPLE NO.	TYPE	BLOWS PER 6"	RECOVERY (%)	PID READING (ppm)	TIME (00:00)	COMMENTS (1) Rig Behavior (2) Air Monitoring
	SAND (SP); dark yellowish brown (10YR 4/4); dry; fine- to coarse-grained sand; trace fine to coarse subrounded to subangular gravel; (5,90,5); loose											Boring location cleared to 5 ft bgs with hand auger
5										2.9		
	@ 7' - Subrounded cobbles (≤ 12 cm)											
10										2.5		
	@ 11' becomes moist											
15										15.2		
20										2.5		
	SAND (SP); dark yellowish brown (10YR 4/4); moist; fine- to medium-grained sand; trace fine to coarse gravel; trace silt; (5,95,5); slightly dense									5.2		
25										10.2		
	SILTY SAND (SM); dark yellowish brown (10YR 4/6); moist; fine-grained sand; (0,60,40); trace irregular-shaped caliche nodules (≤ 4 cm)									21.1		
										426		
30												

CONTRACTOR WDC Exploration & Wells
EQUIPMENT
DRILL MTHD Sonic
DIAMETER 7 inches
LOGGER Kyle Gadley
NORTHING 26716566.45
EASTING 825347.88
COORDINATE SYSTEM: NAD83 CA SP Zn6, ft
REVIEWER A. Barnes, P.G.

NOTES: The soil core was field screened with FLUTe ribbon for the presence of non-aqueous phase liquids (NAPL). Slight reaction observed on FLUTe ribbon at 38-40 ft interval.

SEE KEY SHEET FOR SYMBOLS AND ABBREVIATIONS

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2100 Main St
Suite 150
Huntington Beach, CA 92648
Tel: (714) 969-0800
Fax: (714) 969-0820

GS FORM: WELL BORE 01/04

BOREHOLE LOG

BORING FTF-35
START DRILL DATE Feb 18, 10
FINISH DRILL DATE Feb 18, 10
LOCATION Henderson, NV
PROJECT Montrose FTF
NUMBER HW0989E

ELEVATION DATA:
GROUND SURF. (Ft)
TOP OF CASING (Ft) 1813.47
DATUM Ft above MSL

DEPTH (ft-bgs)	DESCRIPTION (1) Unit/Formation, Mem. (2) USCS Name (3) Color (4) Moisture (5) Percent Grain Size (6) Plasticity (7) Density/Consistency (8) Structure (9) Other (Mineralization, Discoloration, Odor, etc.)	GRAPHIC LOG	WELL LOG	GROUNDWATER OR STRUCTURE	ELEVATION (ft)	SAMPLE NO.	TYPE	BLOWS PER 6"	RECOVERY (%)	PID READING (ppm)	TIME (00:00)	COMMENTS (1) Rig Behavior (2) Air Monitoring
	SAND (SP); dark yellowish brown (10YR 4/4); moist; fine- to coarse-grained sand; trace fine to coarse subrounded gravel; trace silt; (5,90,5); slightly dense									>10000		
										1997		
	SILT (ML); yellowish brown (10YR 5/4); moist; trace fine-grained sand; (0,5,95); non-plastic; firm											
35	@ 35' - Wet			∇						>10000		
	@ 36' - Irregular shaped caliche nodules (≤ 5 cm)											
40										>10000		
	Total Depth at 40 ft bgs											
45												
50												
55												
60												

CONTRACTOR WDC Exploration & Wells
EQUIPMENT
DRILL MTHD Sonic
DIAMETER 7 inches
LOGGER Kyle Gadley
NORTHING 26716566.45
EASTING 825347.88
COORDINATE SYSTEM: NAD83 CA SP Zn6, ft
REVIEWER A. Barnes, P.G.

NOTES: The soil core was field screened with FLUTe ribbon for the presence of non-aqueous phase liquids (NAPL). Slight reaction observed on FLUTe ribbon at 38-40 ft interval.

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2100 Main St
Suite 150
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Fax: (714) 969-0820

GS FORM: WELL BORE 01/04

BOREHOLE LOG

BORING FTF-36
START DRILL DATE Feb 23, 10
FINISH DRILL DATE Feb 23, 10
LOCATION Henderson, NV
PROJECT Montrose FTF
NUMBER HW0989E

ELEVATION DATA:
GROUND SURF. (Ft)
TOP OF CASING (Ft) 1813.12
DATUM Ft above MSL

DEPTH (ft-bgs)	DESCRIPTION (1) Unit/Formation, Mem. (2) USCS Name (3) Color (4) Moisture (5) Percent Grain Size (6) Plasticity (7) Density/Consistency (8) Structure (9) Other (Mineralization, Discoloration, Odor, etc.)	GRAPHIC LOG	WELL LOG	GROUNDWATER OR STRUCTURE	ELEVATION (ft)	SAMPLE NO.	TYPE	BLOWS PER 6"	RECOVERY (%)	PID READING (ppm)	TIME (00:00)	COMMENTS (1) Rig Behavior (2) Air Monitoring
	SAND (SP); dark yellowish brown (10YR 4/4); dry; fine- to coarse-grained sand; trace silt; trace subrounded to subangular gravel; (5,90,5)											Boring location cleared to 5 ft bgs with hand auger
5										0.0		
	@ 7' becomes moist											
10										0.0		
	Concrete debris from 13-15 ft bgs											
15										0.4		
20										1.6		
	SILT (ML): yellowish brown (10YR 5/6); moist; trace fine-grained sand; (0,5,95); non-plastic; slightly firm; caliche fragments (≤ 9 cm)											
25	SAND (SP); dark yellowish brown (10YR 4/4); moist; fine- to medium-grained sand; trace subrounded to subangular fine to coarse gravel; slightly dense									0.5		
	CLAY (CL); yellowish brown (10YR 4/4); moist; (0,0,100); medium to high plasticity; firm @ 28' - Sand increases at 25 ft bgs											
30												

CONTRACTOR WDC Exploration & Wells
EQUIPMENT
DRILL MTHD Sonic
DIAMETER 7 inches
LOGGER Kyle Gadley
NORTHING 26716607.32
EASTING 825595.19
COORDINATE SYSTEM: NAD83 CA SP Zn6, ft
REVIEWER A. Barnes, P.G.

NOTES: The soil core was field screened with FLUTe ribbon for the presence of non-aqueous phase liquids (NAPL). No indication of NAPL was observed.

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Geosyntec consultants
2100 Main St
Suite 150
Huntington Beach, CA 92648
Tel: (714) 969-0800
Fax: (714) 969-0820

GS FORM: WELL BORE 01/04

BOREHOLE LOG

BORING FTF-36
START DRILL DATE Feb 23, 10
FINISH DRILL DATE Feb 23, 10
LOCATION Henderson, NV
PROJECT Montrose FTF
NUMBER HW0989E

ELEVATION DATA:
GROUND SURF. (Ft)
TOP OF CASING (Ft) 1813.12
DATUM Ft above MSL

DEPTH (ft-bgs)	DESCRIPTION (1) Unit/Formation, Mem. (2) USCS Name (3) Color (4) Moisture (5) Percent Grain Size (6) Plasticity (7) Density/Consistency (8) Structure (9) Other (Mineralization, Discoloration, Odor, etc.)	GRAPHIC LOG	WELL LOG	GROUNDWATER OR STRUCTURE	ELEVATION (ft)	SAMPLE NO.	TYPE	BLOWS PER 6"	RECOVERY (%)	PID READING (ppm)	TIME (00:00)	COMMENTS (1) Rig Behavior (2) Air Monitoring
										0.0		
35										1.5		
	SILT (ML); yellowish brown (10YR 5/4); moist; trace fine-grained sand; (0,5,95); non-plastic to low plasticity; caliche fragments (≤ 4 cm)											
	@ 38' - Wet			∇								
40										412		
	Total Depth at 40 ft bgs											
45												
50												
55												
60												

CONTRACTOR WDC Exploration & Wells
EQUIPMENT
DRILL MTHD Sonic
DIAMETER 7 inches
LOGGER Kyle Gadley
NORTHING 26716607.32
EASTING 825595.19
COORDINATE SYSTEM: NAD83 CA SP Zn6, ft
REVIEWER A. Barnes, P.G.

NOTES: The soil core was field screened with FLUTe ribbon for the presence of non-aqueous phase liquids (NAPL). No indication of NAPL was observed.

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2100 Main St
Suite 150
Huntington Beach, CA 92648
Tel: (714) 969-0800
Fax: (714) 969-0820

GS FORM: WELL BORE 01/04

BOREHOLE LOG

BORING FTF-37 **SHEET** 1 **OF** 1
START DRILL DATE Feb 10, 10
FINISH DRILL DATE Feb 10, 10
LOCATION Henderson, NV
PROJECT Montrose FTF
NUMBER HW0989E

ELEVATION DATA:
GROUND SURF. (Ft)
TOP OF CASING (Ft) 1824.21
DATUM Ft above MSL

DEPTH (ft-bgs)	DESCRIPTION 1) Unit/Formation, Mem. 2) USCS Name 3) Color 4) Moisture 5) Percent Grain Size 6) Plasticity 7) Density/Consistency 8) Structure 9) Other (Mineralization, Discoloration, Odor, etc.)	GRAPHIC LOG	WELL LOG	GROUNDWATER OR STRUCTURE	ELEVATION (ft)	SAMPLE NO.	TYPE	BLOWS PER 6"	RECOVERY (%)	PID READING (ppm)	TIME (00:00)	COMMENTS 1) Rig Behavior 2) Air Monitoring
	SAND (SP); dark yellowish brown (10YR 4/6); moist; fine- to medium-grained sand, trace fine to coarse gravel, trace silt; (5,90,5); loose											
1												
2												
	@ 2.5' - Becomes SAND with Gravel (SP); (15,80,5)											
3	@ 3' to 3.5' Boulder (≤ 17 in)											
4												
5												
	Total Depth at 5.75 ft bgs											
6												
7												
8												
9												
10												

CONTRACTOR WDC Exploration & Wells
EQUIPMENT
DRILL MTHD 3-inch Hand Auger
DIAMETER 10 inches
LOGGER Kyle Gadley
REVIEWER A. Barnes, P.G.

NORTHING 26716429.49
EASTING 825408.22
COORDINATE SYSTEM:
NAD83 CA SP Zn6, ft

NOTES: Boring advanced with a hand auger

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2100 Main St
Suite 150
Huntington Beach, CA 92648
Tel: (714) 969-0800
Fax: (714) 969-0820

GS FORM: WELL BORE 01/04

BOREHOLE LOG

BORING FTF-38
START DRILL DATE Feb 10, 10
FINISH DRILL DATE Feb 10, 10
LOCATION Henderson, NV
PROJECT Montrose FTF
NUMBER HW0989E

ELEVATION DATA:
GROUND SURF. (Ft)
TOP OF CASING (Ft) 1822.28
DATUM Ft above MSL

DEPTH (ft-bgs)	DESCRIPTION (1) Unit/Formation, Mem. (2) USCS Name (3) Color (4) Moisture (5) Percent Grain Size (6) Plasticity (7) Density/Consistency (8) Structure (9) Other (Mineralization, Discoloration, Odor, etc.)	GRAPHIC LOG	WELL LOG	GROUNDWATER OR STRUCTURE	ELEVATION (ft)	SAMPLE NO.	TYPE	BLOWS PER 6"	RECOVERY (%)	PID READING (ppm)	TIME (00:00)	COMMENTS (1) Rig Behavior (2) Air Monitoring
	SAND with Gravel (SP); dark yellowish brown (10YR 4/6); moist; fine- to medium-grained sand, fine to coarse subrounded to subangular gravel, trace silt; (15,80,5); loose											
1												
2												
3												
	@ 3.5' - Trace cobbles (≤ 9 cm)											
4												
5												
	Total Depth at 5.75 ft bgs											
6												
7												
8												
9												
10												

CONTRACTOR WDC Exploration & Wells
EQUIPMENT
DRILL MTHD 3-inch Hand Auger
DIAMETER 10 inches
LOGGER Kyle Gadley
REVIEWER A. Barnes, P.G.

NORTHING 26716482.57
EASTING 825702.88
COORDINATE SYSTEM:
NAD83 CA SP Zn6, ft

NOTES: Boring advanced with a hand auger

SEE KEY SHEET FOR SYMBOLS AND ABBREVIATIONS

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Fax: (714) 969-0820

GS FORM: WELL BORE 01/04

BOREHOLE LOG

BORING FTF-39
START DRILL DATE Feb 17, 10
FINISH DRILL DATE Feb 17, 10
LOCATION Henderson, NV
PROJECT Montrose FTF
NUMBER HW0989E

ELEVATION DATA:
GROUND SURF. (Ft)
TOP OF CASING (Ft) 1821.90
DATUM Ft above MSL

DEPTH (ft-bgs)	DESCRIPTION (1) Unit/Formation, Mem. (2) USCS Name (3) Color (4) Moisture (5) Percent Grain Size (6) Plasticity (7) Density/Consistency (8) Structure (9) Other (Mineralization, Discoloration, Odor, etc.)	GRAPHIC LOG	WELL LOG	GROUNDWATER OR STRUCTURE	ELEVATION (ft)	SAMPLE NO.	TYPE	BLOWS PER 6"	RECOVERY (%)	PID READING (ppm)	TIME (00:00)	COMMENTS (1) Rig Behavior (2) Air Monitoring
	Gravelly SAND (SP); dark yellowish brown (10YR 4/6); fine-grained sand; trace fine to coarse subrounded to subangular gravel; trace silt; (15,80,5); loose											Boring location cleared to 5 ft bgs with hand auger
5										0.8		
10										1.2		
	@ 12' becomes (5,85,10)											
	Trace cobbles (≤ 13 cm)											
15										0.7		
20										0.2		
25										0.3		
30	SILTY SAND (SM); grayish brown (10YR 5/2); moist; fine-grained sand; (0,70,30); slightly											

CONTRACTOR WDC Exploration & Wells
EQUIPMENT
DRILL MTHD Sonic
DIAMETER 7 inches
LOGGER Kyle Gadley
NORTHING 26716511.44
EASTING 825913.03
COORDINATE SYSTEM: NAD83 CA SP Zn6, ft
REVIEWER A. Barnes, P.G.

NOTES: The soil core was field screened with FLUTe ribbon for the presence of non-aqueous phase liquids (NAPL). No indication of NAPL was observed.

SEE KEY SHEET FOR SYMBOLS AND ABBREVIATIONS

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2100 Main St
Suite 150
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Tel: (714) 969-0800
Fax: (714) 969-0820

GS FORM: WELL BORE 01/04

BOREHOLE LOG

BORING FTF-39
START DRILL DATE Feb 17, 10
FINISH DRILL DATE Feb 17, 10
LOCATION Henderson, NV
PROJECT Montrose FTF
NUMBER HW0989E

ELEVATION DATA:
GROUND SURF. (Ft)
TOP OF CASING (Ft) 1821.90
DATUM Ft above MSL

DEPTH (ft-bgs)	DESCRIPTION (1) Unit/Formation, Mem. (2) USCS Name (3) Color (4) Moisture (5) Percent Grain Size (6) Plasticity (7) Density/Consistency (8) Structure (9) Other (Mineralization, Discoloration, Odor, etc.)	GRAPHIC LOG	WELL LOG	GROUNDWATER OR STRUCTURE	ELEVATION (ft)	SAMPLE NO.	TYPE	BLOWS PER 6"	RECOVERY (%)	PID READING (ppm)	TIME (00:00)	COMMENTS (1) Rig Behavior (2) Air Monitoring
	dense @ 30' - Dark yellowish brown (10YR 4/4) (0,60,40)									1.8		
	SAND with Gravel (SP); dark yellowish brown (10YR 4/4); moist; fine- to coarse-grained sand; fine to coarse subrounded to subangular gravel; (10,85,5); slightly dense											
	SILTY SAND (SM); dark yellowish brown (10YR 4/6); moist; fine-grained sand; (0,70,30); slightly dense											
35	SILT (ML); yellowish brown (10YR 5/4); moist; trace fine-grained sand; non-plastic; (0,5,95); firm @ 36' - CLAY (CL) with Sand; dark yellowish brown (10YR 4/4); moist; fine-grained sand; (0,10,90); low to medium plasticity @ 38' - Wet									0.1		
40										0.2		
	Total Depth at 40 ft bgs											
45												
50												
55												
60												

CONTRACTOR WDC Exploration & Wells
EQUIPMENT
DRILL MTHD Sonic
DIAMETER 7 inches
LOGGER Kyle Gadley
NORTHING 26716511.44
EASTING 825913.03
COORDINATE SYSTEM: NAD83 CA SP Zn6, ft
REVIEWER A. Barnes, P.G.

NOTES: The soil core was field screened with FLUTe ribbon for the presence of non-aqueous phase liquids (NAPL). No indication of NAPL was observed.

SEE KEY SHEET FOR SYMBOLS AND ABBREVIATIONS

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GS FORM: WELL BORE 01/04

BOREHOLE LOG

BORING FTF-40
START DRILL DATE Feb 9, 10
FINISH DRILL DATE Feb 9, 10
LOCATION Henderson, NV
PROJECT Montrose FTF
NUMBER HW0989E

ELEVATION DATA:
GROUND SURF. (Ft) 1824.58
TOP OF CASING (Ft) 1824.66
DATUM Ft above MSL

DEPTH (ft-bgs)	DESCRIPTION (1) Unit/Formation, Mem. (2) USCS Name (3) Color (4) Moisture (5) Percent Grain Size (6) Plasticity (7) Density/Consistency (8) Structure (9) Other (Mineralization, Discoloration, Odor, etc.)	GRAPHIC LOG	WELL LOG	GROUNDWATER OR STRUCTURE	ELEVATION (ft)	SAMPLE NO.	TYPE	BLOWS PER 6"	RECOVERY (%)	PID READING (ppm)	TIME (00:00)	COMMENTS (1) Rig Behavior (2) Air Monitoring
	SAND with Gravel (SP); dark yellowish brown (10YR 4/6); moist; fine-grained sand, fine to coarse subrounded to subangular gravel, trace silt; (15,80,5); loose											
1												
2												
3												
4												
5												
	Total Depth at 5.75 ft bgs											
6												
7												
8												
9												
10												

CONTRACTOR WDC Exploration & Wells
EQUIPMENT
DRILL MTHD 3-inch Hand Auger
DIAMETER 10 inches
LOGGER Kyle Gadley
REVIEWER A. Barnes, P.G.

NORTHING 26716375.56
EASTING 825612.28
COORDINATE SYSTEM: NAD83 CA SP Zn6, ft

NOTES: Boring advanced with a hand auger

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Suite 150
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Tel: (714) 969-0800
Fax: (714) 969-0820

GS FORM: WELL BORE 01/04

BOREHOLE LOG

BORING FTF-41
START DRILL DATE Feb 9, 10
FINISH DRILL DATE Feb 9, 10
LOCATION Henderson, NV
PROJECT Montrose FTF
NUMBER HW0989E

ELEVATION DATA:
GROUND SURF. (Ft) 1824.60
TOP OF CASING (Ft) 1824.69
DATUM Ft above MSL

DEPTH (ft-bgs)	DESCRIPTION (1) Unit/Formation, Mem. (2) USCS Name (3) Color (4) Moisture (5) Percent Grain Size (6) Plasticity (7) Density/Consistency (8) Structure (9) Other (Mineralization, Discoloration, Odor, etc.)	GRAPHIC LOG	WELL LOG	GROUNDWATER OR STRUCTURE	ELEVATION (ft)	SAMPLE NO.	TYPE	BLOWS PER 6"	RECOVERY (%)	PID READING (ppm)	TIME (00:00)	COMMENTS (1) Rig Behavior (2) Air Monitoring
	SAND with Gravel (SP); dark yellowish brown (10YR 4/6); moist; fine- to medium-grained sand, fine to coarse subrounded to subangular gravel, trace silt; (10,85,5); loose											
1												
2												
3												
4												
5												
	Total Depth at 5.75 ft bgs											
6												
7												
8												
9												
10												

CONTRACTOR WDC Exploration & Wells
EQUIPMENT
DRILL MTHD 3-inch Hand Auger
DIAMETER 10 inches
LOGGER Kyle Gadley
NORTHING 26716331.04
EASTING 825753.42
COORDINATE SYSTEM: NAD83 CA SP Zn6, ft
REVIEWER A. Barnes, P.G.

NOTES: Boring advanced with a hand auger

SEE KEY SHEET FOR SYMBOLS AND ABBREVIATIONS

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2100 Main St
Suite 150
Huntington Beach, CA 92648
Tel: (714) 969-0800
Fax: (714) 969-0820

GS FORM: WELL BORE 01/04

BOREHOLE LOG

BORING FTF-42
START DRILL DATE Feb 9, 10
FINISH DRILL DATE Feb 9, 10
LOCATION Henderson, NV
PROJECT Montrose FTF
NUMBER HW0989E

ELEVATION DATA:
GROUND SURF. (Ft)
TOP OF CASING (Ft) 1827.08
DATUM Ft above MSL

DEPTH (ft-bgs)	DESCRIPTION (1) Unit/Formation, Mem. (2) USCS Name (3) Color (4) Moisture (5) Percent Grain Size (6) Plasticity (7) Density/Consistency (8) Structure (9) Other (Mineralization, Discoloration, Odor, etc.)	GRAPHIC LOG	WELL LOG	GROUNDWATER OR STRUCTURE	ELEVATION (ft)	SAMPLE NO.	TYPE	BLOWS PER 6"	RECOVERY (%)	PID READING (ppm)	TIME (00:00)	COMMENTS (1) Rig Behavior (2) Air Monitoring
	SAND with Gravel (SP); dark yellowish brown (10YR 4/6); moist; fine- to medium-grained sand, fine to coarse subangular gravel; (10,85,5); loose											
1												
2												
	@ 2.5' - cobbles (≤10 cm)											
3												
4												
	@ 4.5' - No cobbles											
5												
	Total Depth at 5.75 ft bgs											
6												
7												
8												
9												
10												

CONTRACTOR WDC Exploration & Wells
EQUIPMENT
DRILL MTHD 3-inch Hand Auger
DIAMETER 10 inches
LOGGER Kyle Gadley
REVIEWER A. Barnes, P.G.

NORTHING 26716271.82
EASTING 825980.51
COORDINATE SYSTEM:
NAD83 CA SP Zn6, ft

NOTES: Boring advanced with a hand auger

SEE KEY SHEET FOR SYMBOLS AND ABBREVIATIONS

Geosyntec consultants
2100 Main St
Suite 150
Huntington Beach, CA 92648
Tel: (714) 969-0800
Fax: (714) 969-0820

GS FORM: WELL BORE 01/04

BOREHOLE LOG

BORING P28 **SHEET** 1 **OF** 1
START DRILL DATE Jan 28, 10
FINISH DRILL DATE Jan 28, 10
LOCATION Henderson, NV
PROJECT Montrose FTF
NUMBER HW0989E

ELEVATION DATA:
GROUND SURF. (Ft) 1838.25
TOP OF CASING (Ft) 1838.35
DATUM Ft above MSL

DEPTH (ft-bgs)	DESCRIPTION (1) Unit/Formation, Mem. (2) USCS Name (3) Color (4) Moisture (5) Percent Grain Size (6) Plasticity (7) Density/Consistency (8) Structure (9) Other (Mineralization, Discoloration, Odor, etc.)	GRAPHIC LOG	WELL LOG	GROUNDWATER OR STRUCTURE	ELEVATION (ft)	SAMPLE NO.	TYPE	BLOWS PER 6"	RECOVERY (%)	PID READING (ppm)	TIME (00:00)	COMMENTS (1) Rig Behavior (2) Air Monitoring
	Gravelly SAND with Silt (SP): Brown (7.5YR, 5/4); moist; fine- to coarse-grained sand, fine to coarse gravel, trace cobbles; (20, 70, 10); dense; subrounded to subangular sand, gravel and cobbles; non-plastic fines										10:30	Start hand auger
												approximately 10" diameter boring
1												
2												
3												approximately 6" diameter boring
4												approximately 3" diameter boring
5										0.0	11:00	
6	Total Depth at 6 ft bgs										11:15	
7												
8												
9												
10												

CONTRACTOR WDC Exploration & Wells
EQUIPMENT
DRILL MTHD Hand Auger
DIAMETER 3 to 12 inches
LOGGER A. Simons
NORTHING 26715765.69
EASTING 826109.63
COORDINATE SYSTEM: NAD83 CA SP Zn6, ft
REVIEWER A. Barnes, P.G

NOTES: Boring advanced with a hand auger, breaker bar, post hole digger, and vacuum

SEE KEY SHEET FOR SYMBOLS AND ABBREVIATIONS

Geosyntec consultants
2100 Main St
Suite 150
Huntington Beach, CA 92648
Tel: (714) 969-0800
Fax: (714) 969-0820

GS FORM: WELL BORE 01/04

BOREHOLE LOG

BORING P29 **SHEET** 1 **OF** 1
START DRILL DATE Jan 28, 10
FINISH DRILL DATE Jan 28, 10
LOCATION Henderson, NV
PROJECT Montrose FTF
NUMBER HW0989E

ELEVATION DATA:
GROUND SURF. (Ft) 1851.28
TOP OF CASING (Ft) 1851.36
DATUM Ft above MSL

DEPTH (ft-bgs)	DESCRIPTION (1) Unit/Formation, Mem. (2) USCS Name (3) Color (4) Moisture (5) Percent Grain Size (6) Plasticity (7) Density/Consistency (8) Structure (9) Other (Mineralization, Discoloration, Odor, etc.)	GRAPHIC LOG	WELL LOG	GROUNDWATER OR STRUCTURE	ELEVATION (ft)	SAMPLE NO.	TYPE	BLOWS PER 6"	RECOVERY (%)	PID READING (ppm)	TIME (00:00)	COMMENTS (1) Rig Behavior (2) Air Monitoring
	Gravelly SAND with Silt (SP): Brown (7.5YR, 5/4); moist; fine- to coarse-grained sand, fine to coarse gravel, trace cobbles; (20, 70, 10); dense; subrounded to subangular sand, gravel and cobbles; non-plastic fines										08:45	Start hand auger
1												
2											09:15	@ 2' - Hit refusal, step over 5 feet to east 10" diameter
3												
4												3" diameter
5												
	Total Depth at 5.75 ft bgs										10:15	
6												
7												
8												
9												
10												

CONTRACTOR WDC Exploration & Wells
EQUIPMENT
DRILL MTHD
DIAMETER 3 to 12 inches
LOGGER **REVIEWER**

NORTHING 26715216.25
EASTING 826033.75
COORDINATE SYSTEM: NAD83 CA SP Zn6, ft

NOTES: Boring advanced with a hand auger, breaker bar, post hole digger, and vacuum

SEE KEY SHEET FOR SYMBOLS AND ABBREVIATIONS

Geosyntec consultants
2100 Main St
Suite 150
Huntington Beach, CA 92648
Tel: (714) 969-0800
Fax: (714) 969-0820

GS FORM: WELL BORE 01/04

BOREHOLE LOG

BORING P30 **SHEET** 1 **OF** 1
START DRILL DATE Jan 28, 10
FINISH DRILL DATE Jan 28, 10
LOCATION Henderson, NV
PROJECT Montrose FTF
NUMBER HW0989E

ELEVATION DATA:
GROUND SURF. (Ft)
TOP OF CASING (Ft) 1847.14
DATUM Ft above MSL

DEPTH (ft-bgs)	DESCRIPTION (1) Unit/Formation, Mem. (2) USCS Name (3) Color (4) Moisture (5) Percent Grain Size (6) Plasticity (7) Density/Consistency (8) Structure (9) Other (Mineralization, Discoloration, Odor, etc.)	GRAPHIC LOG	WELL LOG	GROUNDWATER OR STRUCTURE	ELEVATION (ft)	SAMPLE NO.	TYPE	BLOWS PER 6"	RECOVERY (%)	PID READING (ppm)	TIME (00:00)	COMMENTS (1) Rig Behavior (2) Air Monitoring
	Gravelly SAND with Silt (SP): Dark brown (10YR, 3/3); moist; fine- to coarse-grained sand, fine to coarse gravel, trace cobbles; (20, 70, 10); dense; subrounded to subangular sand, gravel and cobbles; non-plastic fines										11:50	Start hand auger
1												
2												
3												
4	@ 4' - Becomes coarser; (35, 55, 10); dense										13:00 13:30	3" diameter Break For Lunch Resume work very difficult hand augering
5										0.0		
	Total Depth at 5.75 ft bgs										14:45	
6												
7												
8												
9												
10												

CONTRACTOR WDC Exploration & Wells
EQUIPMENT
DRILL MTHD
DIAMETER 3 to 12 inches
LOGGER **REVIEWER**

NORTHING 26715107.89
EASTING 825090.24
COORDINATE SYSTEM: NAD83 CA SP Zn6, ft

NOTES: Boring advanced with a hand auger, breaker bar, post hole digger, and vacuum

SEE KEY SHEET FOR SYMBOLS AND ABBREVIATIONS

Logged By:	Date Drilled:	Drilling Contractor:	Method/Equipment:	Boring Number:
CAROLE FARR	12/19/96	WEST HAZMAT	HSA CME 75	PSS-3

See "Legend to Logs" for sampling method, classifications and laboratory test methods	Boring Diam.(in.):	Ground Elev.(ft.):	Groundwater Elevation (ft.):	Total Depth (ft.):	Drive wt.(lbs.):	Drop Dist.(in.):
	4	1822.74	▽ ▼	10.0	140	30

Well Construction	Depth (ft.)	Sample Type	Blows/6"	Description	PID Reading (ppmV)	Soil pH (S.U.)	Sample Depth (ft.)
Bentonite				POORLY GRADED SAND WITH GRAVEL (SP), moderate yellowish brown (10YR5/4), dry, fine grained, dense, approx. 20% gravel, subangular, 5-10% silt			
	5		38 45	-Very dense	3.5	8	5-6
Sluff	10		>50/6" >50/6"	-Color change to moderate brown (5YR4/4)	4	7-8	9-10
				Boring terminated at 10 feet below ground surface (bgs). Backfilled on 12/19/96.			

The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.

Project No. **M0071-001-01** Date

Log of Boring

Figure

36 (sheet 1 of 1)

APPENDIX E

EVALUATION OF CHLOROFORM CONCENTRATIONS IN GROUNDWATER MONITOR WELLS MW-1 THROUGH MW-4

1. EVALUATION OF CHLOROFORM CONCENTRATIONS AT THE CPA

One of the reasons for conducting a detailed evaluation of the CPA at this time is the historically increasing trend in chloroform concentrations in groundwater found most significantly in the easternmost monitor well MW-2 and the decreasing trend in MW-4. After decommissioning of the ponds, steadily decreasing concentrations of VOCs would be expected in the downgradient monitor wells. This expected pattern generally has been observed for benzene, chlorobenzene and other compounds. However, the chloroform concentration pattern in the three downgradient Wells MW-2, MW-3 and MW-4 has been considerably different, as shown on Figure E1-1 and described as follows:

- MW-2, which is located furthest to the east, showed decreasing chloroform concentrations from 1990 to late 1994, then a gradual increasing trend until early 2001, when chloroform concentrations started to rapidly increase. A peak concentration of 120,000 µg/L was observed during the August 2005 sampling event and was 100,000 µg/L in October 2007 and 92,000 µg/L in the October 2008 sampling event.
- MW-3, which is located generally in the center of the downgradient boundary of the CPA, has shown decreasing chloroform concentrations since 1990, then exhibited a spike to 37,000 µg/L in 2003 and increased to 35,000 µg/L in October 2007 and 32,000 µg/L in October 2008.
- MW-4, which is located to the west, has shown variable elevated concentrations from 1989 through late 1999, with a high of 97,000 µg/L in 1998, then decreasing concentrations to a low of 1,200 µg/L in October 2007. October 2008 sampling showed chloroform concentrations rebounded to 9,800 µg/L.

Chloroform concentrations with time are variable across the east-west dimension of the CPA and are inconsistent with the general decreasing pattern of the other VOCs commonly observed in the CPA area, specifically benzene and chlorobenzene (Figures E1-2 and E1-3). Concentrations at MW-2 are of particular interest, because concentrations have increased from 20,000 µg/L in the late 1990s to as high as 120,000 µg/L in April 2005.

To understand the potential cause(s) of this increasing concentration trend, numerous lines of evidence were evaluated: groundwater elevation data; well construction and lithologic information; and groundwater chemistry data. These data are discussed in the sections that follow.

1.1 Evaluation of Groundwater Elevation Data

Geosyntec evaluated groundwater elevation and well construction data for the four wells surrounding the closed ponds to assess if changes in groundwater elevations or flow direction correlate with changes in chloroform concentrations in MW-2. Groundwater

coming in contact with vadose-zone materials containing chloroform residual (that was not in contact with groundwater at the beginning of the monitoring period) could influence chloroform concentrations in samples from Well MW-2.

Figure E1-4 illustrates the increasing trend of groundwater elevation data for the four post-closure monitor wells over time from May 1989 to October 2008. The increasing trend in groundwater elevations in the vicinity of the CPA began in the mid- to late-1990s for all four of the wells and continues to the most recent sampling event. It is not known what is causing the sustained elevation rise; however, it may be related to leaking infrastructure in the site vicinity.

Groundwater elevations were relatively stable within the CPA during the period from May 1989, when the monitoring program began, to November 1998. However, within the 9-year time interval from November 1998 to October 2007, groundwater elevations in the same area increased approximately 8 feet in the downgradient Compliance Wells MW-2, MW-3 and MW-4 and approximately 10 feet in MW-1, the upgradient compliance well. As a result of this water level increase, the volumes of soil thereby gaining contact with groundwater during this 9-year time interval was approximately 314,000 cubic yards. If chloroform residues (e.g., DNAPL residual) were present, then the rise in water levels and subsequent change in groundwater flow direction could explain the increase in chloroform concentrations in the samples from Well MW-3 and MW-2.

Further, the beginning of the rising trend in groundwater elevations at both the upgradient and downgradient wells in the vicinity of the CPA is approximately the same as the date of the beginning of increasing chloroform concentrations in samples from Well MW-2 and decreasing chloroform concentrations in MW-4 (Figures E1-5 and E1-6).

1.2 Changes in Groundwater Flow Direction

Further evaluation of groundwater elevations focused on determining if there has been any change in groundwater flow direction in the vicinity of the CPA. A recent potentiometric surface for the CPA is shown on Figure E1-7. Although the primary groundwater flow direction through the CPA is south to north, variations in an eastward or westward flow component may account for variations in contaminant concentration distribution in the three downgradient monitor wells. For example, a more easterly flow component may explain why there is a difference in the chloroform trends between MW-4 to the west and MW-2 to the east.

To perform this analysis, the difference in water levels between MW-2 and MW-3 was calculated over time and plotted along with the chloroform concentrations in MW-2. Figure E1-8 illustrates these data and shows an increasing westward flow component prior to the late 1990s, transitioning to a decreasing westward flow component starting in

the late 1990s and continuing to the present. The timing of this decreasing westward flow component corresponds to the rise in groundwater elevations.

The increasing trend from May 1989 to approximately November 1998 corresponds to a net change in "south to north" flow direction of approximately 20 degrees to the northwest (Figure E1-3). Considering the later data set, the trend from November 1998 to October 2008 represents a change of approximately 15 degrees back toward the northeast (Figure E1-10). This more easterly flow component could have directed more chloroform laden groundwater from the source area toward the location of MW-2, which again is the easternmost monitor well within the CPA.

1.3 Evaluation of Well Construction and Lithology Data

As part of this evaluation, Geosyntec also evaluated the well construction and lithology of the three downgradient wells to determine if variations in well construction or lithology may be responsible for the different chloroform time versus concentration trends in MW-2. Figure E1-11 illustrates a simple cross-section through these wells (MW-2, MW-3 and MW-4).

As illustrated, all three downgradient wells are screened in relatively low permeability zones at essentially the same depth; these three wells are screened within the Transition Zone between the more permeable alluvial materials and the less permeable UMCf. MW-3 is screened in consistently fine-grained materials while both MW-4 and MW-2 have slightly more permeable zones within their screen and/or sand pack zones. The change in flow direction could have diverted chloroform-laden groundwater away from the MW-4 direction toward MW-2. The less permeable materials in MW-3 may have prevented (or delayed) a rise in chloroform concentrations at MW-3.

During this evaluation, it became apparent that MW-1, the upgradient compliance well, is screened within the UMCf materials, as shown in the cross-sections included in Appendix G. As a result, there are two wells at the CPA completed within the UMCf: CP-1 and MW-1. It should be noted that new upgradient well AA-MW-24 was installed as part of the additional groundwater work at the CPA to monitor the more shallow groundwater (Geosyntec, 2008).

1.4 Evaluation of Groundwater Chemistry

To further understand the increasing concentrations of chloroform at MW-2, Geosyntec evaluated the available groundwater chemical data. The evaluation included assessing:

- Time trends in concentrations of chloroform relative to groundwater elevation trends;
- Correlations of trends in concentrations of chloroform with concentrations of other constituents; and

- Time trends in concentrations of other constituents relative to groundwater elevation trends.

While the increasing chloroform concentrations in MW-2 may begin as early as 1995, the chloroform concentration clearly rises as the MW-2 water level rises in the late 1990s and the 2000s. A slight lag between water level rise and chloroform concentration increase is shown on Figure E1-5. The increase in chloroform concentrations after the increased groundwater elevation is consistent with a conceptual model of residual chloroform in previously unsaturated soils being dissolved into the rising groundwater. The time lag would be explained with the residual chloroform being located upgradient of the monitor wells in which the increased concentrations are observed. Data for other parameters can help in evaluation of whether this scenario is realistic.

Geosyntec also evaluated trends of other VOCs in samples from Well MW-2, to assess why these compounds, specifically benzene and chlorobenzene, do not follow the same pattern in MW-2 as chloroform concentrations in samples from Well MW-2 over time, along with the chloroform concentrations. The following trends can be deduced from Figure E1-12:

- The downward arrow in Figure E1-12 shows decreasing benzene and chlorobenzene concentrations until approximately 1994 to 2000. While the chloroform concentrations were stable in the early 1990s, the benzene and chlorobenzene concentrations were steadily decreasing or remaining stable.
- The upward arrow in Figure E1-12 shows an upward trend in the chloroform concentrations in MW-2 from October 1996 to April 2005. A slight decline in chloroform concentration was noted in the October 2006 and April 2007 sampling events. During this upward trend in chloroform concentrations, benzene and chlorobenzene concentrations were low, and stable or declining.

1.4.1 Potential Chloroform Sources – Former Ponds vs. In-Situ Processes

Former Ponds

The source of the chloroform is likely the native soils beneath the CPA that were likely impacted by chloroform wastes (Section 2.4) stored in the ponds during the operational time period. Based on several lines of evidence, samples are consistent with a shift in groundwater flow direction that causes MW-2 to sample water more impacted by the CPA than it was previously. These lines of evidence include: the nature of the wastes placed in each of the ponds; the observed increasing chloroform and decreasing benzene and chlorobenzene in MW-2; increases in groundwater elevations; and a more northeasterly groundwater flow direction.

In-Situ Processes

In addition to chloroform wastes in the ponds serving as the source of chloroform in groundwater, chloroform can be generated in the subsurface under certain conditions. Because of that, Geosyntec has evaluated potential in-situ chloroform production processes and evidence regarding their occurrence (or lack thereof) at the CPA. They are reductive dechlorination and decomposition of acetaldehyde.

Reductive dechlorination of carbon tetrachloride could produce chloroform. However, carbon tetrachloride concentrations at the CPA are negligible. In addition, concentrations of the product of reductive dechlorination of chloroform (methylene chloride) at the site are negligible. The lack of significant concentrations of both carbon tetrachloride and methylene chloride suggests that chloroform is not being formed in this way.

The decomposition of compounds such as acetaldehyde could potentially produce methane. Chloroform is known to be produced from methane during chlorination of wastewater (where methane produced from decomposition of organic matter is chlorinated). The chlorination process requires the presence of chlorine (Cl_2, a strong oxidizing agent) that would be toxic to methane-producing organisms. In addition, chlorination of methane would produce chloromethane and dichloromethane at concentrations similar to that of chloroform (trichloromethane), and that is not the case at the site. These facts suggest that such a process is not occurring.

Because acetaldehyde has no chlorine atoms, chlorination would have to take place in the subsurface. Without a source of chlorine (Cl_2, as opposed to the common ion, chloride), this generation from acetaldehyde would not occur.

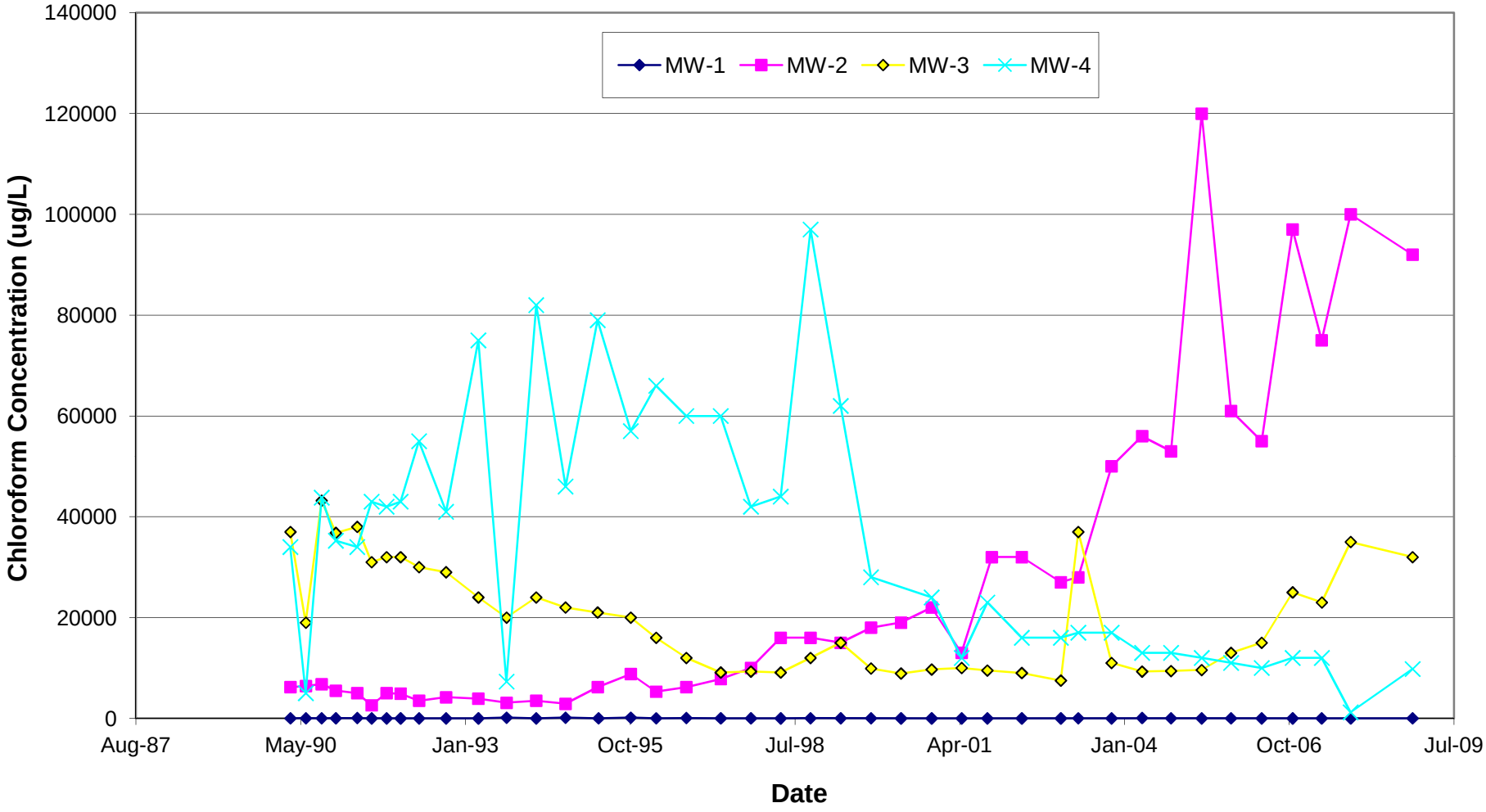
Because of these issues, chloroform likely is not being generated in-situ at the CPA.

2. CONCLUSIONS

Based on this evaluation, it appears that the increasing chloroform concentrations observed in Monitor Wells MW-2 and MW-3 located in the central and eastern downgradient direction from the CPA and decreasing concentrations in MW-4 located in the western downgradient direction are likely caused by two factors: 1) rising groundwater elevations mobilizing residual chloroform within the previously unsaturated vadose zone; and/or 2) a northeastern shift of groundwater flow direction toward MW-2 from the majority of the CPA. The latter factor is less certain due to the lack of groundwater elevation monitoring locations east and northeast of the CPA.

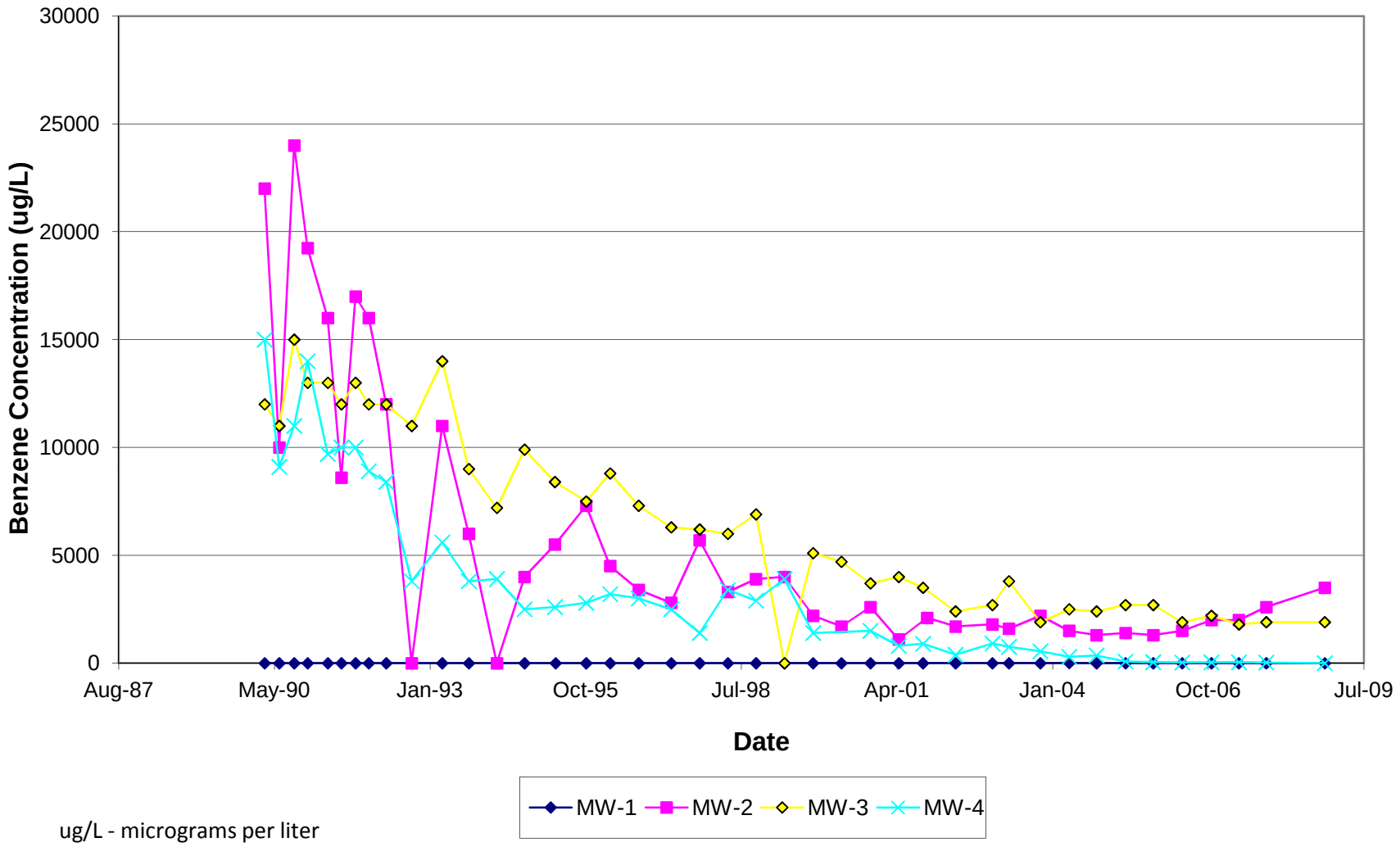
FIGURES

Figure E1-1: Chloroform Concentrations in MW-1, MW-2, MW-3, and MW-4 (May 1989 to October 2008)



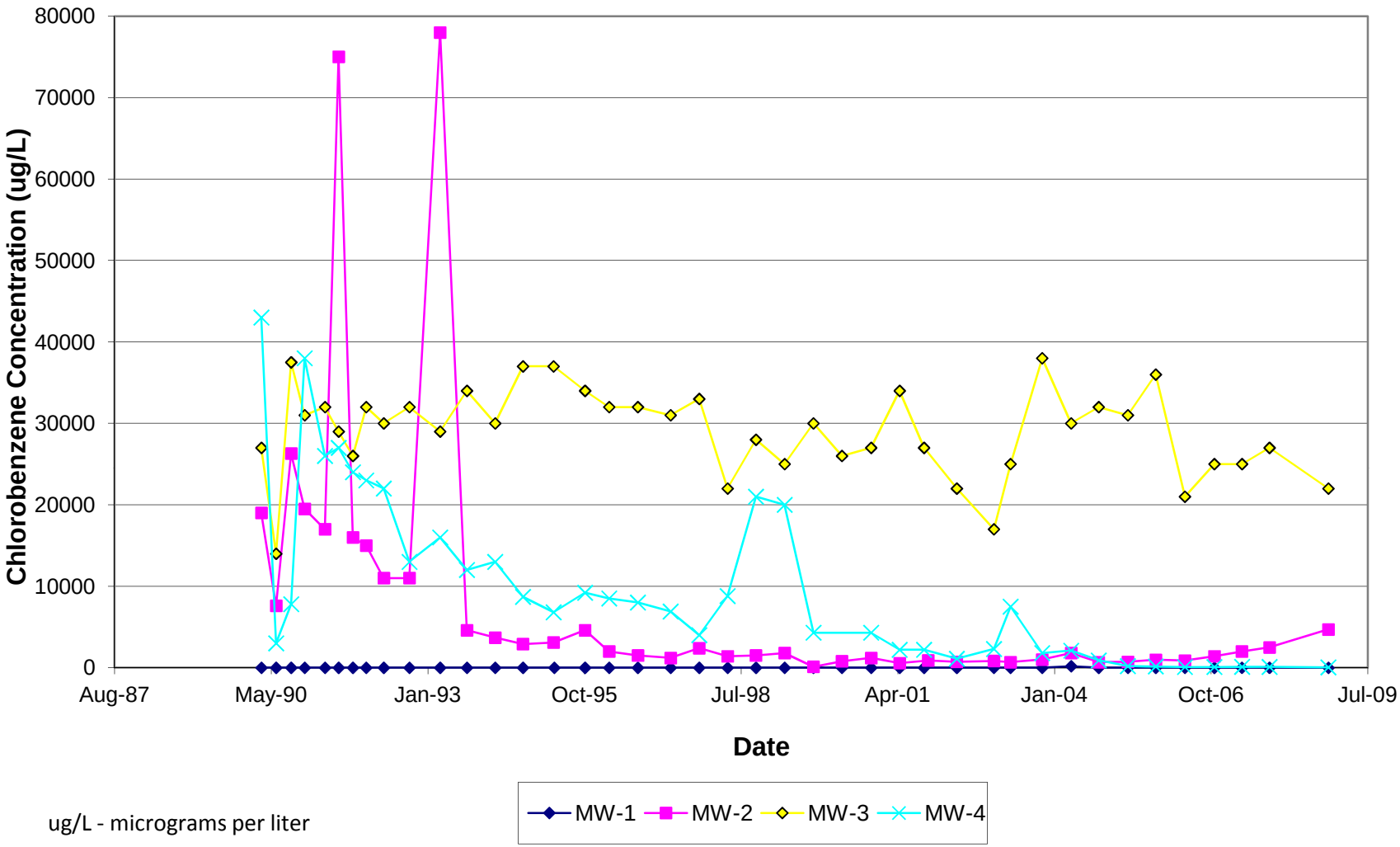
ug/L - micrograms per liter

Figure E1-2: Benzene Concentrations in MW-1, MW-2, MW-3, and MW-4 (May 1989 to October 2008)



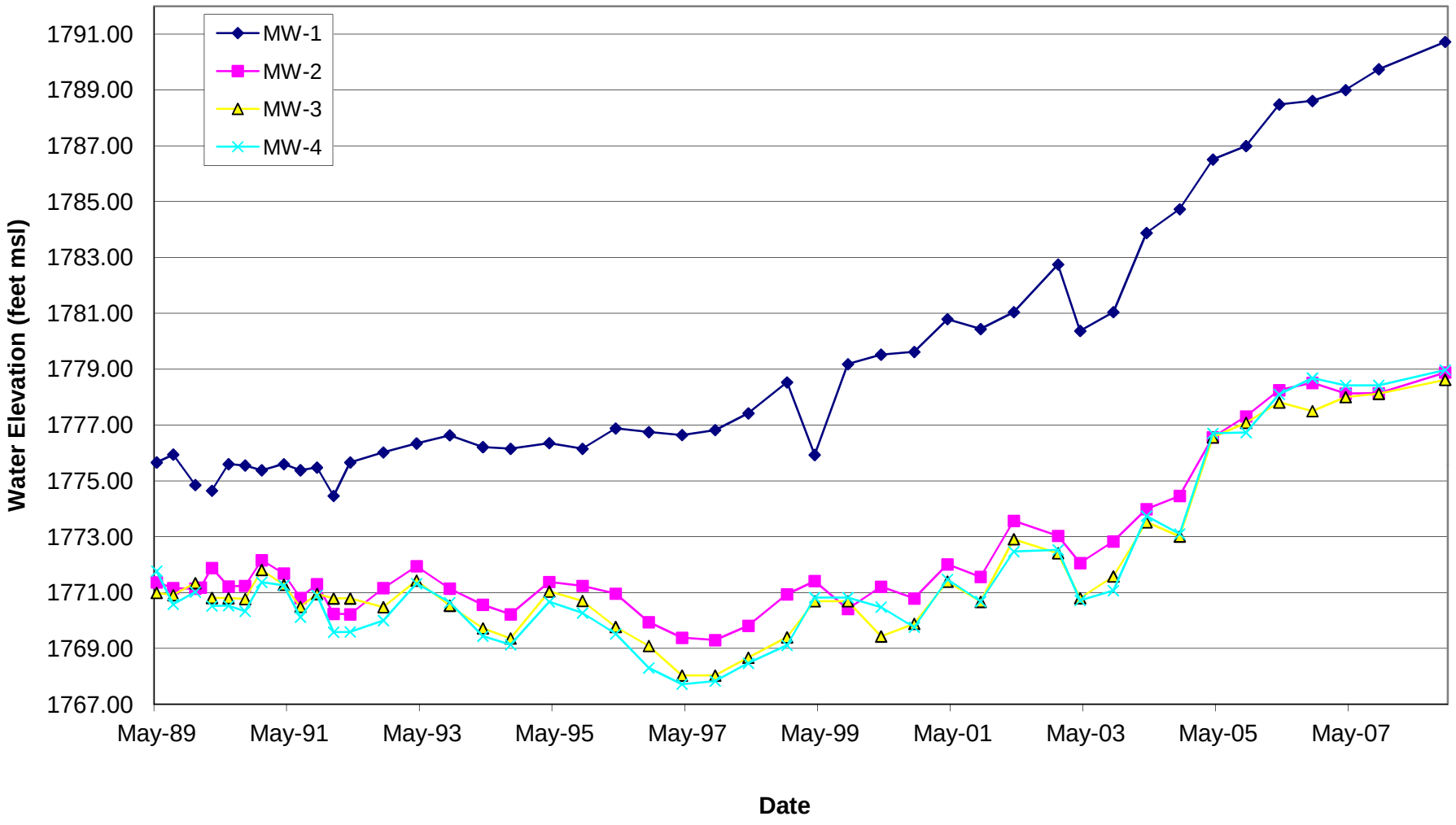
ug/L - micrograms per liter

Figure E1-3: Chlorobenzene Concentrations in MW-1, MW-2, MW-3, and MW-4 (May 1989 to October 2008)



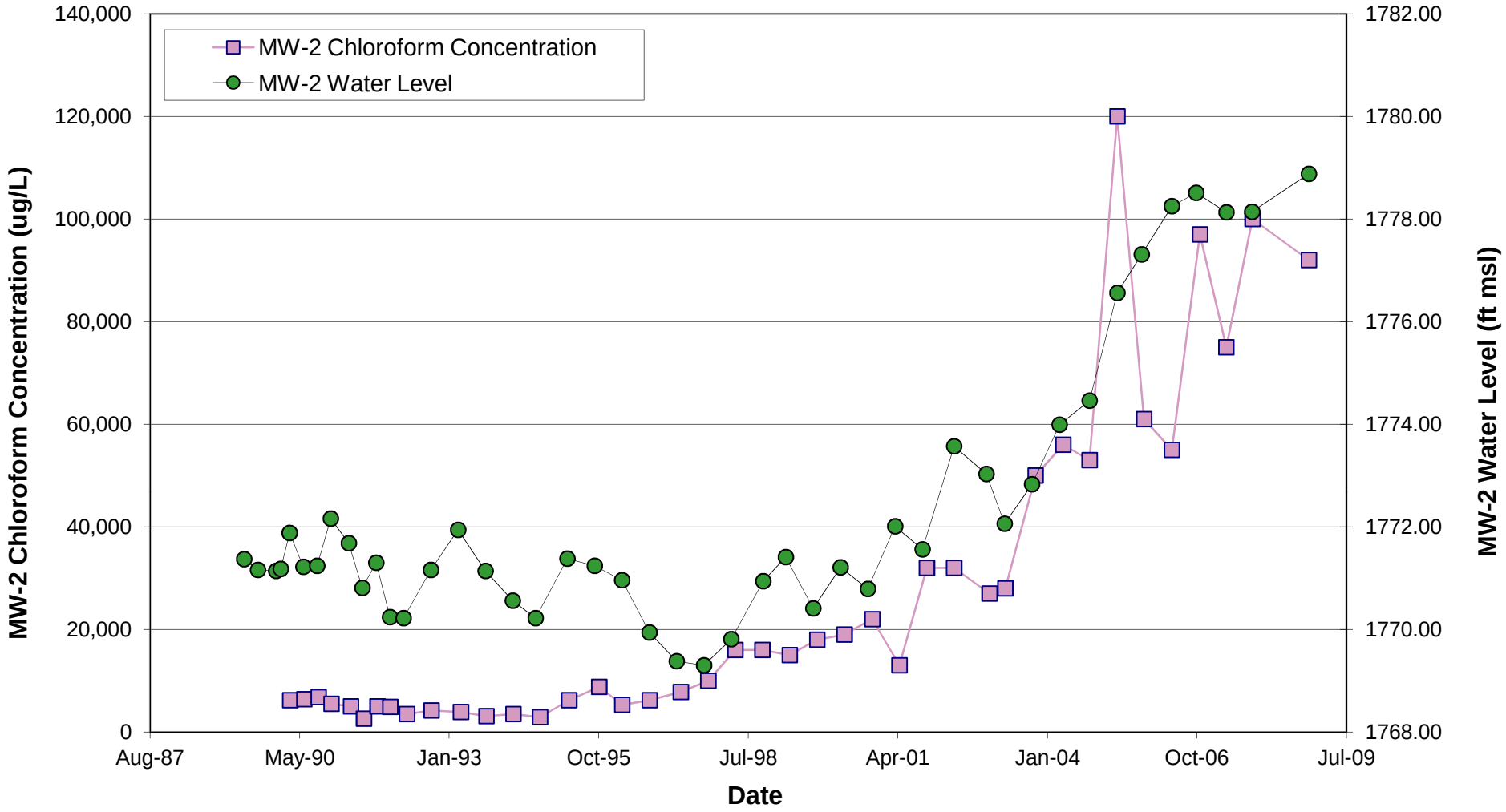
ug/L - micrograms per liter

Figure E1-4: Groundwater Elevations in MW-1, MW-2, MW-3, and MW-4 (May 1989 to October 2008)



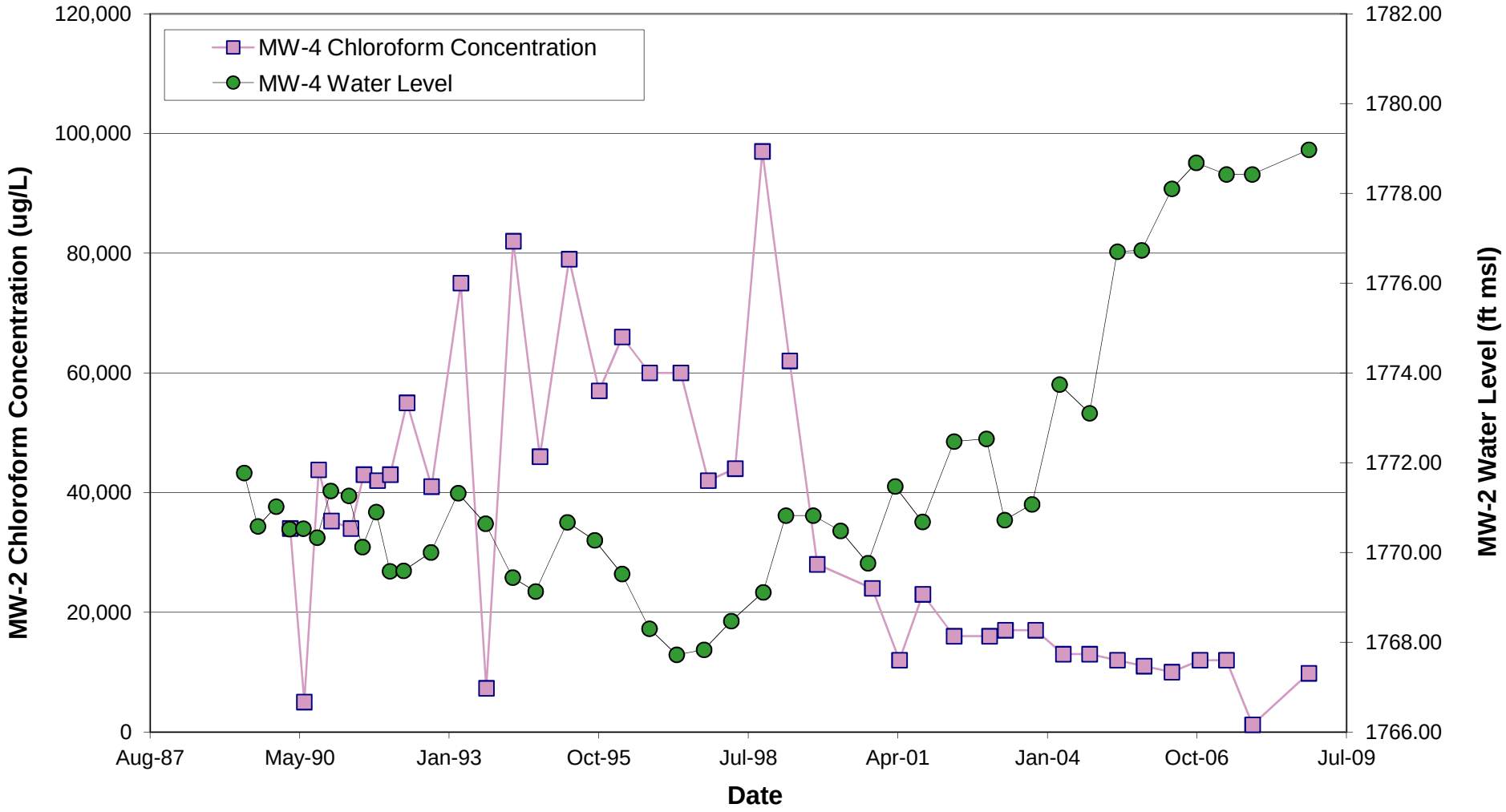
feet msl - feet above mean sea level

Figure E1-5: MW-2 Chloroform Concentrations and Groundwater Elevations (May 1989 to October 2008)

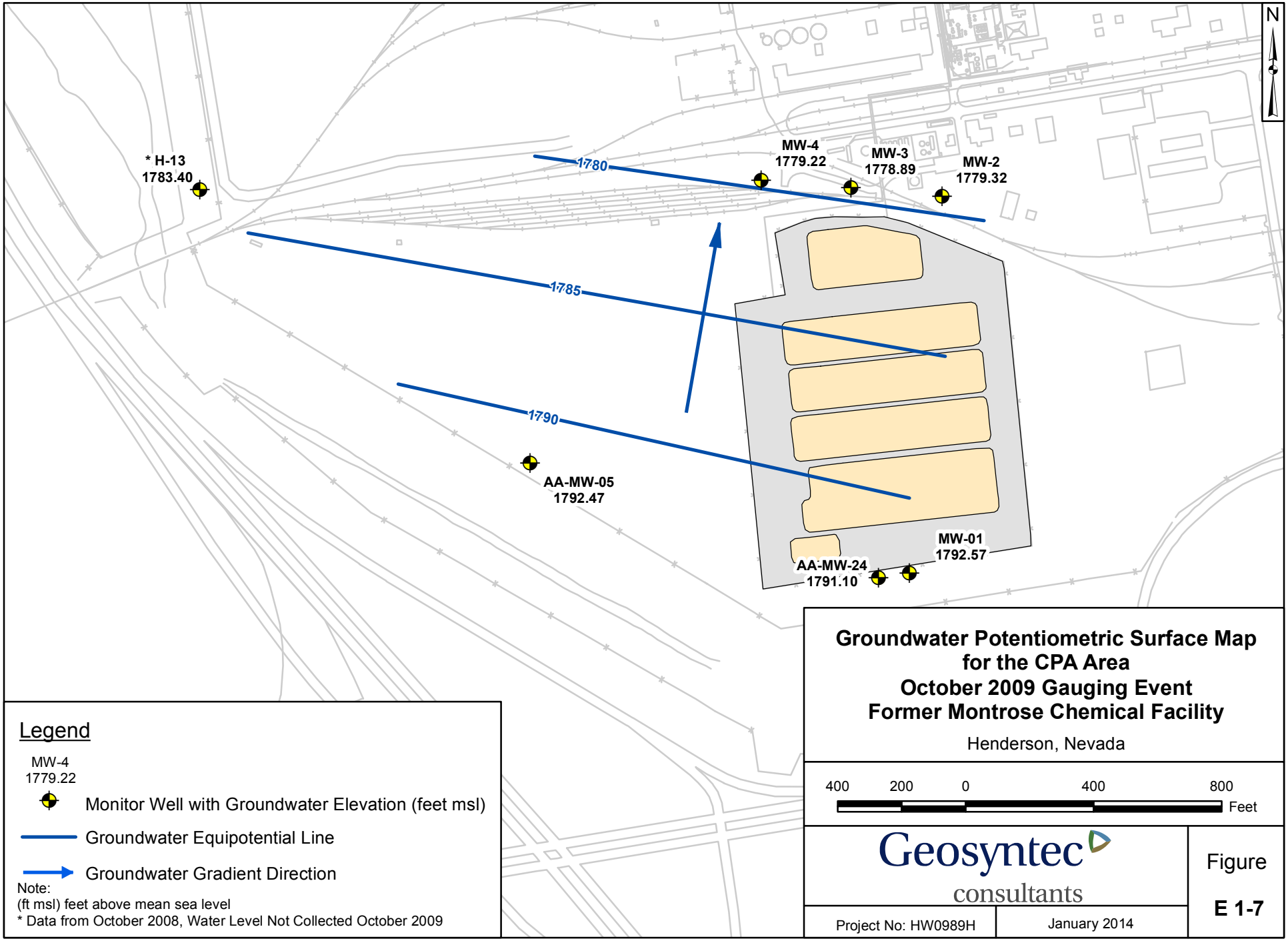


ug/L - micrograms per liter
ft msl - feet above mean sea level

Figure E1-6: MW-4 Chloroform Concentrations and Groundwater Elevations (May 1989 to October 2008)



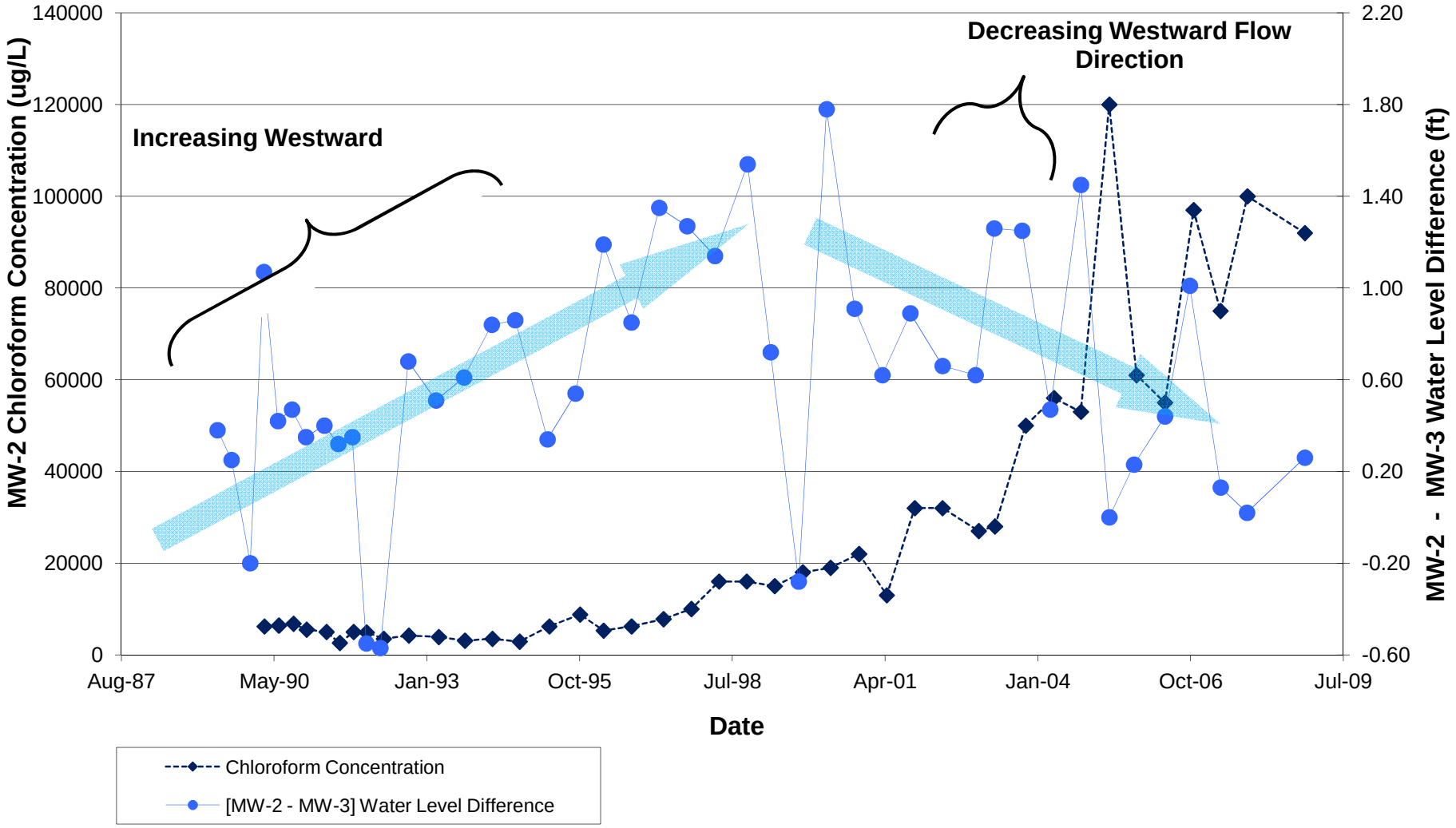
ug/L - micrograms per liter
ft msl - feet above mean sea level



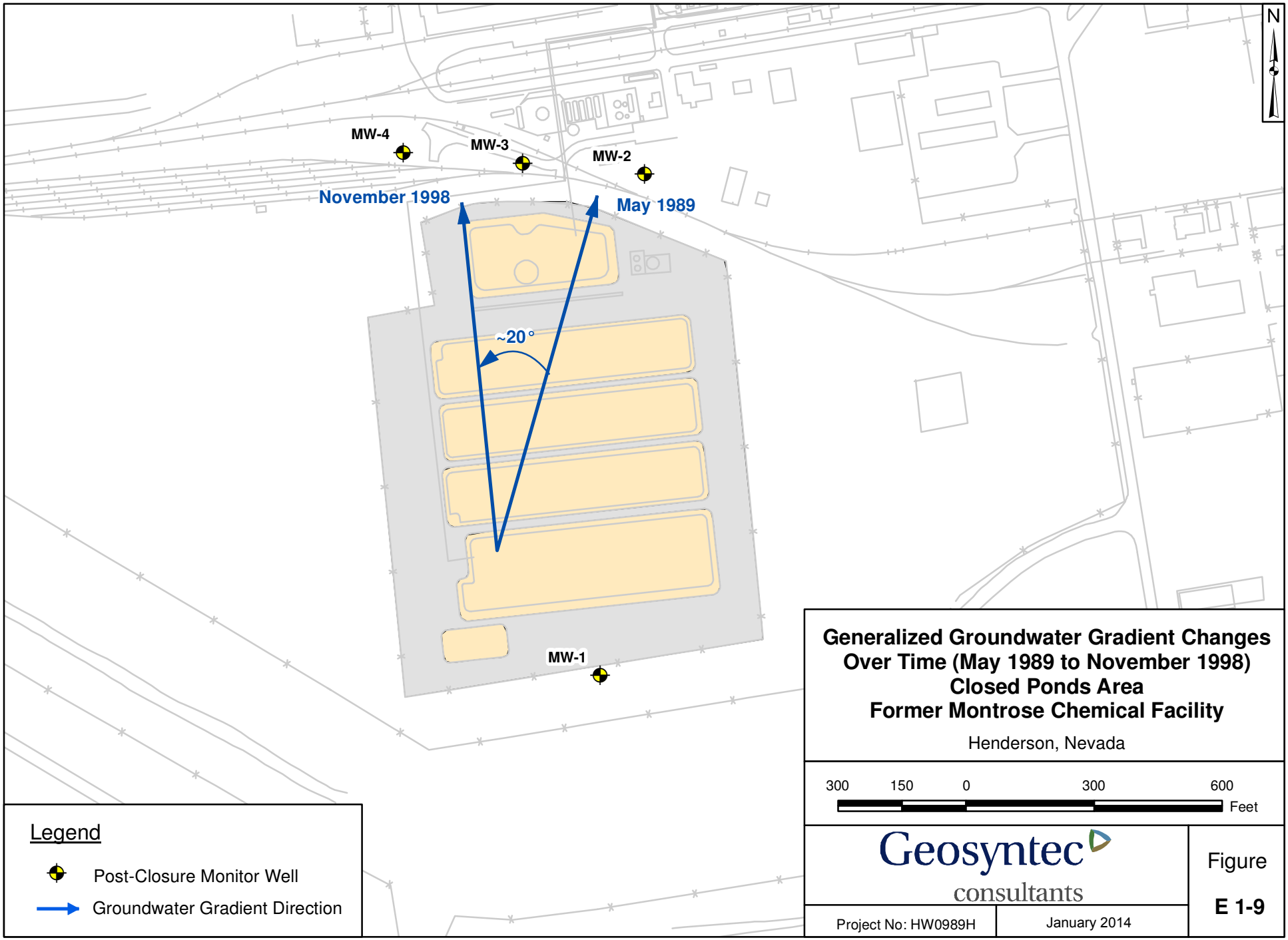
Groundwater Potentiometric Surface Map for the CPA Area October 2009 Gauging Event Former Montrose Chemical Facility

Henderson, Nevada

Figure E1-8: MW-2 Chloroform Concentrations and Easterly Gradient Components (May 1989 to October 2008)



ug/L - micrograms per liter



Generalized Groundwater Gradient Changes Over Time (May 1989 to November 1998)
Closed Ponds Area
Former Montrose Chemical Facility

Henderson, Nevada

Geosyntec consultants

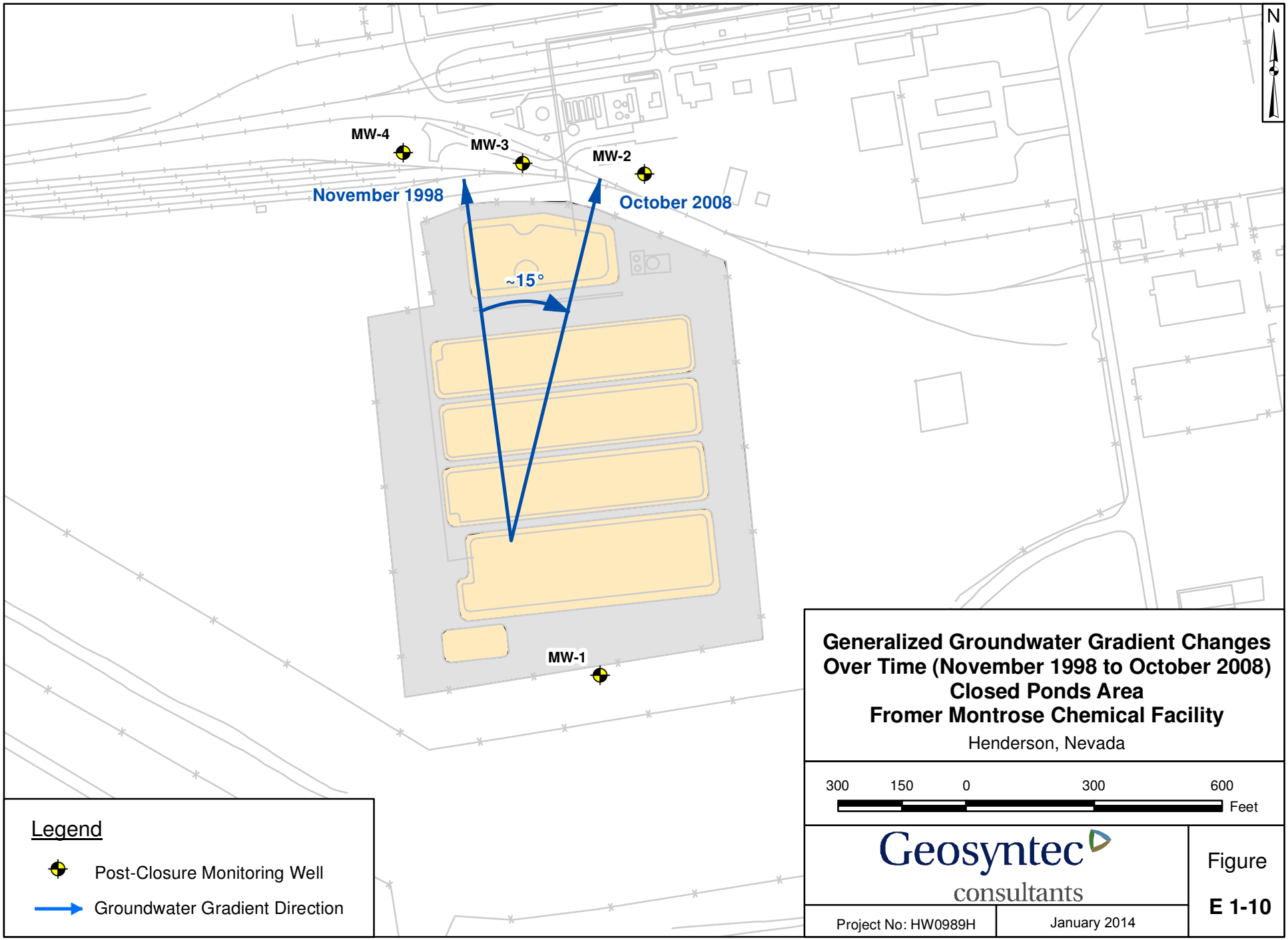
Project No: HW0989H

January 2014

Figure

E 1-9

G:\GIS\HW0934\Projects\Closed Pond Area\Report\Rev03\GW Gradient Map Pre Nov98.mxd



Generalized Groundwater Gradient Changes Over Time (November 1998 to October 2008)
Closed Ponds Area
Fromer Montrose Chemical Facility
Henderson, Nevada

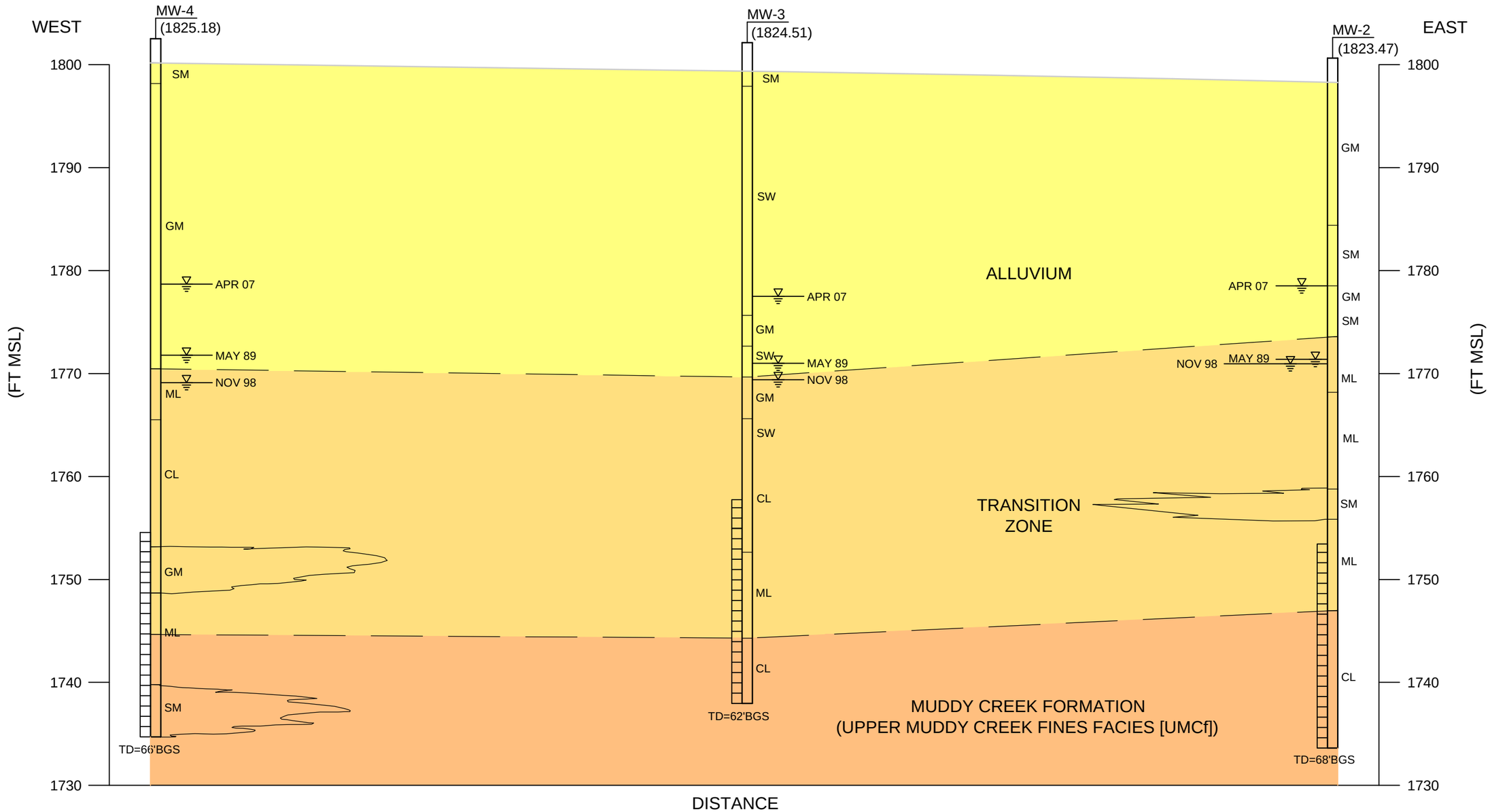
Geosyntec consultants

Project No: HW0989H

January 2014

Figure
E 1-10

G:\GIS\HW0934\Projects\Closed Pond Area\Report\Rev03\GW Gradient Map Post Nov98.mxd



LEGEND

MW-4 ← WELL NAME

(1825.18) ← CASING ELEVATION (FT MSL)

BOREHOLE LOCATION WITH PREDOMINANT LITHOLOGIC DESCRIPTION (USCS CLASSIFICATIONS OF LITHOLOGY)

WELL SCREEN INTERVAL

INFERRED CONTACT

(FT MSL) — FEET ABOVE MEAN SEA LEVEL

MEASURED WATER LEVEL

TD — TOTAL DEPTH

BGS — BELOW GROUND SURFACE

0 25 50
SCALE IN FEET

10 5 0
SCALE IN FEET

CROSS-SECTION DOWNGRADIENT OF THE CLOSED PONDS AREA
(MW-2, MW-3, MW-4)
FORMER MONTROSE CHEMICAL FACILITY
HENDERSON, NEVADA

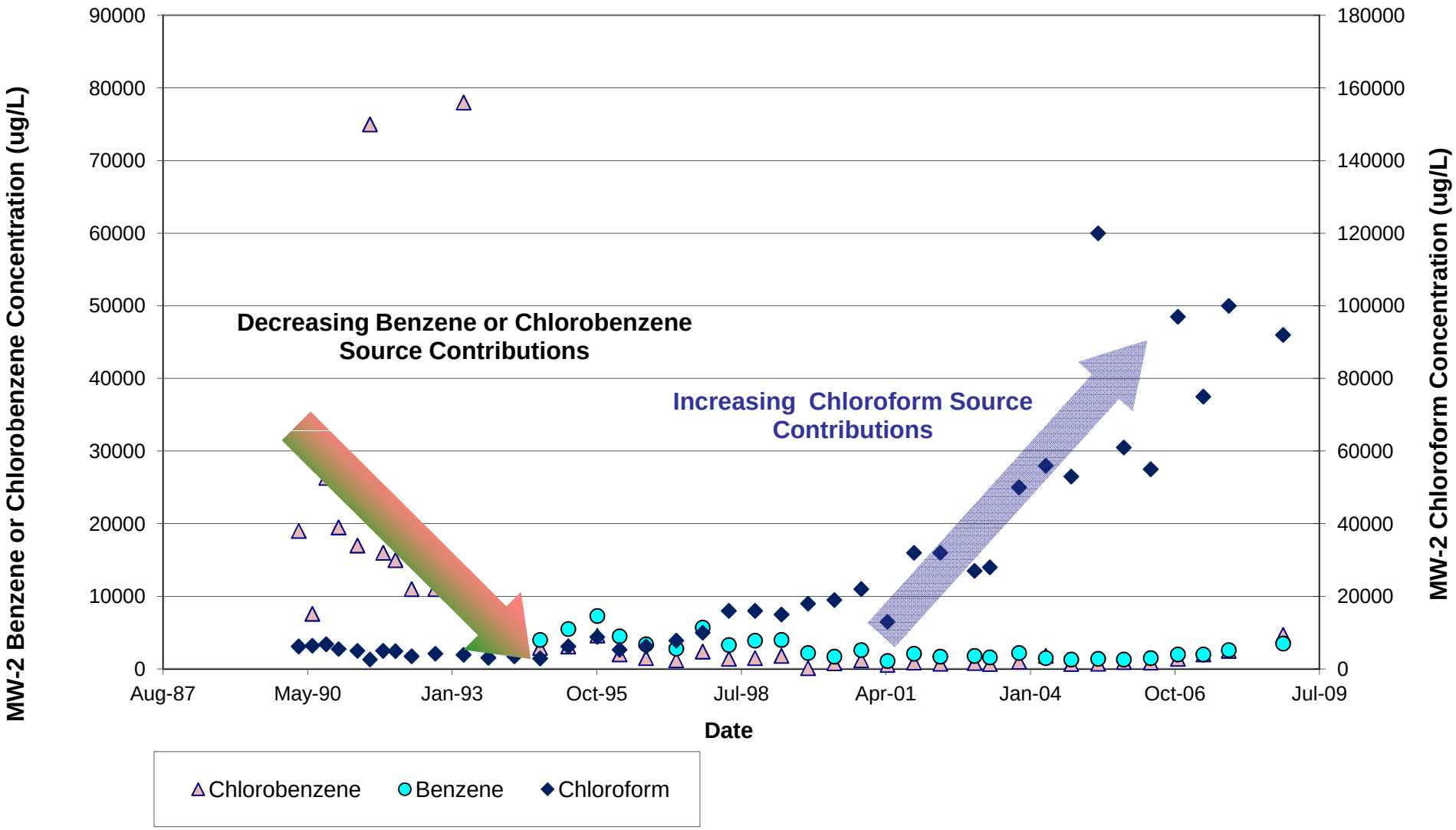
Geosyntec consultants

FIGURE
E1-11

PROJECT NO: HW0989H | JANUARY 2014

N:\CACADD\MMONTROSE CHEMICAL FACILITY\MONTROSE CHEMICAL FACILITY-HW\0989\FIGURES\0989F040

Figure E1-12: MW-2 Chloroform, Benzene, and Chlorobenzene Concentrations (May 1989 to October 2008)



ug/L - micrograms per liter

APPENDIX F

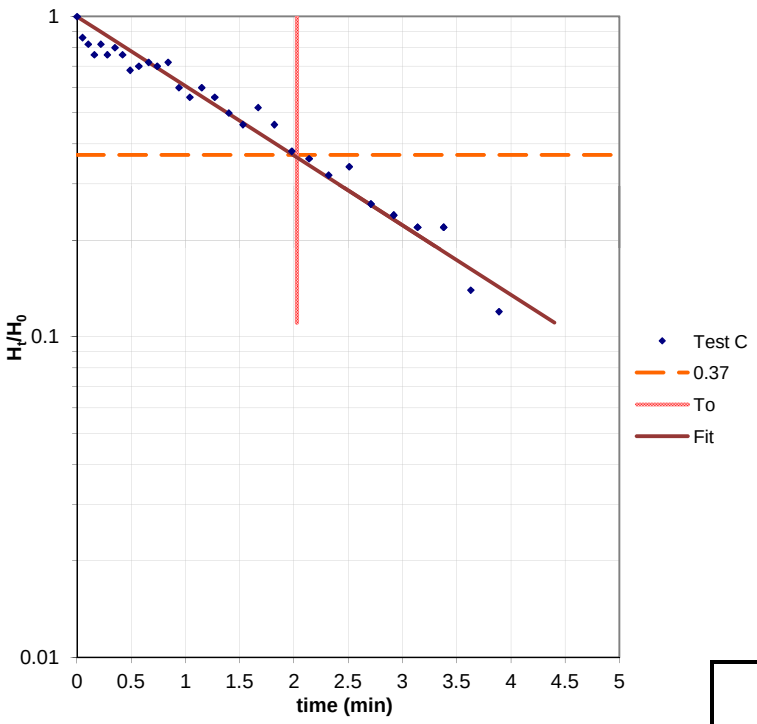
HVORSLEV METHOD GRAPHS

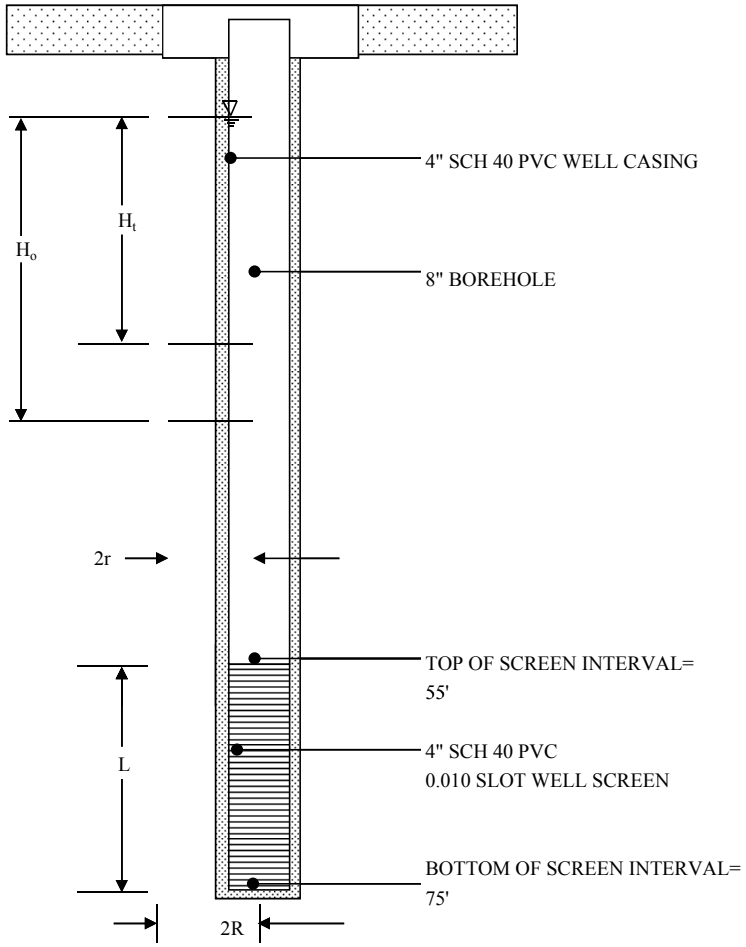
EVALUATION OF HYDRAULIC CONDUCTIVITY (K) BY HVORSLEV METHOD

Hvorslev Equation:

$$K = \frac{r^2 \ln (L/R)}{2 L T_o}$$

H_0 (ft) =	0.05	Maximum distance below static water level
Ht (ft) =	varies	Distance below static water table at time = t
r (ft) =	0.166	Radius of the well casing
R (ft) =	0.333	Radius of the borehole
L (ft) =	20	Length of the screened interval
L/R =	60	
T_0 (min) =	2.026	
m =	-0.5	Slope of Fit Line
K (ft/day) =	**2.0**	**Hydraulic Conductivity**





AA-MW-20

GEOSYNTEC CONSULTANTS		DATE	January 2014
Huntington Beach, Ca		PROJECT NO.	HW0989H

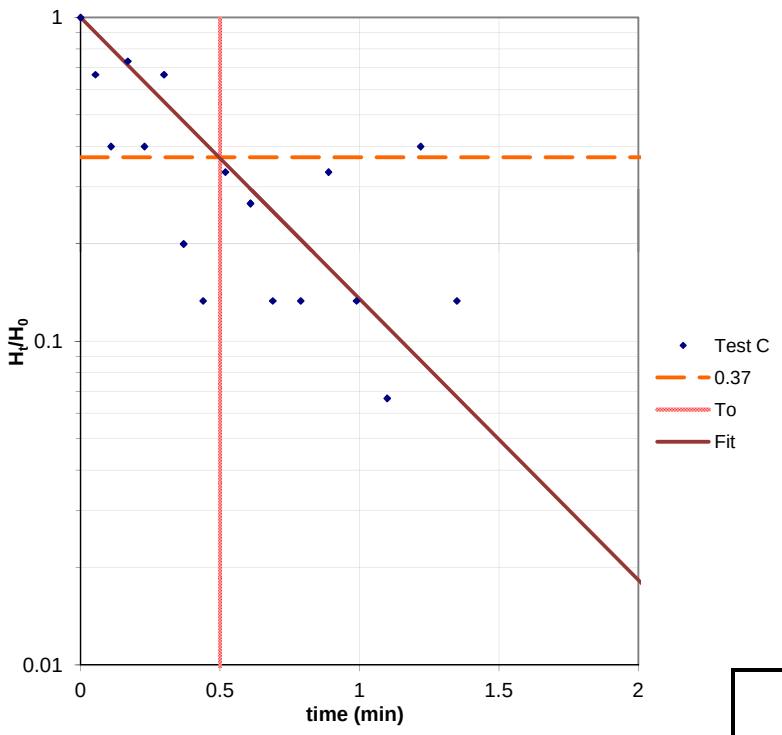
EVALUATION OF HYDRAULIC CONDUCTIVITY (K) BY HVORSLEV METHOD

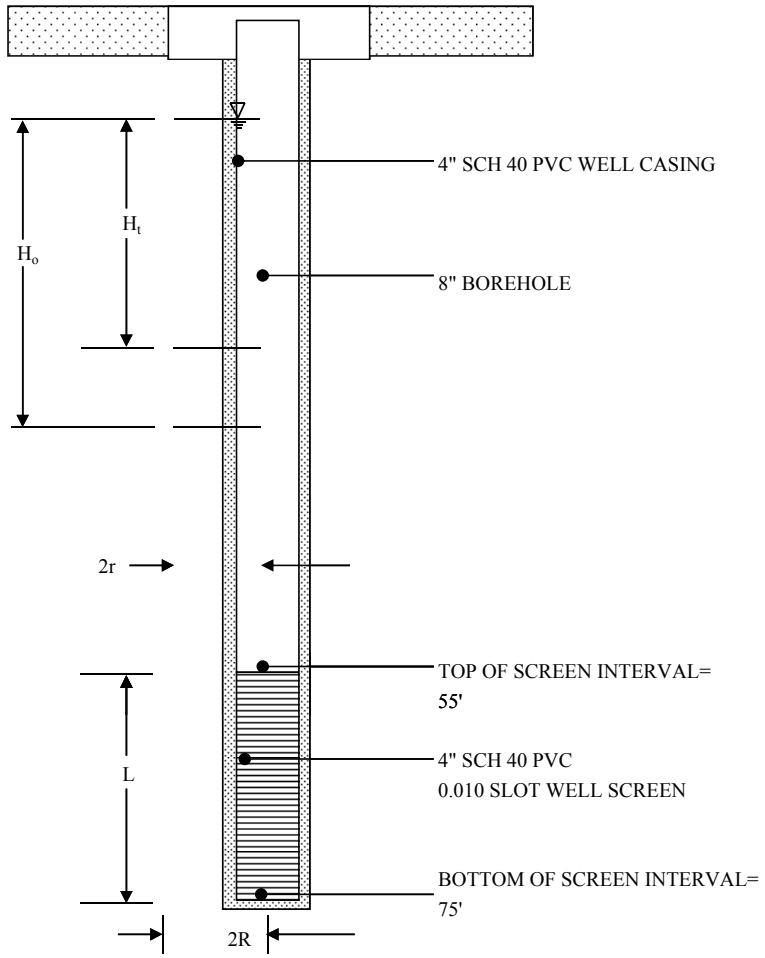
Hvorslev Equation:

$$K = \frac{r^2 \ln (L/R)}{2 L T_o}$$

H_0 (ft) =	0.015	Maximum distance below static water level
Ht (ft) =	varies	Distance below static water table at time = t
r (ft) =	0.166	Radius of the well casing
R (ft) =	0.333	Radius of the borehole
L (ft) =	20	Length of the screened interval
L/R =	60	
T_0 (min) =	0.5	
m =	-2	Slope of Fit Line

K (ft/day) =	**8.1**	**Hydraulic Conductivity**





AA-MW-21

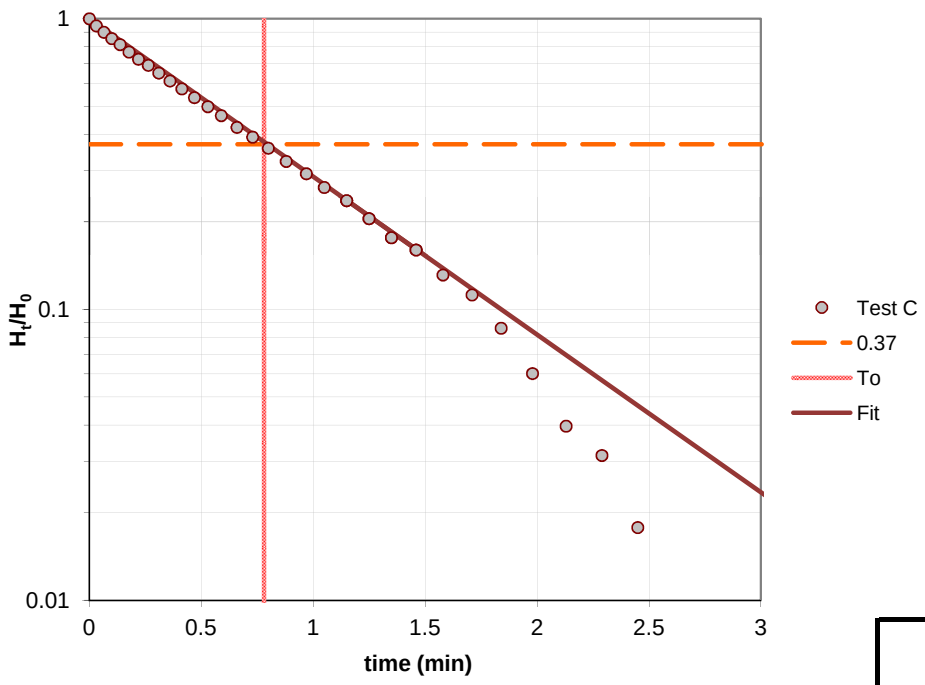
GEOSYNTEC CONSULTANTS		DATE	January 2014
Huntington Beach, Ca		PROJECT NO.	HW0989H

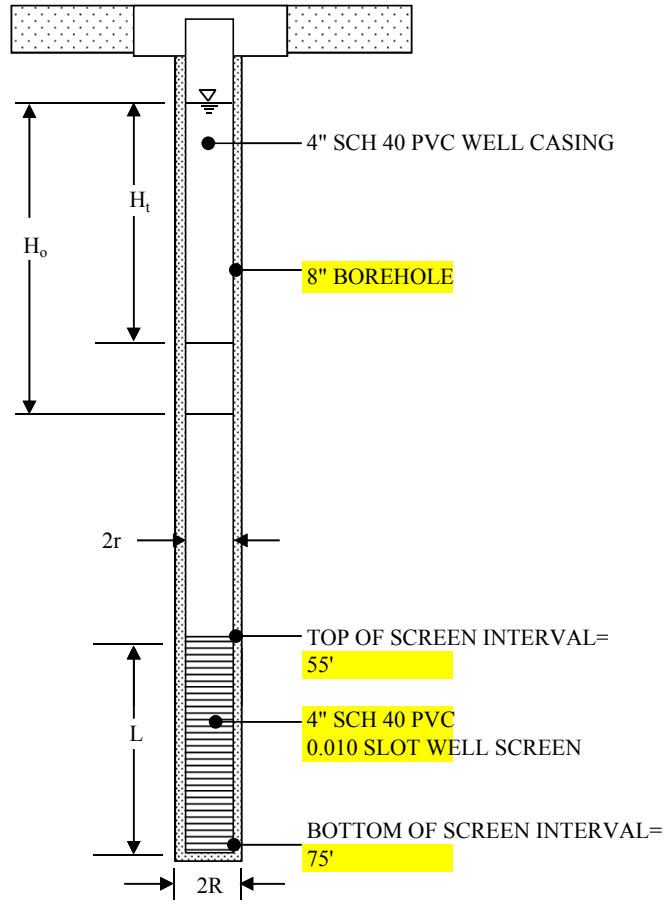
EVALUATION OF HYDRAULIC CONDUCTIVITY (K) BY HVORSLEV METHOD

Hvorslev Equation:

$$K = \frac{r^2 \ln (L/R)}{2 L T_o}$$

H_0 (ft) =	1.07	Maximum distance below static water level
Ht (ft) =	varies	Distance below static water table at time = t
r (ft) =	0.166	Radius of the well casing
R (ft) =	0.333	Radius of the borehole
L (ft) =	20	Length of the screened interval
L/R =	60	
T_0 (min) =	0.78	
m =	-1.25	Slope of Fit Line
K (ft/day) =	**5.2**	**Hydraulic Conductivity**





AA-MW-22

GEOSYNTEC CONSULTANTS		DATE	January 2014
Huntington Beach, Ca		PROJECT NO.	HW0989H

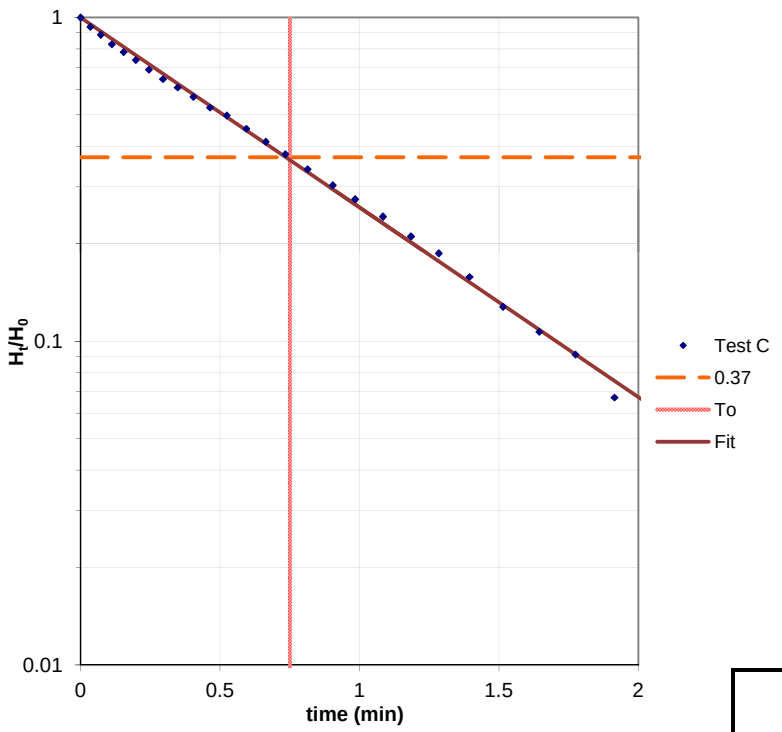
EVALUATION OF HYDRAULIC CONDUCTIVITY (K) BY HVORSLEV METHOD

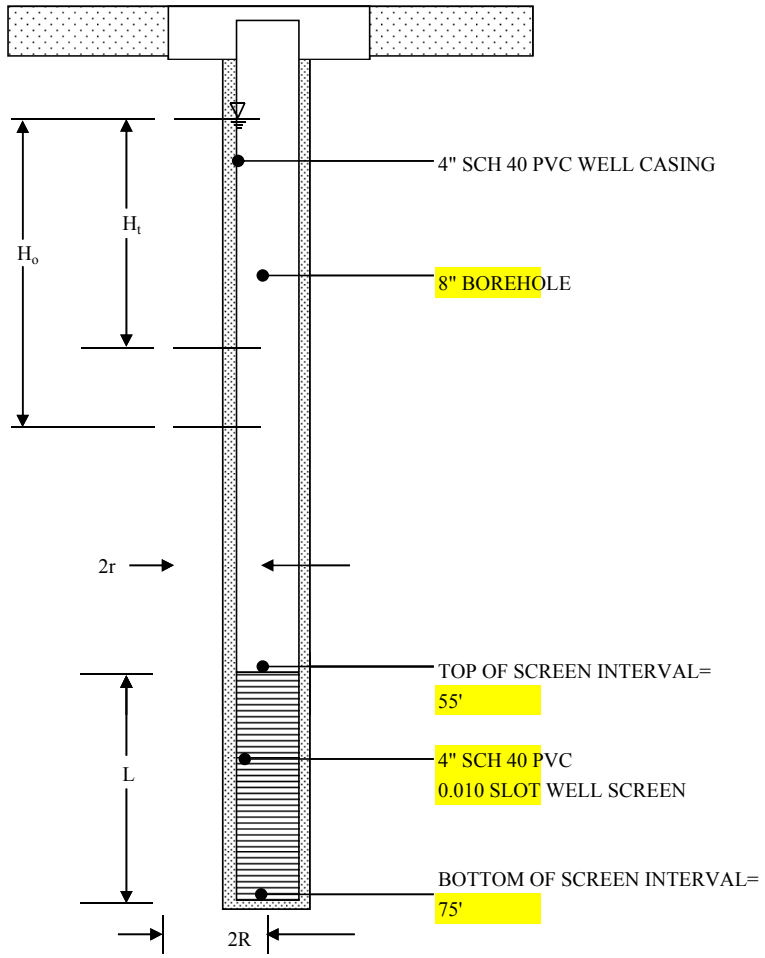
Hvorslev Equation:

$$K = \frac{r^2 \ln (L/R)}{2 L T_o}$$

H_0 (ft) =	0.626	Maximum distance below static water level
Ht (ft) =	varies	Distance below static water table at time = t
r (ft) =	0.166	Radius of the well casing
R (ft) =	0.333	Radius of the borehole
L (ft) =	20	Length of the screened interval
L/R =	60	
T_0 (min) =	0.75	
m =	-1.35	Slope of Fit Line

K (ft/day) =	**5.4**	**Hydraulic Conductivity**



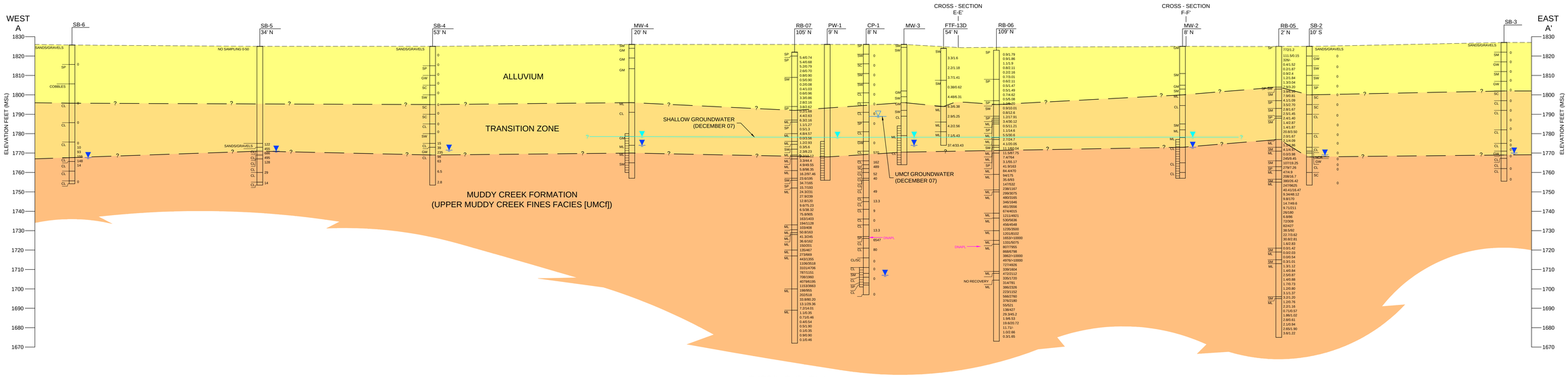


AA-MW-23

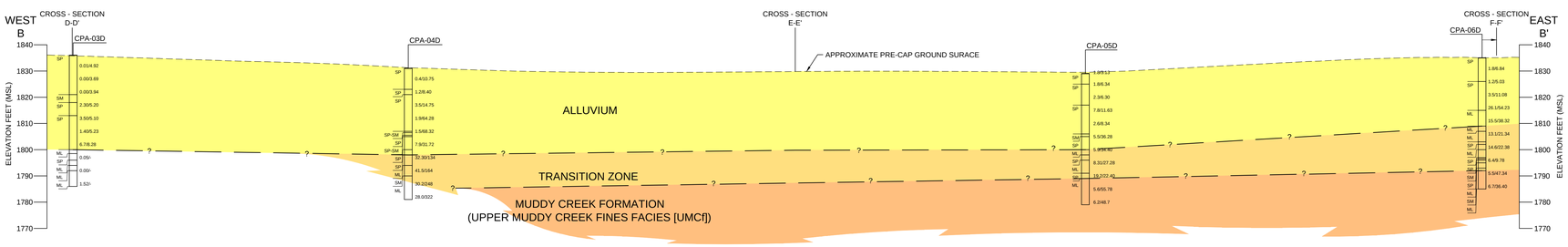
GEOSYNTEC CONSULTANTS		DATE	January 2014
Huntington Beach, Ca		PROJECT NO.	HW0989H

APPENDIX G

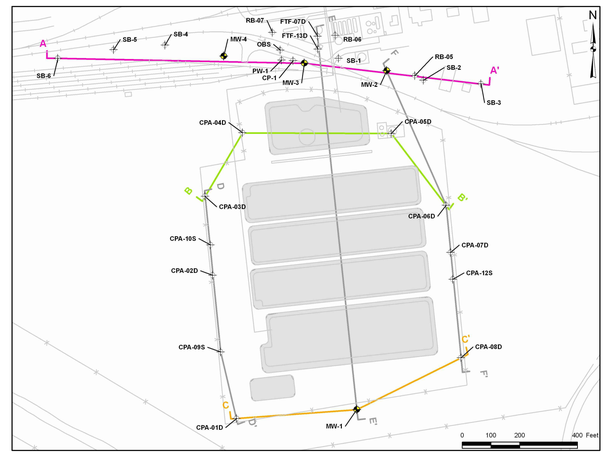
CROSS-SECTIONS A-A' THROUGH F-F' WITH PID/FID READINGS



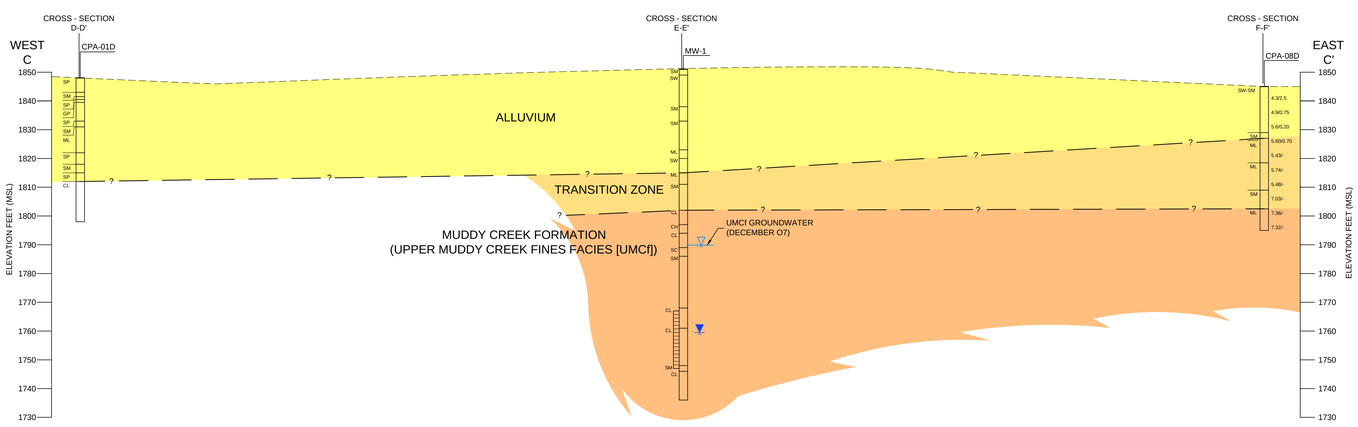
CROSS - SECTION A-A'



CROSS - SECTION B-B'

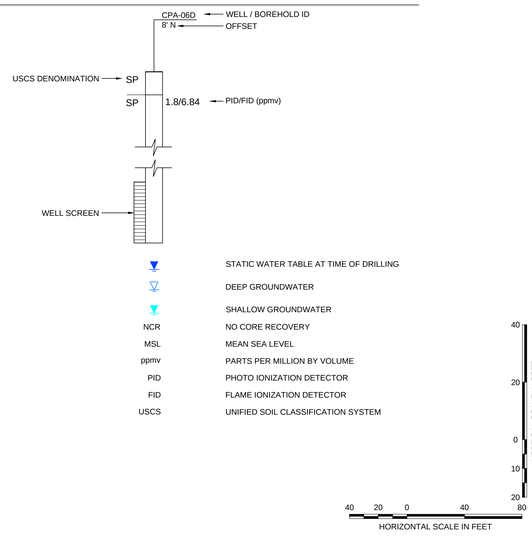


PLAN VIEW



CROSS - SECTION C-C'

LEGEND



NOTES:

1. SUBSURFACE CONDITIONS MAY VARY AWAY FROM BORING LOCATIONS AND WITH THE PASSAGE OF TIME.
2. CROSS - SECTIONS ARE 2X VERTICALLY EXAGGERRATED.

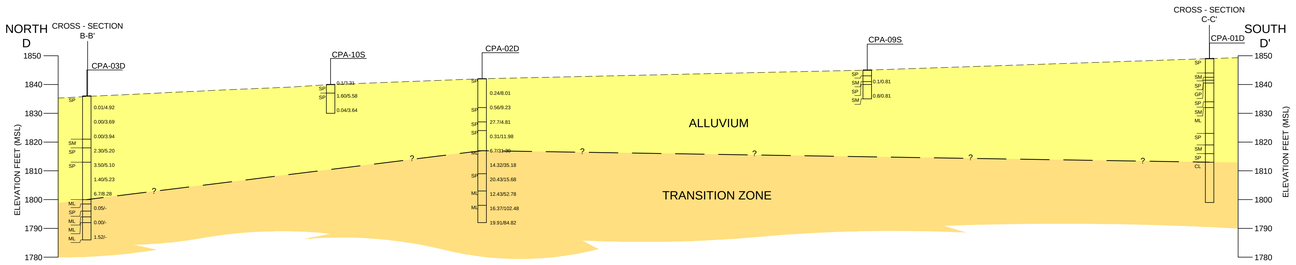
IDEALIZED CROSS-SECTIONS A-A' THROUGH C-C' CLOSED PONDS AREA AND FORMER TANK FARM, CONCEPTUAL SITE MODEL FORMER MONTROSE FACILITY - HENDERSON, NEVADA

Geosyntec consultants

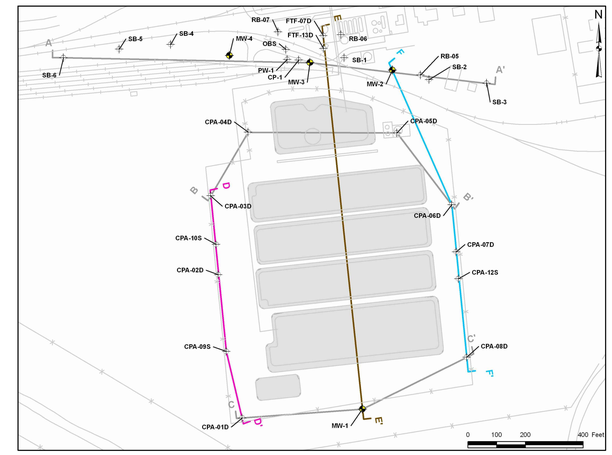
FIGURE G-1

PROJECT NO: HW0989H | JANUARY 2014

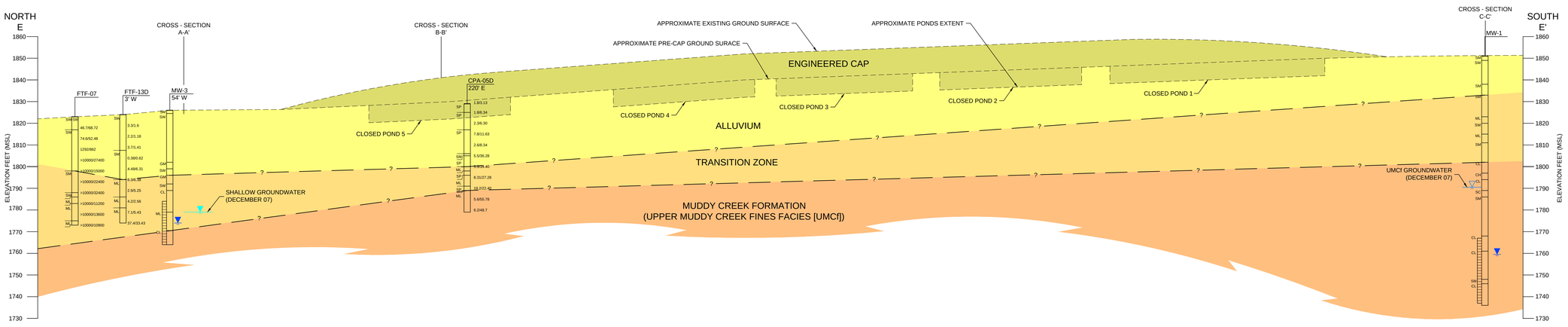
N:\CAD\ADMN\MONTROSE CHEMICAL FACILITY\MONTROSE CHEMICAL FACILITY-HW0989F\FIGURES\0989F043



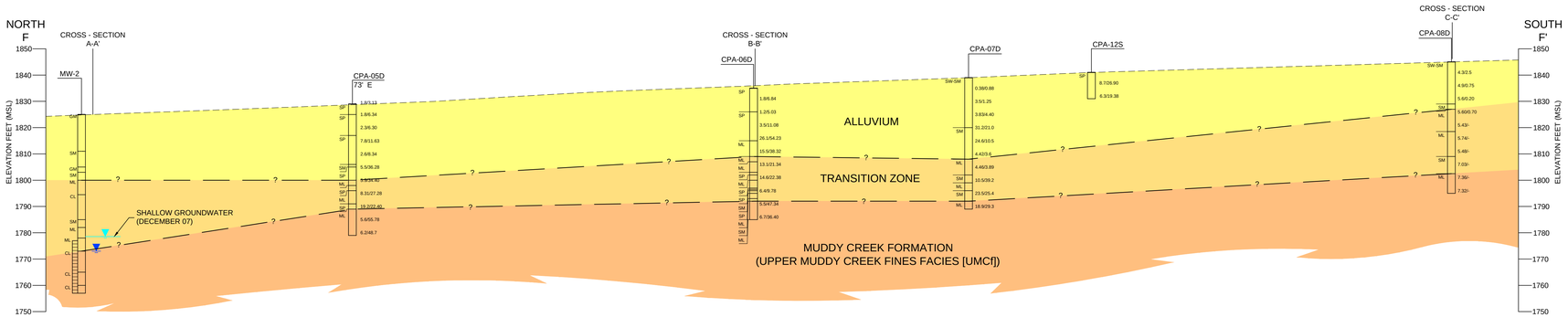
CROSS - SECTION D-D'



PLAN VIEW

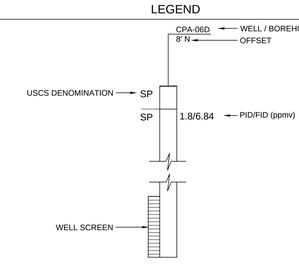


CROSS - SECTION E-E'



CROSS - SECTION F-F'

LEGEND



	STATIC WATER TABLE AT TIME OF DRILLING
	DEEP GROUNDWATER
	SHALLOW GROUNDWATER
NCR	NO CORE RECOVERY
MSL	MEAN SEA LEVEL
ppmv	PARTS PER MILLION BY VOLUME
PID	PHOTO IONIZATION DETECTOR
FID	FLAME IONIZATION DETECTOR
USCS	UNIFIED SOIL CLASSIFICATION SYSTEM

VERTICAL SCALE IN FEET: 40, 20, 0, 10, 20

HORIZONTAL SCALE IN FEET: 40, 20, 0, 40, 80

NOTES:

1. SUBSURFACE CONDITIONS MAY VARY AWAY FROM BORING LOCATIONS AND WITH THE PASSAGE OF TIME.
2. CROSS - SECTIONS ARE 2X VERTICALLY EXAGGERRATED.

IDEALIZED CROSS-SECTIONS D-D' THROUGH F-F' CLOSED PONDS AREA AND FORMER TANK FARM, CONCEPTUAL SITE MODEL FORMER MONTROSE FACILITY - HENDERSON, NEVADA

Geosyntec consultants

FIGURE G-2

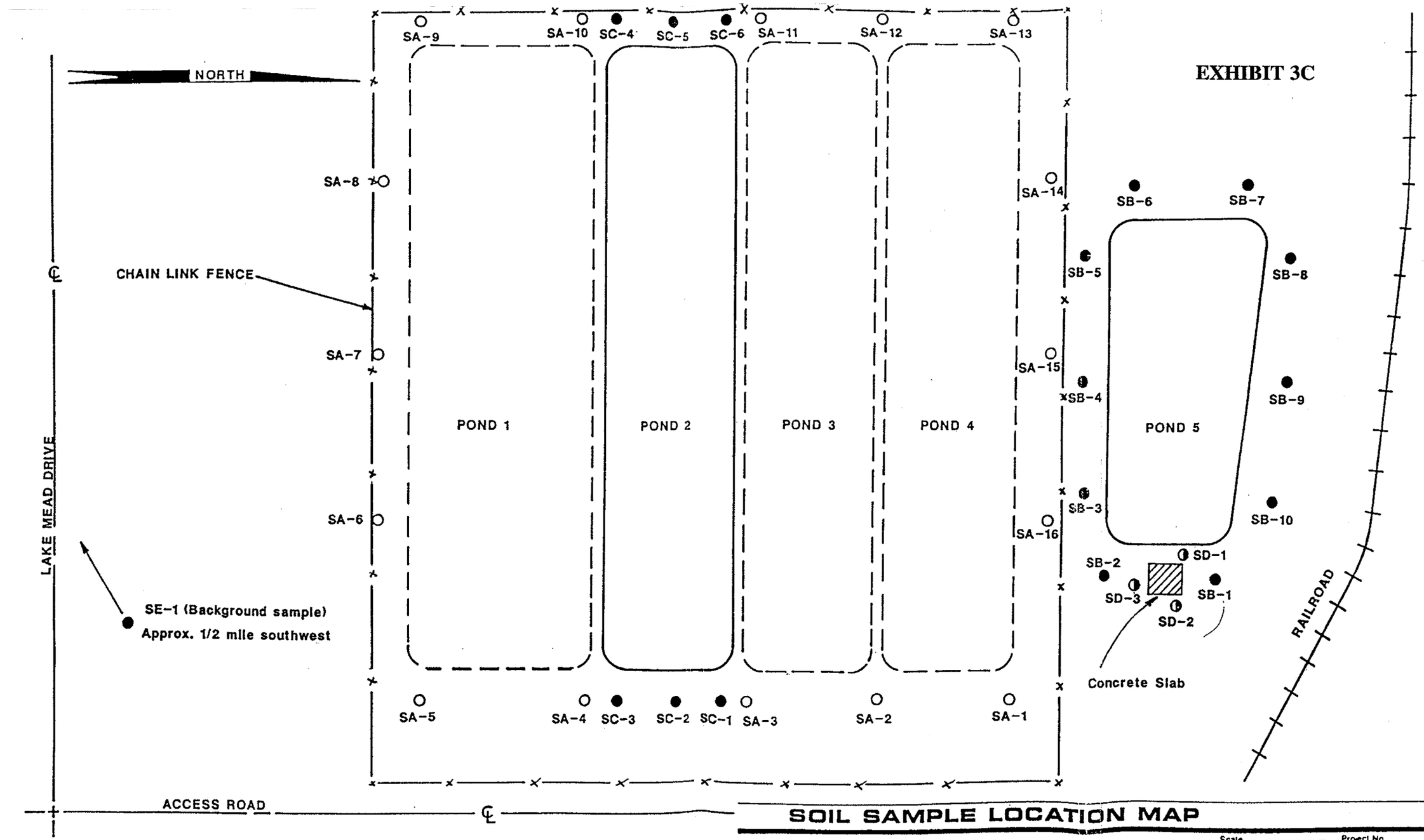
PROJECT NO: HW0989H | JANUARY 2014

N:\CAD\GIS\MONTROSE CHEMICAL FACILITY\MONTROSE CHEMICAL FACILITY-HW0989F\FIGURES\0989F043

Geosyntec consultants

APPENDIX H

QUALITY ASSURANCE PLAN, PONDS 2 & 5 CLOSURE, CLARK COUNTY, NEVADA



SOIL SAMPLE LOCATION MAP

MONTROSE CHEMICAL CORPORATION OF CALIFORNIA

Ponds 2 & 5 Closure Henderson, Nevada

EXPLANATION

● Approximate location of soil samples analyzed for full schedule

○ Approximate location of soil samples analyzed for pH

◑ Approximate location of soil samples analyzed for PCB's

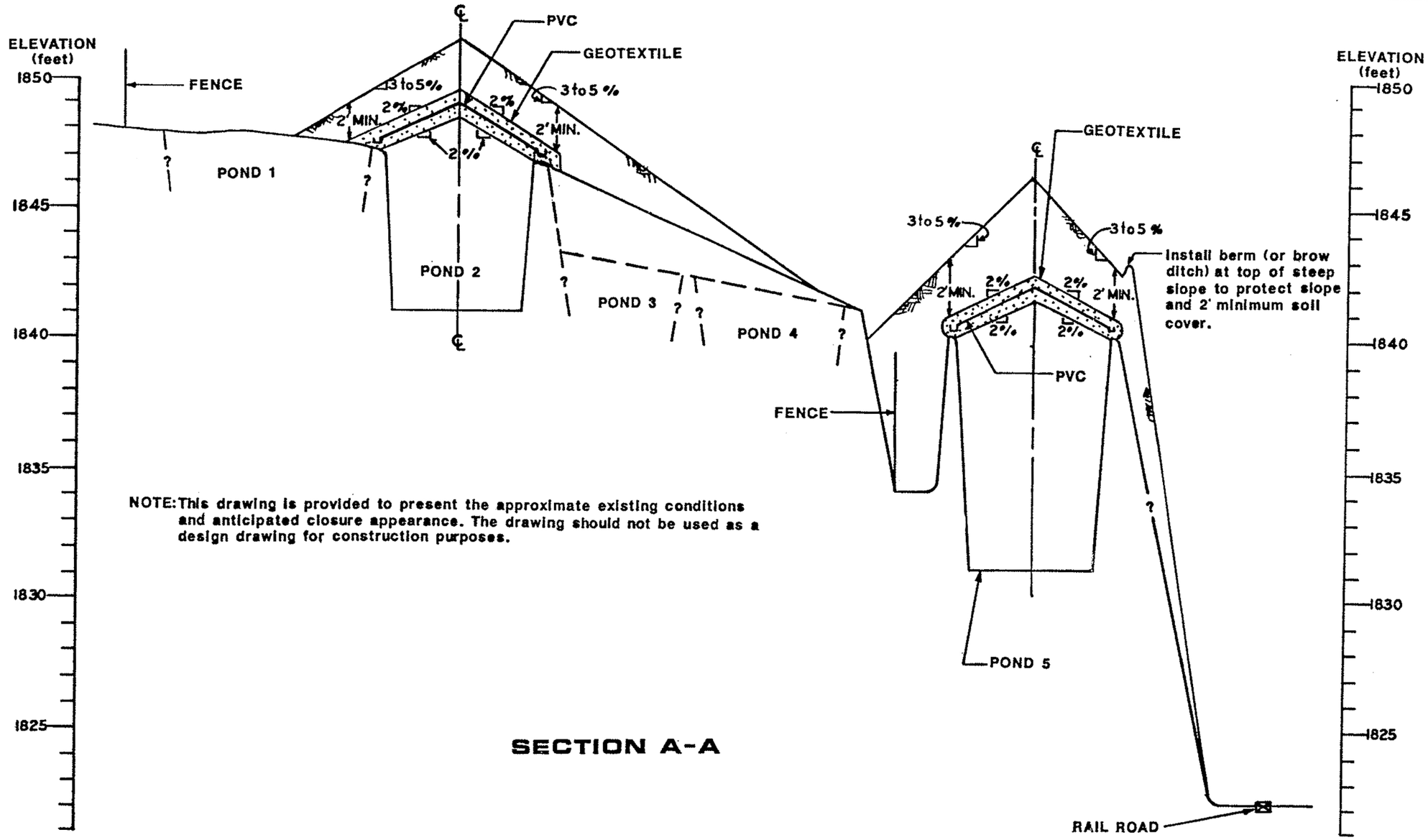
REFERENCE: "Site Plan", by Ben G. Sweet, R.L.S., dated April 14, 1983

Converse Consultants Southwest, Inc.

Geotechnical Engineering and Applied Sciences

Scale	NO SCALE
Date	9/22/87
Prepared by	WLL
Checked by	RJP
Approved By	RJP
Project No	87-43102-01
Drawing No	1

105067



NOTE: This drawing is provided to present the approximate existing conditions and anticipated closure appearance. The drawing should not be used as a design drawing for construction purposes.

SECTION A-A

SCALE: HORIZ. 1"=100'
VERT. 1"=4'

REFERENCE: "Site Plan", by Ben G. Sweet, R.L.S., dated April 14, 1983

CROSS SECTION

QUALITY ASSURANCE PLAN

Ponds 2 & 5 Closure

Clark County, Nevada

Converse Consultants Southwest, Inc.

Geotechnical Engineering and Applied Sciences

Scale	AS SHOWN
Date	9/22/87
Prepared by	WLL
Checked by	RJP
Approved By	RJP
Project No	87-43102-01
Drawing No	2

EXHIBIT 8A

APPENDIX I

NDEP ASBESTOS CALCULATION SPREADSHEET

Asbestos Risk Calculations

$$Risk = (C_{soil} * URF * (ET_{out} + (ET_{in} * ATT_{in})) * EF * ED) / (PEF * AT)$$

ESTIMATED RISK	Units	CHRYSOTILE					AMPHIBOLE				
		Construction	Off-Site Residential	Outdoor Worker	Indoor Worker	Onsite Resident	Construction	Off-Site Residential	Outdoor Worker	Indoor Worker	Onsite Resident
Estimated Risk (Total Structures)	Unitless	5E-08	1E-08	5E-09	2E-09	1E-08	3E-05	7E-06	3E-06	1E-06	6E-06
95% UCL (Total Structures)	Unitless	2E-07	4E-08	**2E-08**	**7E-09**	3.3E-08	4.9E-05	1.2E-05	**5E-06**	**2E-06**	1E-05
ESTIMATED AIR CONCENTRATIONS											
Estimated Airborne Concentration, C_{air} (best estimate)[A]	f/m^3	2.8E+02	1.5E+00	1.2E+00	1.2E+00	1.2E+00	1.4E+03	7.7E+00	6.2E+00	6.2E+00	6.2E+00
Estimated Airborne Concentration (upper bound)[B]	f/m^3	8.9E+02	4.9E+00	3.9E+00	3.9E+00	3.9E+00	2.4E+03	1.3E+01	1.1E+01	1.1E+01	1.1E+01

[A] *Estimated Airborne Concentration = Estimated C_{soil} * 1/PEF*

[B] *Estimated Airborne Concentration = 95% UCL (upper bound) * 1/PEF*

R-factor Calculations (Equation 31 in Guidance Document)

R-factor	Based on Table 8-2 ("Expected") CHRYSOTILE	AMPHIBOLE
$R_{lung\ cancer}$	0.4858	0.6928
$R_{mesothelioma}$	0.0833	62.5566
$R_{combined}$	0.5693	63.2060

*After Table 8-2: Esimated Additional Deaths from Lung Cancer or Mesothelioma per 100,000 persons from constant lifetime exposure to 0.0001 TEM f/cc longer than 10 um and thinner than 0.4 um - Based on **OPTIMUM** Risk Coefficients (Berman and Crump, 2003)*

	CHRYSOTILE				AMPHIBOLE			
	Non-Smokers		Smokers		Non-Smokers		Smokers	
Disease Endpoint	Males	Females	Males	Females	Males	Females	Males	Females
Lung Cancer	0.185	0.207	1.6	1.5	0.2	0.286	2.22	2.47
Mesothelioma	0.0836	0.096	0.0482	0.0702	62.7	72.3	36.1	52.7
Combined	0.269	0.303	1.65	1.57	62.9	72.5	38.3	55.1

Unit Risk Factor Calculations (Equation 30 in Guidance Document)

Unit Risk Factor (URF)[1]	Based on Table 8-2 ("Expected") CHRYSOTILE	AMPHIBOLE	Units
$URF_{lung\ cancer}$	0.0486	0.0693	$(f/cm^3)^{-1}$
$URF_{mesothelioma}$	0.0083	6.2557	$(f/cm^3)^{-1}$
$URF_{combined}$	0.0569	6.3206	$(f/cm^3)^{-1}$

Unit Risk Adjustment Factor (time on-site / effects averaging time)[2]			
Construction	Off-Site Residential	Industrial-Commercial Worker	Onsite Resident
3.26E-03	**1.49E-01**	**3.26E-02**	**1.49E-01**

[1] The risk factors presented here are based on the Berman and Crump (2003) protocol. This protocol assigns different potency factors to each ot the two general asbestos types (i.e., amphibole and chrysotile). The values presented also assume that 50% of the structures will be longer than 10 um and that risks are averaged over the smokers and the non-smokers of the population. It should be noted that the URFs presented here can only be applied to the structures satisfying the dimensional requirements defined for the recommended exposure index in Berman and Crump (2003). ***APPLYING THESE RISK FACTORS TO ANY OTHER SIZE RANGE OF STRUCTURES IS NOT VALID!***

[2] Unit risk adjustment factors are a summation of relative exposure intensity across scenarios but are not used in the risk calculations as a direct variable. Because the risk calculations deal with soil concentrations rather than air concentrations, it was decided that exposure parameters be written out in their entirety in the risk equations. Therefore the unit risk adjustment factors are included here as a reference point only.

Soil Concentration (C_s) Parameters	Units	CHRYSOTILE Total Structures	AMPHIBOLE Total Structures	
Pooled Analytical Sensitivity (AS)	10^6 f/g PM10	0.9956	0.9956	*Input for AS is in worksheet 'Data and Analytical Sensitivity', and is calculated based on site data*
Number of Structures (*f*)	unitless	2	10	*Input for number of structures is in worksheet 'Data and Analytical Sensitivity', and are calculated based on site data*
C_{soil} (best estimate)	10^6 f/g PM10	1.9911	9.9555	
UCL[1]	---------	6.2958	16.9622	
C_{soil} 95% UCL (upper bound)	10^6 f/g PM10	6.2678	16.8868	

[1] Inverse of the one-tailed probability of the chi-squared distribution. If probability = CHIDIST(x,...), then CHIINV(probability,...) = x.

Parameters and Calculation of Total Outdoor Ambient Air Dust Concentration

Areal Extent of site surface contamination[(3)]	A_{surf}	acres	1.0

Parameter	Units	Value by Scenario: Construction	Off-Site Residential	Outdoor Worker	Indoor Worker	Onsite Resident	
Exposure Frequency (EF)	days/year	250	350	225	250	350	
Exposure Duration (ED)	years	1	30	25	25	30	
Indoor Exposure Time (Et_{in})	hrs/day	0	16.7	0.0	8.0	16.7	
Outdoor Exposure Time (Et_{out})	hrs/day	8	2	8	0	2	
Indoor Attenuation Factor (Att_{in})		0	0.4	0	0.4	0.4	
Weighted Exposure Time (ET)	hr/day	8.00	8.68	8.00	3.20	8.68	
Averaging Time (AT) [70 yr * 365d/yr * 24 hr/d]	hours	613200	613200	613200	613200	613200	
Particulate Emission Factor (PEF)	m^3/kg	7.0E+06	1.3E+09	1.6E+09	1.6E+09	1.6E+09	*Note: These values are taken from the receptor-specific PEF spreadsheets*
Particulate Emission Factor (PEF)	cm^3/µg	7.0E+03	1.3E+06	1.6E+06	1.6E+06	1.6E+06	

Exposure Parameter References

EF: USEPA (2002), Exhibits 1-2 (Industrial-Commercial and On-Site Residenti) and 5-1 (Construction and Off-Site Resident). EF for and Indoor Worker (250 d/yr) applied because it is larger than that for Outdoor Worker (225 d/yr).

ED: USEPA (2002), Exhibits 1-2 (Industrial-Commercial and On-Site Residenti) and 5-1 (Construction and Off-Site Resident).

ET: An 8-hour workday is assumed for the occupational scenarios.

AT: USEPA (2002), Exhibits 1-2 (Industrial-Commercial and On-Site Residenti) and 5-1 (Construction and Off-Site Resident).

Et_{in}: USEPA (1997), Exposure Factors Handbook Errata Sheet

APPENDIX B

DATA USABILITY EVALUATION

APPENDIX B - DATA USABILITY EVALUATION
Closed Ponds Area and Former Tank Farm
Henderson, Nevada

Data Usability Criterion	Evaluation Result
I. Reports	The following reports, work plans, and SOPs were reviewed when completing this Data Usability Evaluation: • Laboratory Data Consultants, 2007. Data Validation Summary Report for the Supplemental Groundwater and Soil Investigation (732.30), Closed Ponds and Former Tank Farm (CPA-FTF), September 2006 through November 2006. July 2. • Laboratory Data Consultants, 2009. Revised Data Validation Summary Report #22, Montrose Former Tank Farm Site Assessment Area, Soil Investigation, Summer 2009. October 30*. • Geosyntec, 2011. Revised Data Validation Summary Reports #MONTR-0032-2010 and #MONTR-0035-2010, Former Montrose Former Tank Farm, Soil Vapor Investigation, April and May 2010, Henderson, Nevada. January 31. • Laboratory Data Consultants, 2010. Data Validation Summary Report #MONTR-0028-2010, Former Montrose Closed Ponds Area, Groundwater and Soil Investigation, January to February 2010, Henderson, Nevada. May 17. • Hargis + Associates, Inc. (Hargis), 2006. Quality Assurance Project Plan, Site-Wide Soil and Groundwater Investigations, Former Montrose and Stauffer Sites, Henderson, Nevada, Revision 1.0. October 26. • Hargis + Associates, Inc., 2007a. Field Sampling and Standard Operating Procedures, Site-Wide Soil and Groundwater Investigations, Former Montrose and Stauffer Sites, Henderson, Nevada, Revision 2.0. May 11. • Hargis, 2007b. Groundwater and Soil Supplemental Investigation for 2006 Data Validation Summary Reports [DVSR Number 4]. July 2. • Hargis + Associates, Inc., 2008. Revision 1.0 Conceptual Site Model, Former Montrose and Stauffer Facilities and Downgradient Areas to Las Vegas Wash, Henderson, Clark County, Nevada. Replacement Pages. July 25. • Nevada Division of Environmental Protection, 2009. Data Verification and Validation Requirements - Supplement established for the BMI Plant Sites and Common Areas Projects, Henderson, Nevada, April 13. Reports and their accompanying laboratory reports included appropriate data and adequate documentation.
II. Documentation	The reports and database provided adequate information regarding sample results related to geographic location and sampling procedures. A sample location map is presented as Figure B-1. A summary of the samples collected in this area is presented in Table B-1.
III. Data Sources	Sample IDs are located included in Table B-1. Analytical sample data results for the environmental medium of interest (groundwater, soil, soil vapor) were provided in the reports listed in Criterion I and are included in the attached Table B-2 (soil vapor), B-3a (soil - dry weight), and B-3b (soil - wet weight). Groundwater, soil and soil

APPENDIX B - DATA USABILITY EVALUATION
Closed Ponds Area and Former Tank Farm
Henderson, Nevada

Data Usability Criterion	Evaluation Result
	vapor samples previously collected by others were analyzed for a broad suite of analytes, as described and listed in the various work plans. The analytical methods utilized during the analytical program were selected to provide full coverage of the specific site-related chemicals (SRCs) listed in the NDEP-approved work plans. Based on sample locations and the sample results, as well as site history, the data were deemed representative of site conditions.
IV. Analytical Methods and Detection Limits	The groundwater and soil samples were analyzed using a variety of methods: Volatile Organic Compounds (VOCs) by EPA SW 846 Method 8260B, Semivolatile Organic Compounds (SVOCs) by EPA SW 846 Method 8270C, 1,4-Dioxane by EPA SW 846 Method 8270C, Chloroacetaldehydes by EPA SW 846 Method 8270C-Selected Ion Monitoring (SIM), Chlorinated Pesticides by EPA SW 846 Method 8081A, Polychlorinated Biphenyls (PCBs) by EPA SW 846 Method 8082, Polychlorinated Dioxins and Dibenzofurans (PCDDs/PCDFs) by EPA SW 846 Method 8290, PCBs as Congeners by EPA Method 1668A, Gasoline Range Organics (GRO) by EPA SW 846 Method 8015B, Gasoline Range Organics (GRO) and Volatile Fuel Hydrocarbons (VFH) by EPA SW 846 Method 8015B, Extractable Fuel Hydrocarbons (EFH) by EPA SW 846 Method 8015B, Ethanol by EPA SW 846 Method 8015B, Aldehydes by EPA SW 846 Method 8315A, White Phosphorus by EPA Method 7580, Organic Acids by HPLC Method, Benzo(a)pyrene (BAP) and Hexachlorobenzene (HCB) by EPA Method 525.2, Pentachlorophenol by EPA Method 515.4, 1,2-Dibromo-3-chloropropane (DBCP) and 1,2-Dibromoethane (EDB) by EPA Method 504.1, Metals by EPA SW 846 Method 6010B/6020/7470A/7471A, Ammonia as Nitrogen by EPA Method 350.3, Phosphorus by EPA Method 365.3, Alkalinity by Standard Method 2320B, Hexavalent Chromium by EPA SW 846 Methods 7196A and 7199, Cyanide by EPA SW 846 Method 9014, pH by EPA Methods SW 846 9045C and 9040B/9045C, Bromide, Chloride, Fluoride, Nitrate as Nitrogen, Nitrite as Nitrogen, Orthophosphate as Phosphorus and Sulfate by EPA SW 846 Method 9056, Total Dissolved Solids (TDS) by EPA Method 160.1, Total Organic Carbon (TOC) and Fractional Organic Carbon (FOC) by Walkley Black Method, TOC by EPA Method 9060A, Cation Exchange Capacity (CEC) by EPA SW846 Method 9081, Particle Size by ASTM Method D422, Moisture Content by ASTM Method D2216, Total Porosity by ASTM Method D2435, Specific Gravity by ASTM Method D2710-F, Bulk Density by ASTM Method D2937, Hydraulic Content and Permeability by ASTM Method D5084, Radium-226 by EPA Method 903.1, Radium-228 by EPA Method 904.0, Isotopic Thorium by modified DOE EML Method HASL-300, U-02-RC, Isotopic Uranium by modified DOE EML Method HASL-300, Th-01-RC. The soil vapor samples were analyzed using the following method: EPA Method TO 15 Reporting limits were confirmed to be adequate for risk assessment application.

APPENDIX B - DATA USABILITY EVALUATION
Closed Ponds Area and Former Tank Farm
Henderson, Nevada

Data Usability Criterion	Evaluation Result
V. Data Review	The data review included evaluation of completeness, laboratory precision, laboratory accuracy and bias, adherence to method specifications and QC limits, and method performance for the sample matrix. Laboratory analytical data were reviewed in accordance with the validation criteria specified by the *Quality Assurance Project Plan, Site-Wide Soil and Groundwater Investigations, Former Montrose and Stauffer Sites, Henderson, Nevada* [QAPP] (Hargis, 2006). Reviewer Name: Julia Klens Caprio Reviewer Qualifications: Over 20 years experience working in analytical laboratories as a method development analyst, production analyst, group supervisor, laboratory assistant technical director, laboratory operations manager. Over 10 years experience in QA/QC including data validation for organic, inorganic, biological, geotechnical, and radiochemistry analyses, laboratory auditing, developing or reviewing project and program quality assurance plans. Completed many EPA validation and quality training workshops, seminars and short courses. B.A. Biology Masters Degree in Organization Management MBA Quality Management ASQ Certified Quality Manager ISO 9001/2000 Certified Quality Auditor NQA-1 Lead Auditor Certified Environmental Field Sampler
VI. Data Quality Indicators	A detailed discussion of the soil and soil vapor data quality can be found in the DVSRs [Laboratory Data Consultants, 2007, Laboratory Data Consultants, 2009, Geosyntec, 2011, Laboratory Data Consultants, 2010]. A brief summary of the data quality indicators is provided below: *Completeness*: The overall completeness level attained for groundwater and soil samples was >95% as described in the reports [Laboratory Data Consultants, 2007, Laboratory Data Consultants, 2009, Geosyntec, 2011, Laboratory Data Consultants, 2010]. This percentage was calculated as the total number of accepted sample results divided by the total number of sample results multiplied by 100. Completeness was considered adequate for HRA application. The overall completeness level attained for the soil vapor samples was <95% as described in the reports [Laboratory Data Consultants, 2007, Laboratory Data Consultants, 2009, Geosyntec, 2011, Laboratory Data Consultants, 2010]. This percentage was calculated as the total number of accepted sample results divided by the total number of sample

APPENDIX B - DATA USABILITY EVALUATION
Closed Ponds Area and Former Tank Farm
Henderson, Nevada

Data Usability Criterion	Evaluation Result
	results multiplied by 100. *Comparability*: The laboratory used standard analytical methods for the analyses. The analytical results were reported in correct standard units. The comparability of the data is regarded as acceptable. *Representativeness*: As explained in the DVSRs [Laboratory Data Consultants, 2007, Laboratory Data Consultants, 2009, Geosyntec, 2011, Laboratory Data Consultants, 2010], sample preservation, holding time, and method blanks were analyzed to evaluate representativeness. Representativeness of the data was deemed acceptable as sampling included site-wide locations and locations biased to accommodate known or potential source locations. *Precision and Accuracy*: Please refer to the DVSRs [Laboratory Data Consultants, 2007, Laboratory Data Consultants, 2009, Geosyntec, 2011, Laboratory Data Consultants, 2010] for a discussion of precision and accuracy. In summary, the groundwater, soil and soil vapor results are considered valid and usable as qualified during data validation with the exception of the rejected sample concentrations. Additional details may be reviewed in the relevant DVRs [Laboratory Data Consultants, 2007, Laboratory Data Consultants, 2009, Geosyntec, 2011, Laboratory Data Consultants, 2010]. Sample results that were found to be estimated (J) are usable for limited purposes only. Sample results that were found to be rejected (R) are not usable. Final qualified groundwater, soil and soil vapor data are presented in Table B-2 and Table B-3a attached to this DUE.
VII. Data Analysis	Summary statistics including frequency of detection, range of non-detects, and minimum, median, mean, and maximum of the detected concentrations are included at the end of Table B-2 and Table B-3a. Spatial data plots for soil vapor are provided in Figure B-2 and for soil in Figure B-3a and Figure B-3b. The plots include geographic information system (GIS) images with overlays showing the analyses performed at each sample location and depth. Summary box and whisker plots are provided as Figures B-4 for soil and Figures B-5 for soil vapor. Different symbols are used for detected and non-detect outliers.

*Date of report not considered exact based on cover letter and report content

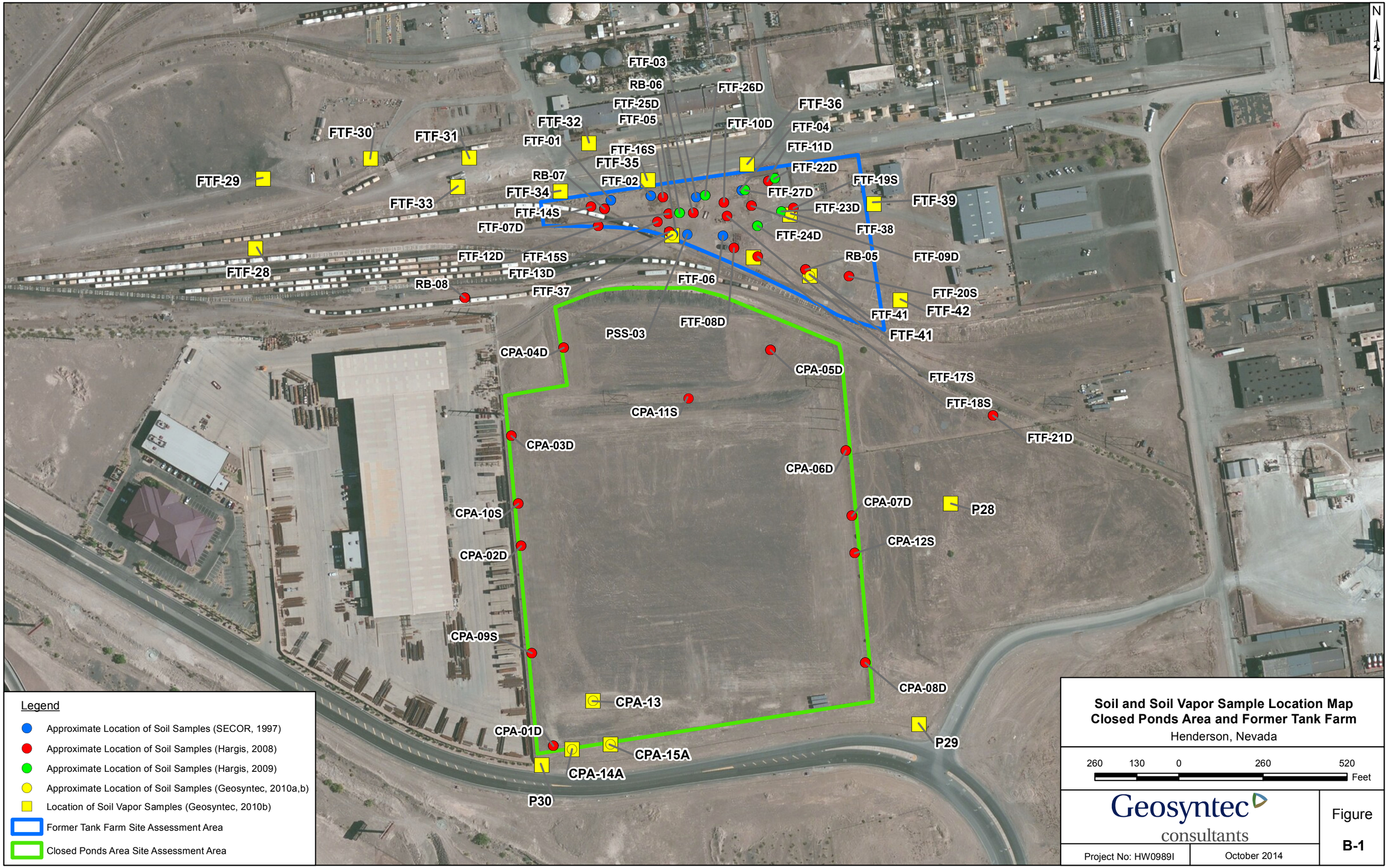
APPENDIX B

TABLES

(Included on DVD)

APPENDIX B

FIGURES



Soil and Soil Vapor Sample Location Map
Closed Ponds Area and Former Tank Farm
Henderson, Nevada

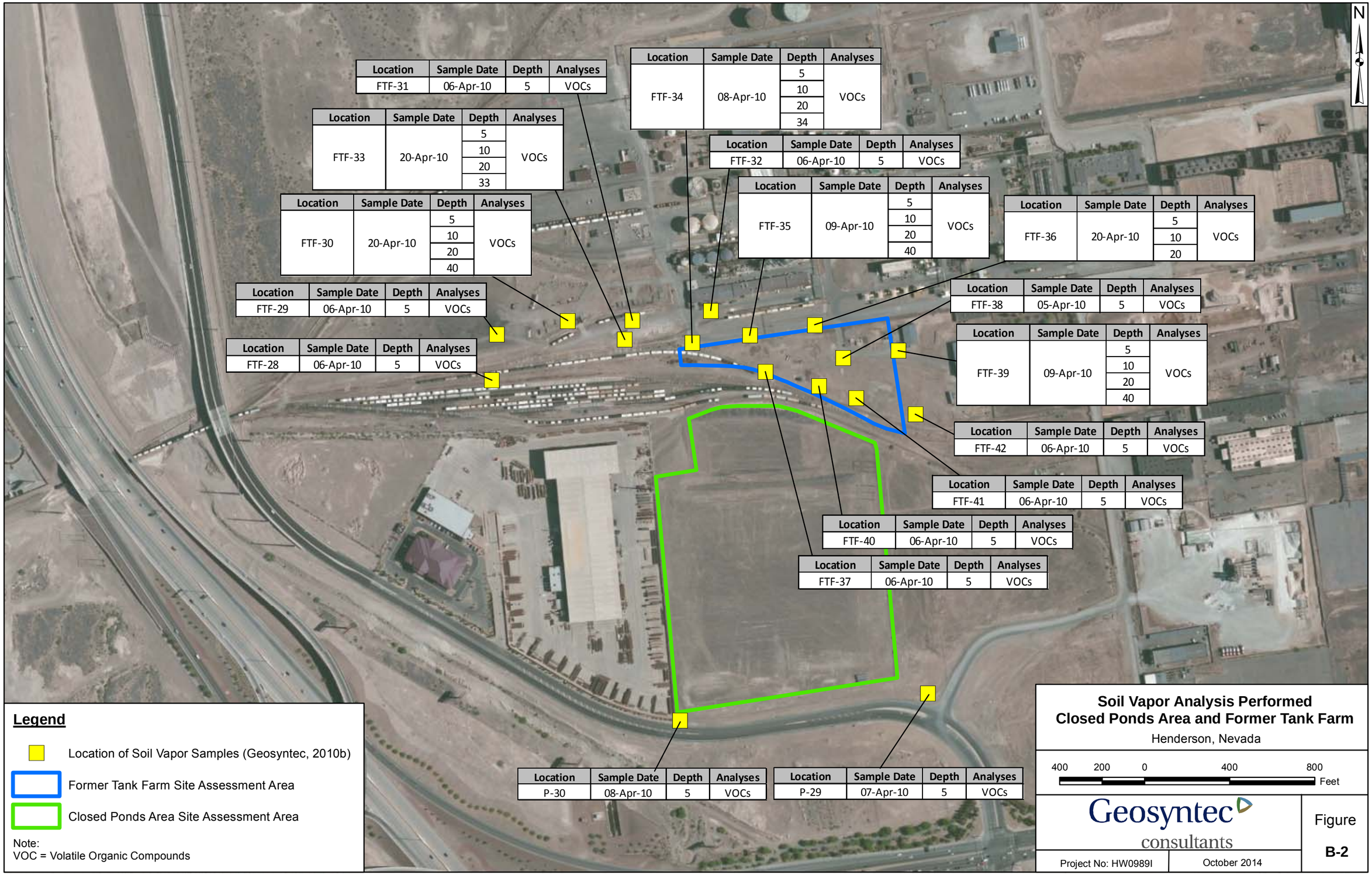
Geosyntec consultants

Project No: HW0989I

October 2014

Figure **B-1**

G:\GIS\HW0934\Projects\CPA_FTF\2014\FTF_CPA_SoilandSoilVaporSampleLoc.mxd lv 10/24/2014



Location	Sample Date	Depth	Analyses
FTF-31	06-Apr-10	5	VOCs

Location	Sample Date	Depth	Analyses
FTF-33	20-Apr-10	5	VOCs
		10	
		20	
		33	

Location	Sample Date	Depth	Analyses
FTF-34	08-Apr-10	5	VOCs
		10	
		20	
		34	

Location	Sample Date	Depth	Analyses
FTF-32	06-Apr-10	5	VOCs

Location	Sample Date	Depth	Analyses
FTF-30	20-Apr-10	5	VOCs
		10	
		20	
		40	

Location	Sample Date	Depth	Analyses
FTF-35	09-Apr-10	5	VOCs
		10	
		20	
		40	

Location	Sample Date	Depth	Analyses
FTF-36	20-Apr-10	5	VOCs
		10	
		20	

Location	Sample Date	Depth	Analyses
FTF-29	06-Apr-10	5	VOCs

Location	Sample Date	Depth	Analyses
FTF-38	05-Apr-10	5	VOCs

Location	Sample Date	Depth	Analyses
FTF-28	06-Apr-10	5	VOCs

Location	Sample Date	Depth	Analyses
FTF-39	09-Apr-10	5	VOCs
		10	
		20	
		40	

Location	Sample Date	Depth	Analyses
FTF-42	06-Apr-10	5	VOCs

Location	Sample Date	Depth	Analyses
FTF-41	06-Apr-10	5	VOCs

Location	Sample Date	Depth	Analyses
FTF-40	06-Apr-10	5	VOCs

Location	Sample Date	Depth	Analyses
FTF-37	06-Apr-10	5	VOCs

Location	Sample Date	Depth	Analyses
P-30	08-Apr-10	5	VOCs

Location	Sample Date	Depth	Analyses
P-29	07-Apr-10	5	VOCs

Soil Vapor Analysis Performed
Closed Ponds Area and Former Tank Farm
Henderson, Nevada

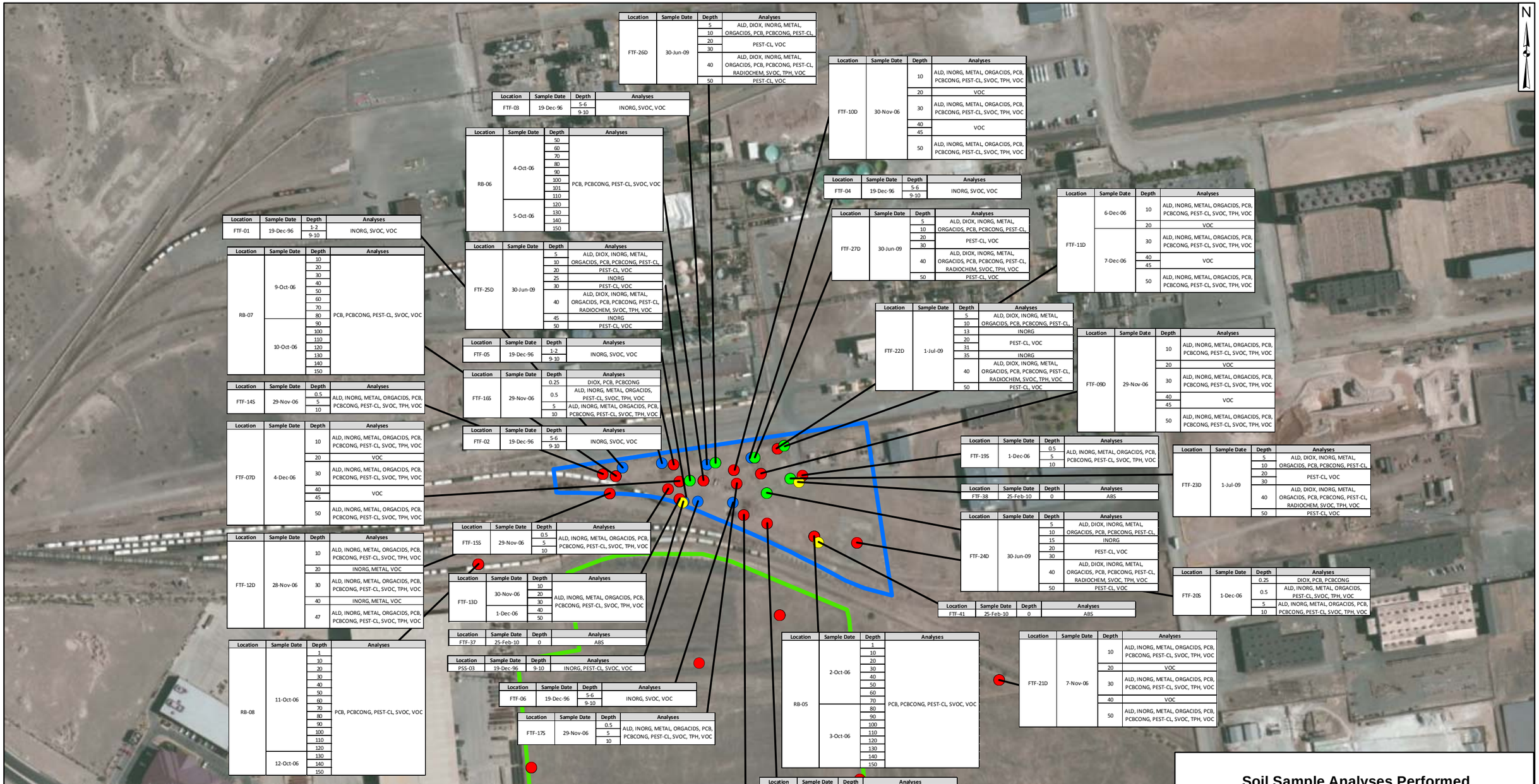
Geosyntec consultants

Project No: HW0989I

October 2014

Figure **B-2**

G:\GIS\HW0934\Projects\CPA_FTF\2014\FTF_SoilVaporInvestigationsTables.mxd lv 10/24/2014



Location	Sample Date	Depth	Analyses
FTF-26D	30-Jun-09	5	ALD, DIOX, INORG, METAL, ORGACIDS, PCB, PCBCONG, PEST-CL,
		10	
		20	PEST-CL, VOC
		30	
		40	ALD, DIOX, INORG, METAL, ORGACIDS, PCB, PCBCONG, PEST-CL, RADIOCHEM, SVOC, TPH, VOC
		50	PEST-CL, VOC

Location	Sample Date	Depth	Analyses
FTF-03	19-Dec-96	5-6	INORG, SVOC, VOC
		9-10	

Location	Sample Date	Depth	Analyses
FTF-10D	30-Nov-06	10	ALD, INORG, METAL ORGACIDS, PCB, PCBCONG, PEST-CL, SVOC, TPH, VOC
		20	VOC
		30	ALD, INORG, METAL, ORGACIDS, PCB, PCBCONG, PEST-CL, SVOC, TPH, VOC
		40	VOC
		45	
		50	ALD, INORG, METAL, ORGACIDS, PCB, PCBCONG, PEST-CL, SVOC, TPH, VOC

Location	Sample Date	Depth	Analyses
RB-06	4-Oct-06	50	PCB, PCBCONG, PEST-CL, SVOC, VOC
		60	
		70	
		80	
		90	
		100	
		101	
		110	
	5-Oct-06	120	
		130	
		140	
		150	

Location	Sample Date	Depth	Analyses
FTF-04	19-Dec-96	5-6	INORG, SVOC, VOC
		9-10	

Location	Sample Date	Depth	Analyses
FTF-01	19-Dec-96	1-2	INORG, SVOC, VOC
		9-10	

Location	Sample Date	Depth	Analyses
FTF-27D	30-Jun-09	5	ALD, DIOX, INORG, METAL, ORGACIDS, PCB, PCBCONG, PEST-CL,
		10	
		20	PEST-CL, VOC
		30	
		40	ALD, DIOX, INORG, METAL, ORGACIDS, PCB, PCBCONG, PEST-CL, RADIOCHEM, SVOC, TPH, VOC
		50	PEST-CL, VOC

Location	Sample Date	Depth	Analyses
FTF-11D	6-Dec-06	10	ALD, INORG, METAL, ORGACIDS, PCB, PCBCONG, PEST-CL, SVOC, TPH, VOC
		20	VOC
	7-Dec-06	30	ALD, INORG, METAL, ORGACIDS, PCB, PCBCONG, PEST-CL, SVOC, TPH, VOC
		40	VOC
		45	
		50	ALD, INORG, METAL, ORGACIDS, PCB, PCBCONG, PEST-CL, SVOC, TPH, VOC

Location	Sample Date	Depth	Analyses
RB-07	9-Oct-06	10	PCB, PCBCONG, PEST-CL, SVOC, VOC
		20	
		30	
		40	
		50	
		60	
		70	
		80	
	10-Oct-06	90	
		100	
		110	
		120	
		130	
		140	
		150	

Location	Sample Date	Depth	Analyses
FTF-25D	30-Jun-09	5	ALD, DIOX, INORG, METAL, ORGACIDS, PCB, PCBCONG, PEST-CL,
		10	
		20	PEST-CL, VOC
		25	INORG
		30	PEST-CL, VOC
		40	ALD, DIOX, INORG, METAL, ORGACIDS, PCB, PCBCONG, PEST-CL, RADIOCHEM, SVOC, TPH, VOC
		45	INORG
		50	PEST-CL, VOC

Location	Sample Date	Depth	Analyses
FTF-22D	1-Jul-09	5	ALD, DIOX, INORG, METAL, ORGACIDS, PCB, PCBCONG, PEST-CL,
		10	
		13	INORG
		20	PEST-CL, VOC
		31	
		35	INORG
		40	ALD, DIOX, INORG, METAL, ORGACIDS, PCB, PCBCONG, PEST-CL, RADIOCHEM, SVOC, TPH, VOC
		50	PEST-CL, VOC

Location	Sample Date	Depth	Analyses
FTF-09D	29-Nov-06	10	ALD, INORG, METAL, ORGACIDS, PCB, PCBCONG, PEST-CL, SVOC, TPH, VOC
		20	VOC
		30	ALD, INORG, METAL, ORGACIDS, PCB, PCBCONG, PEST-CL, SVOC, TPH, VOC
		40	VOC
		45	
		50	ALD, INORG, METAL, ORGACIDS, PCB, PCBCONG, PEST-CL, SVOC, TPH, VOC

Location	Sample Date	Depth	Analyses
FTF-05	19-Dec-96	1-2	INORG, SVOC, VOC
		9-10	

Location	Sample Date	Depth	Analyses
FTF-16S	29-Nov-06	0.25	DIOX, PCB, PCBCONG
		0.5	ALD, INORG, METAL, ORGACIDS, PEST-CL, SVOC, TPH, VOC
		5	ALD, INORG, METAL, ORGACIDS, PCB,
		10	PCBCONG, PEST-CL, SVOC, TPH, VOC

Location	Sample Date	Depth	Analyses
FTF-14S	29-Nov-06	0.5	ALD, INORG, METAL, ORGACIDS, PCB, PCBCONG, PEST-CL, SVOC, TPH, VOC
		5	
		10	

Location	Sample Date	Depth	Analyses
FTF-02	19-Dec-96	5-6	INORG, SVOC, VOC
		9-10	

Location	Sample Date	Depth	Analyses
FTF-19S	1-Dec-06	0.5	ALD, INORG, METAL, ORGACIDS, PCB, PCBCONG, PEST-CL, SVOC, TPH, VOC
		5	
		10	

Location	Sample Date	Depth	Analyses
FTF-23D	1-Jul-09	5	ALD, DIOX, INORG, METAL, ORGACIDS, PCB, PCBCONG, PEST-CL,
		10	
		20	PEST-CL, VOC
		30	
		40	ALD, DIOX, INORG, METAL, ORGACIDS, PCB, PCBCONG, PEST-CL, RADIOCHEM, SVOC, TPH, VOC
		50	PEST-CL, VOC

Location	Sample Date	Depth	Analyses
FTF-07D	4-Dec-06	10	ALD, INORG, METAL, ORGACIDS, PCB, PCBCONG, PEST-CL, SVOC, TPH, VOC
		20	VOC
		30	ALD, INORG, METAL, ORGACIDS, PCB, PCBCONG, PEST-CL, SVOC, TPH, VOC
		40	VOC
		45	
		50	ALD, INORG, METAL, ORGACIDS, PCB, PCBCONG, PEST-CL, SVOC, TPH, VOC

Location	Sample Date	Depth	Analyses
FTF-38	25-Feb-10	0	ABS

Location	Sample Date	Depth	Analyses
FTF-24D	30-Jun-09	5	ALD, DIOX, INORG, METAL, ORGACIDS, PCB, PCBCONG, PEST-CL,
		10	
		15	INORG
		20	PEST-CL, VOC
		30	
		40	ALD, DIOX, INORG, METAL, ORGACIDS, PCB, PCBCONG, PEST-CL, RADIOCHEM, SVOC, TPH, VOC
		50	PEST-CL, VOC

Location	Sample Date	Depth	Analyses
FTF-15S	29-Nov-06	0.5	ALD, INORG, METAL, ORGACIDS, PCB, PCBCONG, PEST-CL, SVOC, TPH, VOC
		5	
		10	

Location	Sample Date	Depth	Analyses
FTF-20S	1-Dec-06	0.25	DIOX, PCB, PCBCONG
		0.5	ALD, INORG, METAL, ORGACIDS, PEST-CL, SVOC, TPH, VOC
		5	ALD, INORG, METAL, ORGACIDS, PCB,
		10	PCBCONG, PEST-CL, SVOC, TPH, VOC

Location	Sample Date	Depth	Analyses
FTF-12D	28-Nov-06	10	ALD, INORG, METAL, ORGACIDS, PCB, PCBCONG, PEST-CL, SVOC, TPH, VOC
		20	INORG, METAL, VOC
		30	ALD, INORG, METAL, ORGACIDS, PCB, PCBCONG, PEST-CL, SVOC, TPH, VOC
		40	INORG, METAL, VOC
		47	ALD, INORG, METAL, ORGACIDS, PCB, PCBCONG, PEST-CL, SVOC, TPH, VOC

Location	Sample Date	Depth	Analyses
FTF-13D	30-Nov-06	10	ALD, INORG, METAL, ORGACIDS, PCB, PCBCONG, PEST-CL, SVOC, TPH, VOC
		20	
		30	
	1-Dec-06	40	
		50	

Location	Sample Date	Depth	Analyses
FTF-41	25-Feb-10	0	ABS

Location	Sample Date	Depth	Analyses
FTF-37	25-Feb-10	0	ABS

Location	Sample Date	Depth	Analyses
RB-05	2-Oct-06	1	PCB, PCBCONG, PEST-CL, SVOC, VOC
		10	
		20	
		30	
		40	
		50	
		60	
		70	
	3-Oct-06	80	
		90	
		100	
		110	
		120	
		130	
		140	
		150	

Location	Sample Date	Depth	Analyses
FTF-21D	7-Nov-06	10	ALD, INORG, METAL, ORGACIDS, PCB, PCBCONG, PEST-CL, SVOC, TPH, VOC
		20	VOC
		30	ALD, INORG, METAL, ORGACIDS, PCB, PCBCONG, PEST-CL, SVOC, TPH, VOC
		40	VOC
		50	ALD, INORG, METAL, ORGACIDS, PCB, PCBCONG, PEST-CL, SVOC, TPH, VOC

Location	Sample Date	Depth	Analyses
PSS-03	19-Dec-96	9-10	INORG, PEST-CL, SVOC, VOC

Location	Sample Date	Depth	Analyses
FTF-06	19-Dec-96	5-6	INORG, SVOC, VOC
		9-10	

Location	Sample Date	Depth	Analyses
FTF-17S	29-Nov-06	0.5	ALD, INORG, METAL, ORGACIDS, PCB, PCBCONG, PEST-CL, SVOC, TPH, VOC
		5	
		10	

Location	Sample Date	Depth	Analyses
RB-08	11-Oct-06	1	PCB, PCBCONG, PEST-CL, SVOC, VOC
		10	
		20	
		30	
		40	
		50	
		60	
		70	
		80	
		90	
		100	
		110	
		120	
	12-Oct-06	130	
		140	
		150	

Location	Sample Date	Depth	Analyses
FTF-18S	1-Dec-06	0.5	ALD, INORG, METAL, ORGACIDS, PCB, PCBCONG, PEST-CL, SVOC, TPH, VOC
		5	
		10	

Location	Sample Date	Depth	Analyses
FTF-08D	4-Dec-06	10	ALD, INORG, METAL, ORGACIDS, PCB, PCBCONG, PEST-CL, SVOC, TPH, VOC
		20	VOC
		30	ALD, INORG, METAL, ORGACIDS, PCB, PCBCONG, PEST-CL, SVOC, TPH, VOC
		40	VOC
		50	ALD, INORG, METAL, ORGACIDS, PCB, PCBCONG, PEST-CL, SVOC, TPH, VOC

Legend

- Approximate Location of Soil Samples (SECOR, 1997)
- Approximate Location of Soil Samples (Hargis, 2008)
- Approximate Location of Soil Samples (Hargis, 2009)
- Approximate Location of Soil Samples (Geosyntec, 2010a,b)
- Former Tank Farm Site Assessment Area
- Closed Ponds Area Site Assessment Area

Notes:
ALD = Aldehydes
ASB = Asbestos
DIOX = Dioxins and Furans
INORG = Inorganic Compounds
METAL = Metals
ORGACID = Organic Acids
PCB = Polychlorinated Biphenyls as Aroclors
PCBCONG = Polychlorinated Biphenyl Congeners
PEST-CL = Chlorinated Pesticides
RADCHEM = Radiochemical Compounds
SVOC = Semi-Volatile Organic Compounds
TPH = Petroleum Hydrocarbons, Ethanol, & Methanol
VOC = Volatile Organic Compounds

Soil Sample Analyses Performed
Former Tank Farm
Henderson, Nevada

300 150 0 300 600
Feet

Geosyntec consultants

Project No: HW0989I

October 2014

Figure
B-3A

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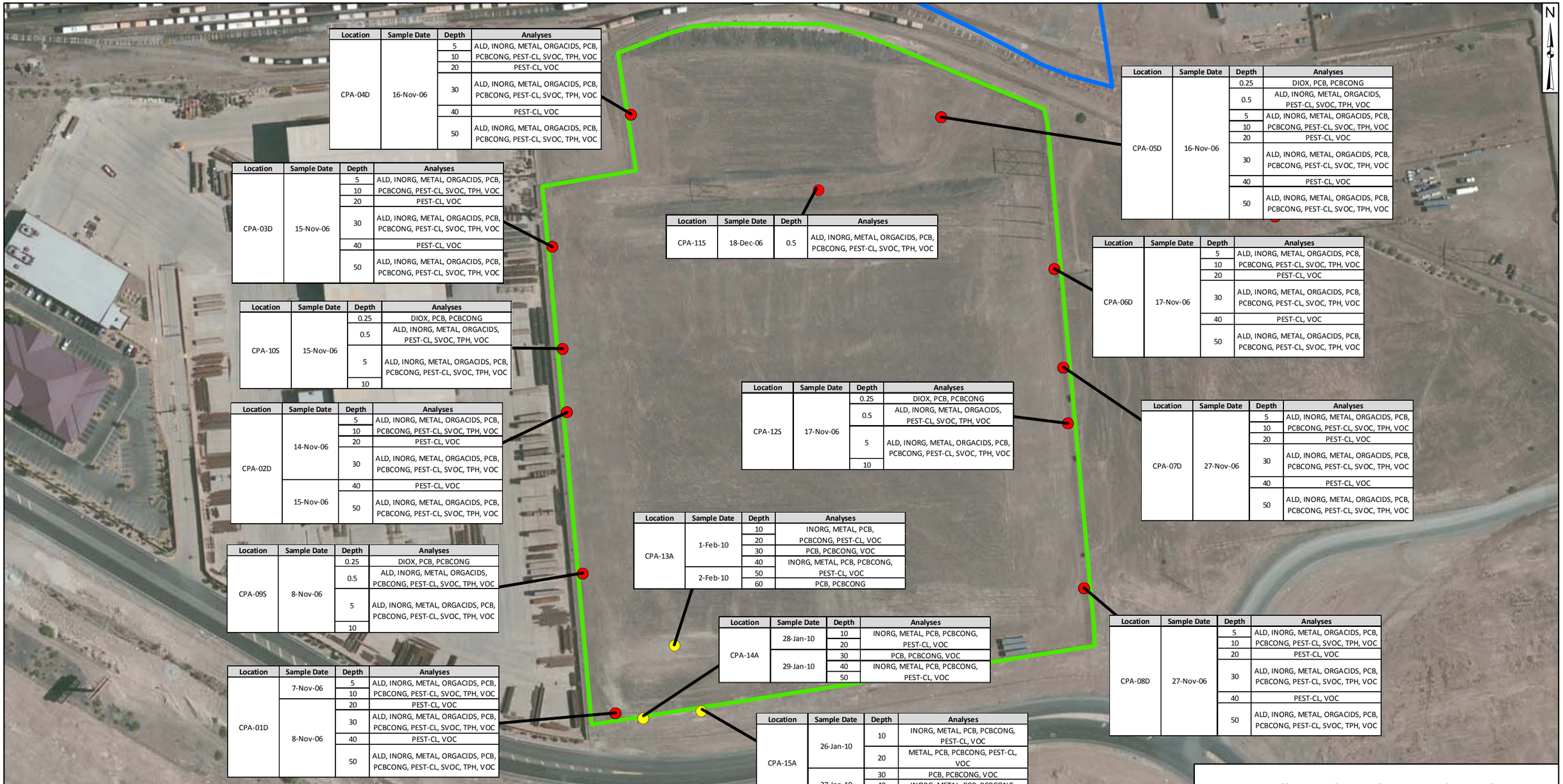


Location	Sample Date	Depth	Analyses
CPA-04D	16-Nov-06	5	ALD, INORG, METAL, ORGACIDS, PCB, PCBCONG, PEST-CL, SVOC, TPH, VOC
		10	
		20	PEST-CL, VOC
		30	ALD, INORG, METAL, ORGACIDS, PCB, PCBCONG, PEST-CL, SVOC, TPH, VOC
		40	PEST-CL, VOC
		50	ALD, INORG, METAL, ORGACIDS, PCB, PCBCONG, PEST-CL, SVOC, TPH, VOC

Location	Sample Date	Depth	Analyses
CPA-05D	16-Nov-06	0.25	DIOX, PCB, PCBCONG
		0.5	ALD, INORG, METAL, ORGACIDS, PEST-CL, SVOC, TPH, VOC
		5	ALD, INORG, METAL, ORGACIDS, PCB, PCBCONG, PEST-CL, SVOC, TPH, VOC
		10	
		20	PEST-CL, VOC
		30	ALD, INORG, METAL, ORGACIDS, PCB, PCBCONG, PEST-CL, SVOC, TPH, VOC
		40	PEST-CL, VOC
		50	ALD, INORG, METAL, ORGACIDS, PCB, PCBCONG, PEST-CL, SVOC, TPH, VOC

Location	Sample Date	Depth	Analyses
CPA-03D	15-Nov-06	5	ALD, INORG, METAL, ORGACIDS, PCB, PCBCONG, PEST-CL, SVOC, TPH, VOC
		10	
		20	PEST-CL, VOC
		30	ALD, INORG, METAL, ORGACIDS, PCB, PCBCONG, PEST-CL, SVOC, TPH, VOC
		40	PEST-CL, VOC
		50	ALD, INORG, METAL, ORGACIDS, PCB, PCBCONG, PEST-CL, SVOC, TPH, VOC

Location	Sample Date	Depth	Analyses
CPA-11S	18-Dec-06	0.5	ALD, INORG, METAL, ORGACIDS, PCB, PCBCONG, PEST-CL, SVOC, TPH, VOC

Location	Sample Date	Depth	Analyses
CPA-06D	17-Nov-06	5	ALD, INORG, METAL, ORGACIDS, PCB, PCBCONG, PEST-CL, SVOC, TPH, VOC
		10	
		20	PEST-CL, VOC
		30	ALD, INORG, METAL, ORGACIDS, PCB, PCBCONG, PEST-CL, SVOC, TPH, VOC
		40	PEST-CL, VOC
		50	ALD, INORG, METAL, ORGACIDS, PCB, PCBCONG, PEST-CL, SVOC, TPH, VOC

Location	Sample Date	Depth	Analyses
CPA-10S	15-Nov-06	0.25	DIOX, PCB, PCBCONG
		0.5	ALD, INORG, METAL, ORGACIDS, PEST-CL, SVOC, TPH, VOC
		5	ALD, INORG, METAL, ORGACIDS, PCB, PCBCONG, PEST-CL, SVOC, TPH, VOC
		10	

Location	Sample Date	Depth	Analyses
CPA-12S	17-Nov-06	0.25	DIOX, PCB, PCBCONG
		0.5	ALD, INORG, METAL, ORGACIDS, PEST-CL, SVOC, TPH, VOC
		5	ALD, INORG, METAL, ORGACIDS, PCB, PCBCONG, PEST-CL, SVOC, TPH, VOC
		10	

Location	Sample Date	Depth	Analyses
CPA-07D	27-Nov-06	5	ALD, INORG, METAL, ORGACIDS, PCB, PCBCONG, PEST-CL, SVOC, TPH, VOC
		10	
		20	PEST-CL, VOC
		30	ALD, INORG, METAL, ORGACIDS, PCB, PCBCONG, PEST-CL, SVOC, TPH, VOC
		40	PEST-CL, VOC
		50	ALD, INORG, METAL, ORGACIDS, PCB, PCBCONG, PEST-CL, SVOC, TPH, VOC

Location	Sample Date	Depth	Analyses
CPA-02D	14-Nov-06	5	ALD, INORG, METAL, ORGACIDS, PCB, PCBCONG, PEST-CL, SVOC, TPH, VOC
		10	
		20	PEST-CL, VOC
		30	ALD, INORG, METAL, ORGACIDS, PCB, PCBCONG, PEST-CL, SVOC, TPH, VOC
	15-Nov-06	40	PEST-CL, VOC
		50	ALD, INORG, METAL, ORGACIDS, PCB, PCBCONG, PEST-CL, SVOC, TPH, VOC

Location	Sample Date	Depth	Analyses
CPA-13A	1-Feb-10	10	INORG, METAL, PCB, PCBCONG, PEST-CL, VOC
		20	
		30	PCB, PCBCONG, VOC
		40	INORG, METAL, PCB, PCBCONG, PEST-CL, VOC
	2-Feb-10	50	
		60	PCB, PCBCONG

Location	Sample Date	Depth	Analyses
CPA-09S	8-Nov-06	0.25	DIOX, PCB, PCBCONG
		0.5	ALD, INORG, METAL, ORGACIDS, PCBCONG, PEST-CL, SVOC, TPH, VOC
		5	ALD, INORG, METAL, ORGACIDS, PCB, PCBCONG, PEST-CL, SVOC, TPH, VOC
		10	

Location	Sample Date	Depth	Analyses
CPA-14A	28-Jan-10	10	INORG, METAL, PCB, PCBCONG, PEST-CL, VOC
		20	
	29-Jan-10	30	PCB, PCBCONG, VOC
		40	INORG, METAL, PCB, PCBCONG, PEST-CL, VOC
		50	

Location	Sample Date	Depth	Analyses
CPA-08D	27-Nov-06	5	ALD, INORG, METAL, ORGACIDS, PCB, PCBCONG, PEST-CL, SVOC, TPH, VOC
		10	
		20	PEST-CL, VOC
		30	ALD, INORG, METAL, ORGACIDS, PCB, PCBCONG, PEST-CL, SVOC, TPH, VOC
		40	PEST-CL, VOC
		50	ALD, INORG, METAL, ORGACIDS, PCB, PCBCONG, PEST-CL, SVOC, TPH, VOC

Location	Sample Date	Depth	Analyses
CPA-01D	7-Nov-06	5	ALD, INORG, METAL, ORGACIDS, PCB, PCBCONG, PEST-CL, SVOC, TPH, VOC
		10	
	8-Nov-06	20	PEST-CL, VOC
		30	ALD, INORG, METAL, ORGACIDS, PCB, PCBCONG, PEST-CL, SVOC, TPH, VOC
		40	PEST-CL, VOC
		50	ALD, INORG, METAL, ORGACIDS, PCB, PCBCONG, PEST-CL, SVOC, TPH, VOC

Location	Sample Date	Depth	Analyses
CPA-15A	26-Jan-10	10	INORG, METAL, PCB, PCBCONG, PEST-CL, VOC
		20	METAL, PCB, PCBCONG, PEST-CL, VOC
	27-Jan-10	30	PCB, PCBCONG, VOC
		40	INORG, METAL, PCB, PCBCONG, PEST-CL, VOC
		50	

Legend

- Approximate Location of Soil Samples (SECOR, 1997)
- Approximate Location of Soil Samples (Hargis, 2008)
- Approximate Location of Soil Samples (Hargis, 2009)
- Approximate Location of Soil Samples (Geosyntec, 2010a,b)
- Former Tank Farm Site Assessment Area
- Closed Ponds Area Site Assessment Area

Notes:
ALD = Aldehydes
ASB = Asbestos
DIOX = Dioxins and Furans
INORG = Inorganic Compounds
METAL = Metals
ORGACID = Organic Acids
PCB = Polychlorinated Biphenyls as Aroclors
PCBCONG = Polychlorinated Biphenyl Congeners
PEST-CL = Chlorinated Pesticides
RADCHEM = Radiochemical Compounds
SVOC = Semi-Volatile Organic Compounds
TPH = Petroleum Hydrocarbons, Ethanol, & Methanol
VOC = Volatile Organic Compounds

Soil Sample Analyses Performed
Closed Ponds Area

Henderson, Nevada

200 100 0 200 400 Feet

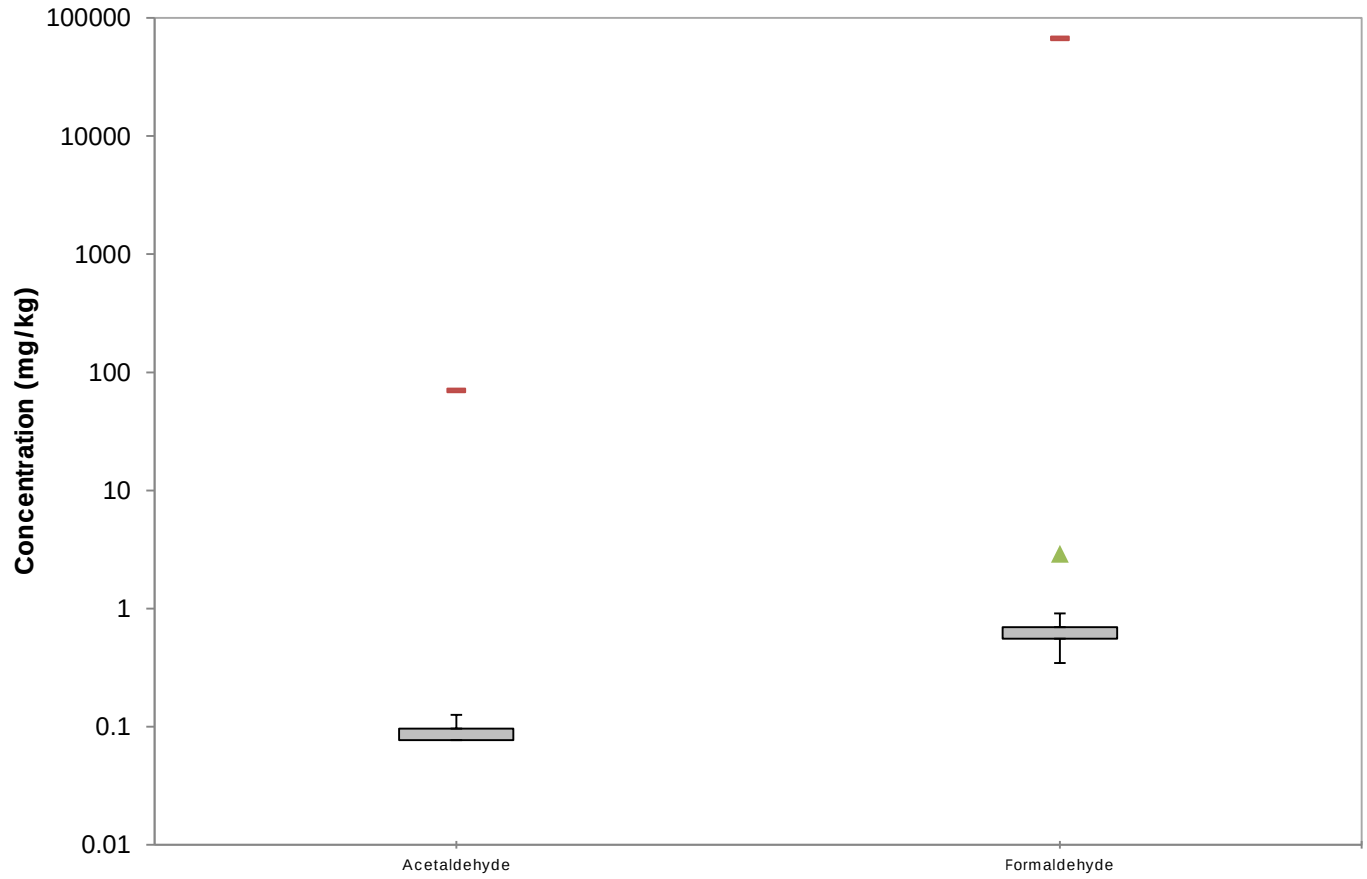
Geosyntec consultants

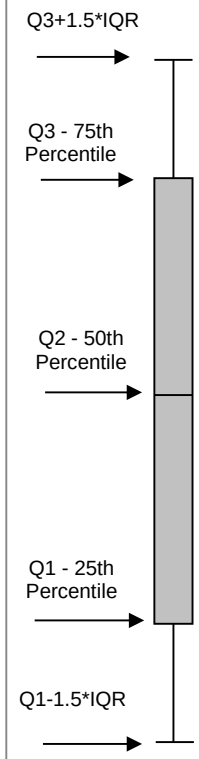
Project No: HW0989I

October 2014

Figure **B-3B**

G:\GIS\HW0934\Projects\CPA_FTF\2014\CPA_SoilsampleAnalysesTables.mxd cc 10/24/2014





* Denotes No Basic Comparison Level Available

Denotes Basic Comparison Level

Denotes ND Statistical Outlier

Denotes Detected Statistical Outlier

Notes:

mg/kg= milligrams per kilogram
ND = non-detect
IQR = interquartile range equals the 3rd quartile (75th percentile) - 1st quartile (25th percentile)
Half of the sample quantitation limit is used for nondetects unless otherwise noted.

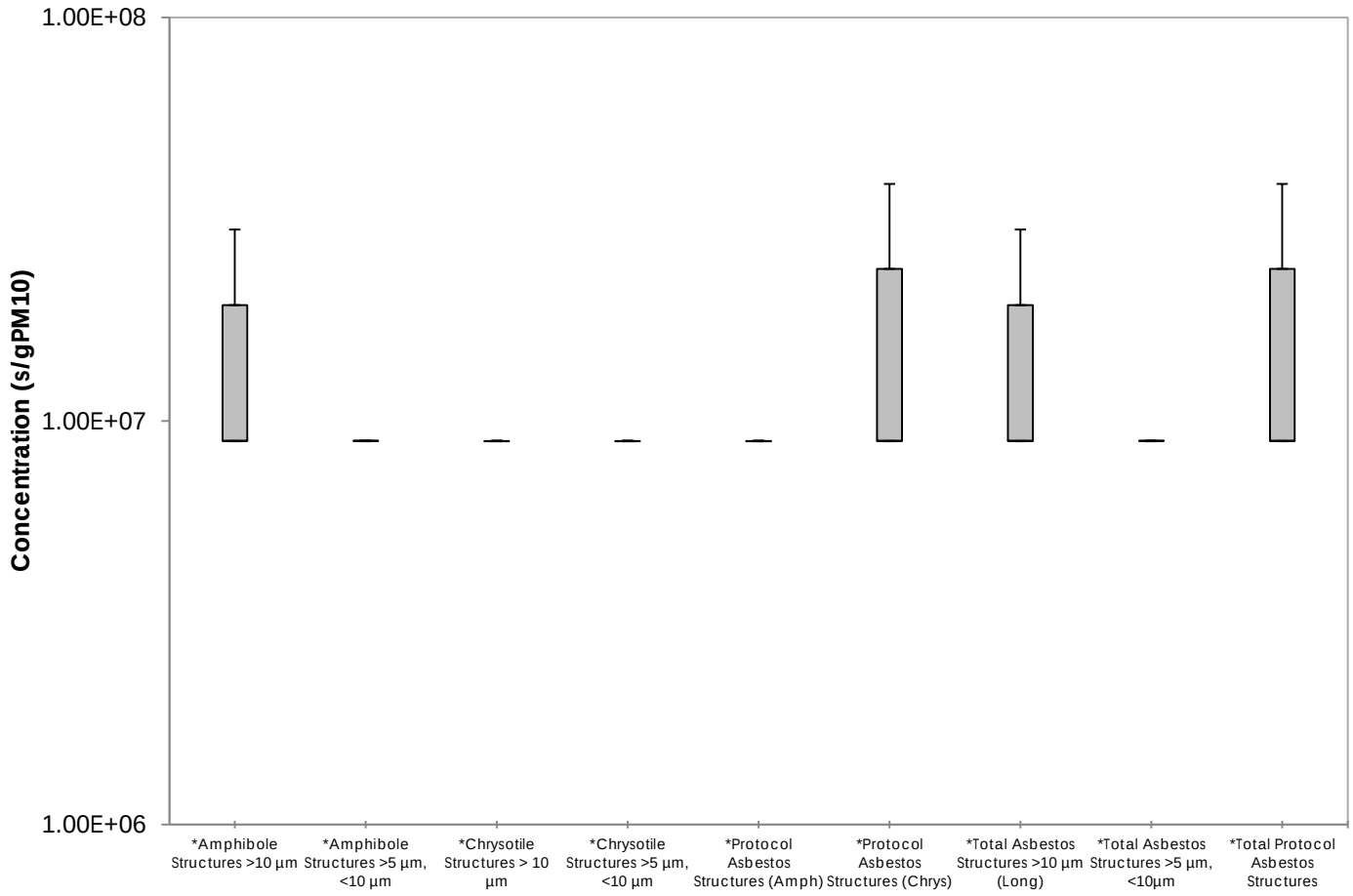
Soil Box and Whisker Plots - ALDEHYDES
Closed Ponds Area and Former Tank Farm
Henderson, Nevada

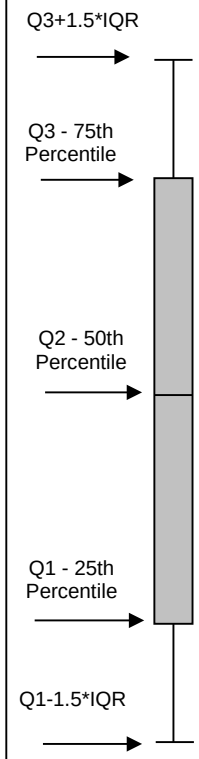
Geosyntec consultants

Huntington Beach | 22-Jun-15

Figure B-4A

P:\PRJ4\CAWP\HW0989\CPA-FTF DUE (May 2014)\[Figures B-4 - Soil Boxplots (Updated June 2015).xlsm]B4BC





* Denotes No Basic Comparison Level Available

Denotes Basic Comparison Level

Denotes ND Statistical Outlier

Denotes Detected Statistical Outlier

Notes:

s/gPM10= structures per gram particulate matter 10
ND = non-detect
IQR = interquartile range equals the 3rd quartile (75th percentile) - 1st quartile (25th percentile)
Half of the sample quantitation limit is used for nondetects unless otherwise noted.

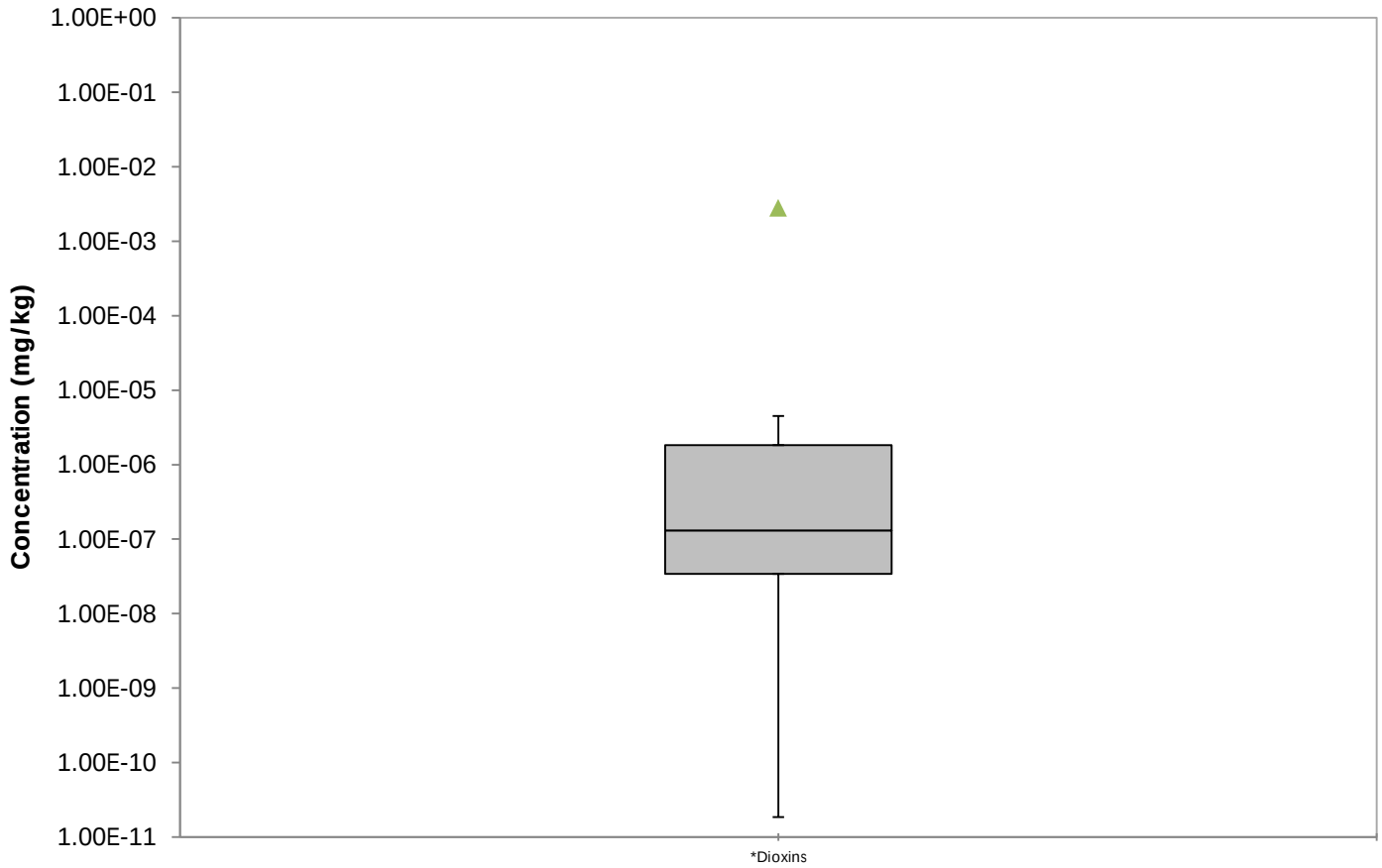
Soil Box and Whisker Plots - ASBESTOS
Closed Ponds Area and Former Tank Farm
Henderson, Nevada

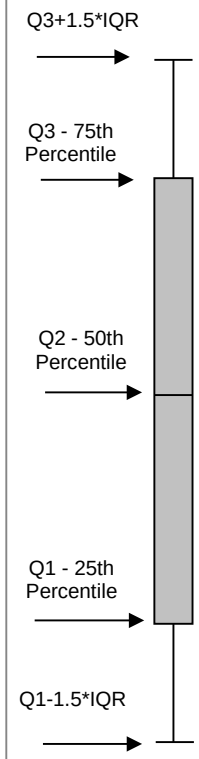
Geosyntec consultants

Figure B-4B

Huntington Beach | 22-Jun-15

P:\PRJ4\CAWP\HW0989\CPA-FTF DUE (May 2014)\[Figures B-4 - Soil Boxplots (Updated June 2015).xlsm]B4BC





* Denotes No Basic Comparison Level Available

Denotes Basic Comparison Level

Denotes ND Statistical Outlier

Denotes Detected Statistical Outlier

Notes:

mg/kg= milligrams per kilogram
ND = non-detect
IQR = interquartile range equals the 3rd quartile (75th percentile) - 1st quartile (25th percentile)
Half of the sample quantitation limit is used for nondetects unless otherwise noted.

Soil Box and Whisker Plots - DIOXINS
Closed Ponds Area and Former Tank Farm
Henderson, Nevada

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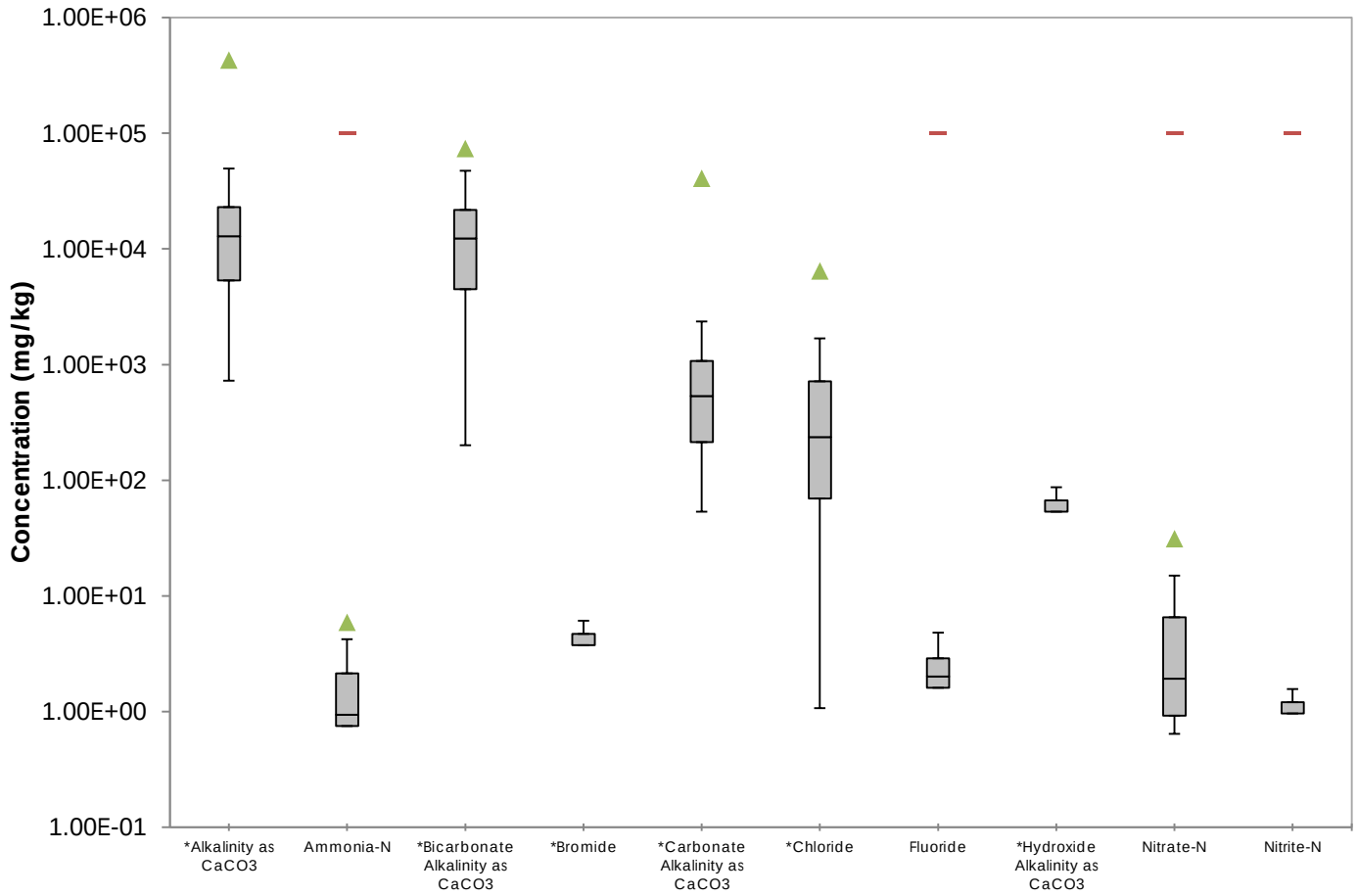
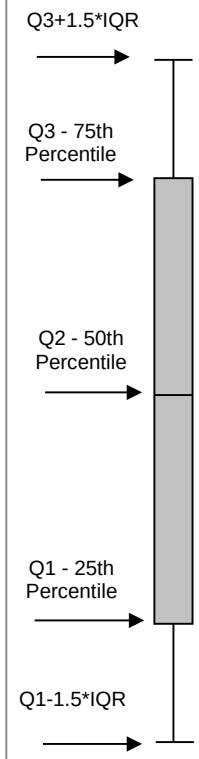
Figure B-4C

P:\PRJ4\CAWP\HW0989\CPA-FTF DUE (May 2014)\[Figures B-4 - Soil Boxplots (Updated June 2015).xlsm]B4BC





* Denotes No Basic Comparison Level Available

Denotes Basic Comparison Level

Denotes ND Statistical Outlier

Denotes Detected Statistical Outlier

Notes:

mg/kg= milligrams per kilogram
ND = non-detect
IQR = interquartile range equals the 3rd quartile (75th percentile) - 1st quartile (25th percentile)
Half of the sample quantitation limit is used for nondetects unless otherwise noted.

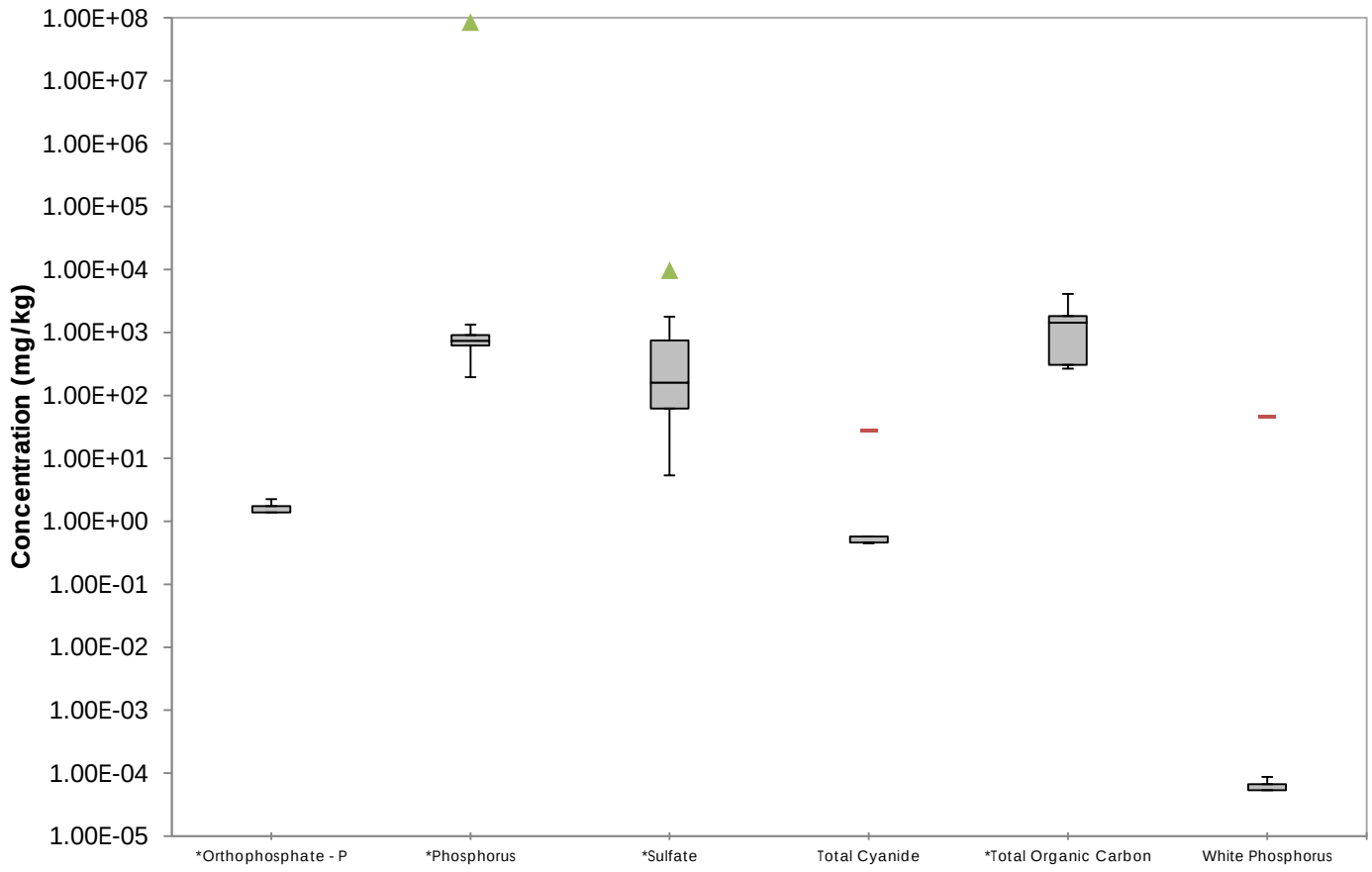
Soil Box and Whisker Plots - INORGANICS
Closed Ponds Area and Former Tank Farm
Henderson, Nevada

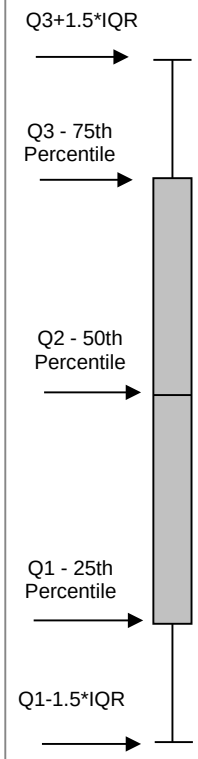
Geosyntec consultants

Huntington Beach | 22-Jun-15

Figure B-4D

P:\PRJ4\CAWP\HW0989\CPA-FTF DUE (May 2014)\[Figures B-4 - Soil Boxplots (Updated June 2015).xlsm]B4BC





* Denotes No Basic Comparison Level Available

Denotes Basic Comparison Level

Denotes ND Statistical Outlier

Denotes Detected Statistical Outlier

Notes:

mg/kg= milligrams per kilogram
ND = non-detect
IQR = interquartile range equals the 3rd quartile (75th percentile) - 1st quartile (25th percentile)
Half of the sample quantitation limit is used for nondetects unless otherwise noted.

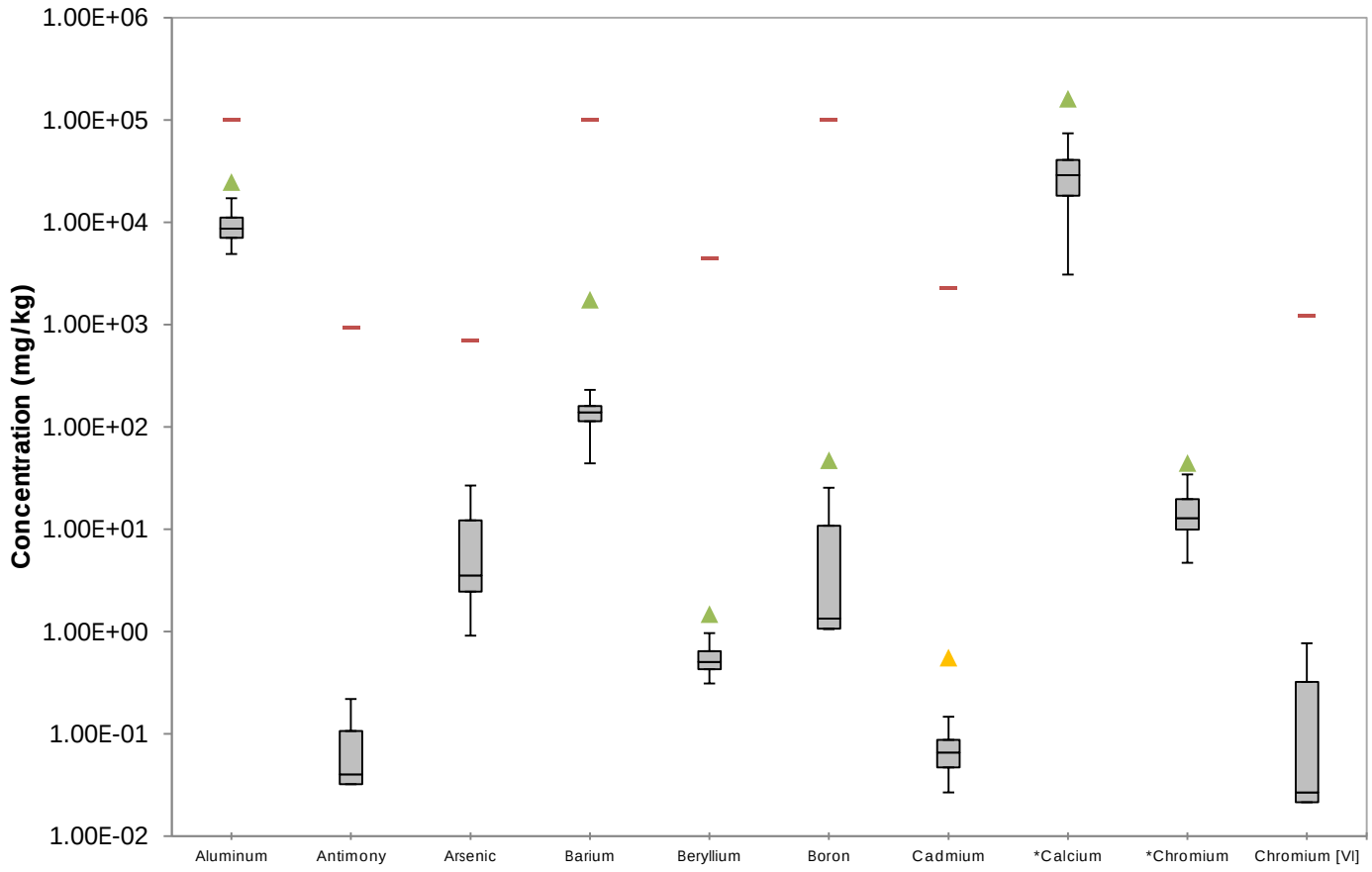
Soil Box and Whisker Plots - INORGANICS
Closed Ponds Area and Former Tank Farm
Henderson, Nevada

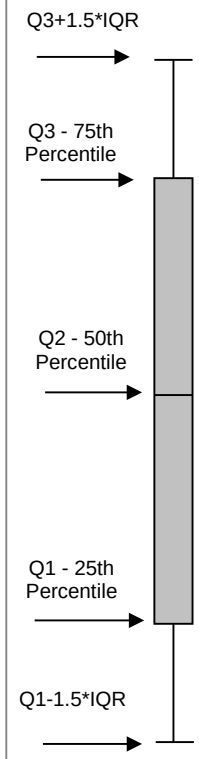
Geosyntec consultants

Huntington Beach | 22-Jun-15

Figure B-4E

P:\PRJ4\CAWP\HW0989\CPA-FTF DUE (May 2014)\[Figures B-4 - Soil Boxplots (Updated June 2015).xlsm]B4BC





* Denotes No Basic Comparison Level Available

Denotes Basic Comparison Level

Denotes ND Statistical Outlier

Denotes Detected Statistical Outlier

Notes:

mg/kg= milligrams per kilogram
ND = non-detect
IQR = interquartile range equals the 3rd quartile (75th percentile) - 1st quartile (25th percentile)
Half of the sample quantitation limit is used for nondetects unless otherwise noted.

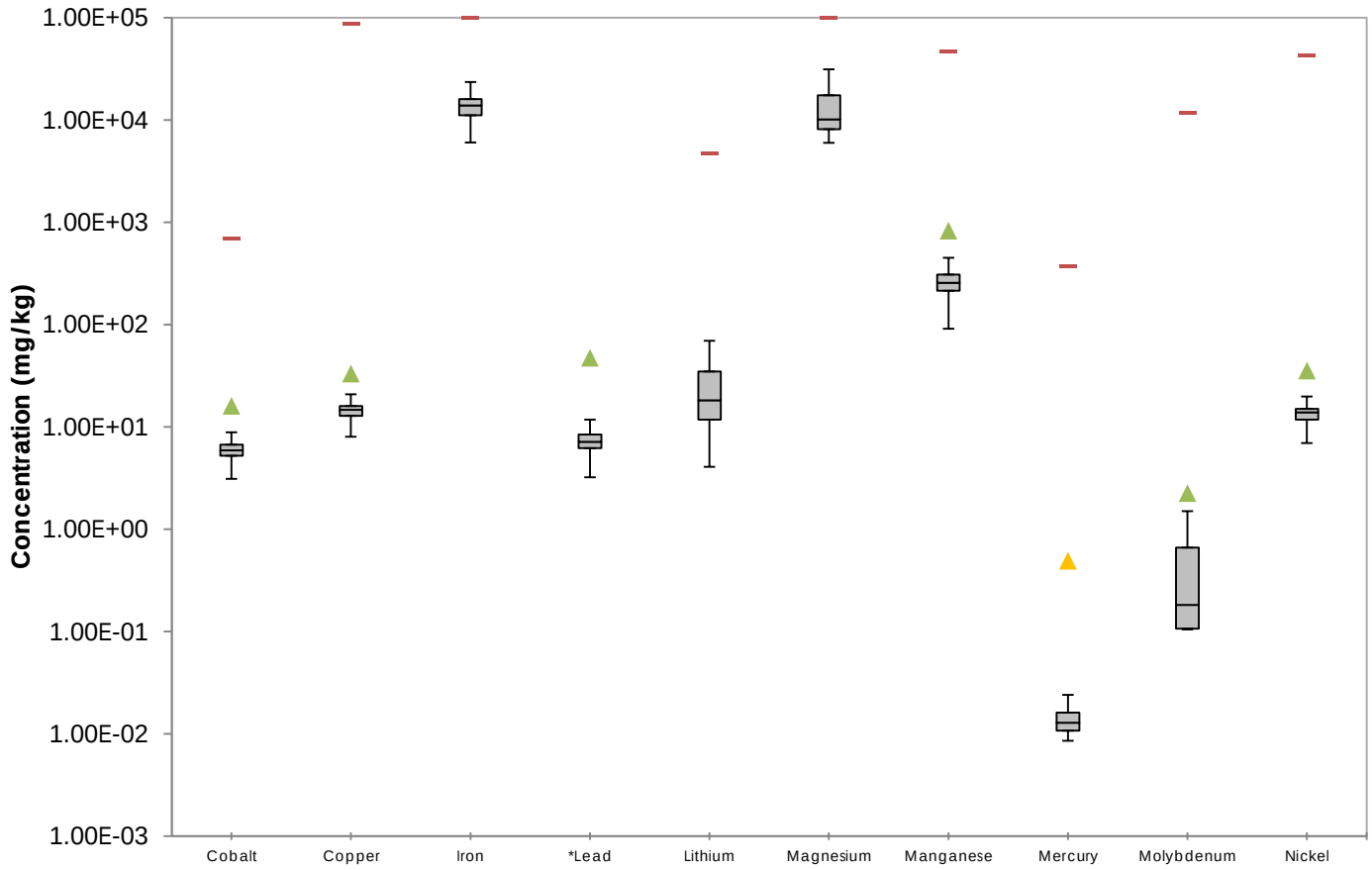
Soil Box and Whisker Plots - INORGANICS
Closed Ponds Area and Former Tank Farm
Henderson, Nevada

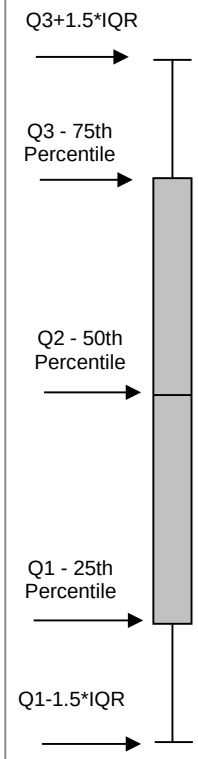
Geosyntec consultants

Huntington Beach | 22-Jun-15

Figure B-4F

P:\PRJ4\CAWP\HW0989\CPA-FTF DUE (May 2014)\[Figures B-4 - Soil Boxplots (Updated June 2015).xlsm]B4BC





* Denotes No Basic Comparison Level Available

Denotes Basic Comparison Level

Denotes ND Statistical Outlier

Denotes Detected Statistical Outlier

Notes:

mg/kg= milligrams per kilogram
ND = non-detect
IQR = interquartile range equals the 3rd quartile (75th percentile) - 1st quartile (25th percentile)
Half of the sample quantitation limit is used for nondetects unless otherwise noted.

Soil Box and Whisker Plots - INORGANICS
Closed Ponds Area and Former Tank Farm
Henderson, Nevada

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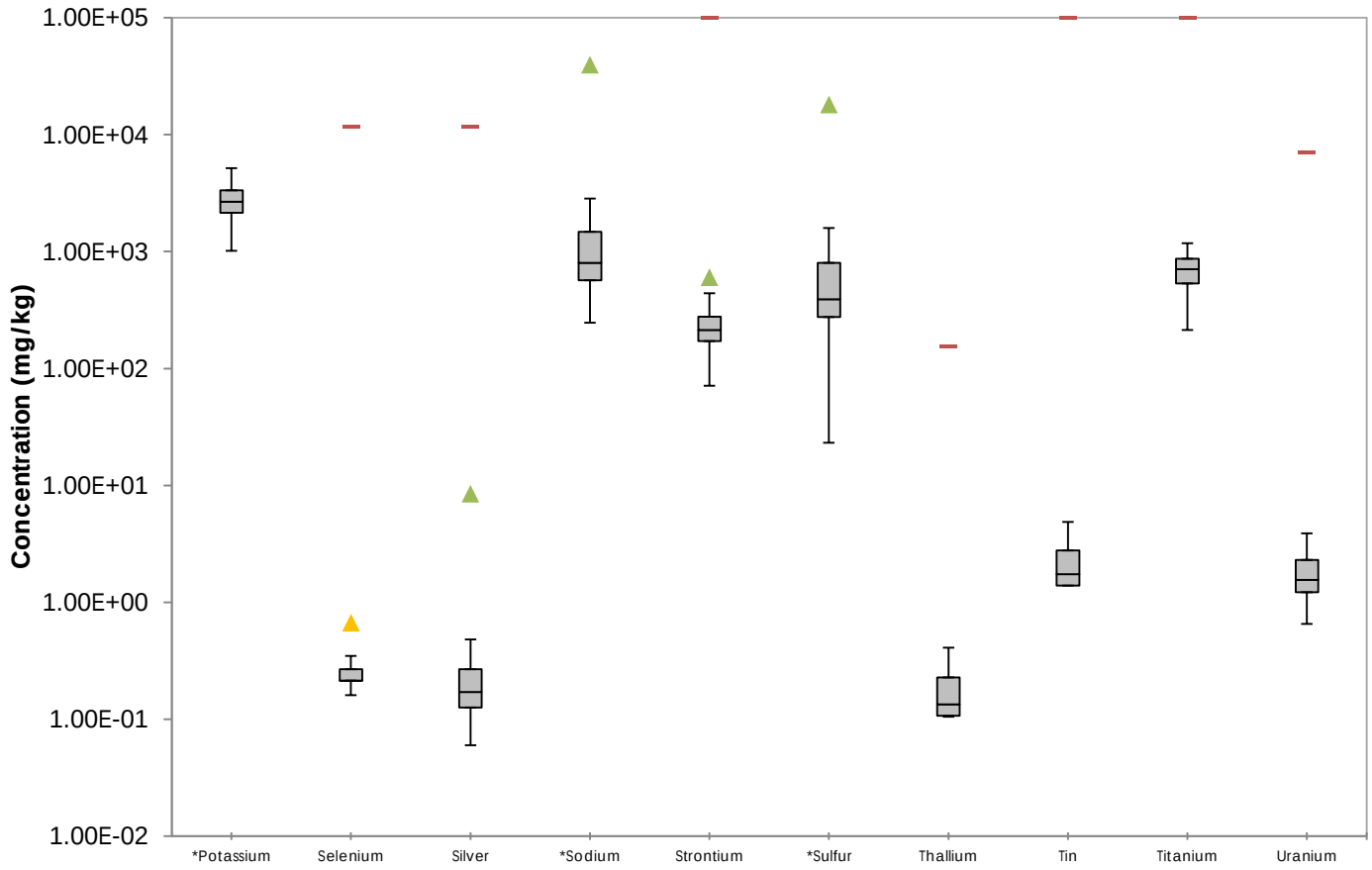
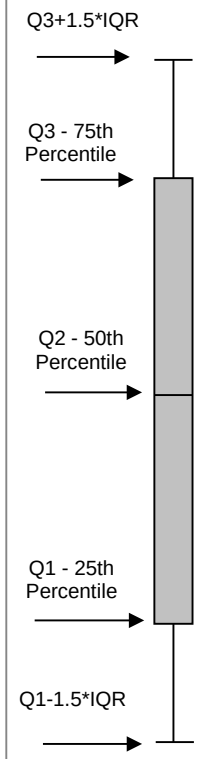
Figure B-4G

P:\PRJ4\CAWP\HW0989\CPA-FTF DUE (May 2014)\[Figures B-4 - Soil Boxplots (Updated June 2015).xlsm]B48C





* Denotes No Basic Comparison Level Available

Denotes Basic Comparison Level

Denotes ND Statistical Outlier

Denotes Detected Statistical Outlier

Notes:

mg/kg= milligrams per kilogram
ND = non-detect
IQR = interquartile range equals the 3rd quartile (75th percentile) - 1st quartile (25th percentile)
Half of the sample quantitation limit is used for nondetects unless otherwise noted.

Soil Box and Whisker Plots - INORGANICS
Closed Ponds Area and Former Tank Farm
Henderson, Nevada

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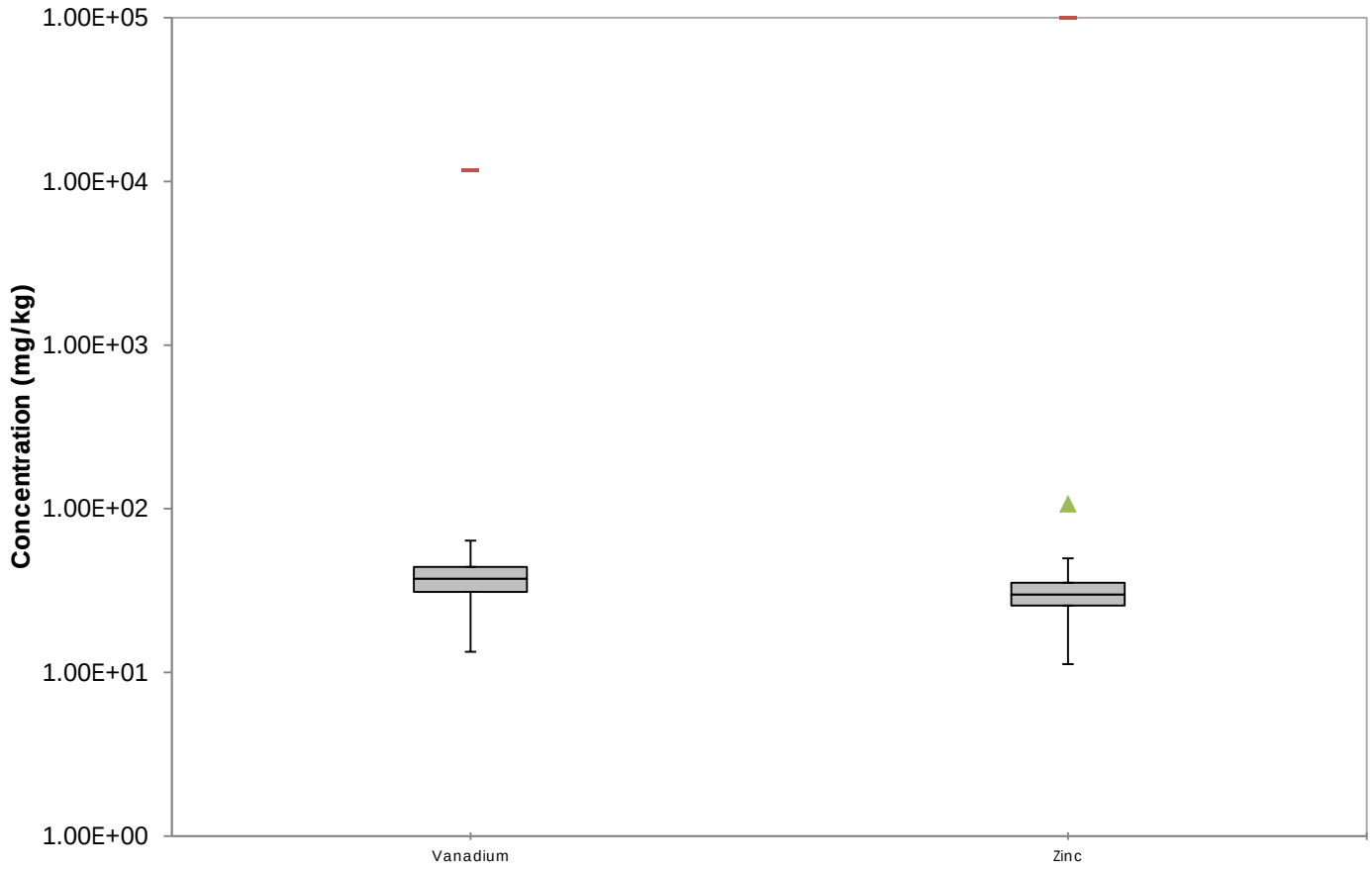
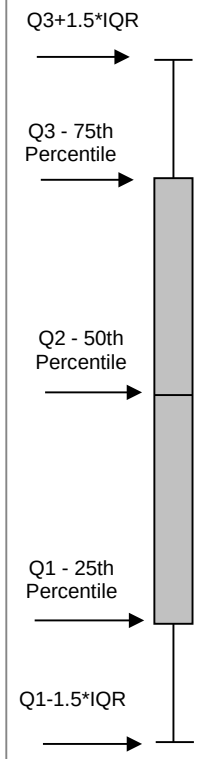
Figure B-4H

P:\PRJ4\CAWP\HW0989\CPA-FTF DUE (May 2014)\[Figures B-4 - Soil Boxplots (Updated June 2015).xlsm]B48C





* Denotes No Basic Comparison Level Available
Denotes Basic Comparison Level
Denotes ND Statistical Outlier
Denotes Detected Statistical Outlier

Notes:

mg/kg= milligrams per kilogram
ND = non-detect
IQR = interquartile range equals the 3rd quartile (75th percentile) - 1st quartile (25th percentile)
Half of the sample quantitation limit is used for nondetects unless otherwise noted.

Soil Box and Whisker Plots - INORGANICS
Closed Ponds Area and Former Tank Farm
Henderson, Nevada

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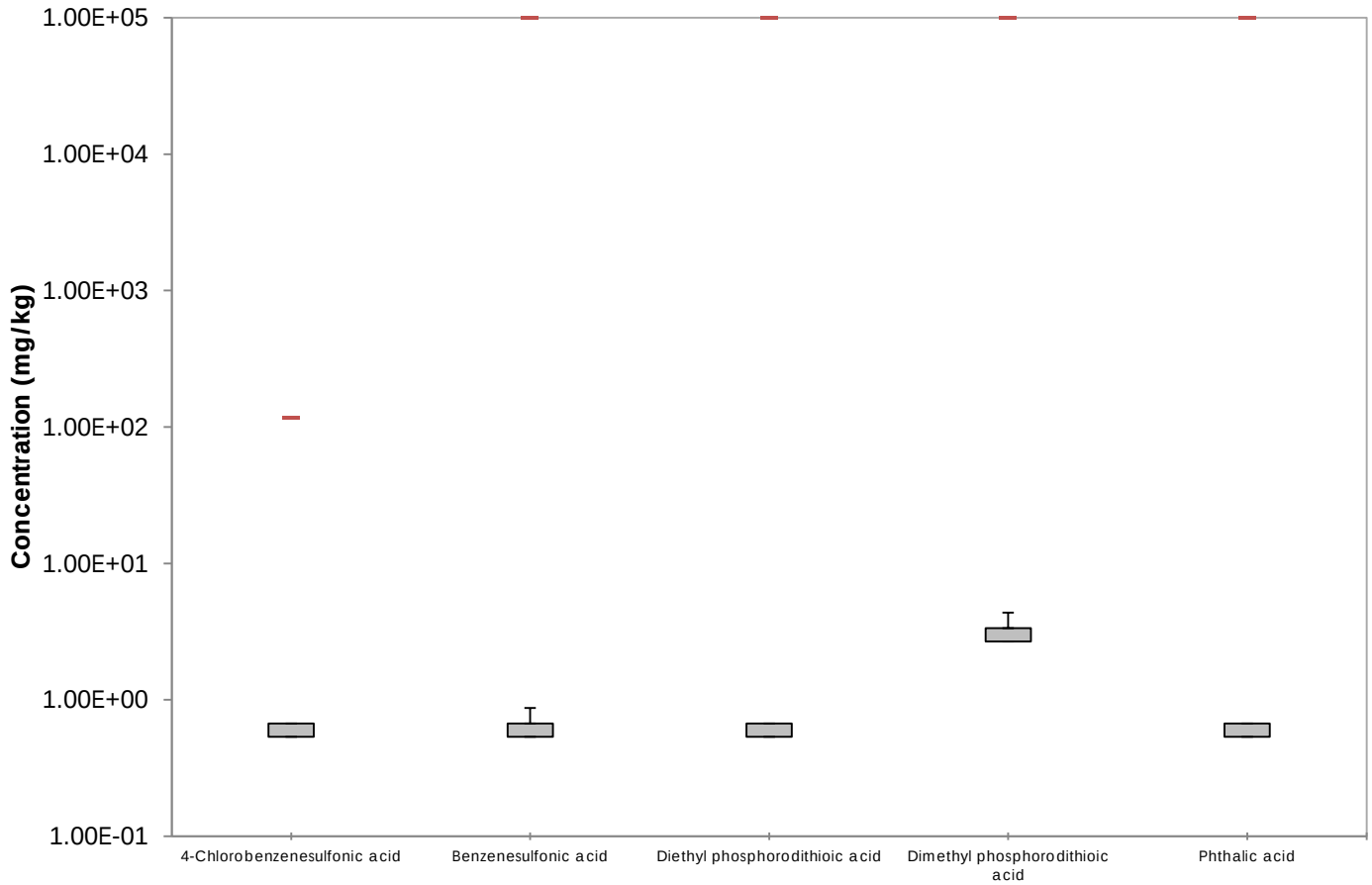
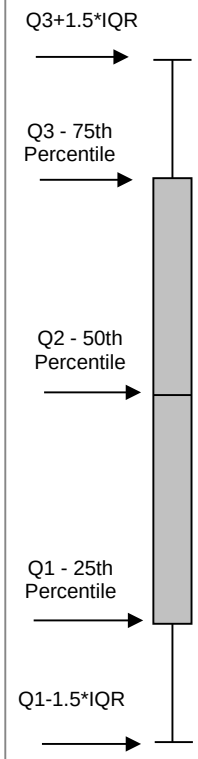
Figure B-4I

Huntington Beach | 22-Jun-15

P:\PRJ4\CAWP\HW0989\CPA-FTF DUE (May 2014)\[Figures B-4 - Soil Boxplots (Updated June 2015).xlsm]B4BC





* Denotes No Basic Comparison Level Available

Denotes Basic Comparison Level

Denotes ND Statistical Outlier

Denotes Detected Statistical Outlier

Notes:

mg/kg= milligrams per kilogram
ND = non-detect
IQR = interquartile range equals the 3rd quartile (75th percentile) - 1st quartile (25th percentile)
Half of the sample quantitation limit is used for nondetects unless otherwise noted.

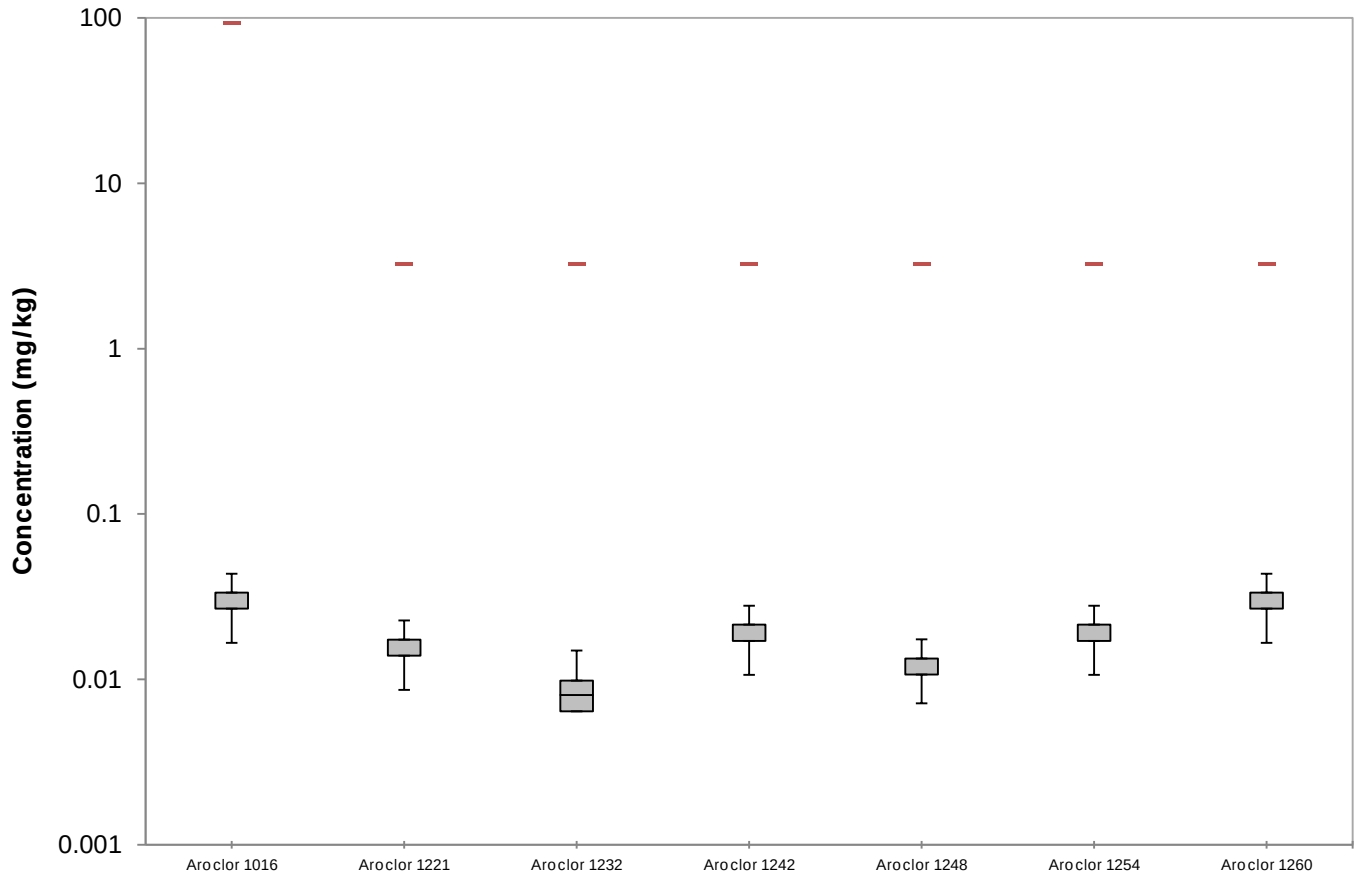
Soil Box and Whisker Plots -ORGANIC ACIDS
Closed Ponds Area and Former Tank Farm
Henderson, Nevada

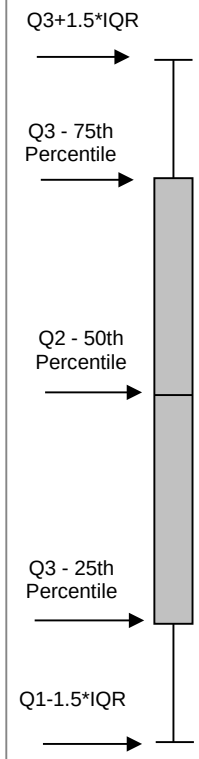
Geosyntec consultants

Figure B-4J

Huntington Beach | 22-Jun-15

P:\PRJ4\CAWP\HW0989\CPA-FTF DUE (May 2014)\[Figures B-4 - Soil Boxplots (Updated June 2015).xlsm]B48C





* Denotes No Basic Comparison Level Available

Denotes Basic Comparison Level

Denotes ND Statistical Outlier

Denotes Detected Statistical Outlier

Notes:

mg/kg= milligrams per kilogram
ND = non-detect
IQR = interquartile range equals the 3rd quartile (75th percentile) - 1st quartile (25th percentile)
Half of the sample quantitation limit is used for nondetects unless otherwise noted.

Soil Box and Whisker Plots -
POLYCHLORINATED BIPHENYLS
Closed Ponds Area and Former Tank Farm
Henderson, Nevada

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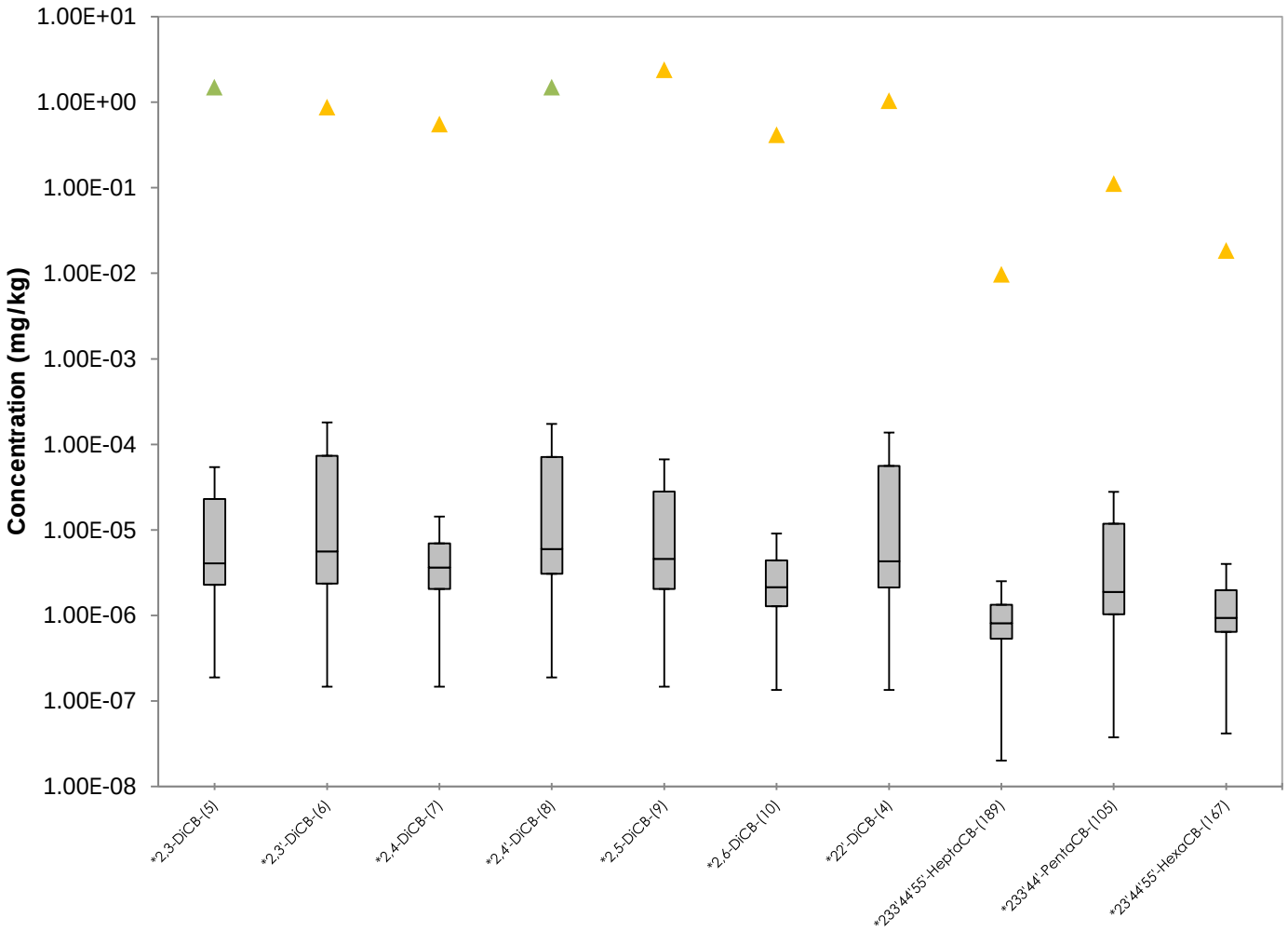
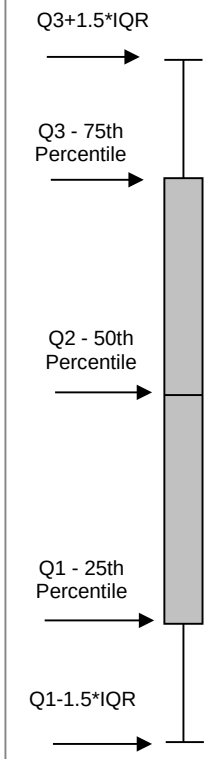
Figure B-4K

P:\PRJ4\CAWP\HW0989\CPA-FTF DUE (May 2014)\[Figures B-4 - Soil Boxplots (Updated June 2015).xlsm]B48C





* Denotes No Basic Comparison Level Available

Denotes Basic Comparison Level

Denotes ND Statistical Outlier

Denotes Detected Statistical Outlier

Notes:

mg/kg= milligrams per kilogram
ND = non-detect
IQR = interquartile range equals the 3rd quartile (75th percentile) - 1st quartile (25th percentile)
Half of the sample quantitation limit is used for nondetects unless otherwise noted.

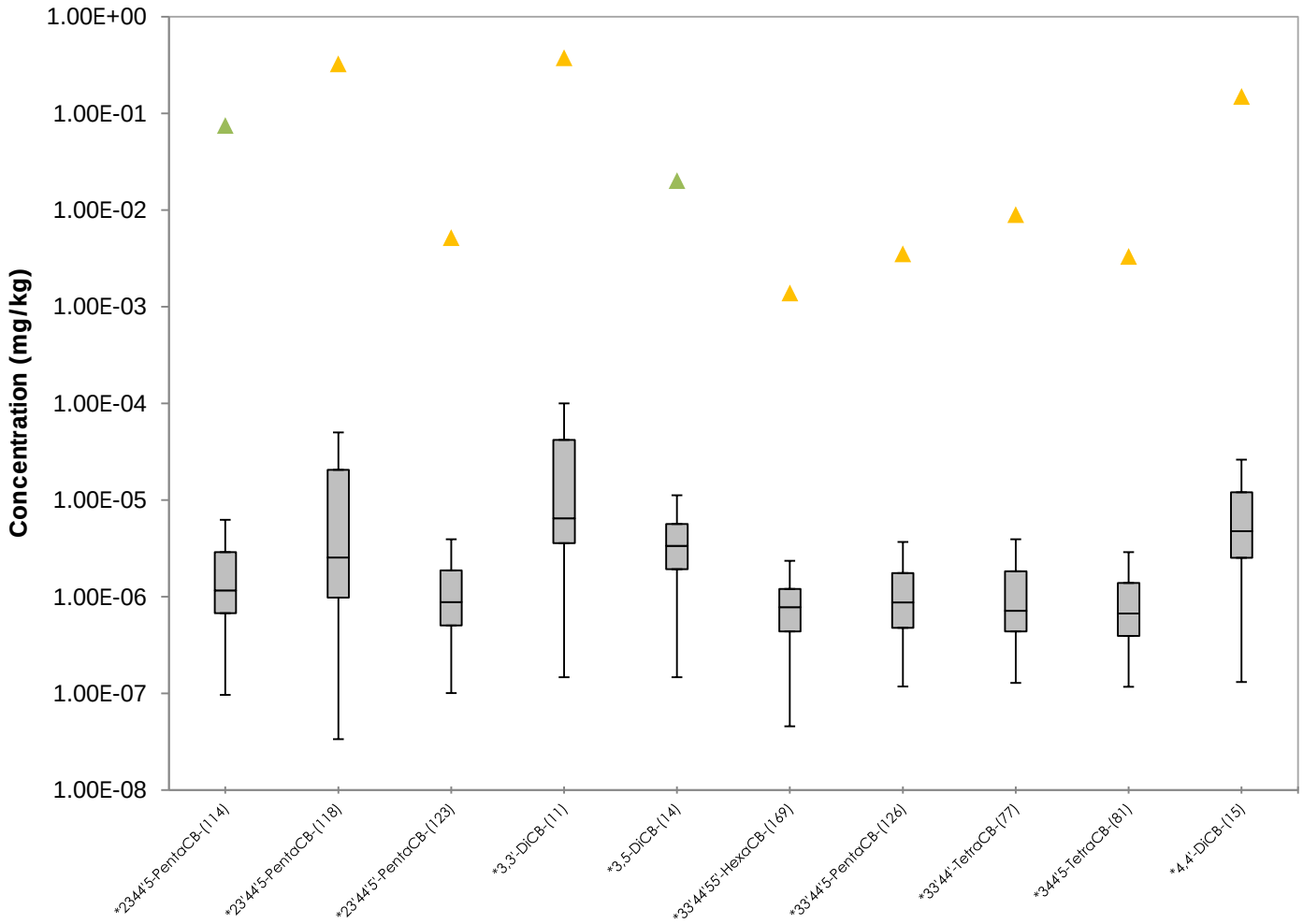
Soil Box and Whisker Plots -
POLYCHLORINATED BIPHENYLS
Closed Ponds Area and Former Tank Farm
Henderson, Nevada

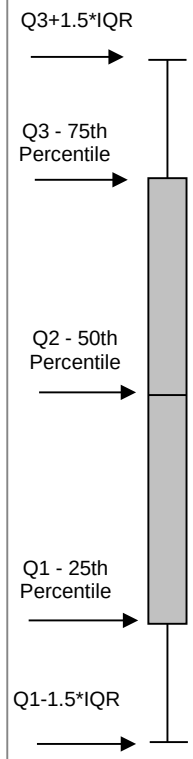
Geosyntec consultants

Figure B-4L

Huntington Beach | 22-Jun-15

P:\PRJ4\CAWP\HW0989\CPA-FTF DUE (May 2014)\Figure





* Denotes No Basic Comparison Level Available

Denotes Basic Comparison Level

Denotes ND Statistical Outlier

Denotes Detected Statistical Outlier

Notes:

mg/kg= milligrams per kilogram
ND = non-detect
IQR = interquartile range equals the 3rd quartile (75th percentile) - 1st quartile (25th percentile)
Half of the sample quantitation limit is used for nondetects unless otherwise noted.

Soil Box and Whisker Plots -
POLYCHLORINATED BIPHENYLS
Closed Ponds Area and Former Tank Farm
Henderson, Nevada

Geosyntec consultants

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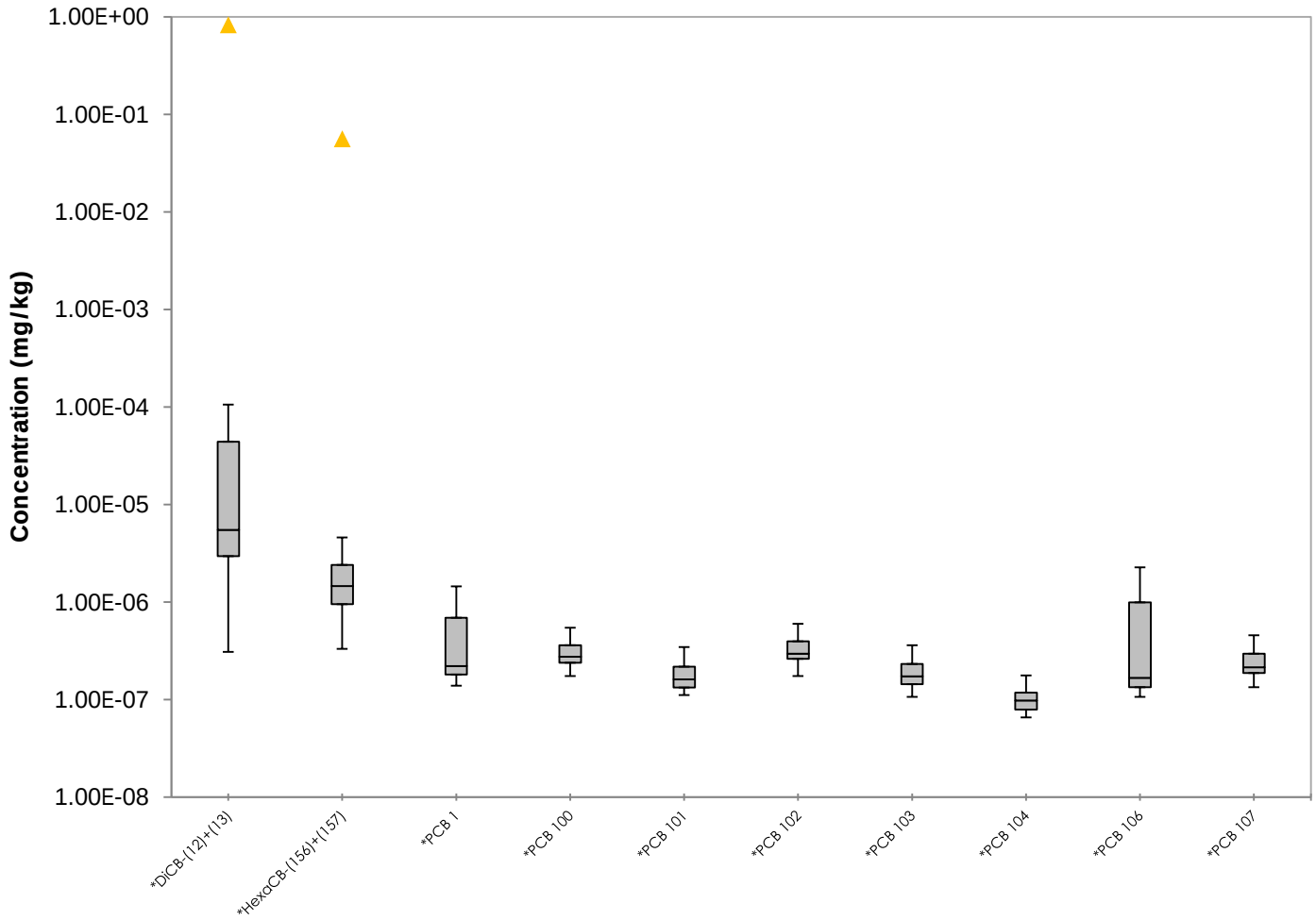
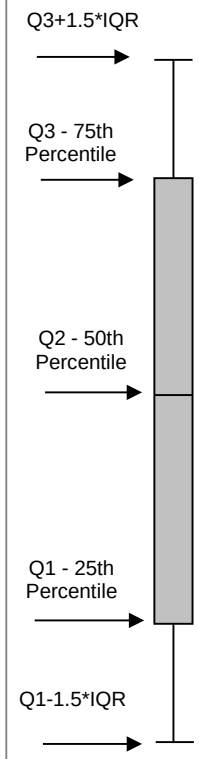
Figure B-4M

P:\PRJ4\CAWP\HW0989\CPA-FTF DUE (May 2014)\[Figures B-4 - Soil Boxplots (Updated June 2015).xlsm]B4BC





* Denotes No Basic Comparison Level Available

Denotes Basic Comparison Level

Denotes ND Statistical Outlier

Denotes Detected Statistical Outlier

Notes:

mg/kg= milligrams per kilogram
ND = non-detect
IQR = interquartile range equals the 3rd quartile (75th percentile) - 1st quartile (25th percentile)
Half of the sample quantitation limit is used for nondetects unless otherwise noted.

Soil Box and Whisker Plots -
POLYCHLORINATED BIPHENYLS
Closed Ponds Area and Former Tank Farm
Henderson, Nevada

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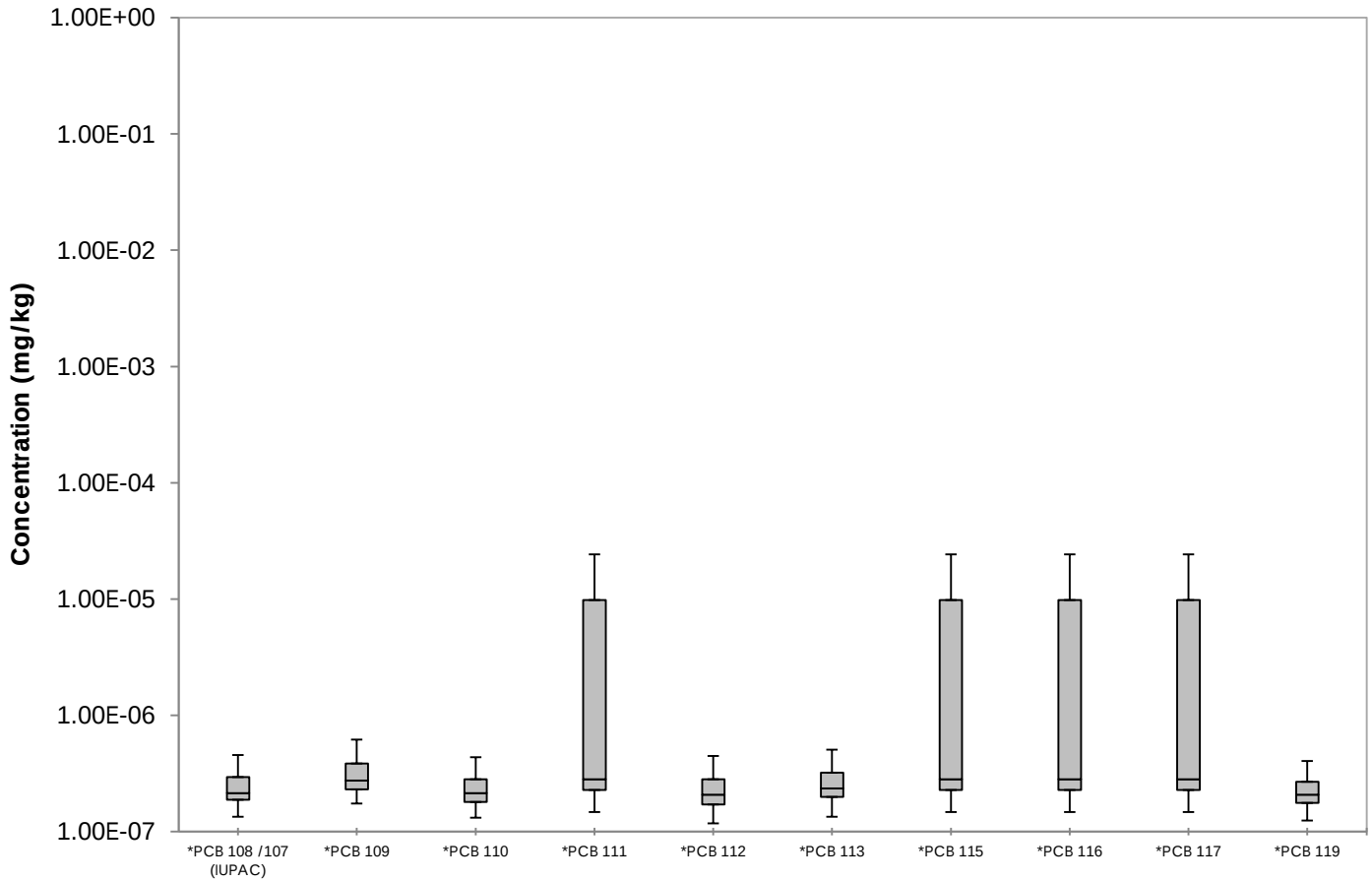
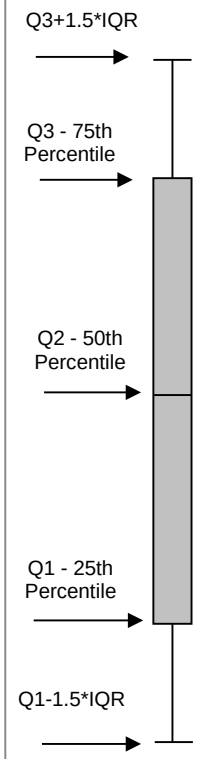
Figure B-4N

P:\PRJ4\CAWP\HW0989\CPA-FTF DUE (May 2014)\[Figures B-4 - Soil Boxplots (Updated June 2015).xlsm]B4BC





* Denotes No Basic Comparison Level Available

Denotes Basic Comparison Level

Denotes ND Statistical Outlier

Denotes Detected Statistical Outlier

Notes:

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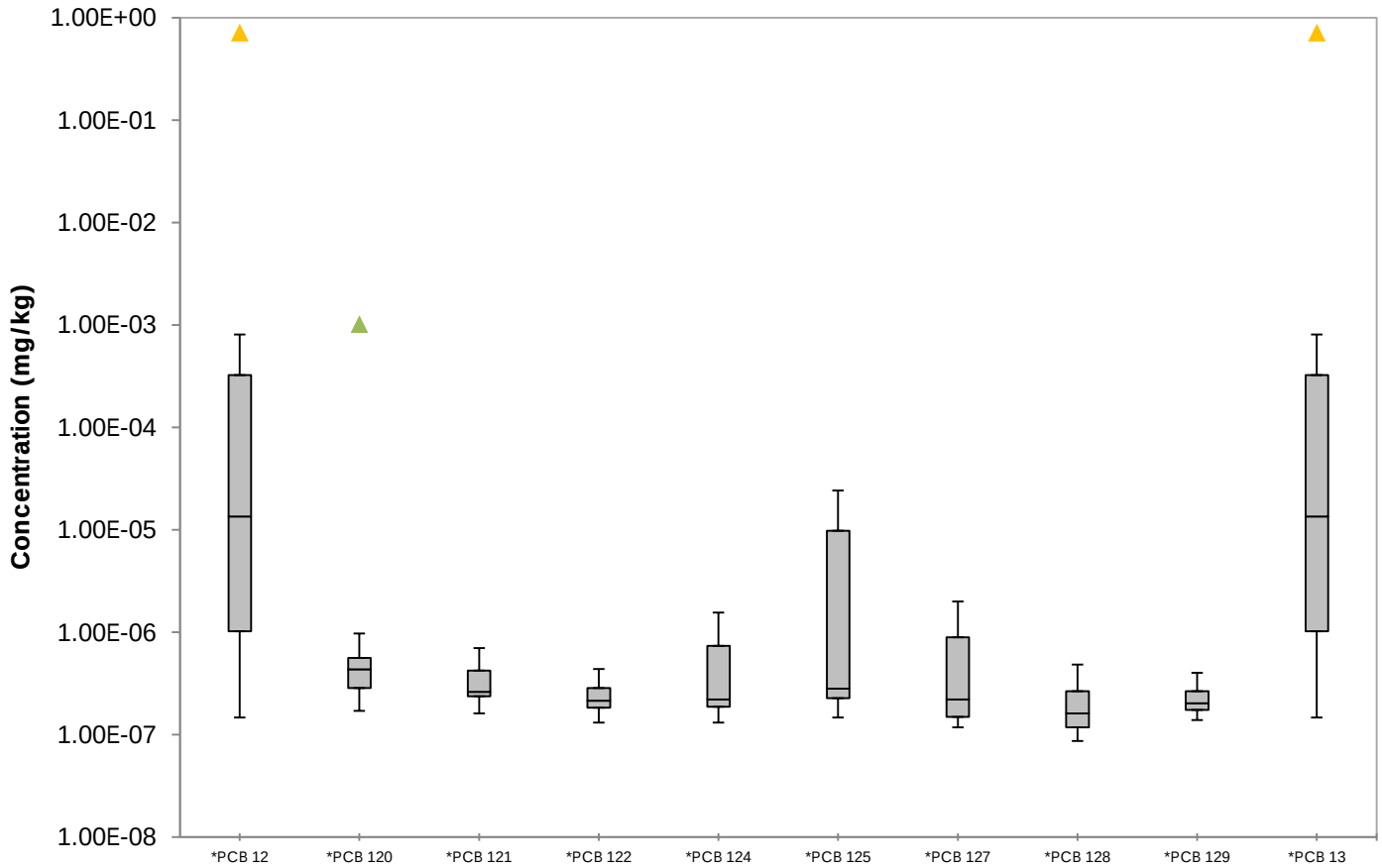
Figure B-4O

P:\PRJ4\CAWP\HW0989\CPA-FTF DUE (May 2014)\[Figures B-4 - Soil Boxplots (Updated June 2015).xlsm]B4BC



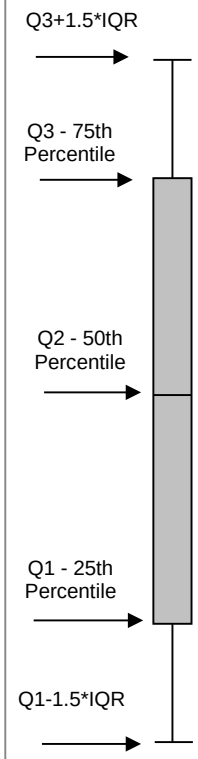


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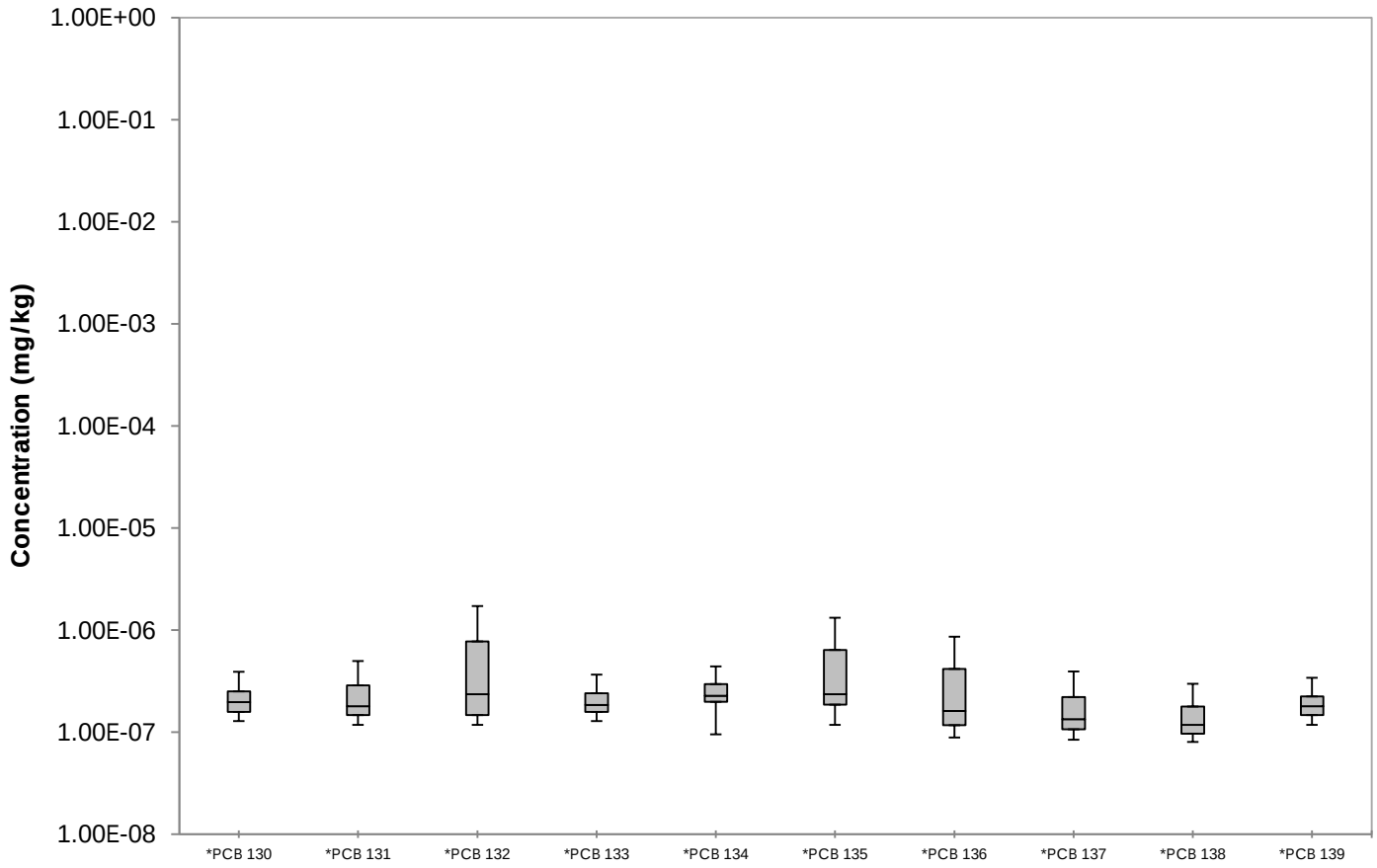
Figure B-4P

P:\PRJ4\CAWP\HW0989\CPA-FTF DUE (May 2014)\[Figures B-4 - Soil Boxplots (Updated June 2015).xlsm]B4BC



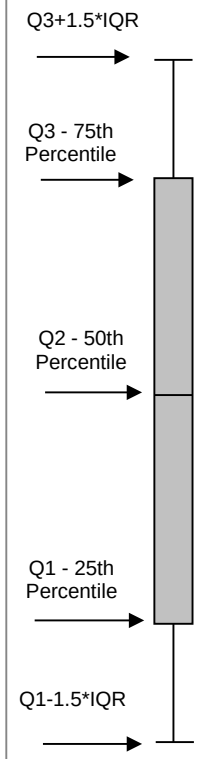


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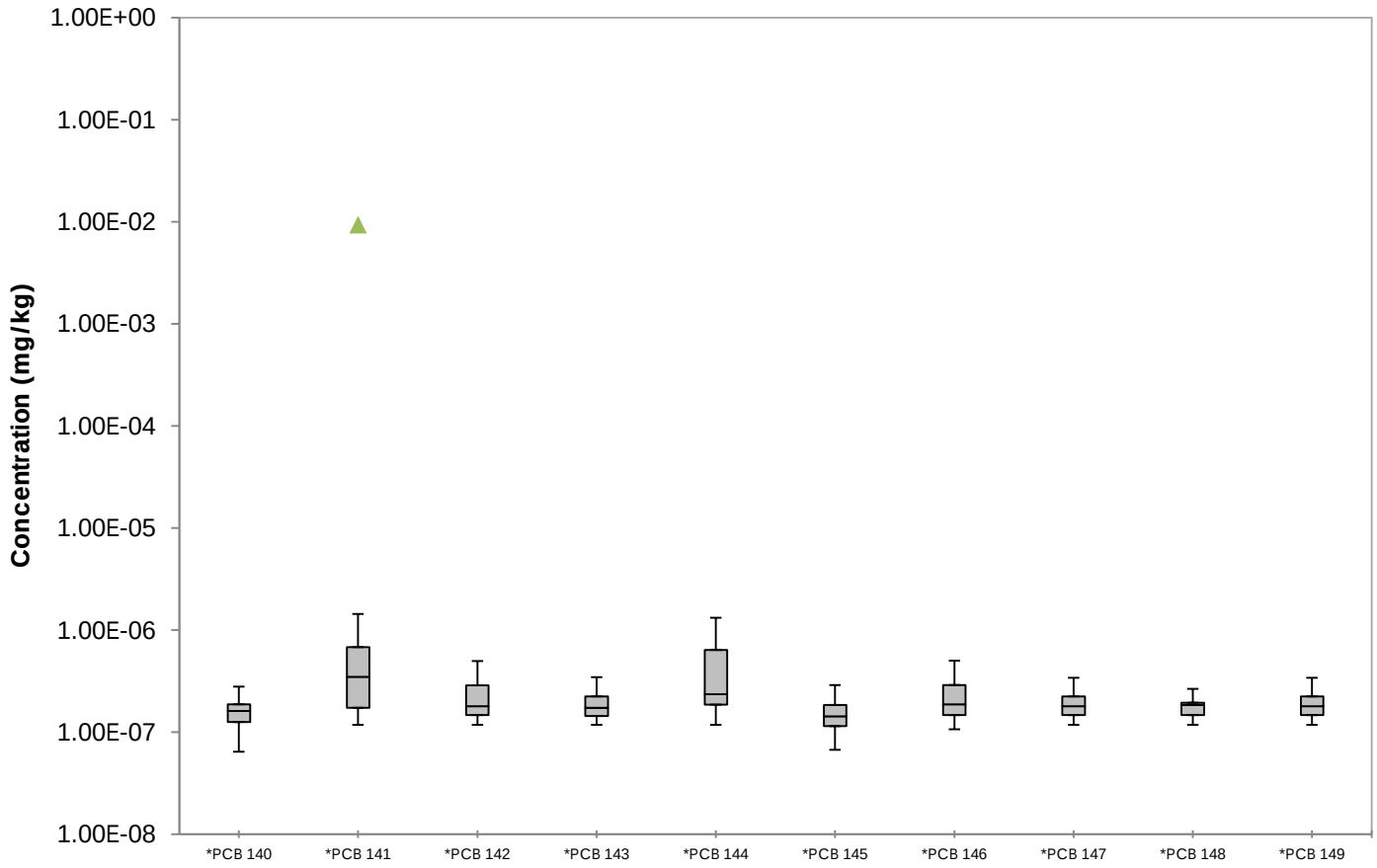
Figure B-4Q

P:\PRJ4\CAWP\HW0989\CPA-FTF DUE (May 2014)\[Figures B-4 - Soil Boxplots (Updated June 2015).xlsm]B48C



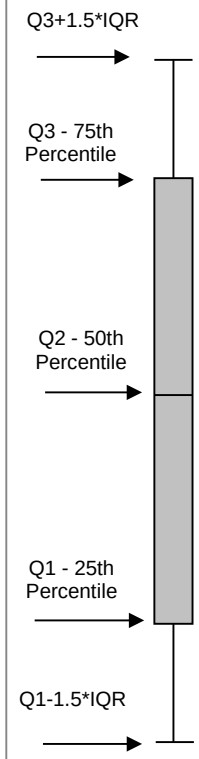


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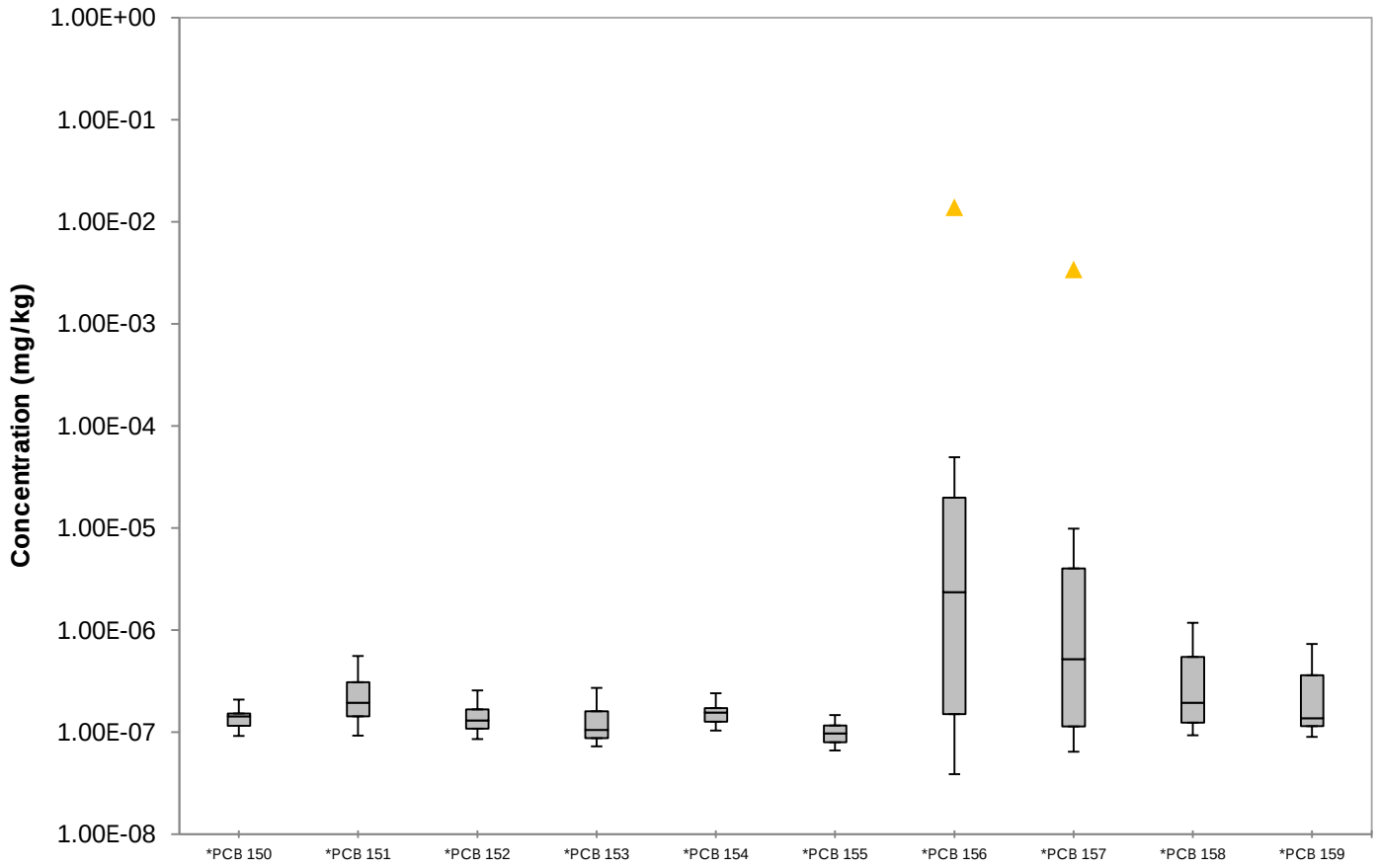
Figure B-4R

P:\PRJ4\CAWP\HW0989\CPA-FTF DUE (May 2014)\[Figures B-4 - Soil Boxplots (Updated June 2015).xlsm]B48C



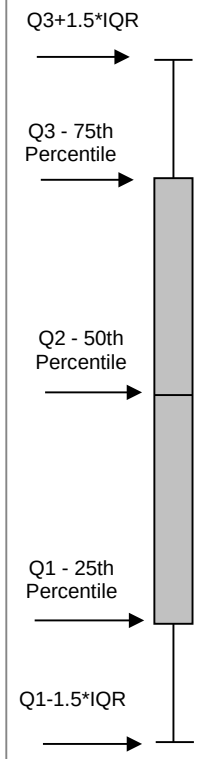


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Figure B-4S

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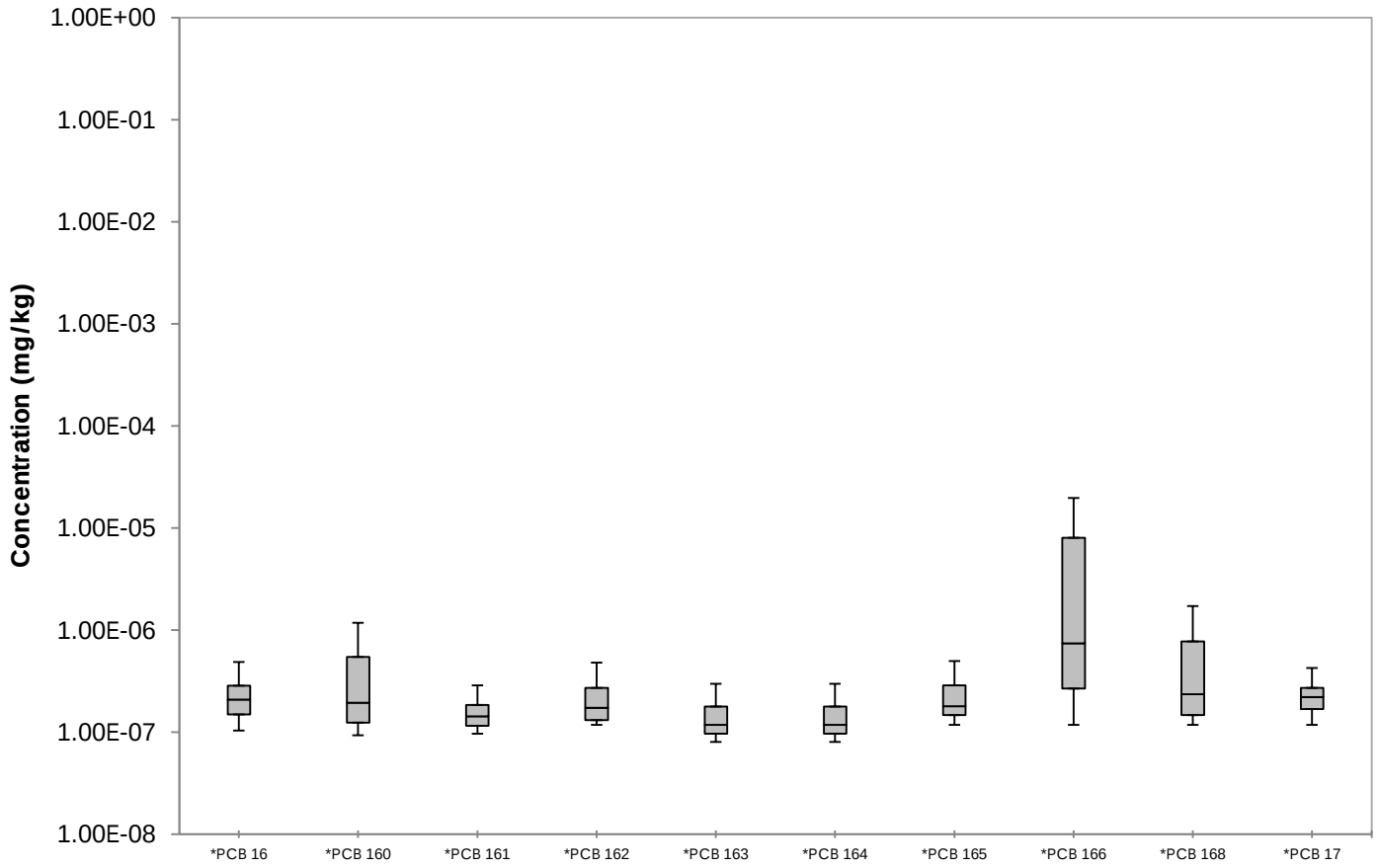
P:\PRJ4\CAWP\HW0989\CPA-FTF DUE (May 2014)\[Figures B-4 - Soil Boxplots (Updated June 2015).xlsm]B4BC



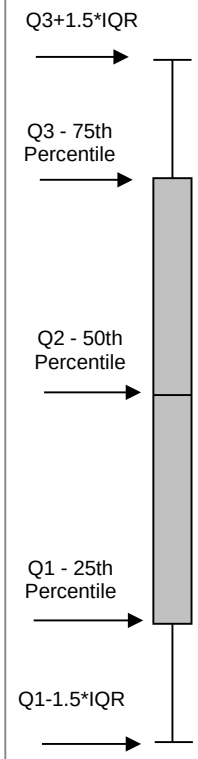


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Figure B-4T

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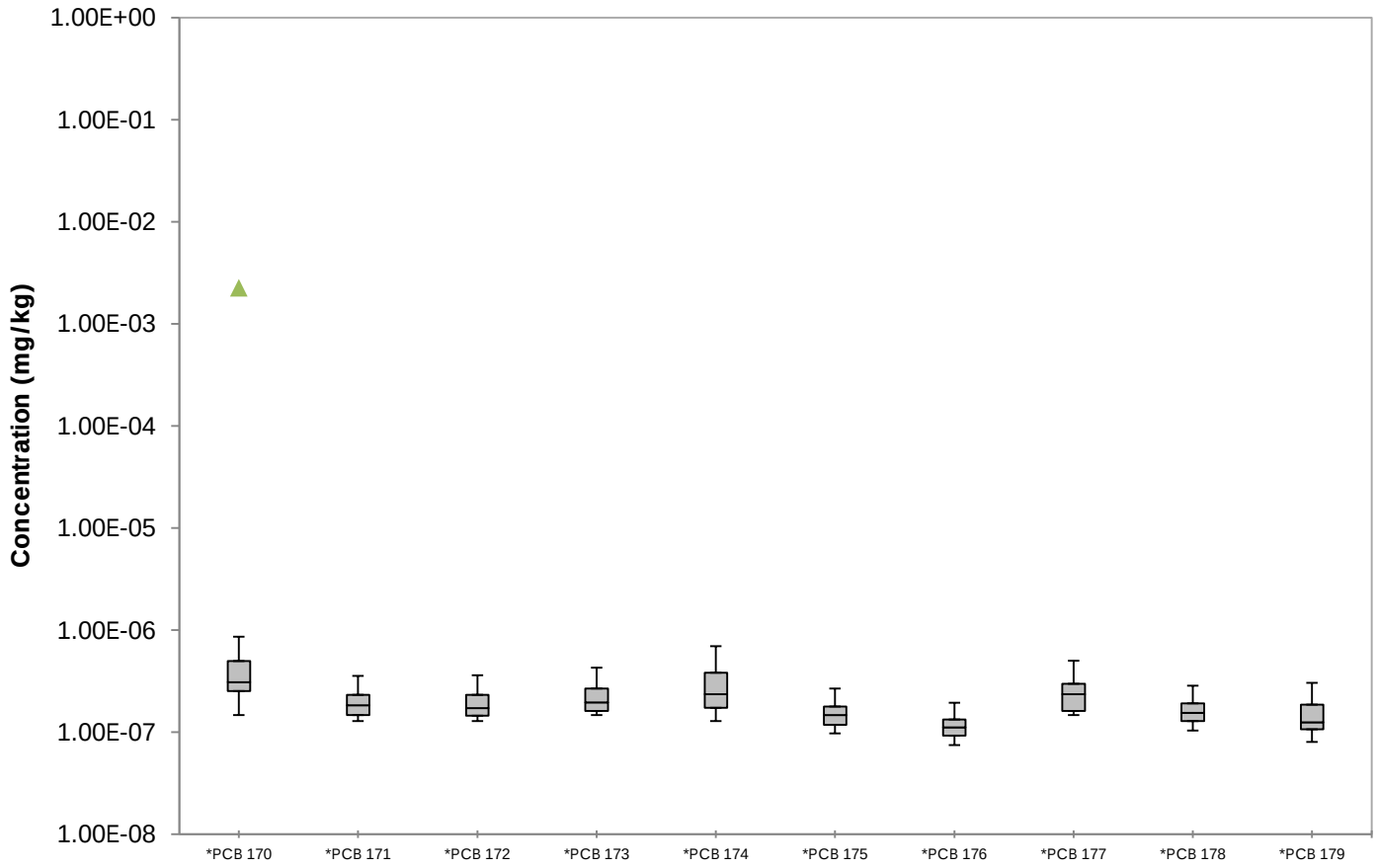
P:\PRJ4\CAWP\HW0989\CPA-FTF DUE (May 2014)\[Figures B-4 - Soil Boxplots (Updated June 2015).xlsm]B4BC



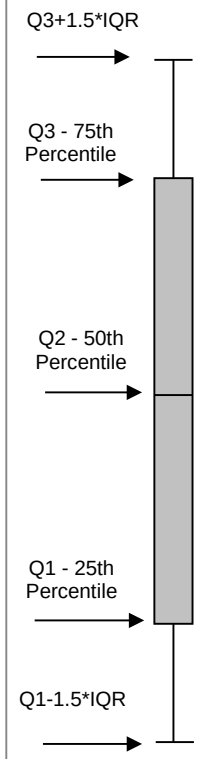


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Figure B-4U

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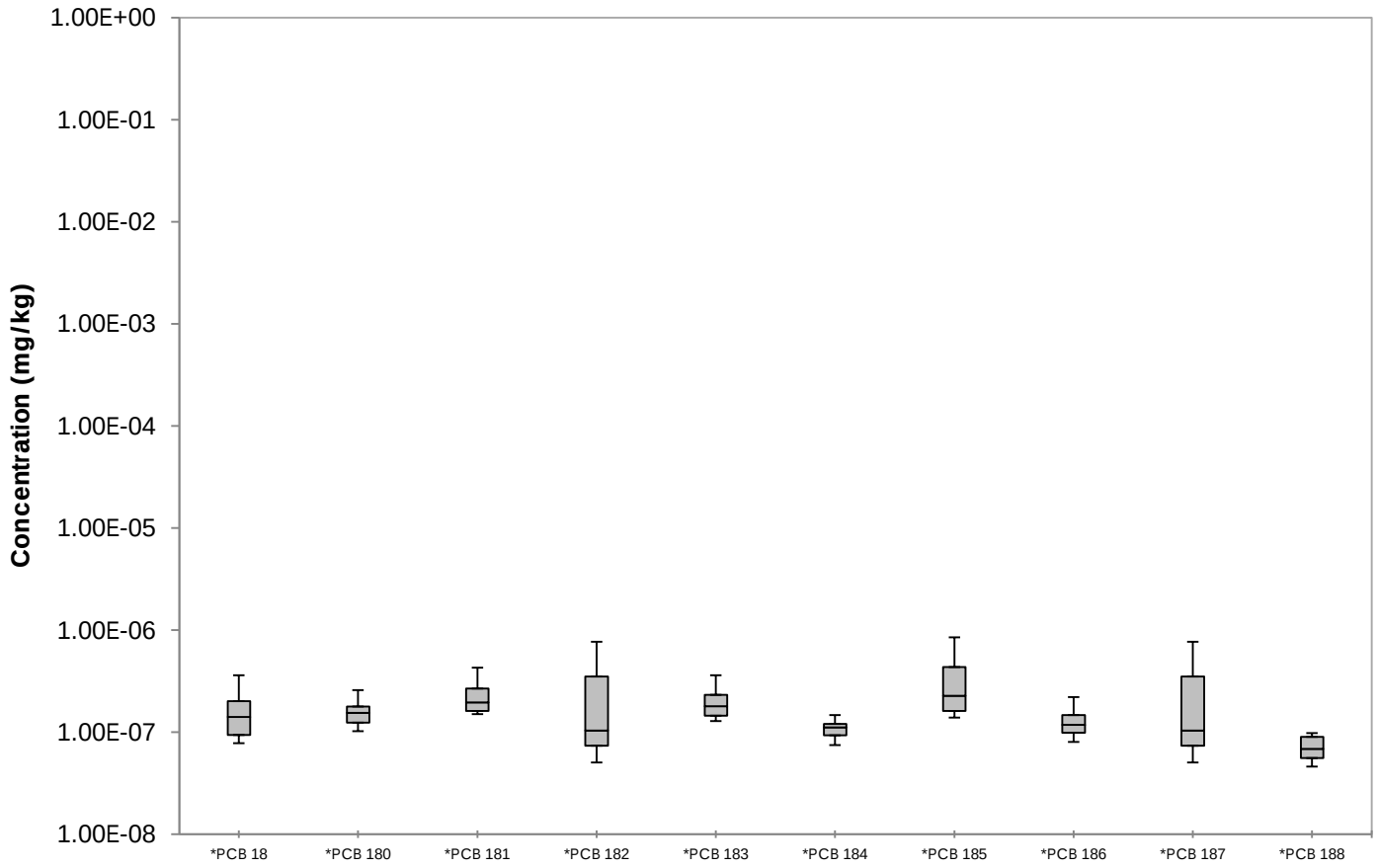
P:\PRJ4\CAWP\HW0989\CPA-FTF DUE (May 2014)\[Figures B-4 - Soil Boxplots (Updated June 2015).xlsm]B4BC



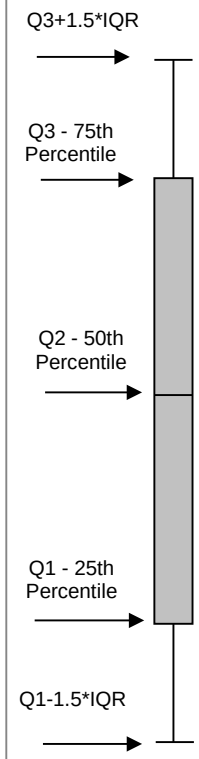


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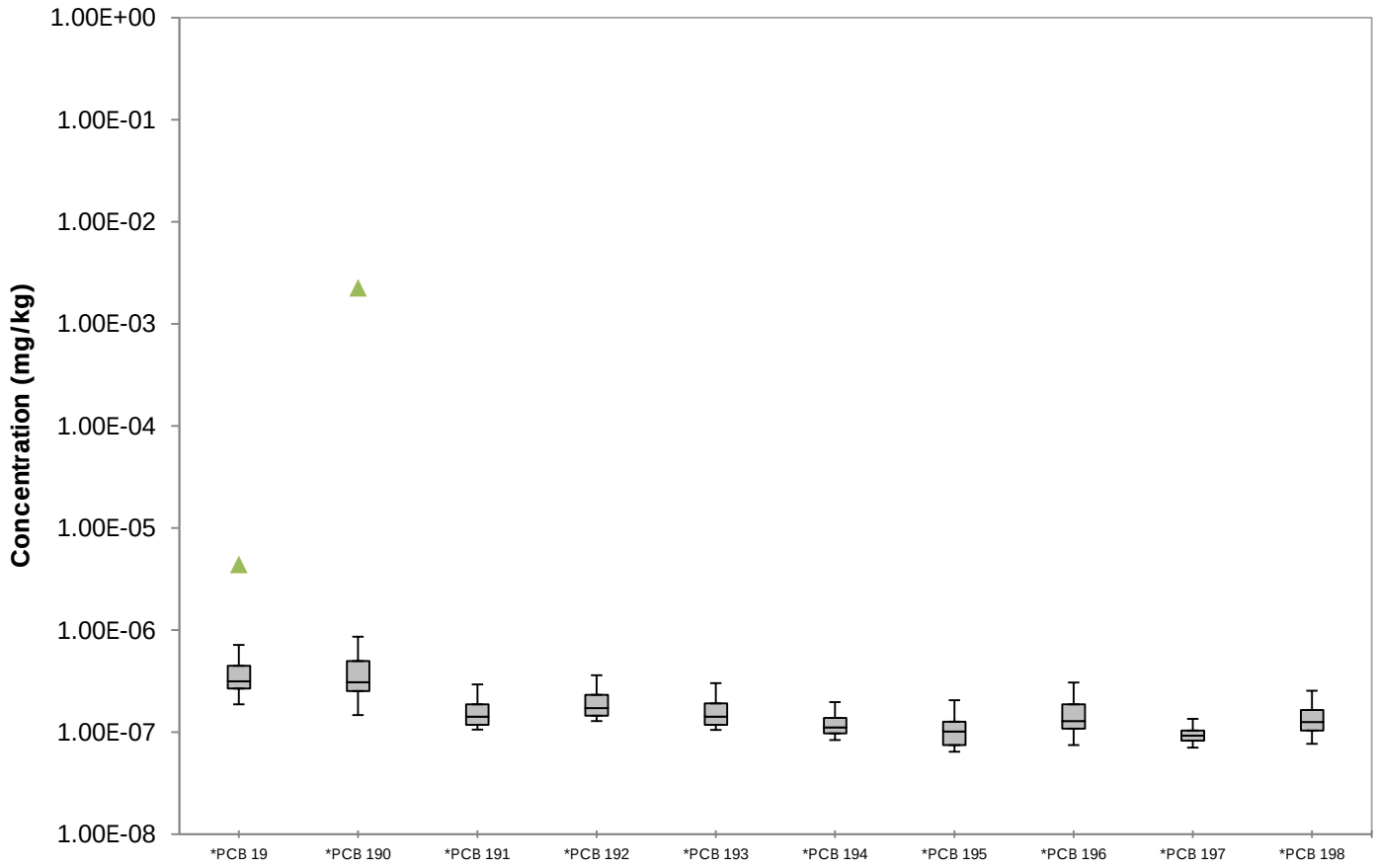
Figure B-4V

P:\PRJ4\CAWP\HW0989\CPA-FTF DUE (May 2014)\[Figures B-4 - Soil Boxplots (Updated June 2015).xlsm]B48C



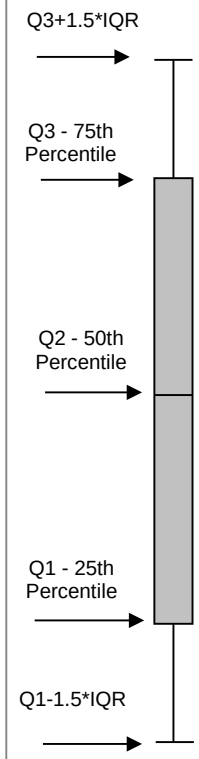


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Figure B-4W

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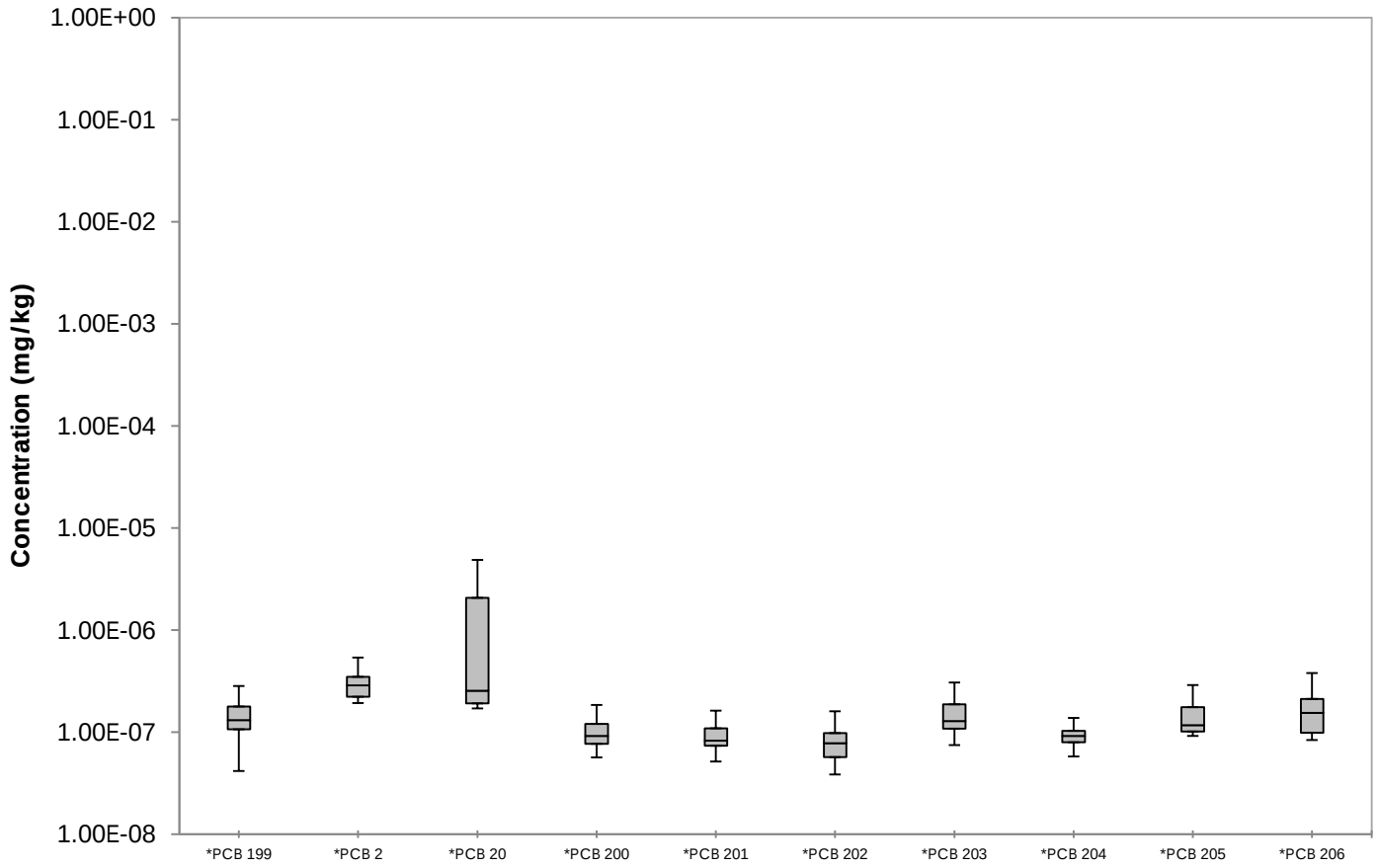
P:\PRJ4\CAWP\HW0989\CPA-FTF DUE (May 2014)\[Figures B-4 - Soil Boxplots (Updated June 2015).xlsm]B48C



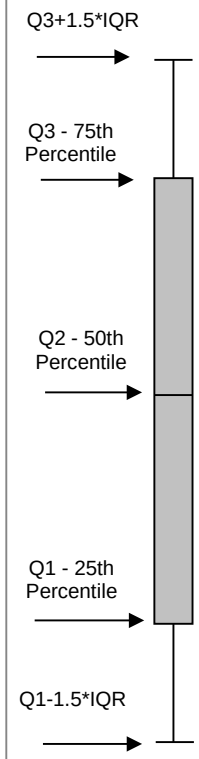


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Figure B-4X

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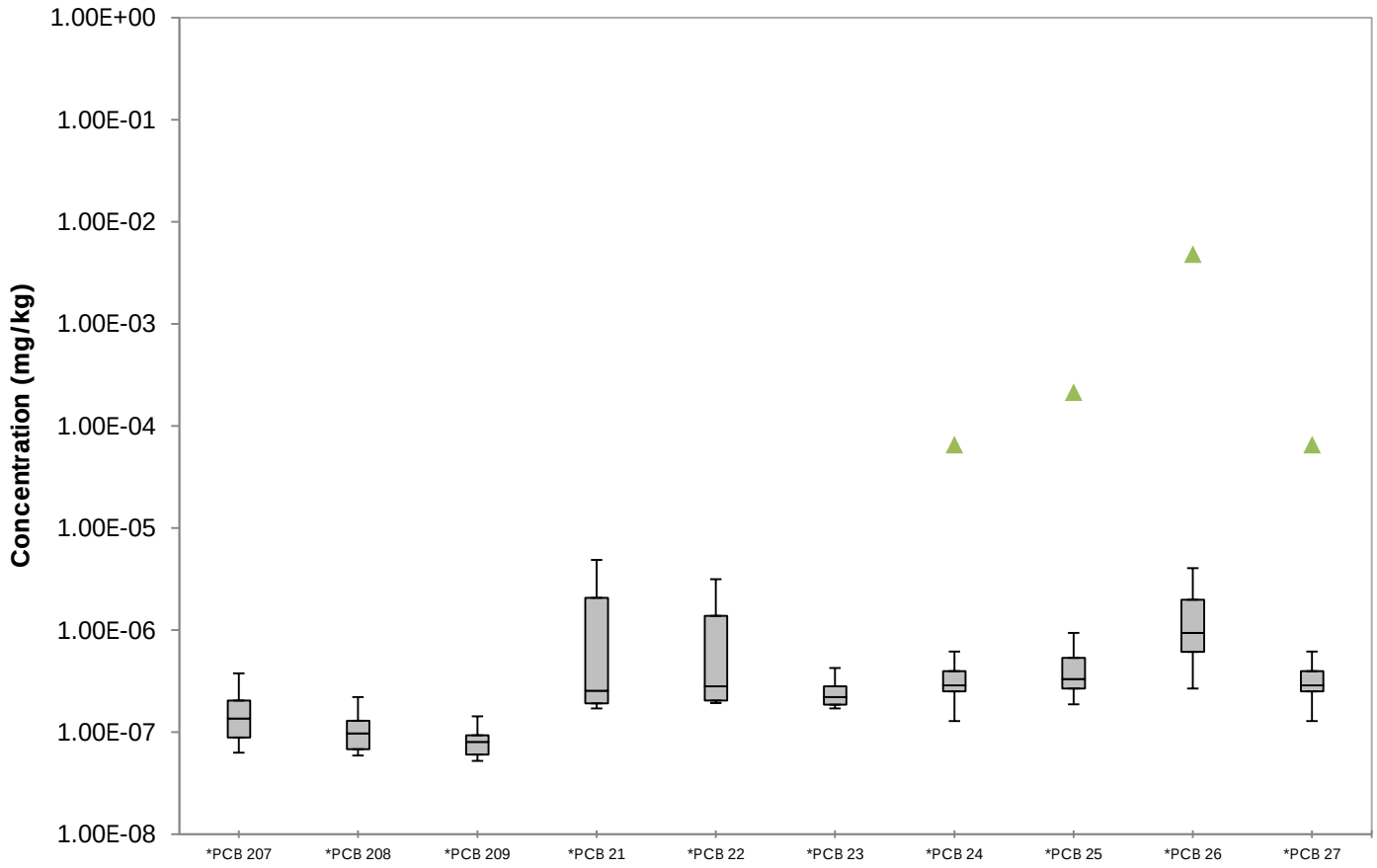
P:\PRJ4\CAWP\HW0989\CPA-FTF DUE (May 2014)\[Figures B-4 - Soil Boxplots (Updated June 2015).xlsm]B4BC



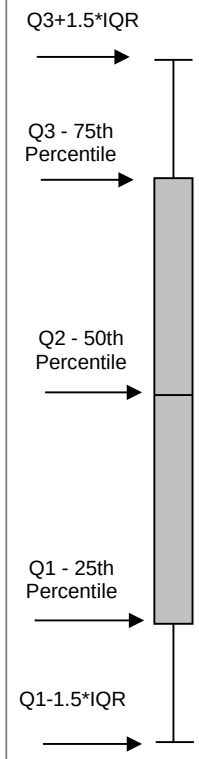


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Figure B-4Y

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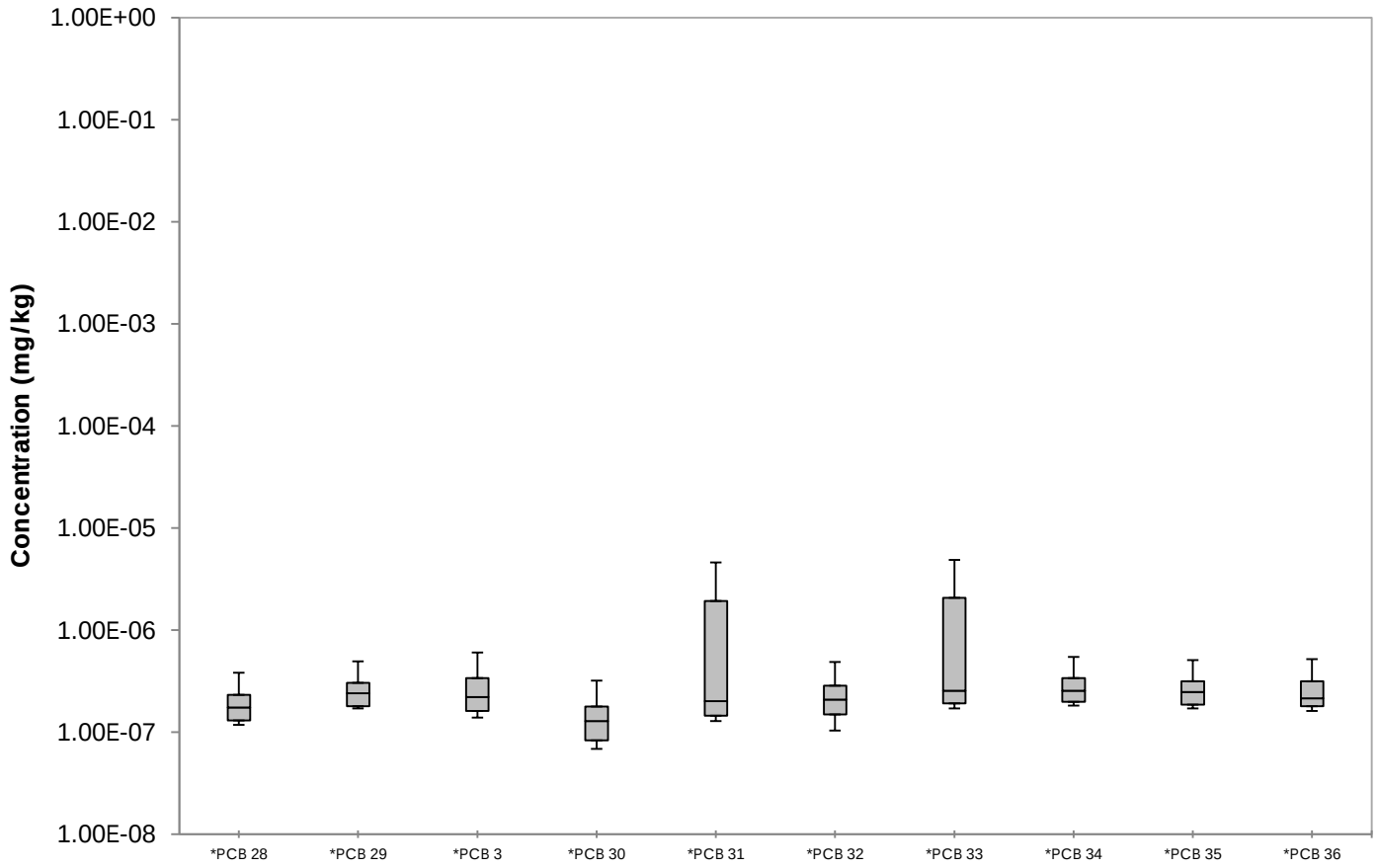
P:\PRJ4\CAWP\HW0989\CPA-FTF DUE (May 2014)\[Figures B-4 - Soil Boxplots (Updated June 2015).xlsm]B4BC



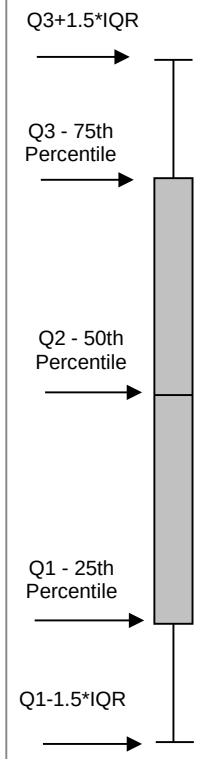


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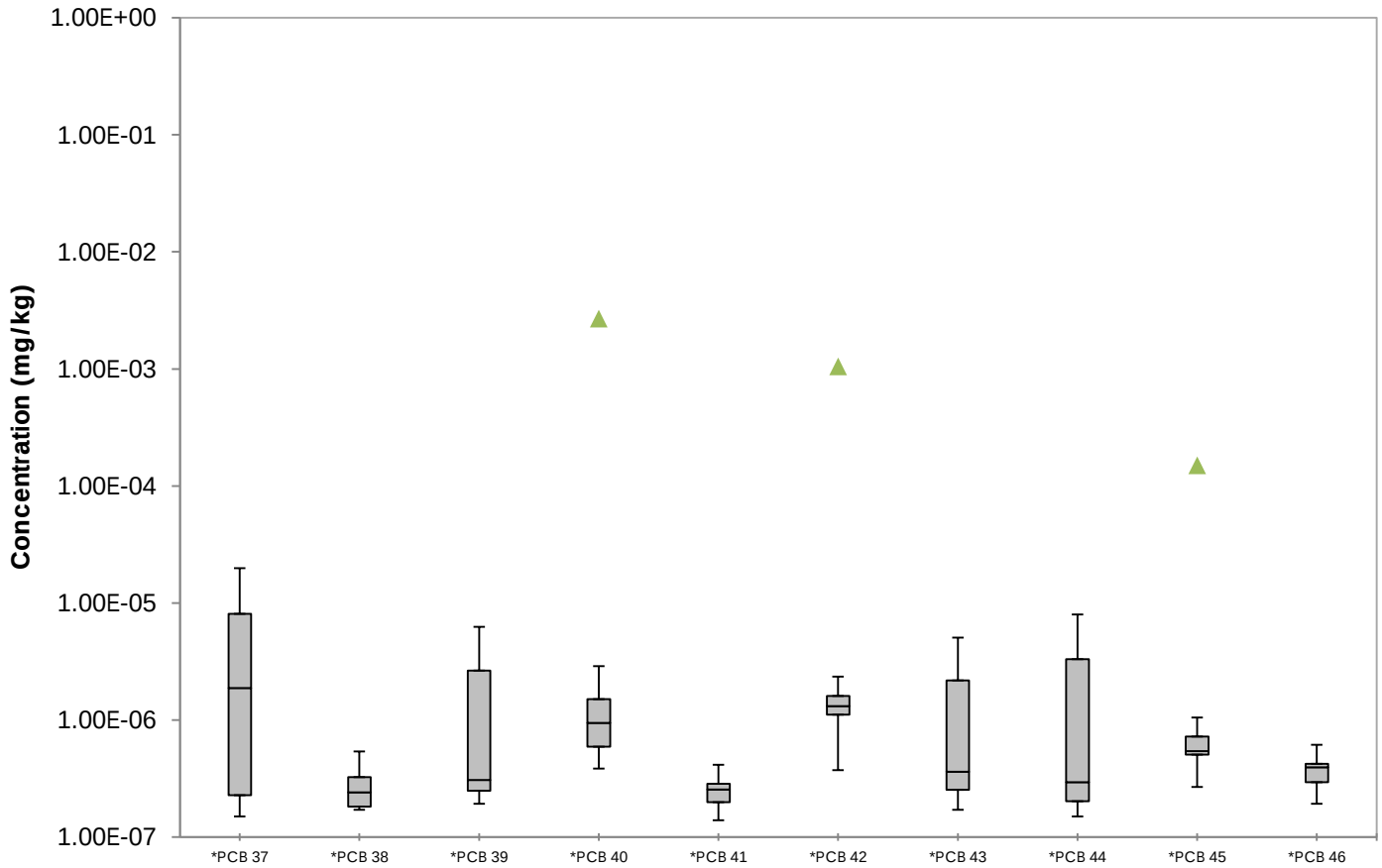
Figure B-4Z

P:\PRJ4\CAWP\HW0989\CPA-FTF DUE (May 2014)\[Figures B-4 - Soil Boxplots (Updated June 2015).xlsm]B4BC



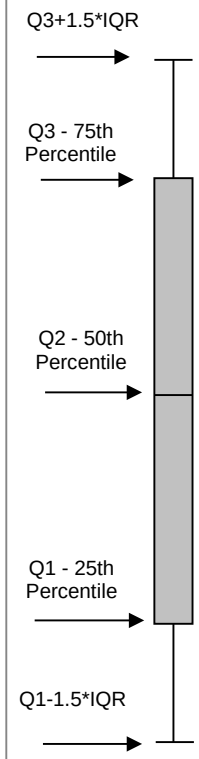


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Figure B-4AA

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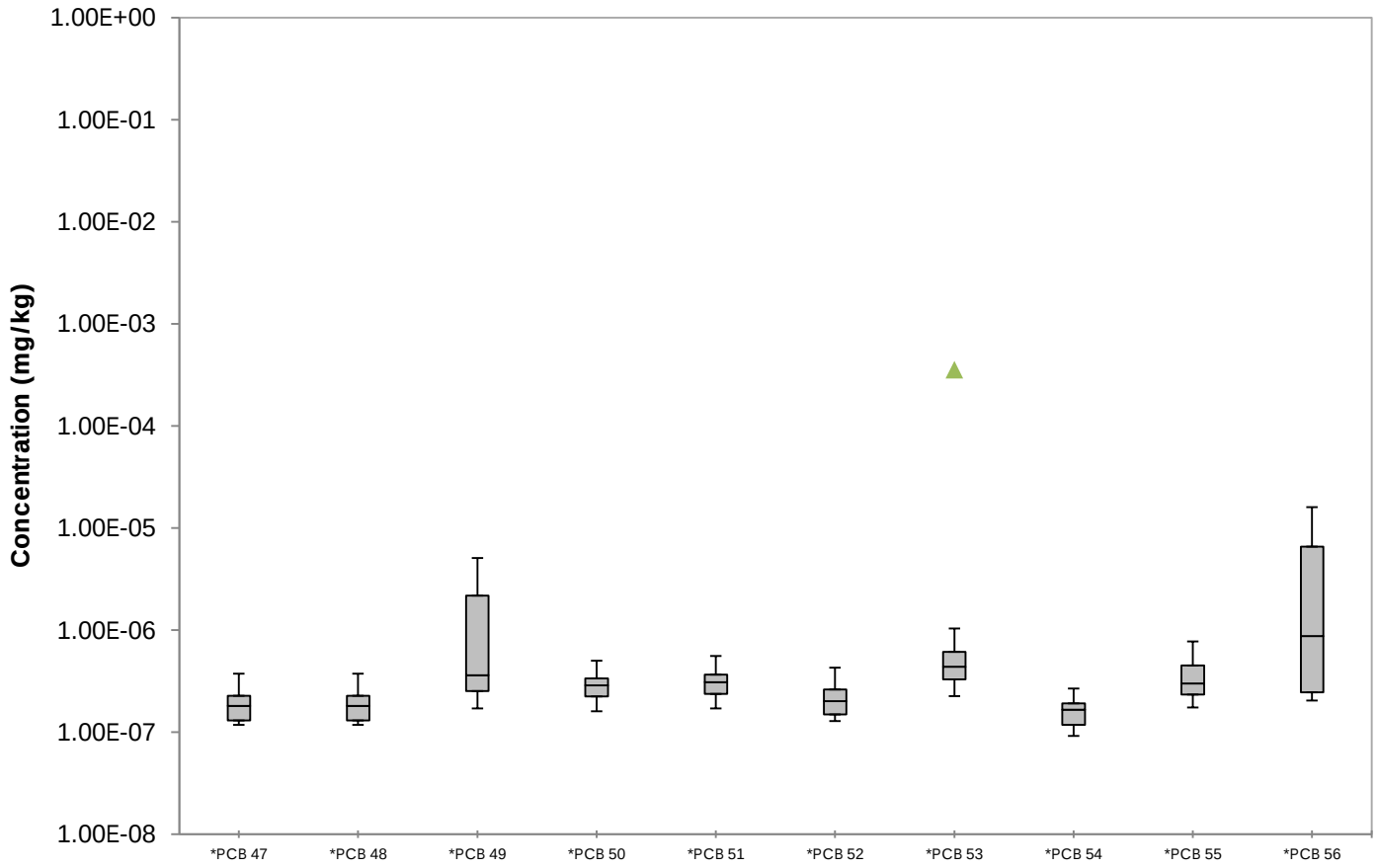
P:\PRJ4\CAWP\HW0989\CPA-FTF DUE (May 2014)\[Figures B-4 - Soil Boxplots (Updated June 2015).xlsm]B4BC



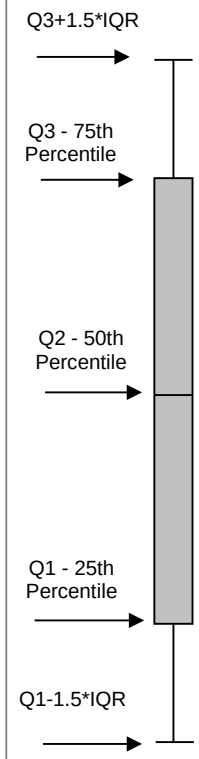


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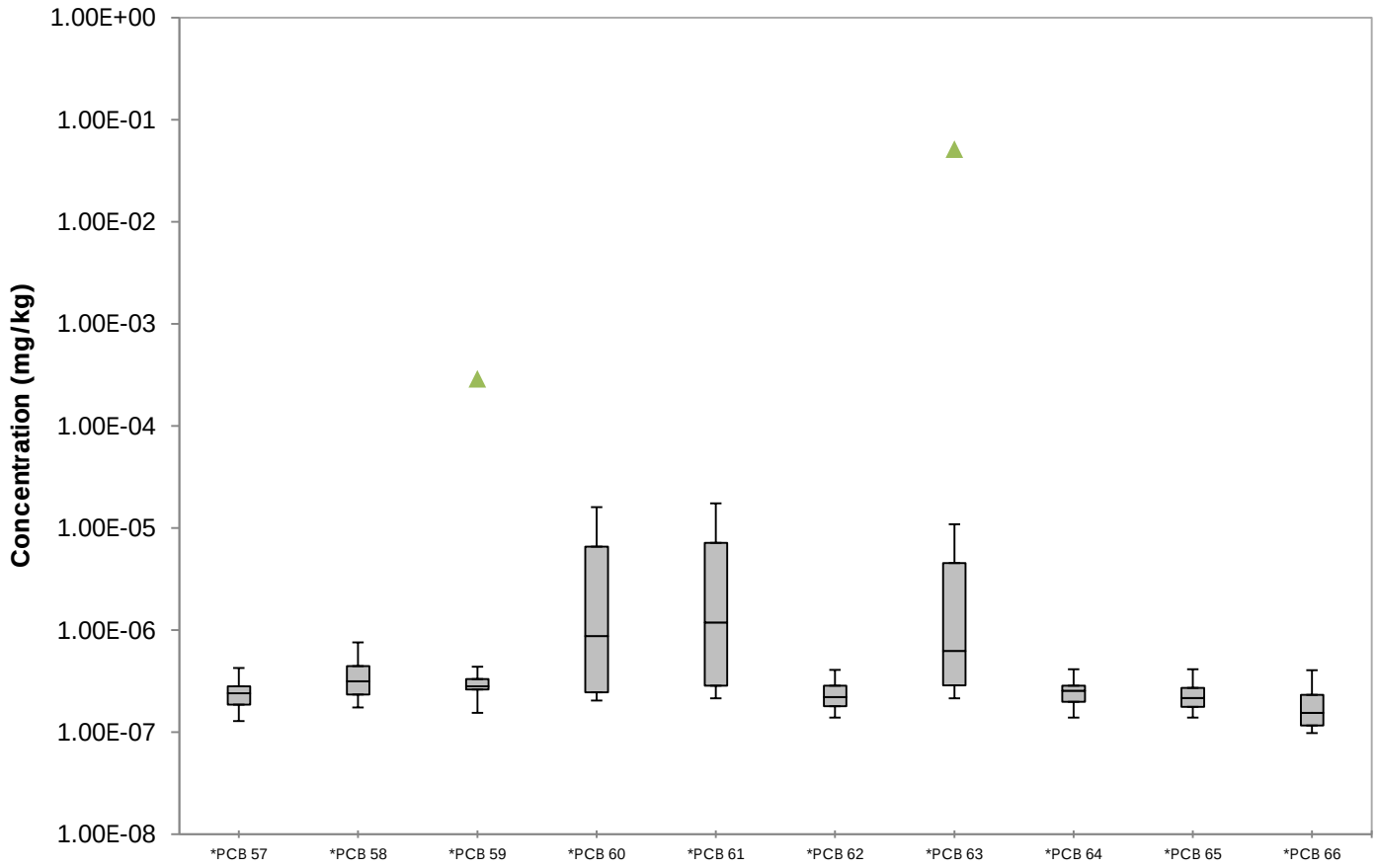
Figure B-4AB

P:\PRJ4\CAWP\HW0989\CPA-FTF DUE (May 2014)\[Figures B-4 - Soil Boxplots (Updated June 2015).xlsm]B4BC



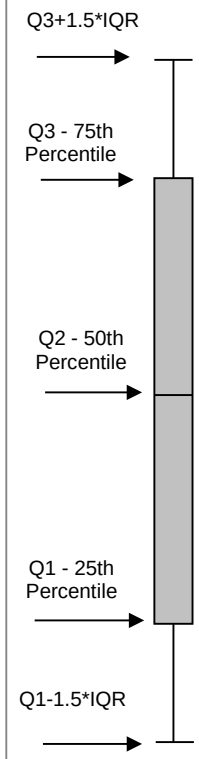


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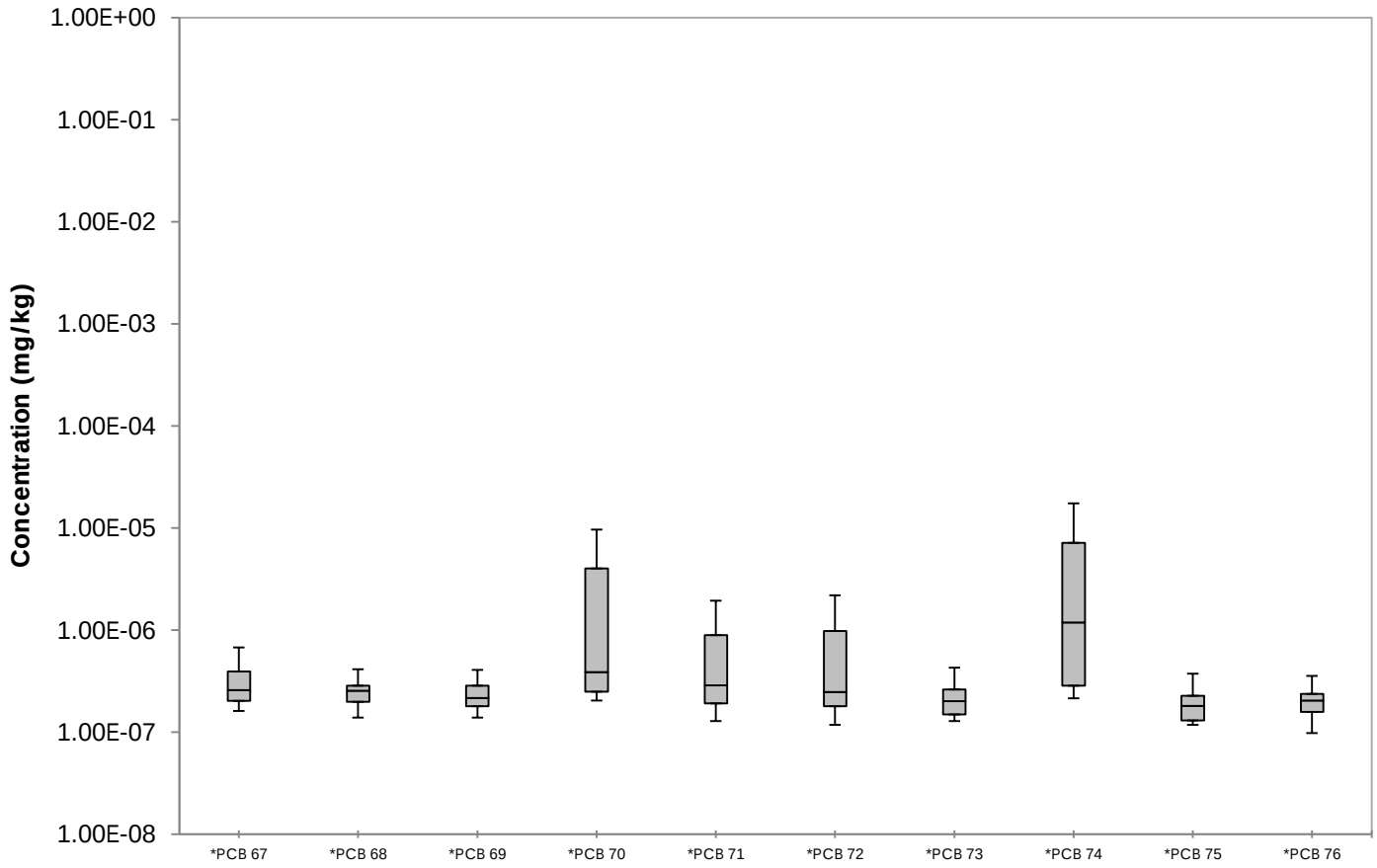
Figure B-4AC

P:\PRJ4\CAWP\HW0989\CPA-FTF DUE (May 2014)\[Figures B-4 - Soil Boxplots (Updated June 2015).xlsm]B4BC



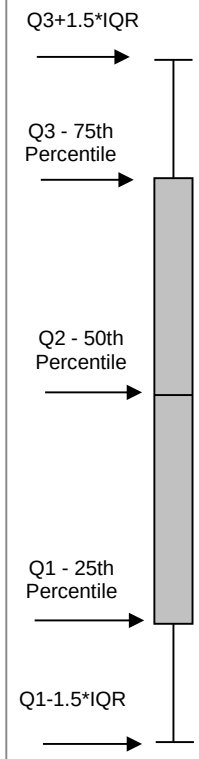


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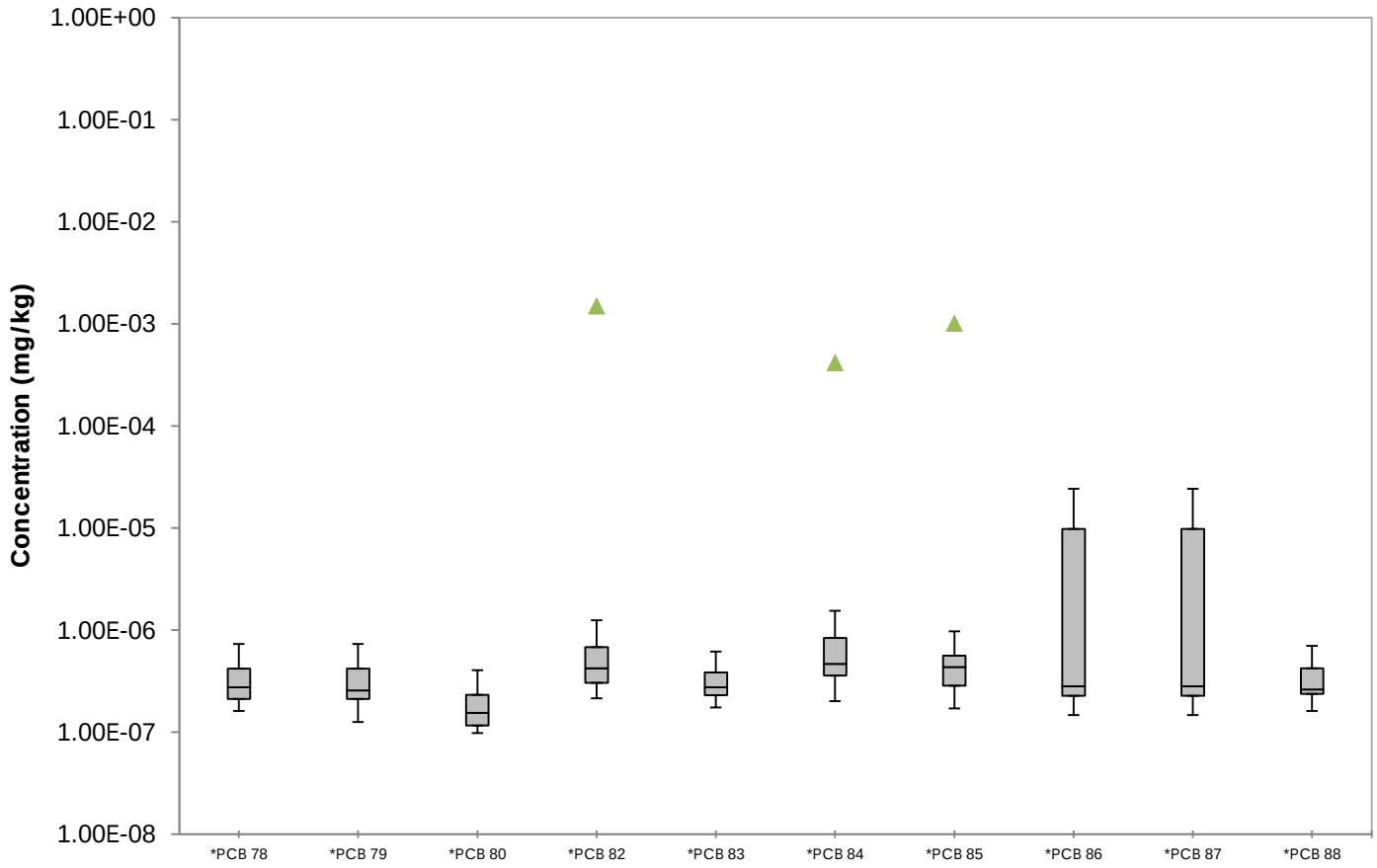
Figure B-4AD

P:\PRJ4\CAWP\HW0989\CPA-FTF DUE (May 2014)\[Figures B-4 - Soil Boxplots (Updated June 2015).xlsm]B4BC



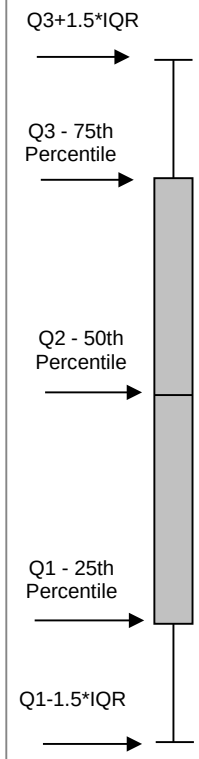


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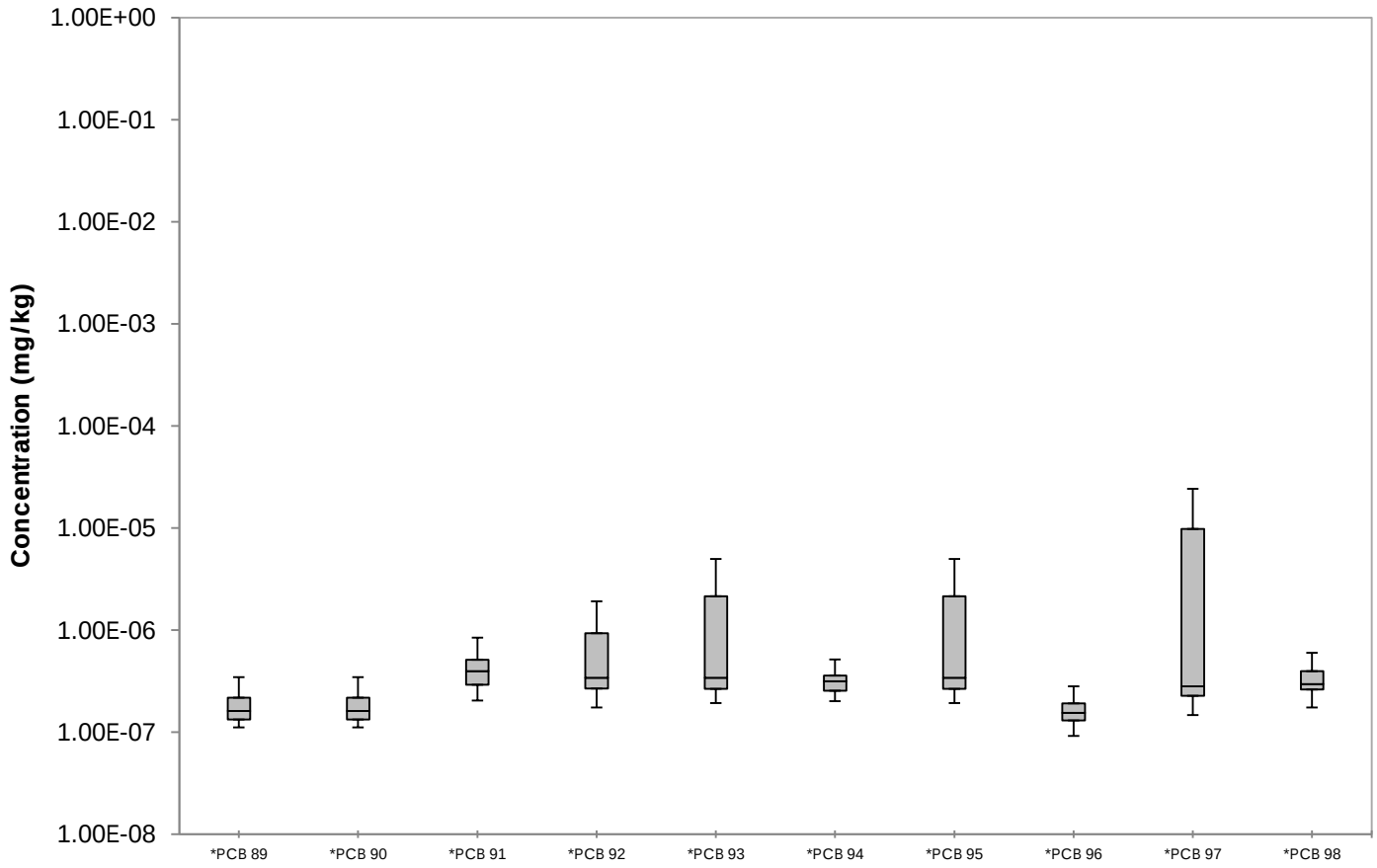
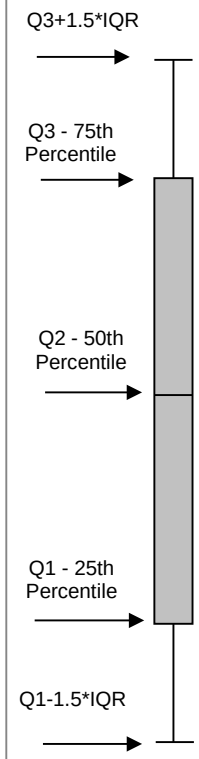
Figure B-4AE

P:\PRJ4\CAWP\HW0989\CPA-FTF DUE (May 2014)\[Figures B-4 - Soil Boxplots (Updated June 2015).xlsm]B48C





* Denotes No Basic Comparison Level Available

Denotes Basic Comparison Level

Denotes ND Statistical Outlier

Denotes Detected Statistical Outlier

Notes:

mg/kg= milligrams per kilogram
ND = non-detect
IQR = interquartile range equals the 3rd quartile (75th percentile) - 1st quartile (25th percentile)
Half of the sample quantitation limit is used for nondetects unless otherwise noted.

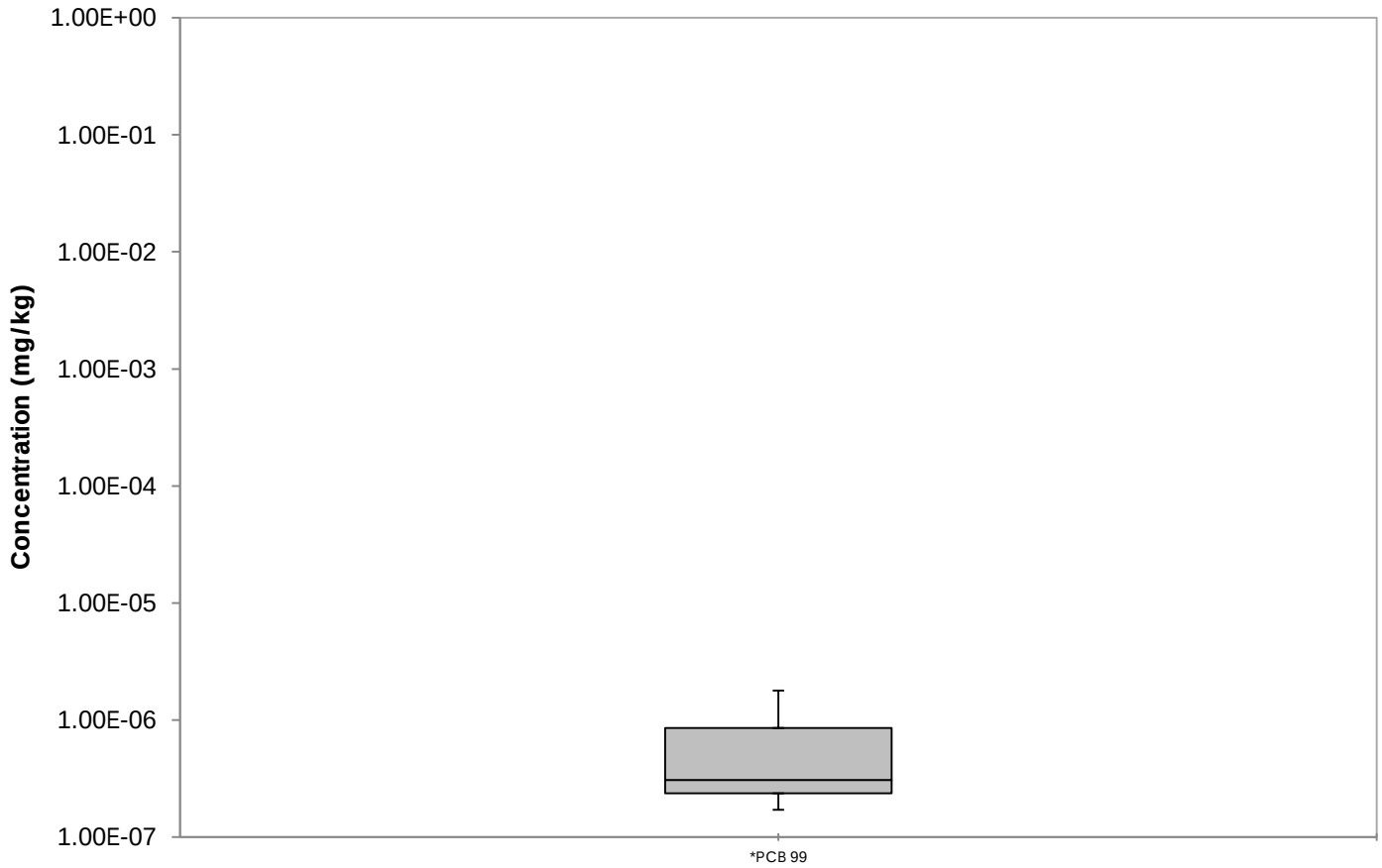
Soil Box and Whisker Plots -
POLYCHLORINATED BIPHENYLS
Closed Ponds Area and Former Tank Farm
Henderson, Nevada

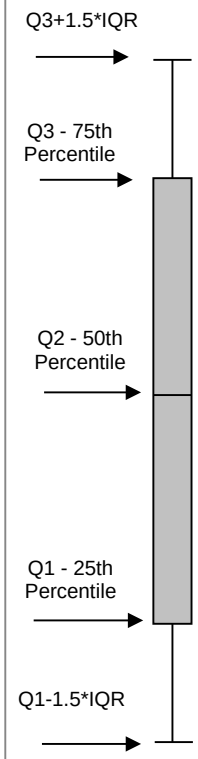
Geosyntec consultants

Huntington Beach | 22-Jun-15

Figure B-4AF

P:\PRJ4\CAWP\HW0989\CPA-FTF DUE (May 2014)\[Figures B-4 - Soil Boxplots (Updated June 2015).xlsm]B4BC





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Denotes Basic Comparison Level

Denotes ND Statistical Outlier

Denotes Detected Statistical Outlier

Notes:

mg/kg= milligrams per kilogram
ND = non-detect
IQR = interquartile range equals the 3rd quartile (75th percentile) - 1st quartile (25th percentile)
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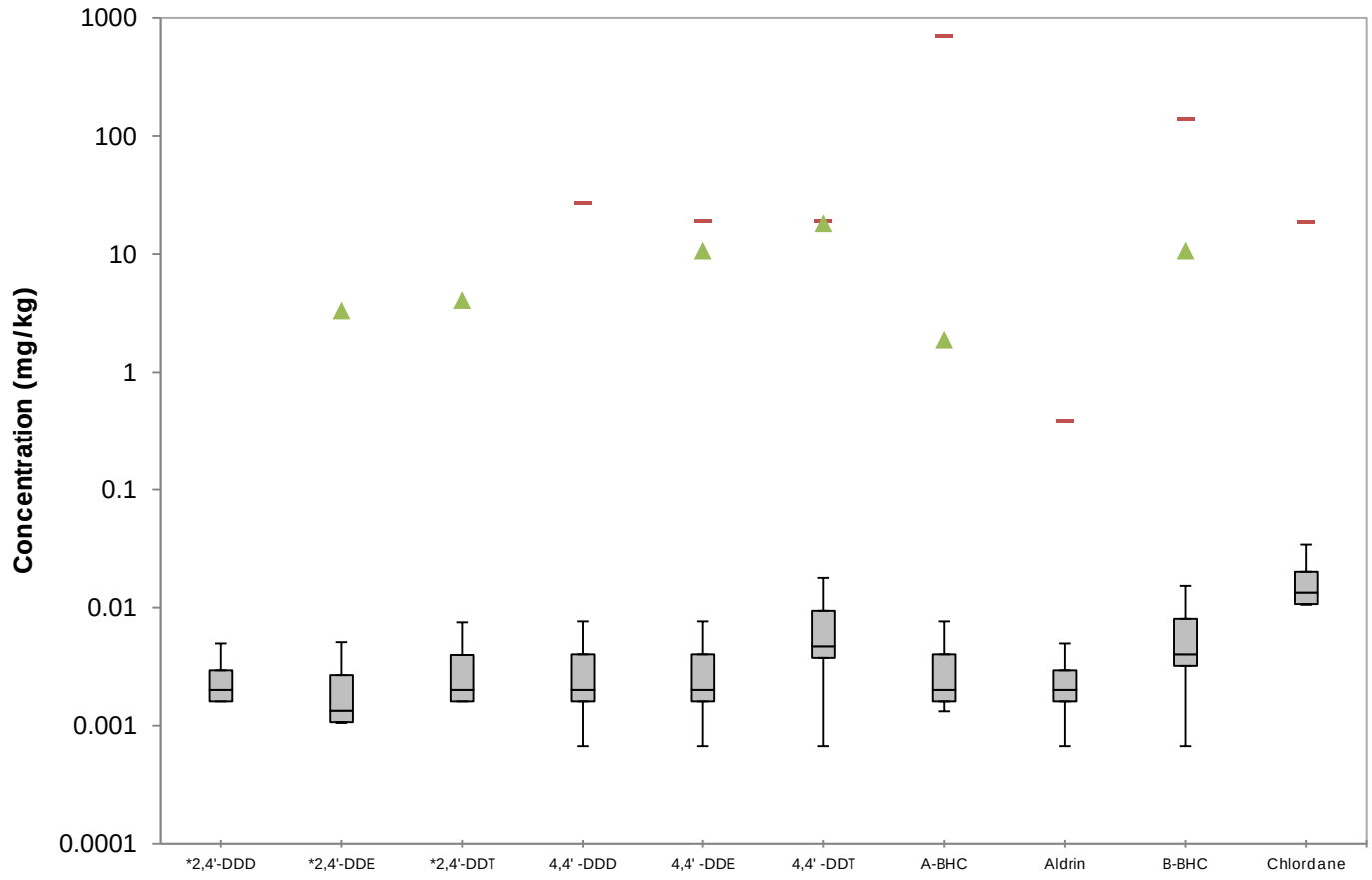
Soil Box and Whisker Plots -
POLYCHLORINATED BIPHENYLS
Closed Ponds Area and Former Tank Farm
Henderson, Nevada

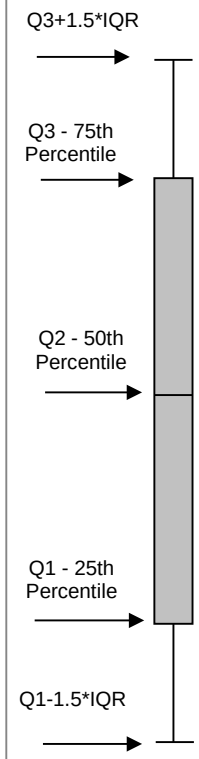
Geosyntec consultants

Figure B-4AG

Huntington Beach | 22-Jun-15

P:\PRJ4\CAWP\HW0989\CPA-FTF DUE (May 2014)\[Figures B-4 - Soil Boxplots (Updated June 2015).xlsm]B4BC





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Notes:

mg/kg= milligrams per kilogram
ND = non-detect
IQR = interquartile range equals the 3rd quartile (75th percentile) - 1st quartile (25th percentile)
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Soil Box and Whisker Plots - PESTICIDES
Closed Ponds Area and Former Tank Farm
Henderson, Nevada

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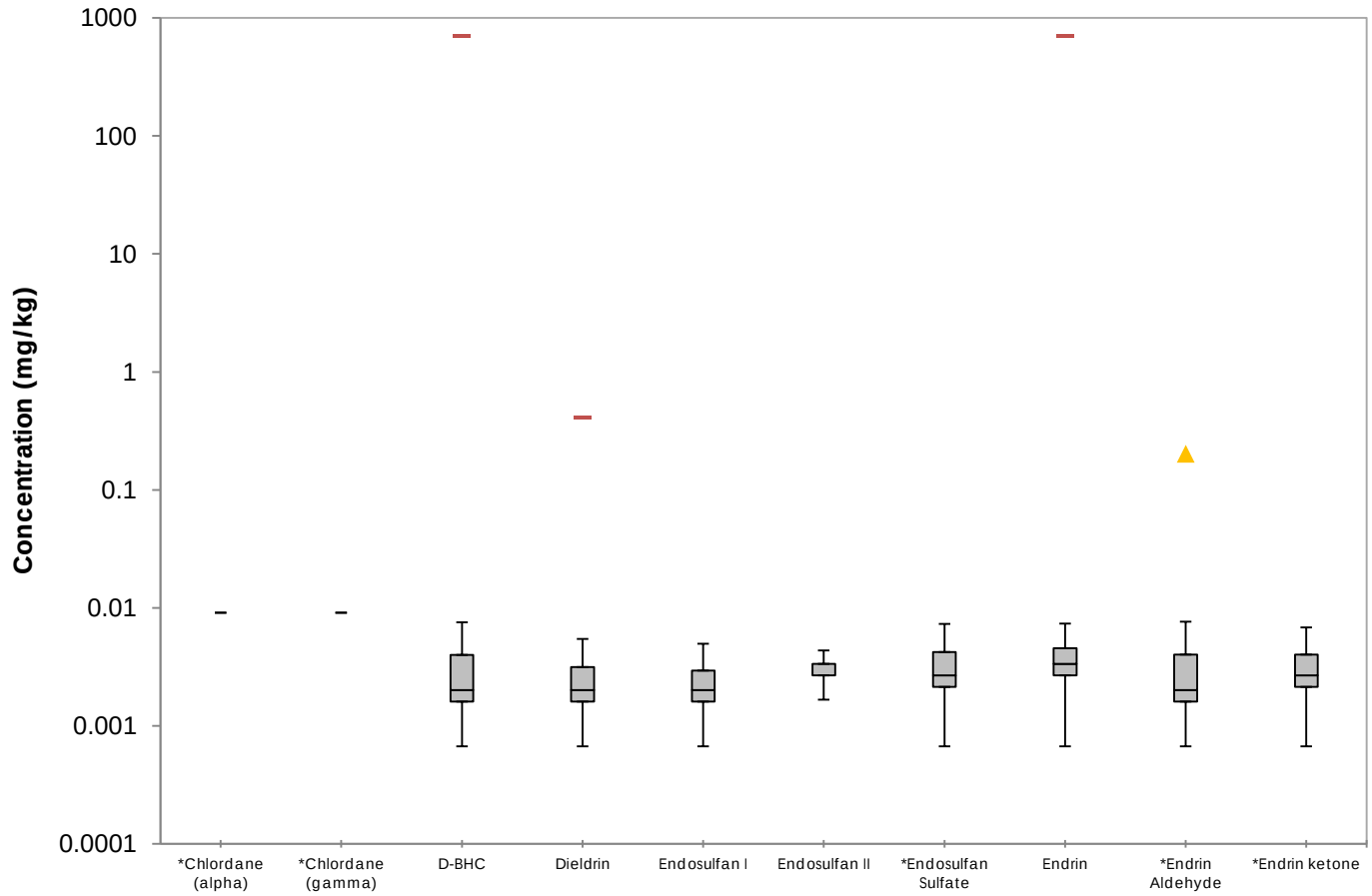
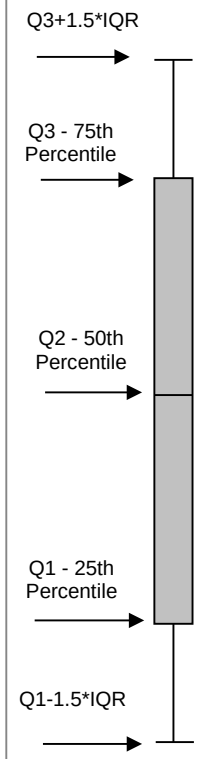
Figure B-4AH

Huntington Beach | 22-Jun-15

P:\PRJ4\CAWP\HW0989\CPA-FTF DUE (May 2014)\[Figures B-4 - Soil Boxplots (Updated June 2015).xlsm]B48C





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Denotes ND Statistical Outlier

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Notes:

mg/kg= milligrams per kilogram
ND = non-detect
IQR = interquartile range equals the 3rd quartile (75th percentile) - 1st quartile (25th percentile)
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Soil Box and Whisker Plots - PESTICIDES
Closed Ponds Area and Former Tank Farm
Henderson, Nevada

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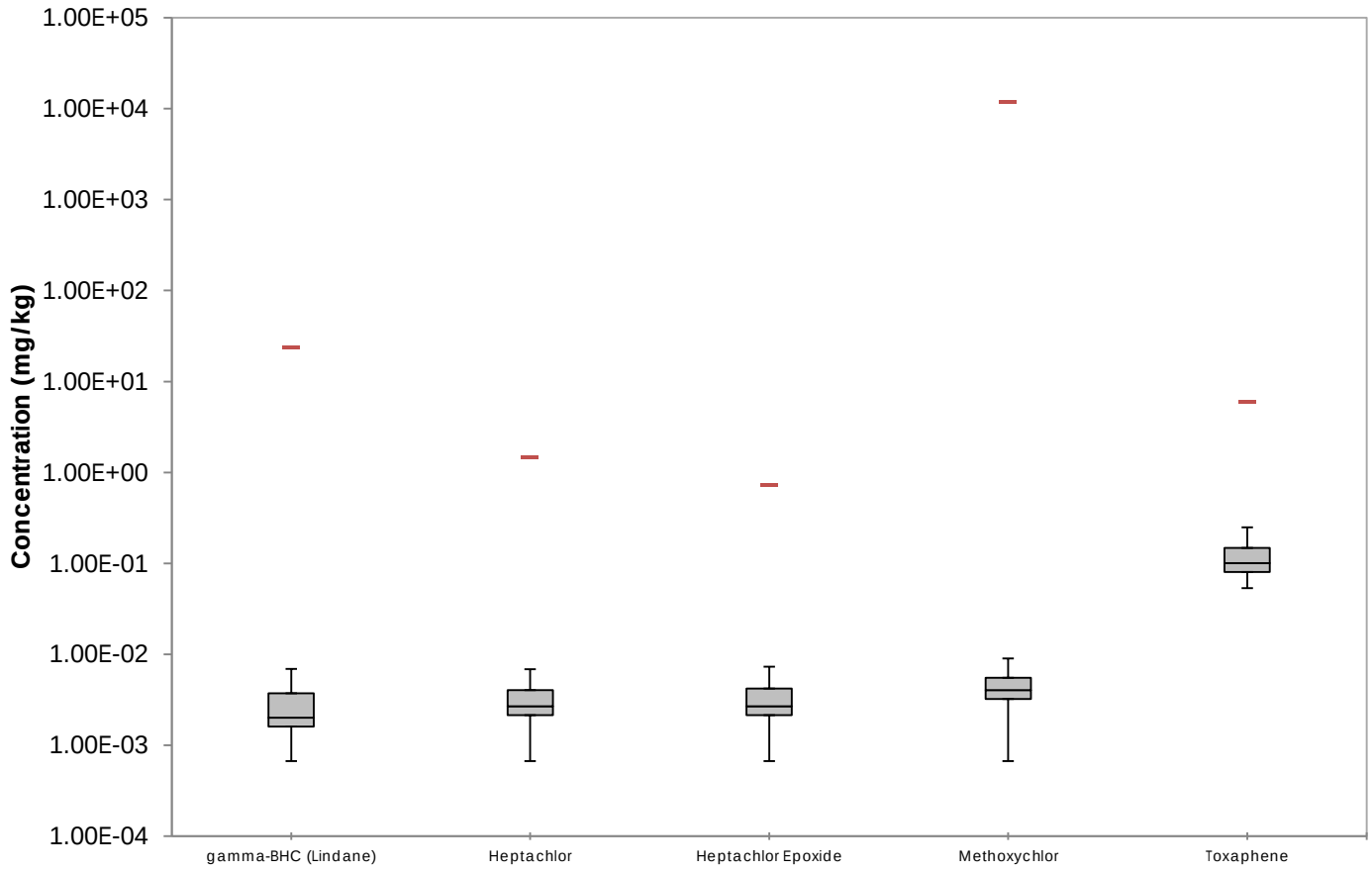
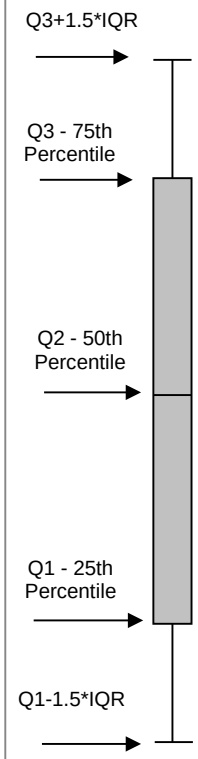
Figure B-4AI

P:\PRJ4\CAWP\HW0989\CPA-FTF DUE (May 2014)\[Figures B-4 - Soil Boxplots (Updated June 2015).xlsm]B48C





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Denotes Detected Statistical Outlier

Notes:

mg/kg= milligrams per kilogram
ND = non-detect
IQR = interquartile range equals the 3rd quartile (75th percentile) - 1st quartile (25th percentile)
Half of the sample quantitation limit is used for nondetects unless otherwise noted.

Soil Box and Whisker Plots - PESTICIDES
Closed Ponds Area and Former Tank Farm
Henderson, Nevada

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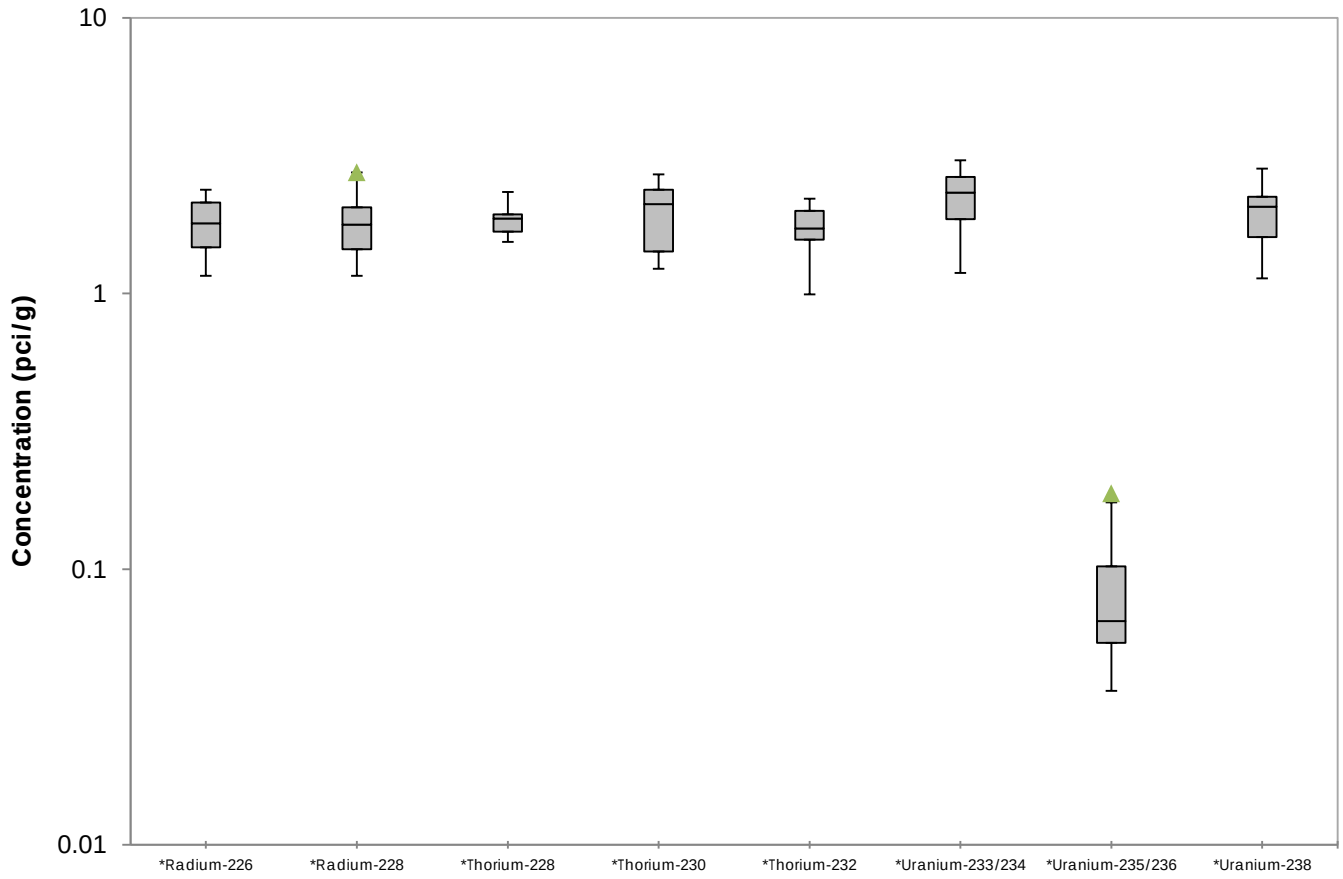
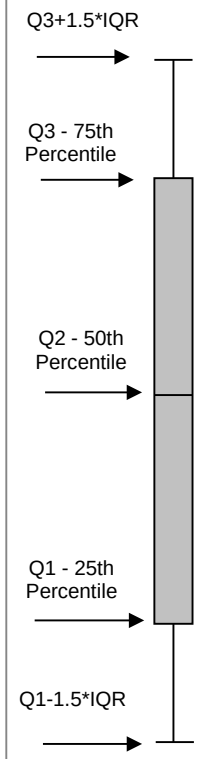
Figure B-4AJ

P:\PRJ4\CAWP\HW0989\CPA-FTF DUE (May 2014)\[Figures B-4 - Soil Boxplots (Updated June 2015).xlsm]B48C





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Denotes ND Statistical Outlier

Denotes Detected Statistical Outlier

Notes:

pci/g= picocuries per gram
ND = non-detect
IQR = interquartile range equals the 3rd quartile (75th percentile) - 1st quartile (25th percentile)
Half of the sample quantitation limit is used for nondetects unless otherwise noted.

Soil Box and Whisker Plots -
RADIOCHEMICAL COMPOUNDS
Closed Ponds Area and Former Tank Farm
Henderson, Nevada

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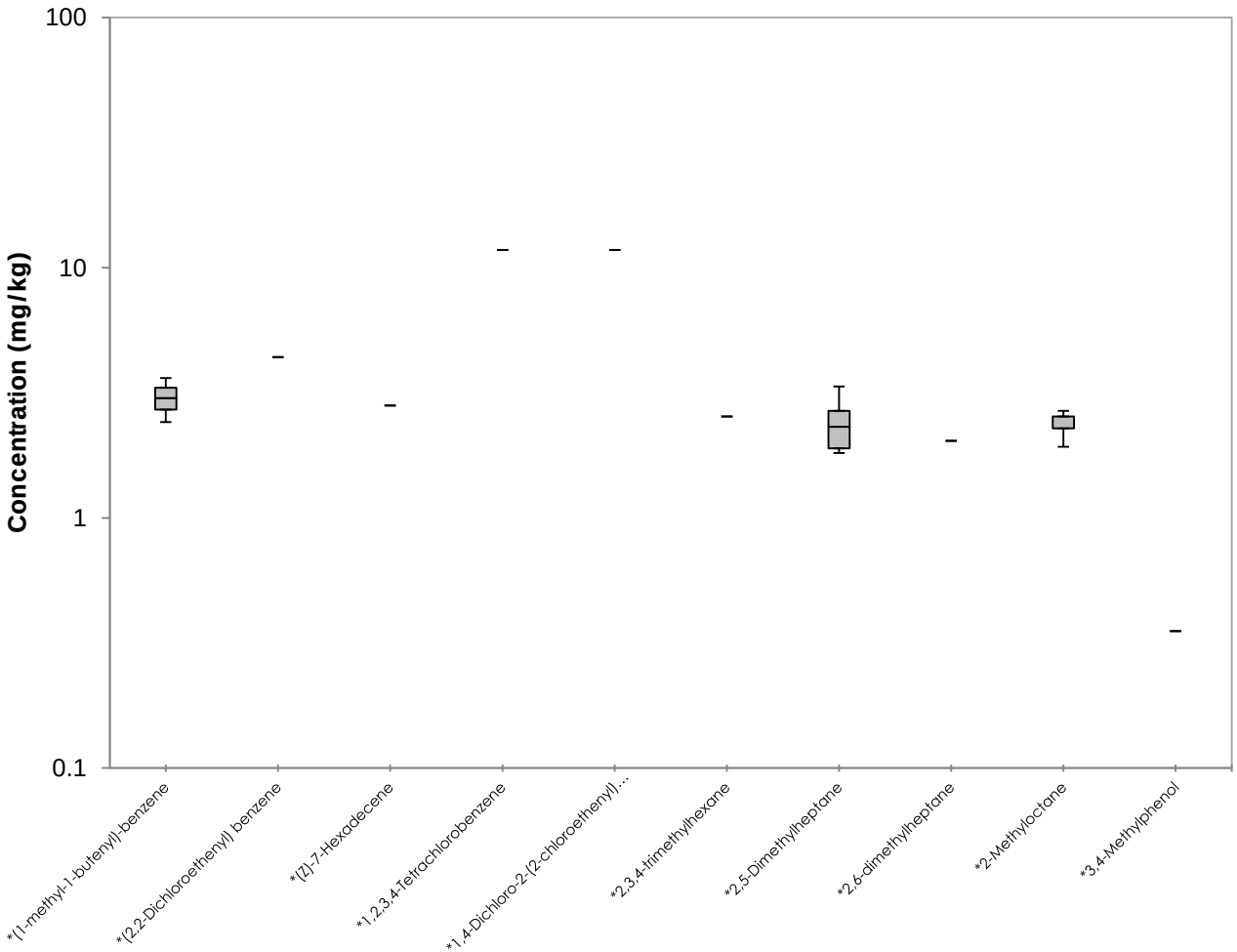
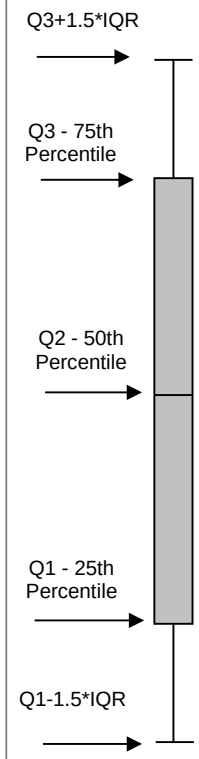
Figure B-4AK

Huntington Beach | 22-Jun-15

P:\PRJ4\CAWP\HW0989\CPA-FTF DUE (May 2014)\[Figures B-4 - Soil Boxplots (Updated June 2015).xlsm]B4BC





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Notes:

mg/kg= milligrams per kilogram
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IQR = interquartile range equals the 3rd quartile (75th percentile) - 1st quartile (25th percentile)
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Soil Box and Whisker Plots -
SEMIVOLATILE ORGANIC COMPOUNDS
Closed Ponds Area and Former Tank Farm
Henderson, Nevada

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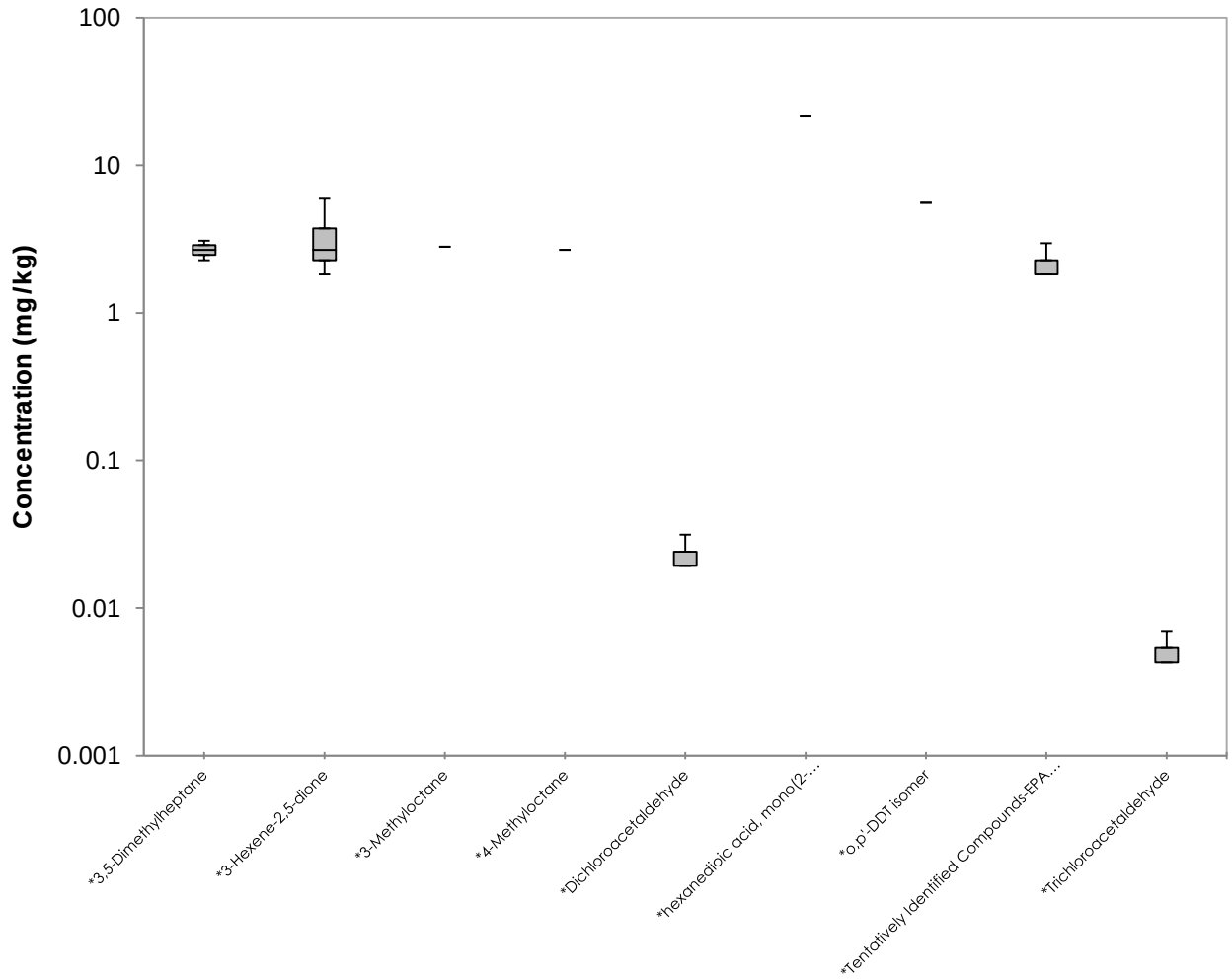
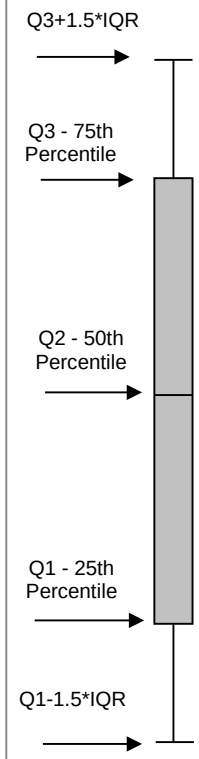
Figure B-4AL

P:\PRJ4\CAWP\HW0989\CPA-FTF DUE (May 2014)\[Figures B-4 - Soil Boxplots (Updated June 2015).xlsm]B4BC





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Soil Box and Whisker Plots -
SEMIVOLATILE ORGANIC COMPOUNDS
Closed Ponds Area and Former Tank Farm
Henderson, Nevada

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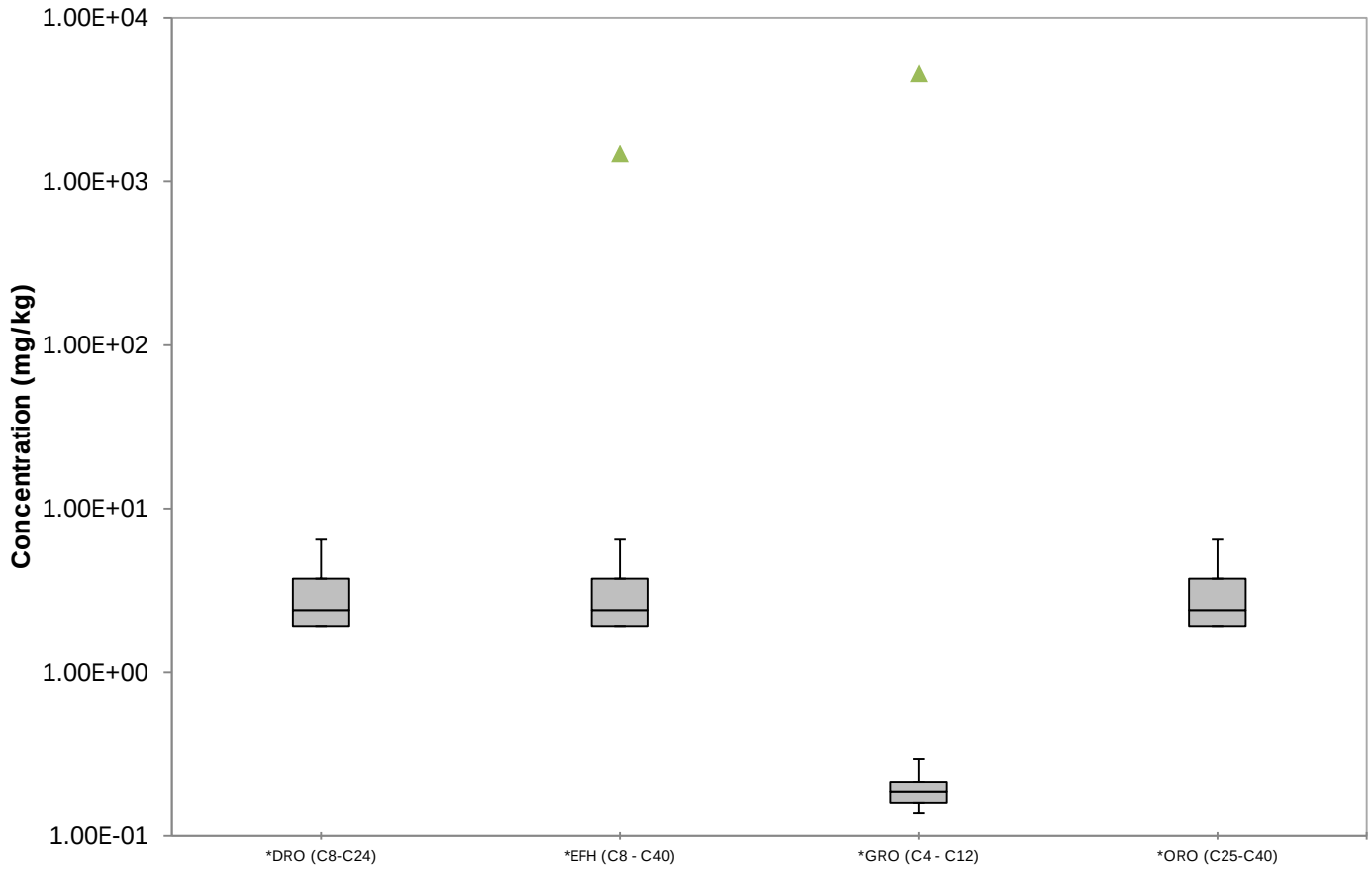
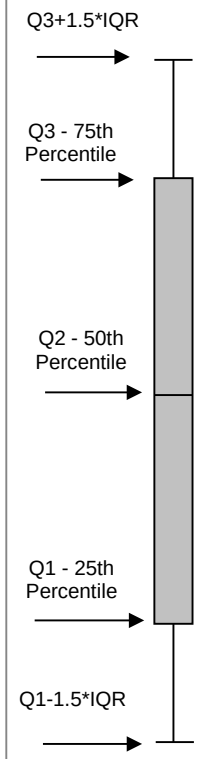
Figure B-4AM

P:\PRJ4\CAWP\HW0989\CPA-FTF DUE (May 2014)\[Figures B-4 - Soil Boxplots (Updated June 2015).xlsm]B4BC





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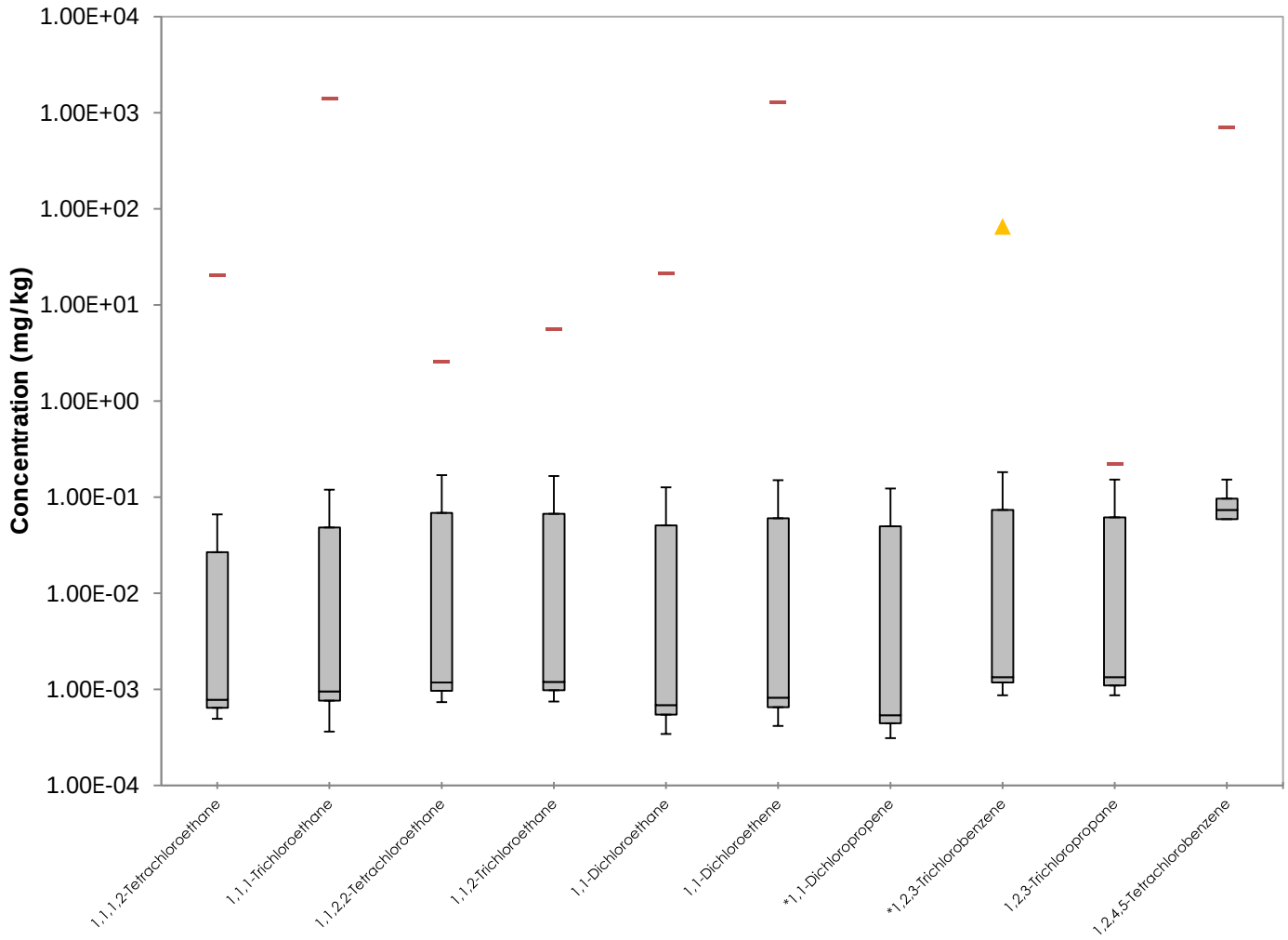
Soil Box and Whisker Plots -
TOTAL PETROLEUM HYDROCARBONS
Closed Ponds Area and Former Tank Farm
Henderson, Nevada

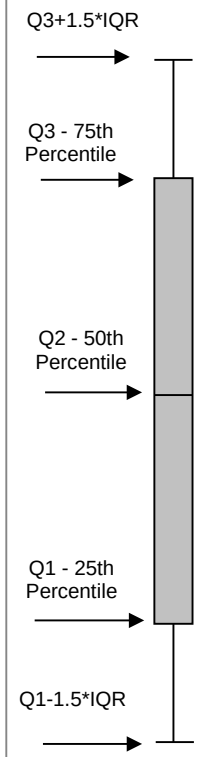
Geosyntec consultants

Figure B-4AN

Huntington Beach | 22-Jun-15

P:\PRJ4\CAWP\HW0989\CPA-FTF DUE (May 2014)\[Figures B-4 - Soil Boxplots (Updated June 2015).xlsm]B4BC





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Soil Box and Whisker Plots -
VOLATILE ORGANIC COMPOUNDS
Closed Ponds Area and Former Tank Farm
Henderson, Nevada

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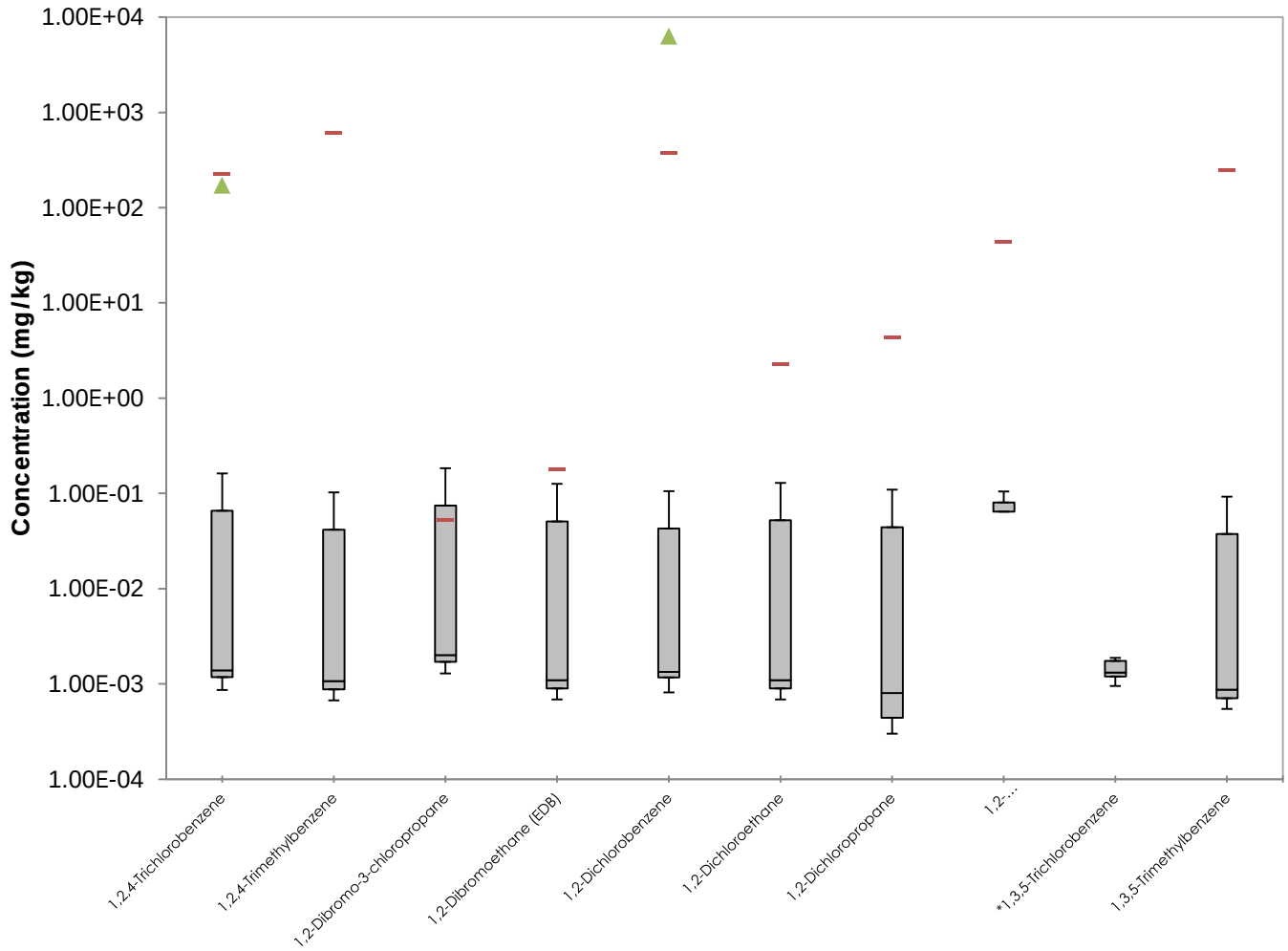
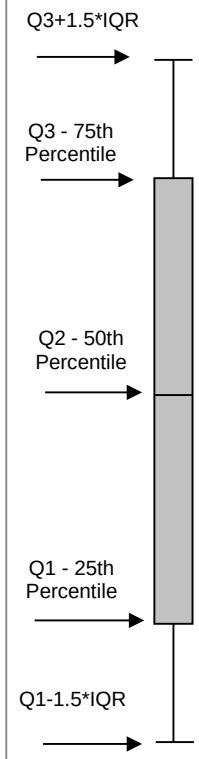
Huntington Beach | 22-Jun-15

Figure B-4AO

P:\PRJ4\CAWP\HW0989\CPA-FTF DUE (May 2014)\[Figures B-4 - Soil Boxplots (Updated June 2015).xlsm]B4BC





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Soil Box and Whisker Plots -
VOLATILE ORGANIC COMPOUNDS
Closed Ponds Area and Former Tank Farm
Henderson, Nevada

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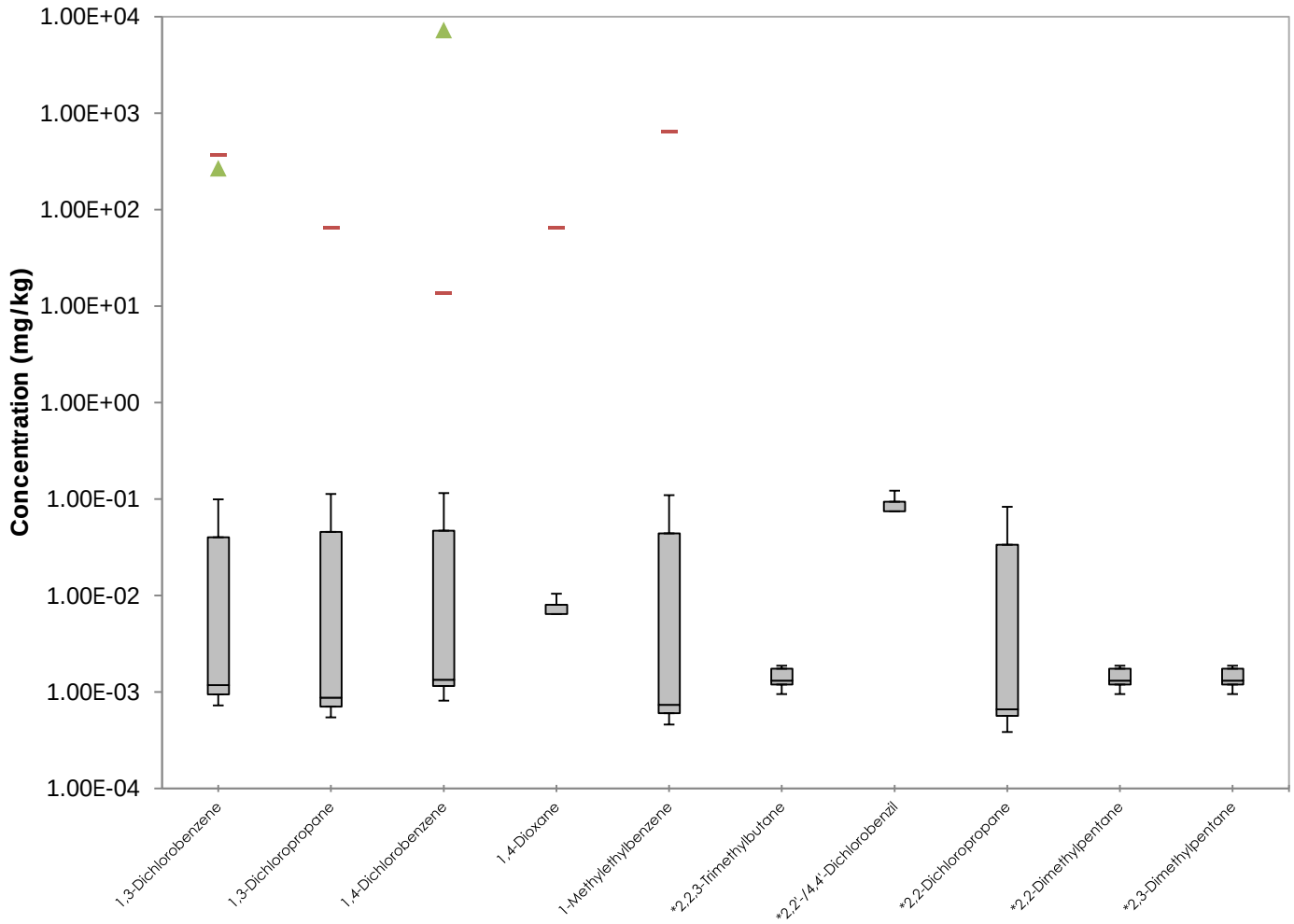
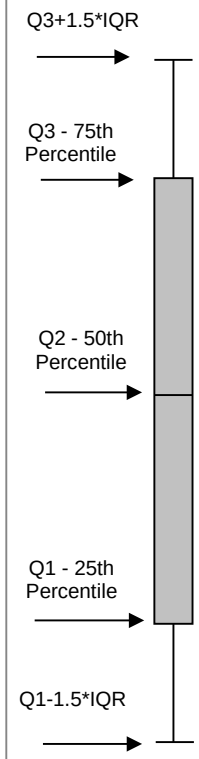
Figure B-4AP

P:\PRJ4\CAWP\HW0989\CPA-FTF DUE (May 2014)\[Figures B-4 - Soil Boxplots (Updated June 2015).xlsm]B4BC





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Soil Box and Whisker Plots -
VOLATILE ORGANIC COMPOUNDS
Closed Ponds Area and Former Tank Farm
Henderson, Nevada

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Figure B-4AQ

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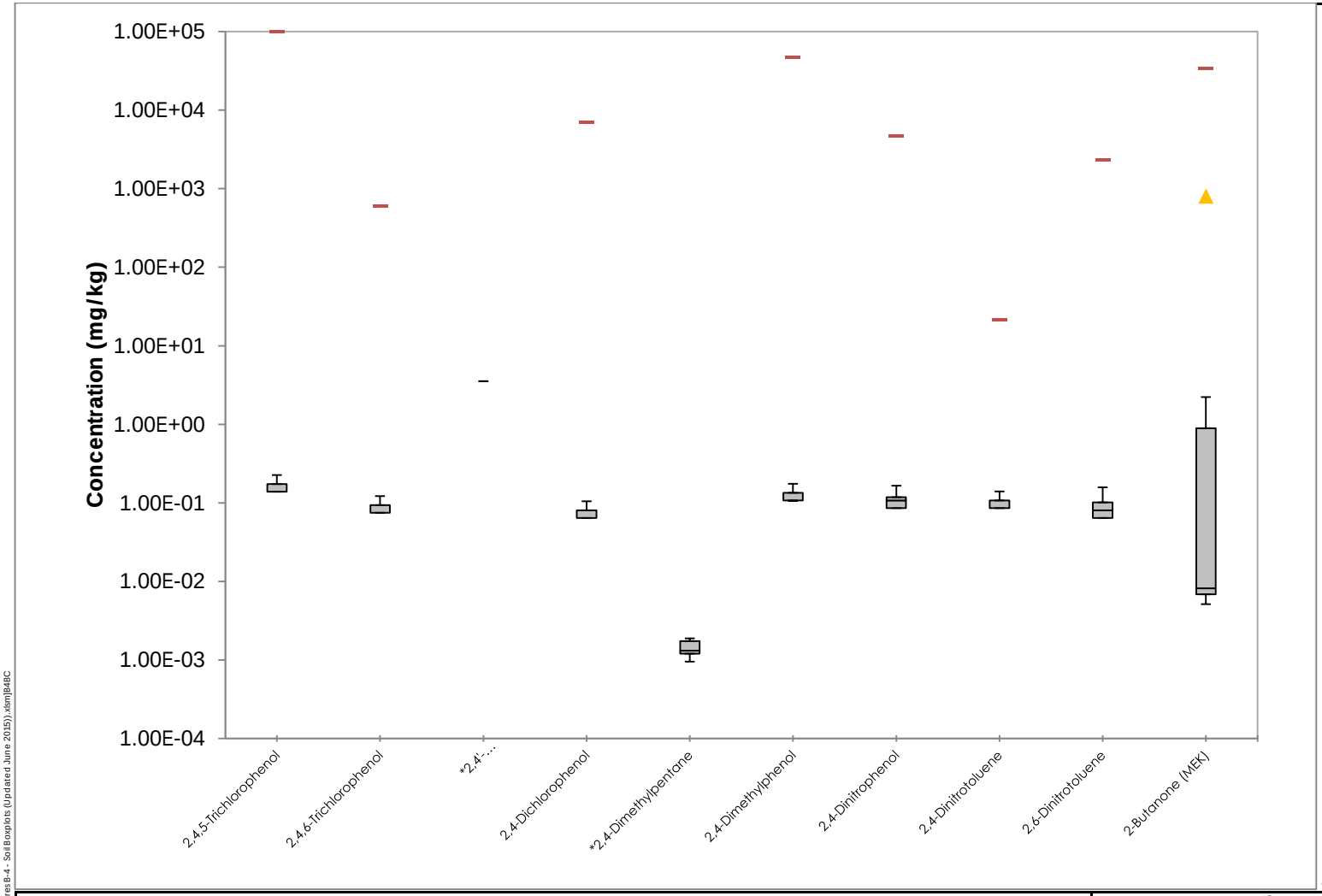

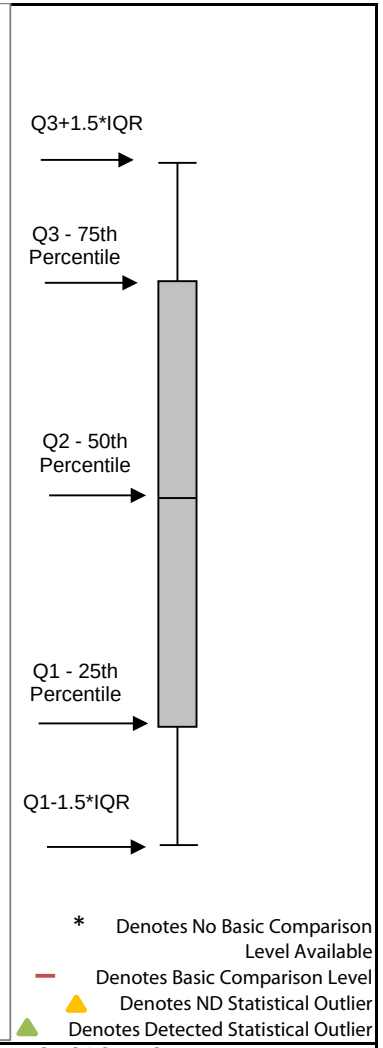

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Soil Box and Whisker Plots -
VOLATILE ORGANIC COMPOUNDS
Closed Ponds Area and Former Tank Farm
Henderson, Nevada

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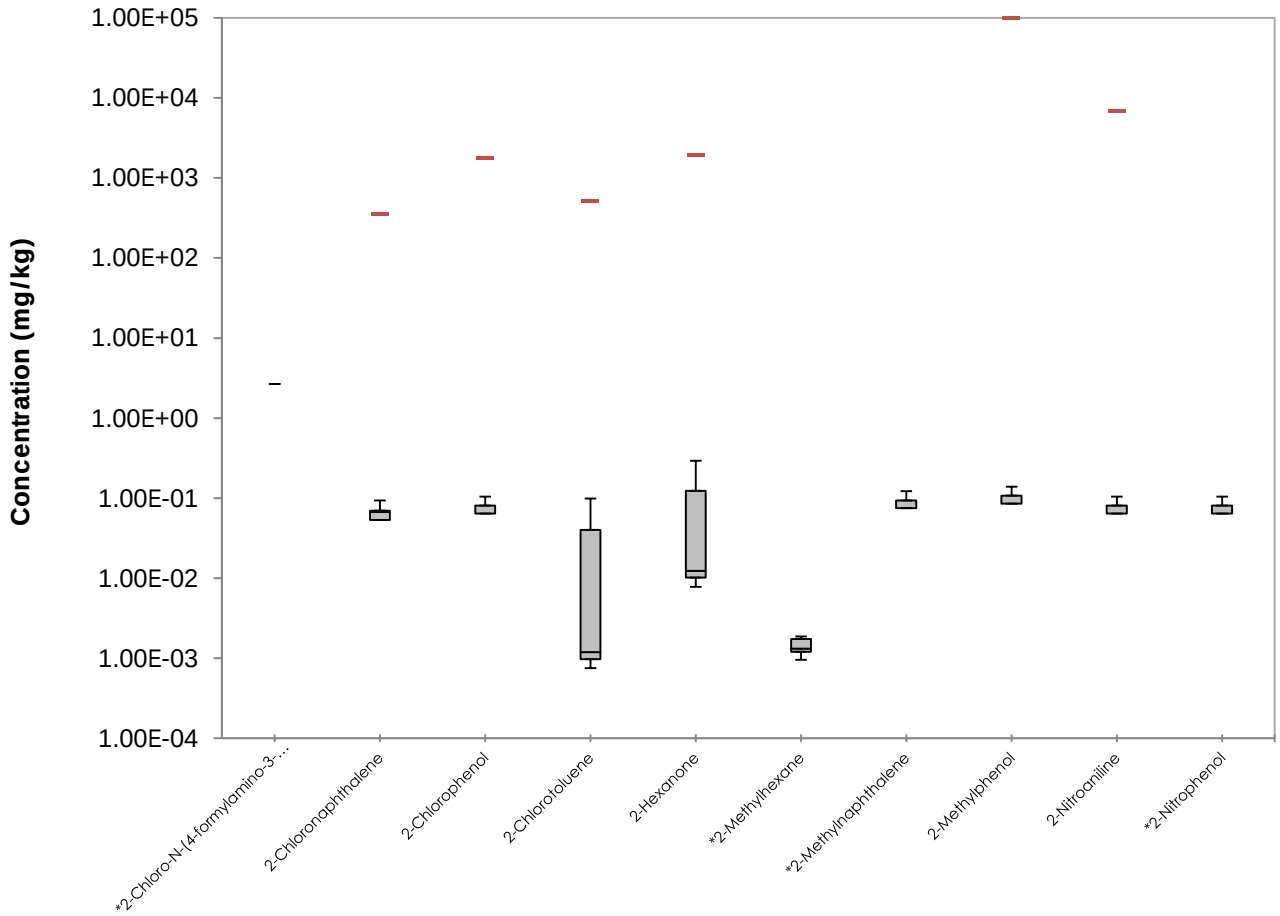
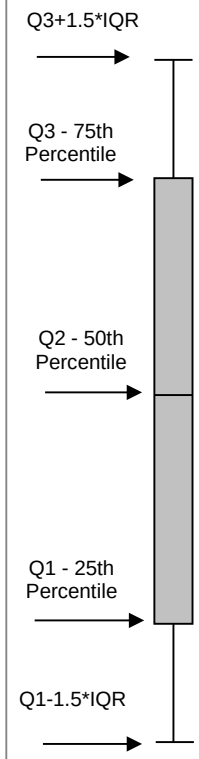
Huntington Beach | 22-Jun-15

Figure B-4AR

P:\PRJ4\CAWP\HW0989\CPA-FTF DUE (May 2014)\[Figures B-4 - Soil Boxplots (Updated June 2015).xlsm]B48C





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Soil Box and Whisker Plots -
VOLATILE ORGANIC COMPOUNDS
Closed Ponds Area and Former Tank Farm
Henderson, Nevada

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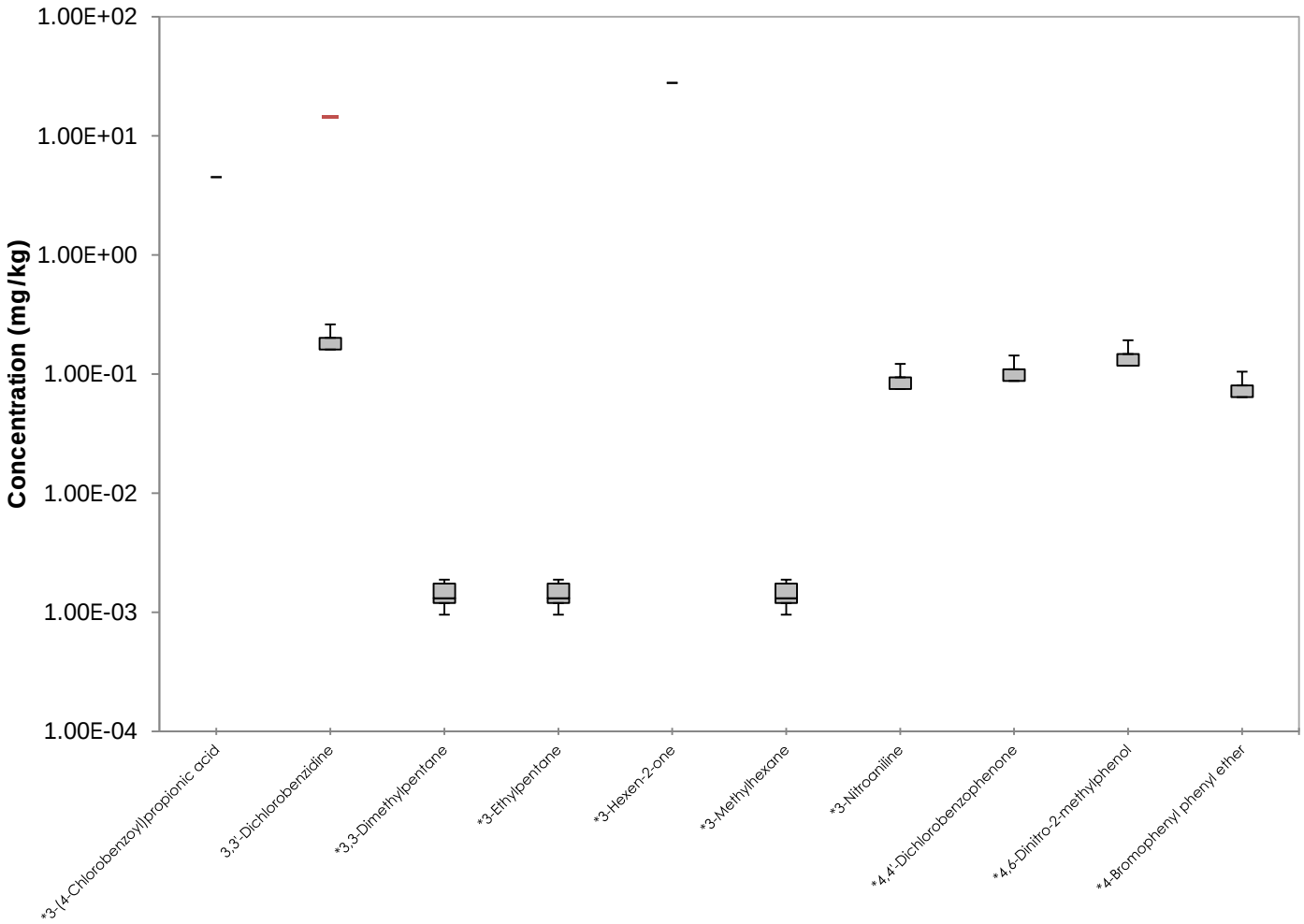
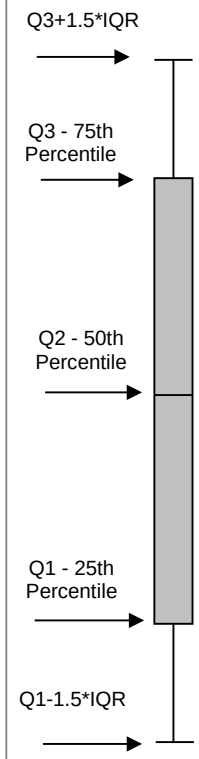
Figure B-4AS

P:\PRJ4\CAWP\HW0989\CPA-FTF DUE (May 2014)\[Figures B-4 - Soil Boxplots (Updated June 2015).xlsm]B4BC





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Notes:

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ND = non-detect
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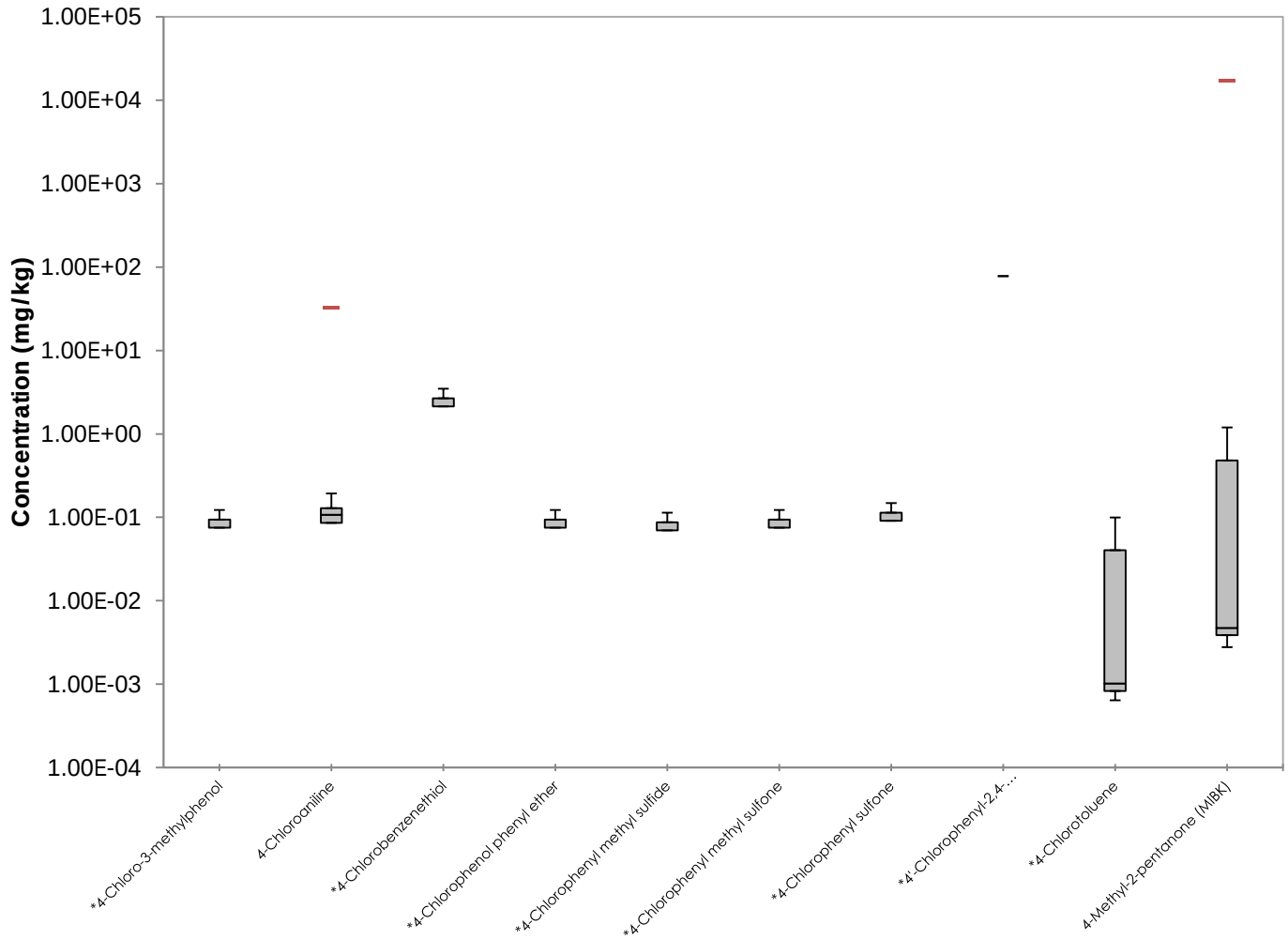
Soil Box and Whisker Plots -
VOLATILE ORGANIC COMPOUNDS
Closed Ponds Area and Former Tank Farm
Henderson, Nevada

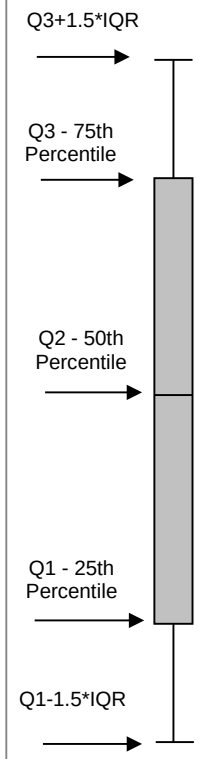
Geosyntec consultants

Figure B-4AT

Huntington Beach | 22-Jun-15

P:\PRJ4\CAWP\HW0989\CPA-FTF DUE (May 2014)\[Figures B-4 - Soil Boxplots (Updated June 2015).xlsm]B4BC





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Notes:

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Soil Box and Whisker Plots -
VOLATILE ORGANIC COMPOUNDS
Closed Ponds Area and Former Tank Farm
Henderson, Nevada

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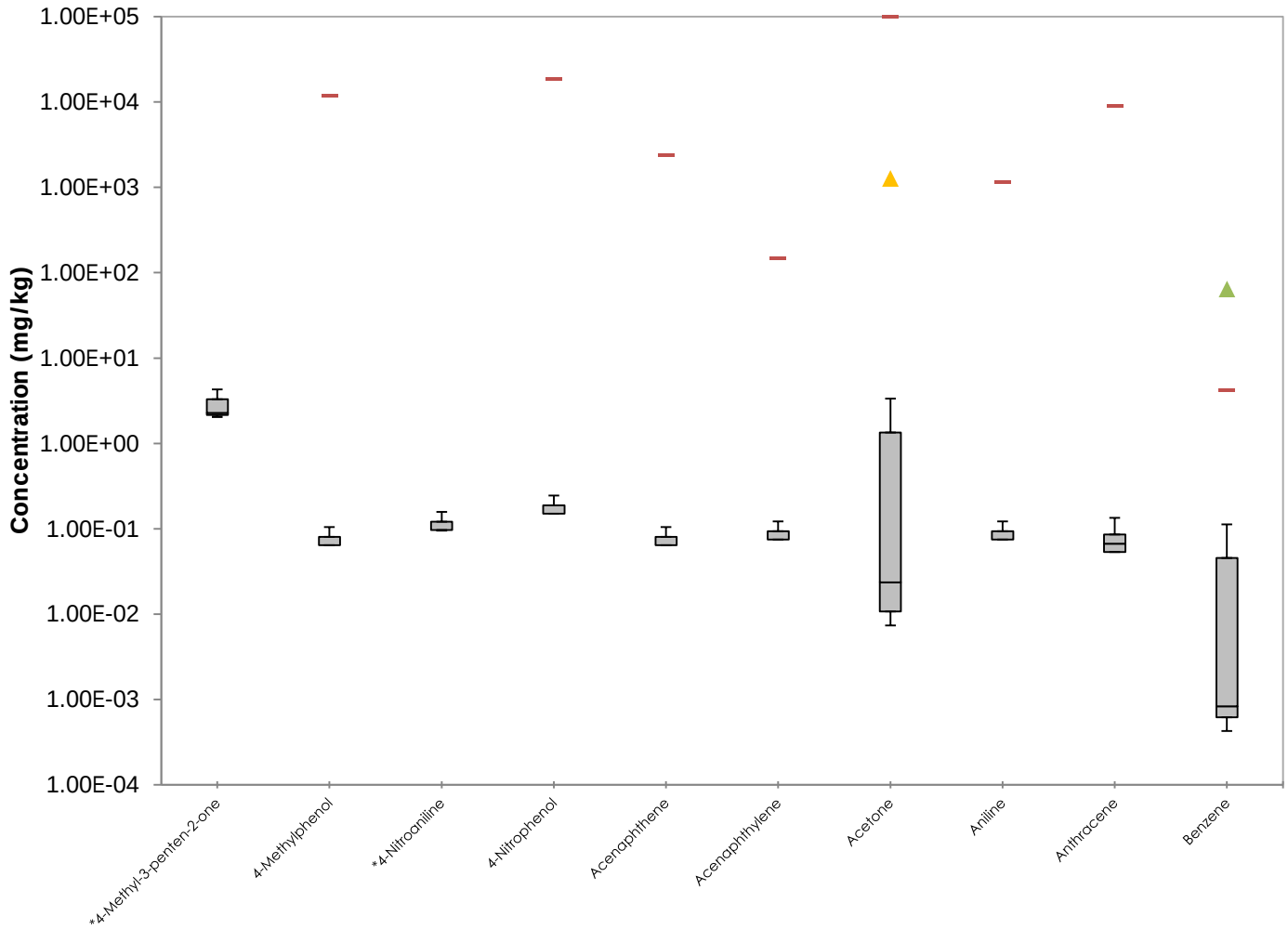
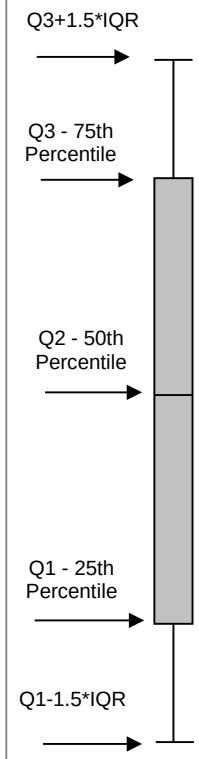
Figure B-4U

P:\PRJ4\CAWP\HW0989\CPA-FTF DUE (May 2014)\[Figures B-4 - Soil Boxplots (Updated June 2015).xlsm]B48C





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Soil Box and Whisker Plots -
VOLATILE ORGANIC COMPOUNDS
Closed Ponds Area and Former Tank Farm
Henderson, Nevada

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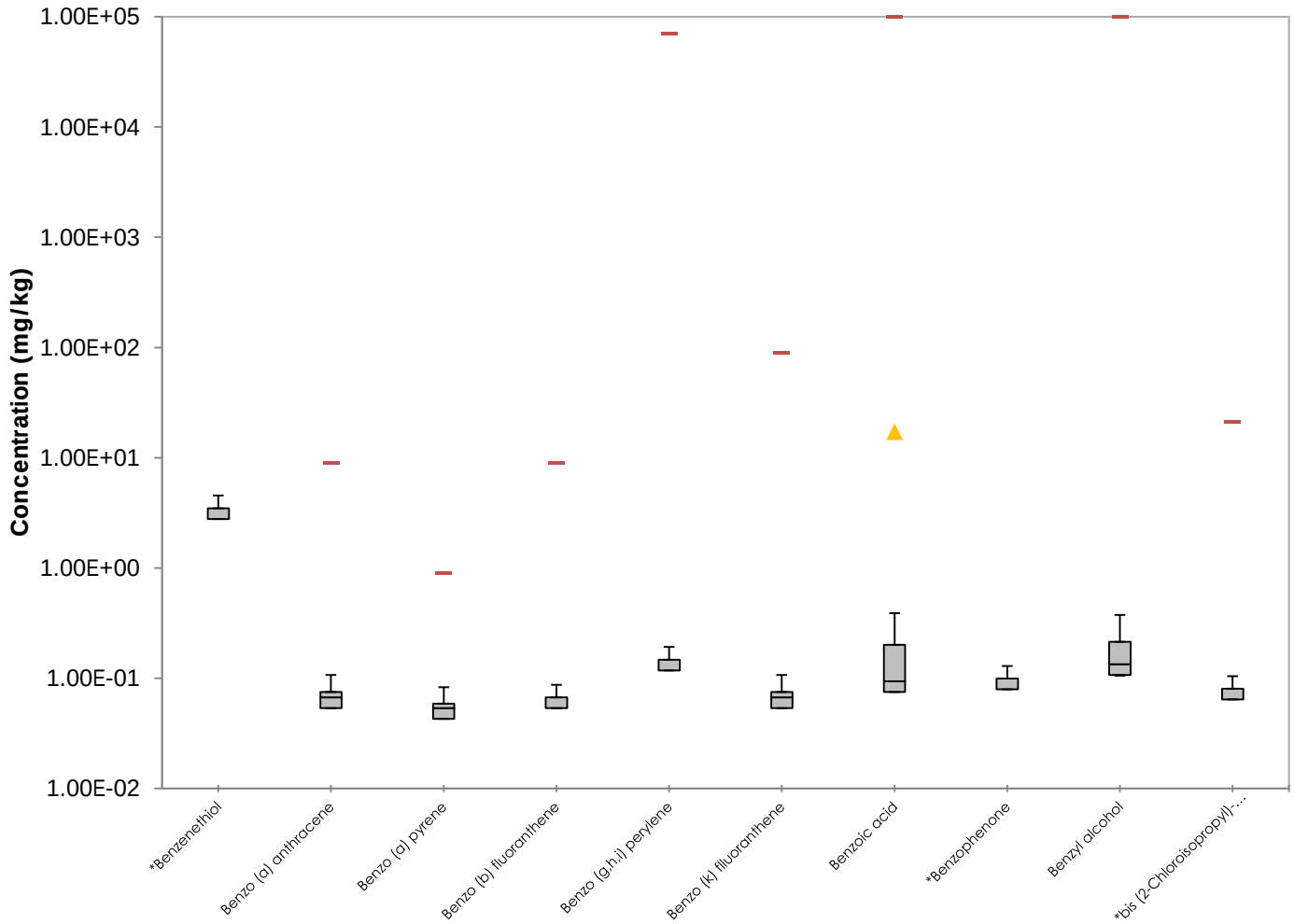
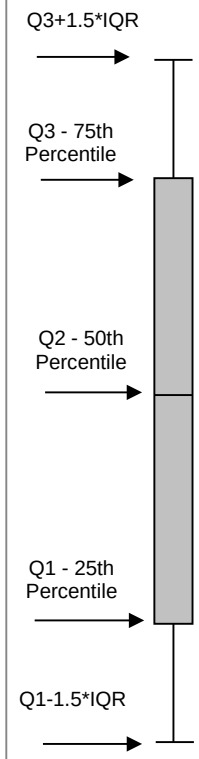
Figure B-4AV

P:\PRJ4\CAWP\HW0989\CPA-FTF DUE (May 2014)\[Figures B-4 - Soil Boxplots (Updated June 2015).xlsm]B4BC





* Denotes No Basic Comparison Level Available

Denotes Basic Comparison Level

Denotes ND Statistical Outlier

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Notes:

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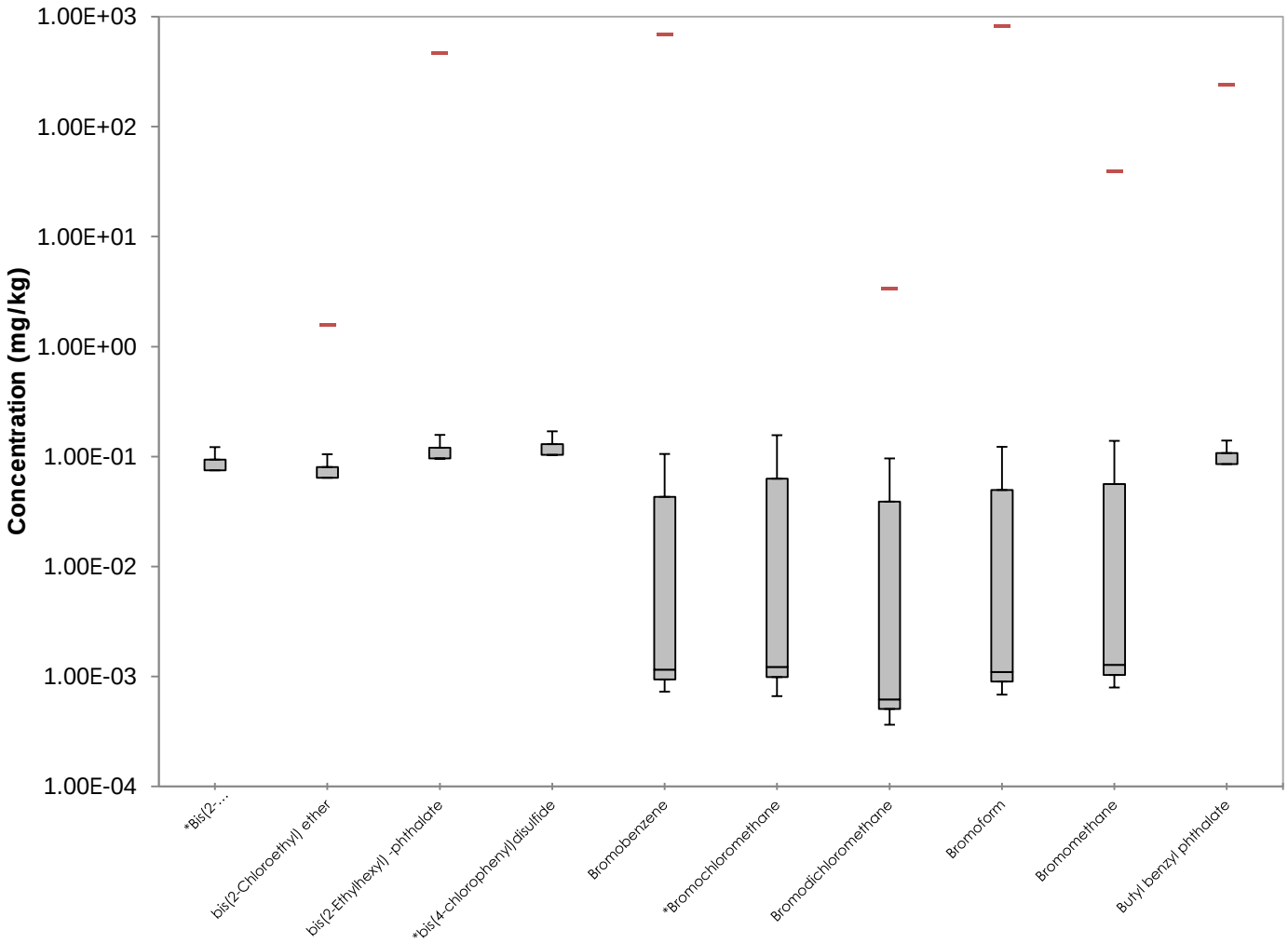
Figure B-4AW

P:\PRJ4\CAWP\HW0989\CPA-FTF DUE (May 2014)\[Figures B-4 - Soil Boxplots (Updated June 2015).xlsm]B48C



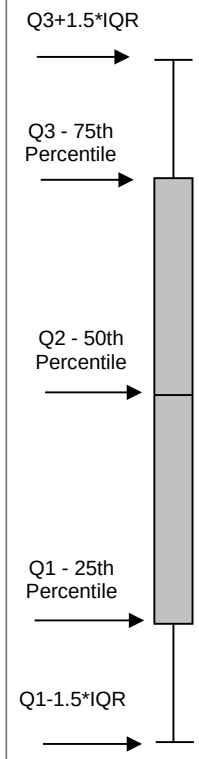


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Figure B-4AX

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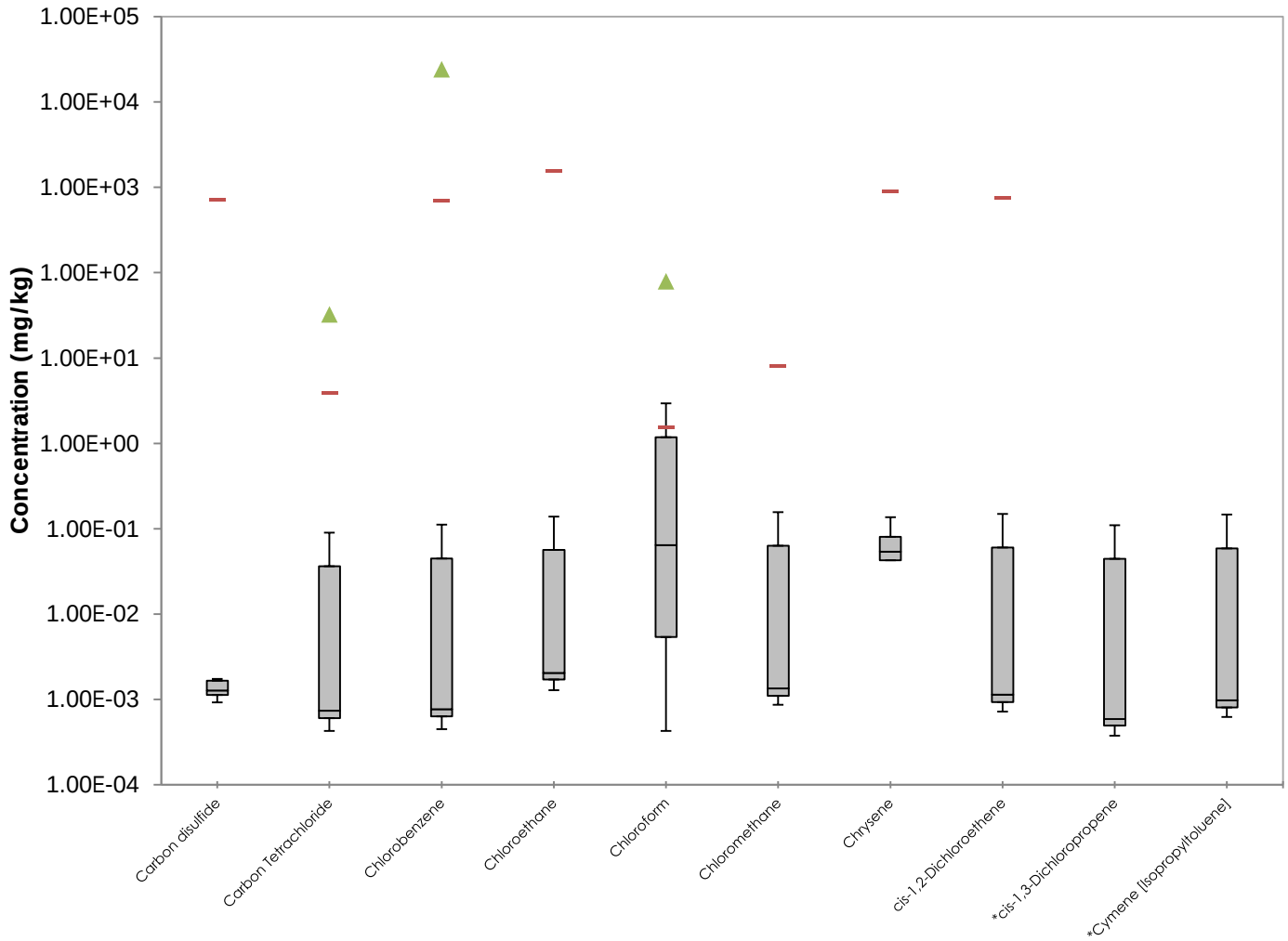
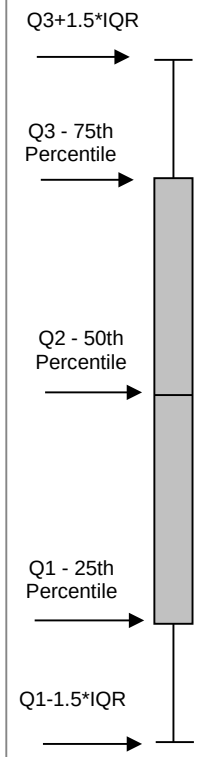
P:\PRJ4\CAWP\HW0989\CPA-FTF DUE (May 2014)\[Figures B-4 - Soil Boxplots (Updated June 2015).xlsm]B4BC





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Notes:

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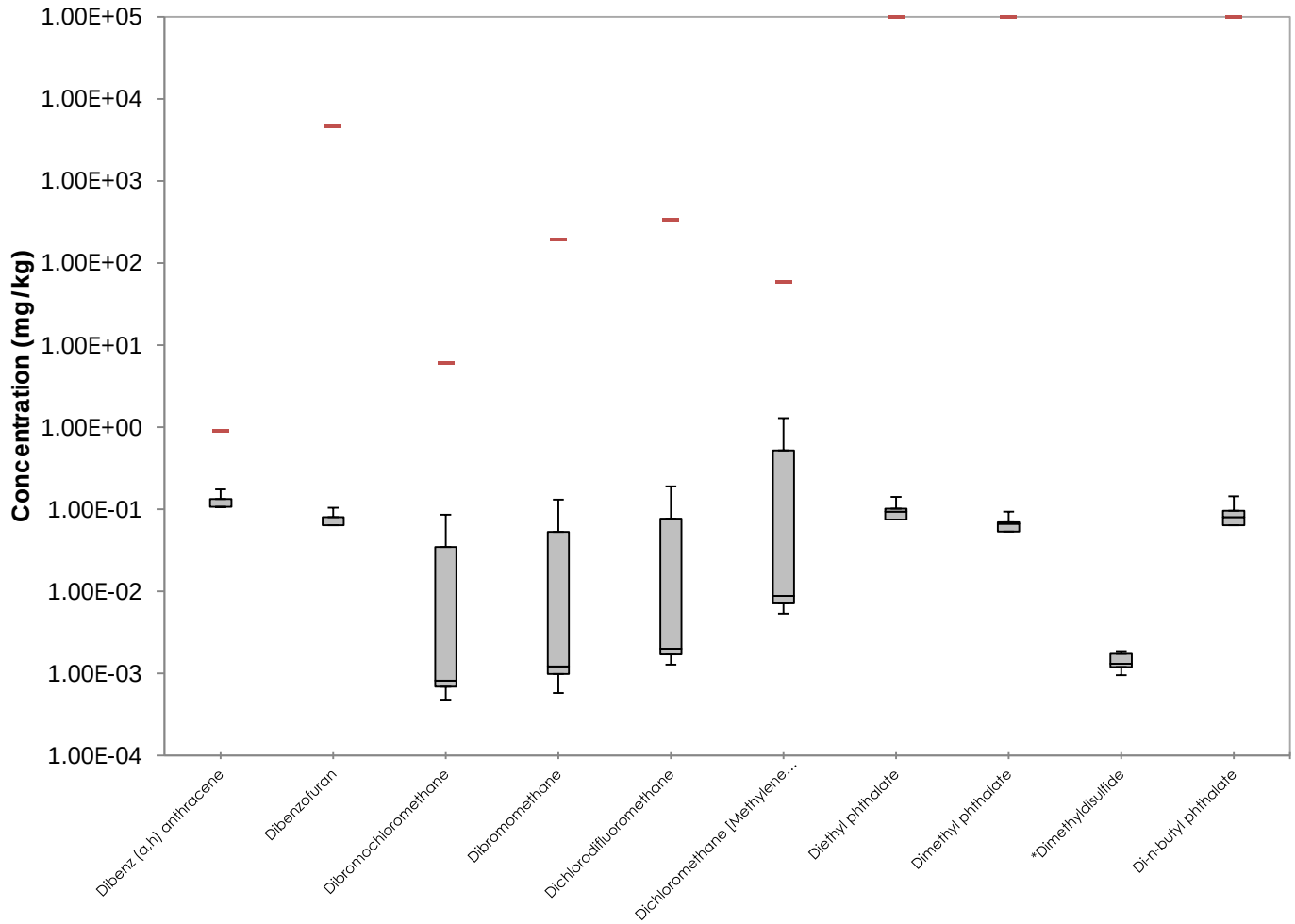
Figure B-4AY

P:\PRJ4\CAWP\HW0989\CPA-FTF DUE (May 2014)\[Figures B-4 - Soil Boxplots (Updated June 2015).xlsm]B4BC



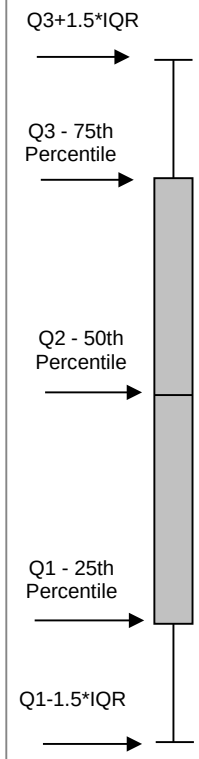


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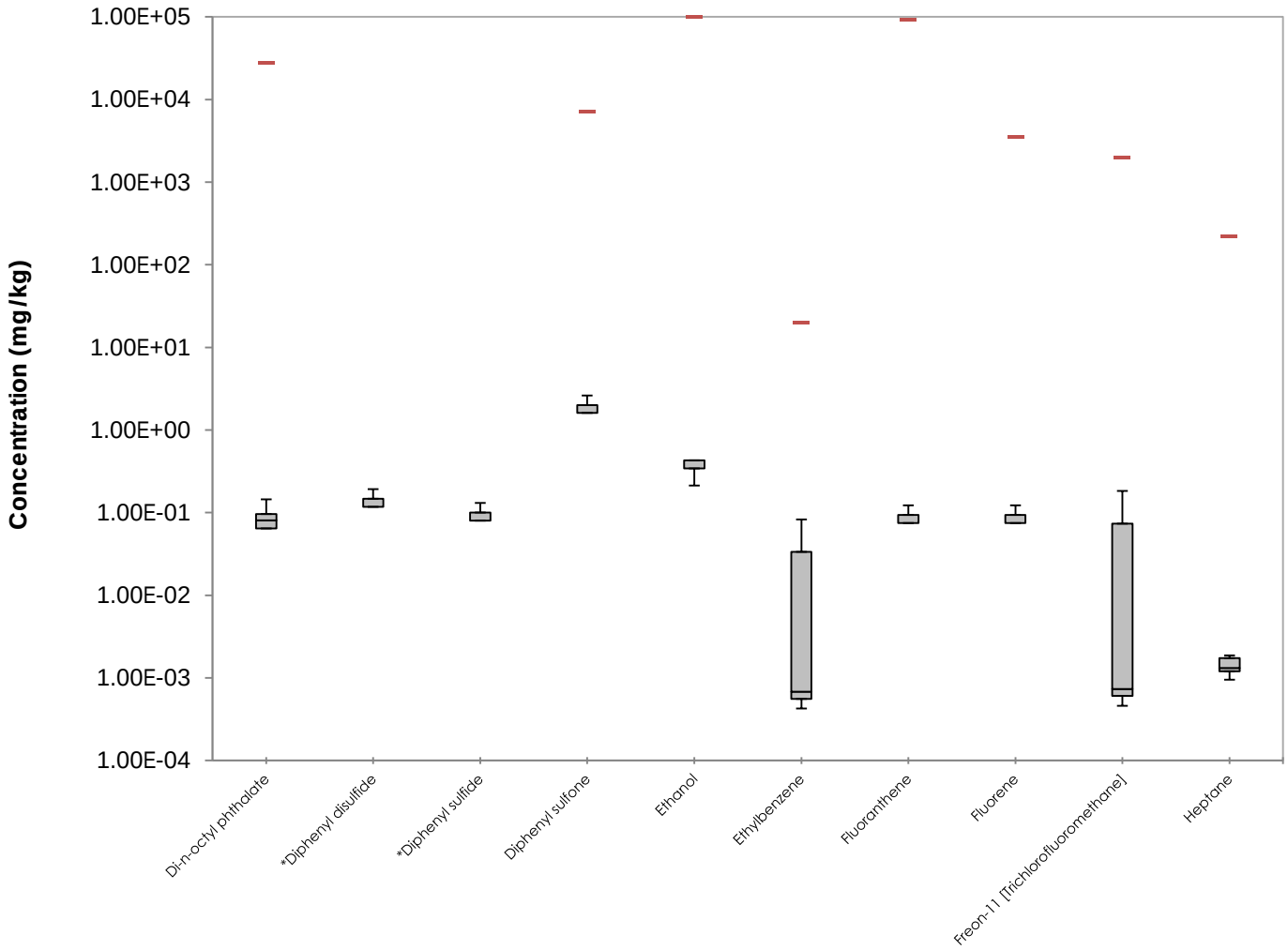
Figure B-4AZ

P:\PRJ4\CAWP\HW0989\CPA-FTF DUE (May 2014)\[Figures B-4 - Soil Boxplots (Updated June 2015).xlsm]B4BC



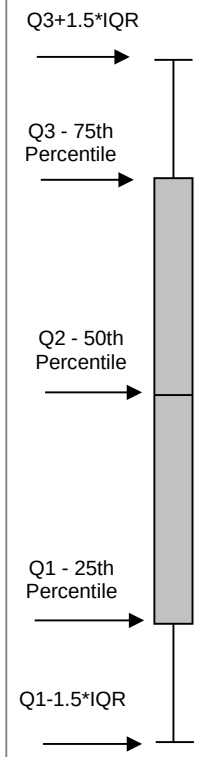


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Figure B-4BA

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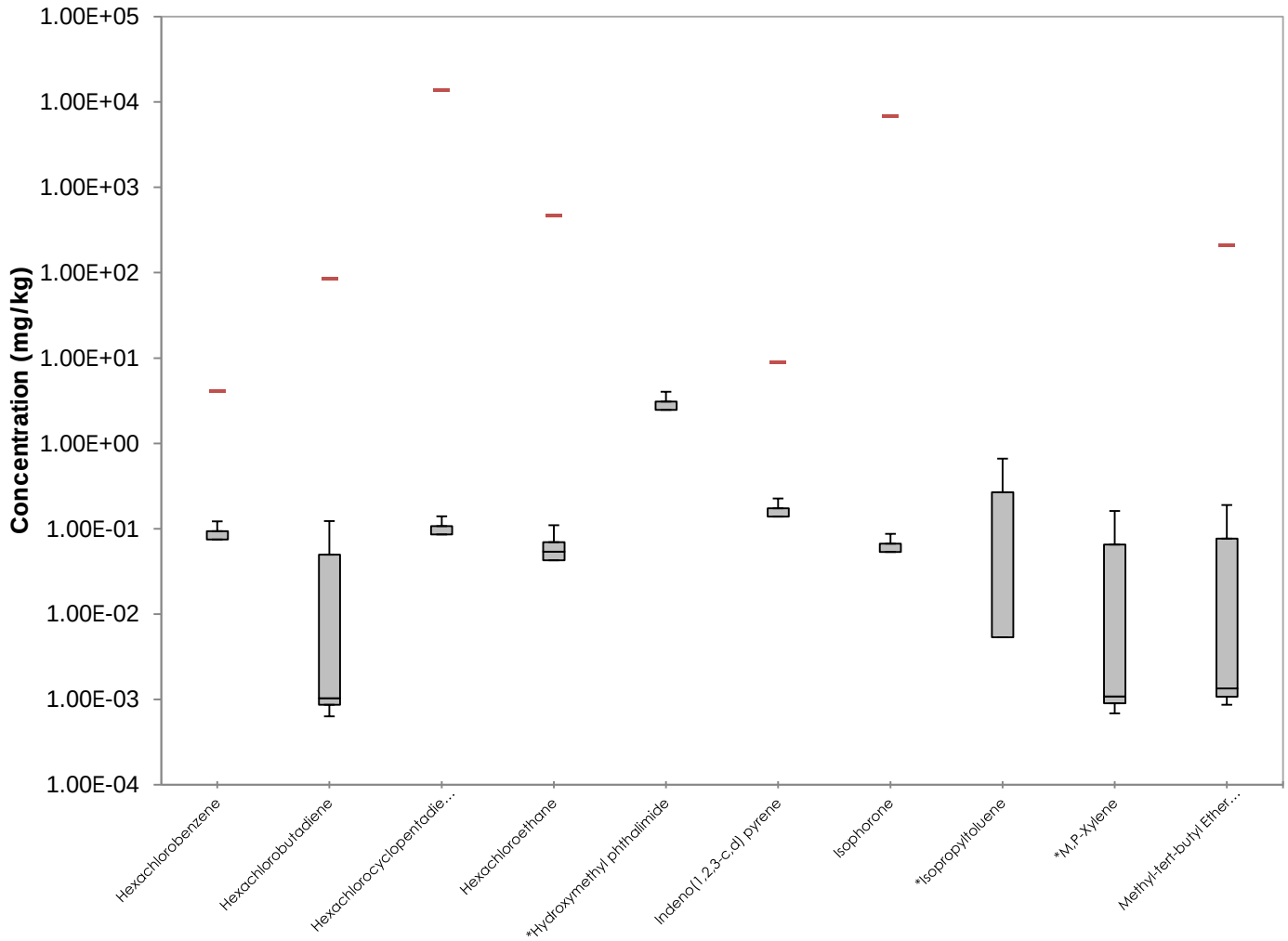
P:\PRJ4\CAWP\HW0989\CPA-FTF DUE (May 2014)\[Figures B-4 - Soil Boxplots (Updated June 2015).xlsm]B4BC



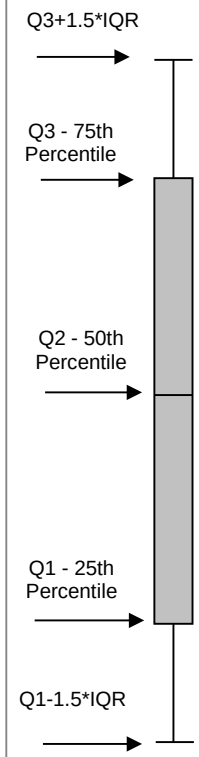


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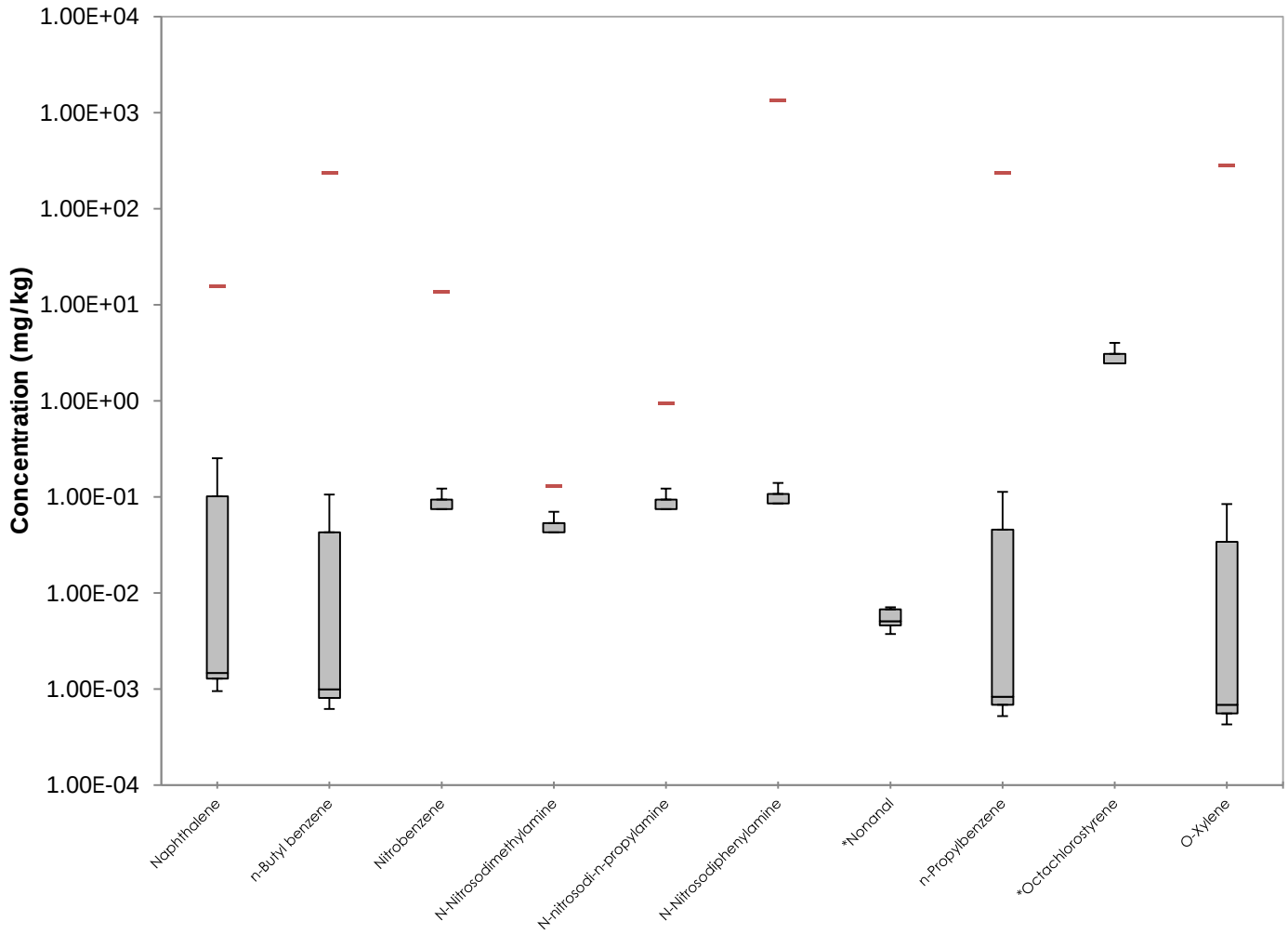
Figure B-4BB

P:\PRJ4\CAWP\HW0989\CPA-FTF DUE (May 2014)\[Figures B-4 - Soil Boxplots (Updated June 2015).xlsm]B4BC



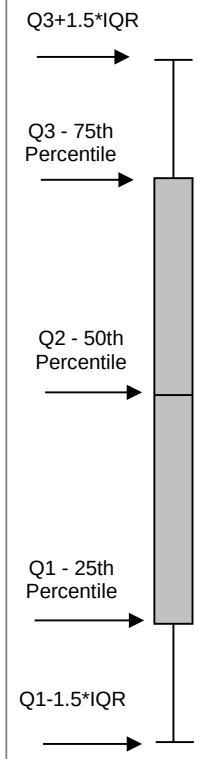


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Figure B-4BC

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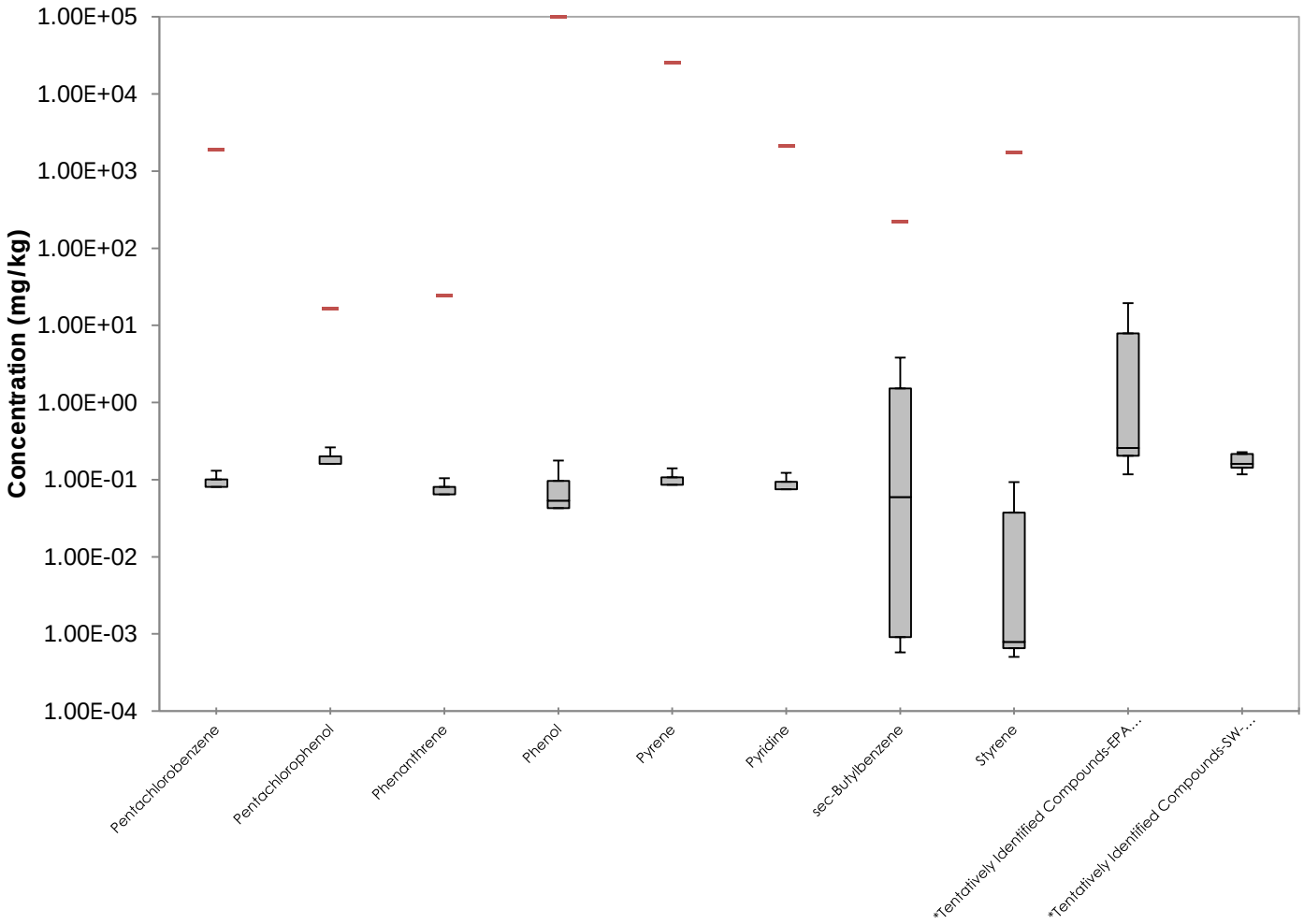
P:\PRJ4\CAWP\HW0989\CPA-FTF DUE (May 2014)\[Figures B-4 - Soil Boxplots (Updated June 2015).xlsm]B4BC



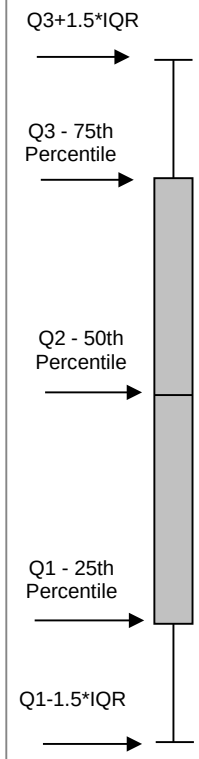


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Figure B-4BD

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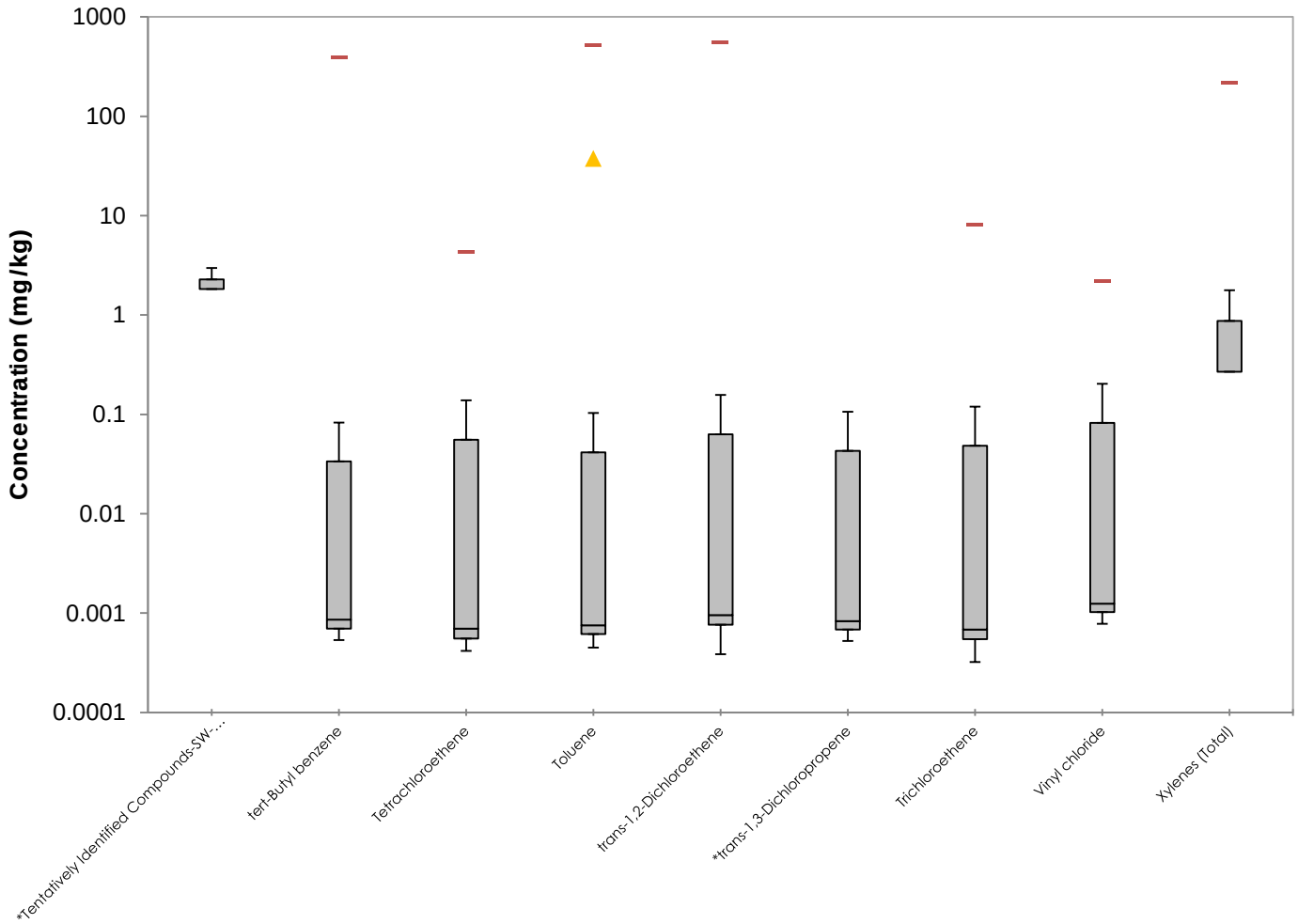
P:\PRJ4\CAWP\HW0989\CPA-FTF DUE (May 2014)\[Figures B-4 - Soil Boxplots (Updated June 2015).xlsm]B4BC



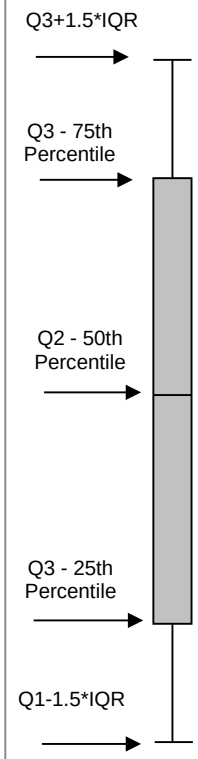


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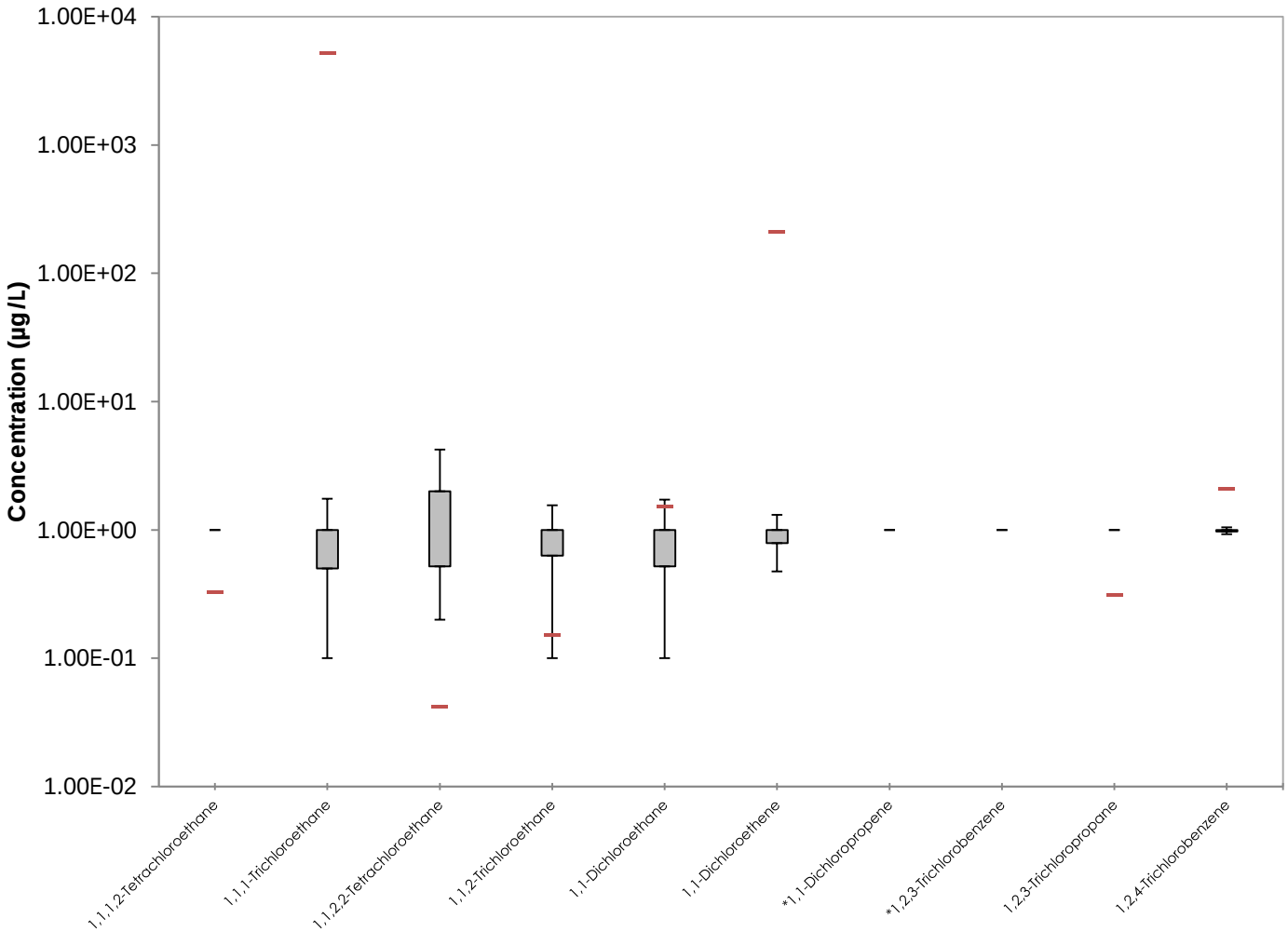
Figure B-4BE

P:\PRJ4\CAWP\HW0989\CPA-FTF DUE (May 2014)\[Figures B-4 - Soil Boxplots (Updated June 2015).xlsm]B4BC



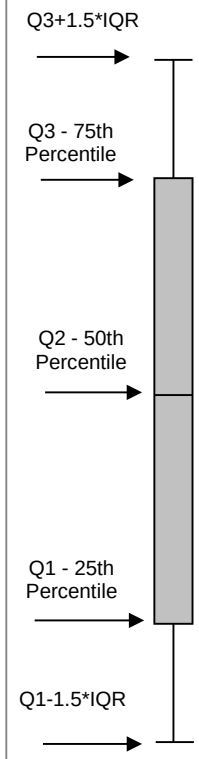


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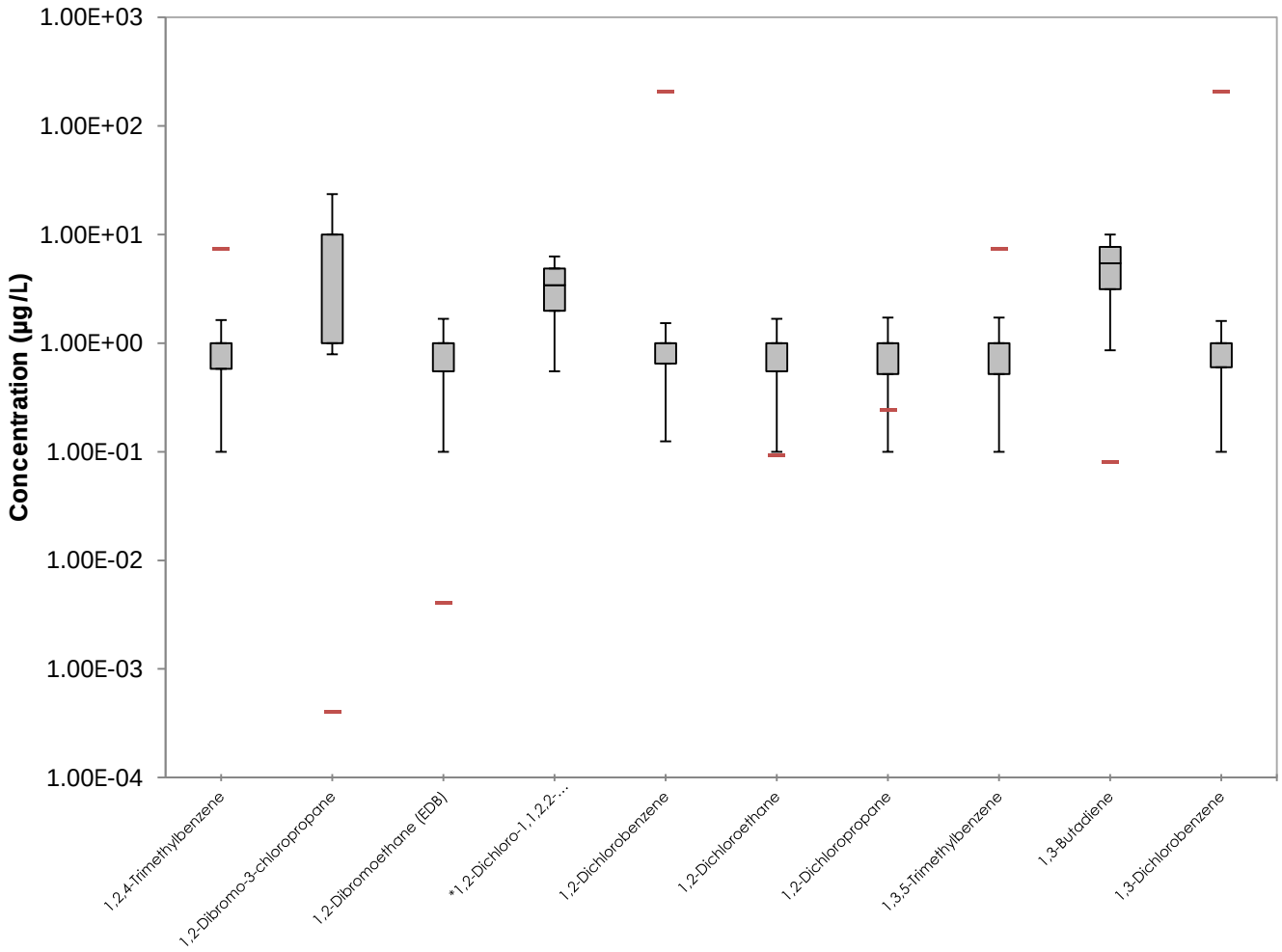
Figure B-5A

P:\PRJ4\CAWP\HW0989\CPA-FTF DUE (May 2014)\[Figures B-5 - Soil Vapor Boxplots (Updated June 2015).xlsm]B5H



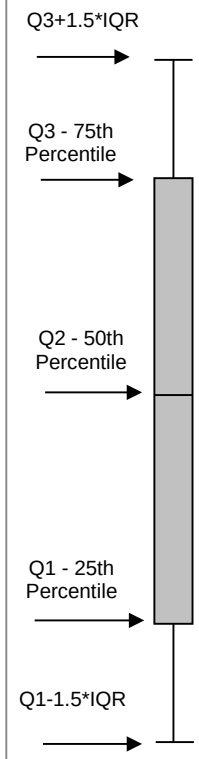


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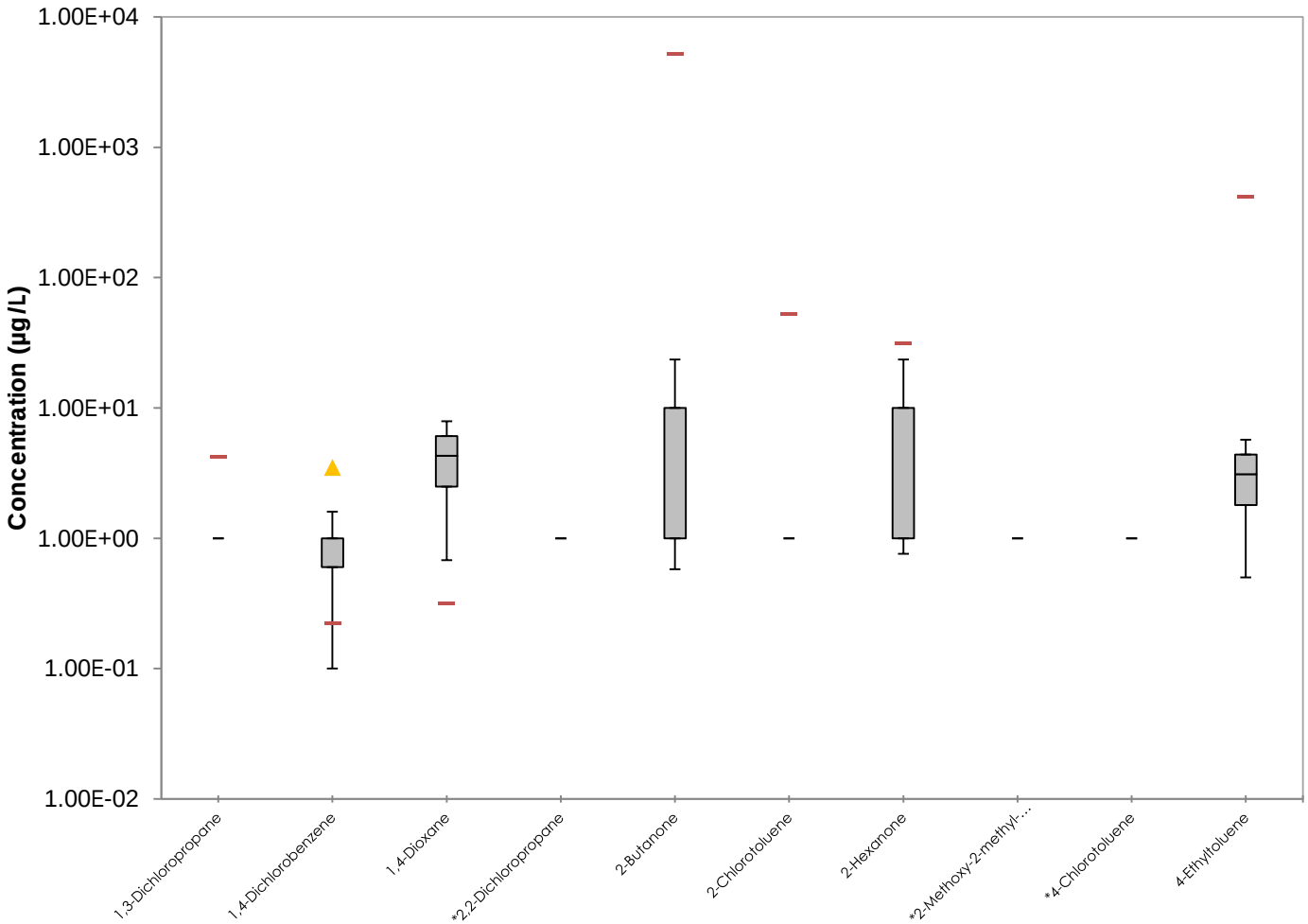
Figure B-5B

P:\PRJ4\CAWP\HW0989\CPA-FTF DUE (May 2014)\[Figures B-5 - Soil Vapor Boxplots (Updated June 2015).xlsm]B5H



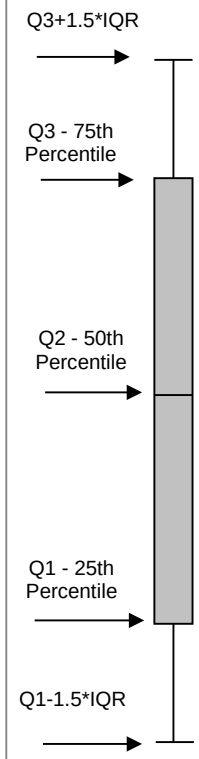


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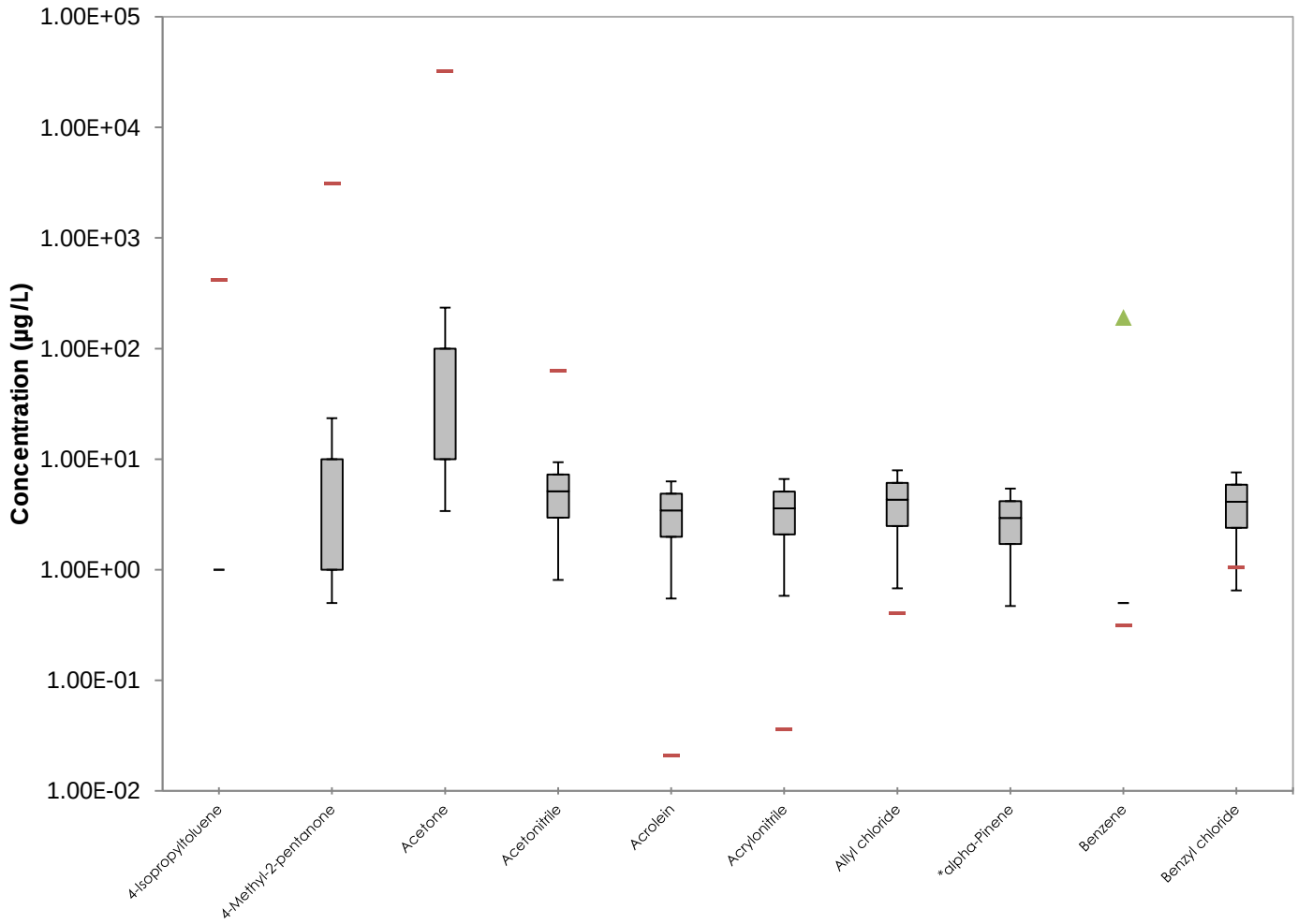
Figure B-5C

P:\PRJ4\CAWP\HW0989\CPA-FTF DUE (May 2014)\[Figures B-5 - Soil Vapor Boxplots (Updated June 2015).xlsm]B5H



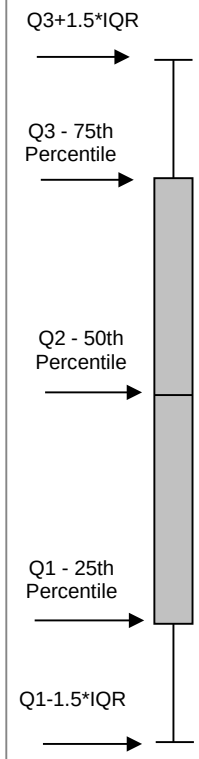


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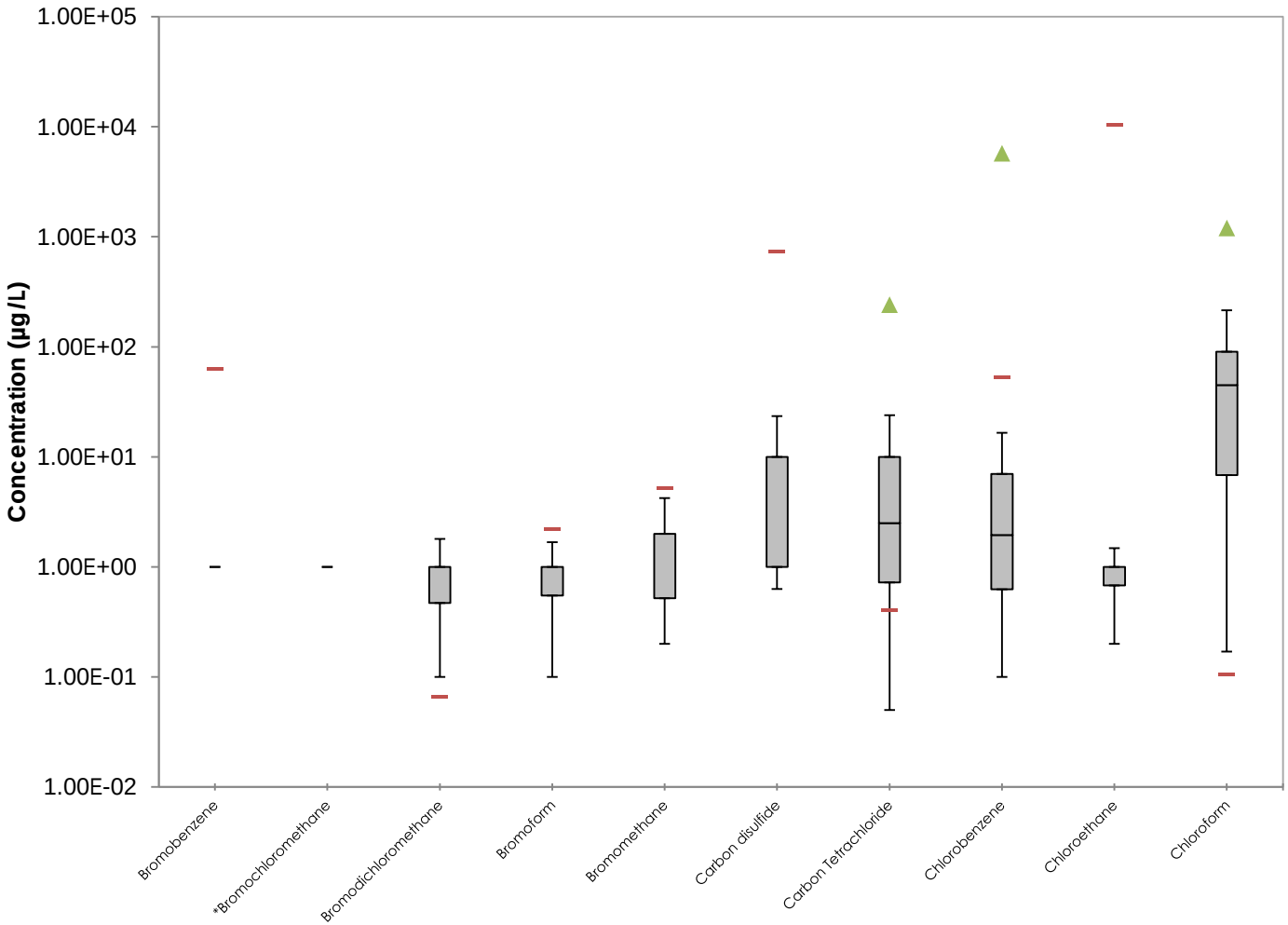
Figure B-5D

P:\PRJ4\CAWP\HW0989\CPA-FTF DUE (May 2014)\[Figures B-5 - Soil Vapor Boxplots (Updated June 2015).xlsm]B5H



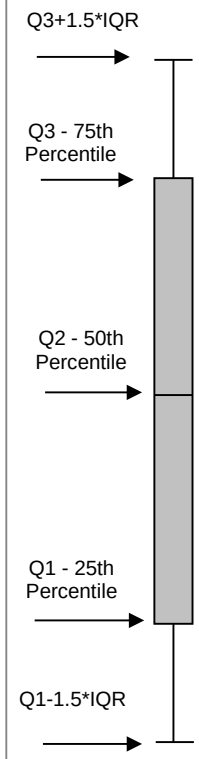


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Figure B-5E

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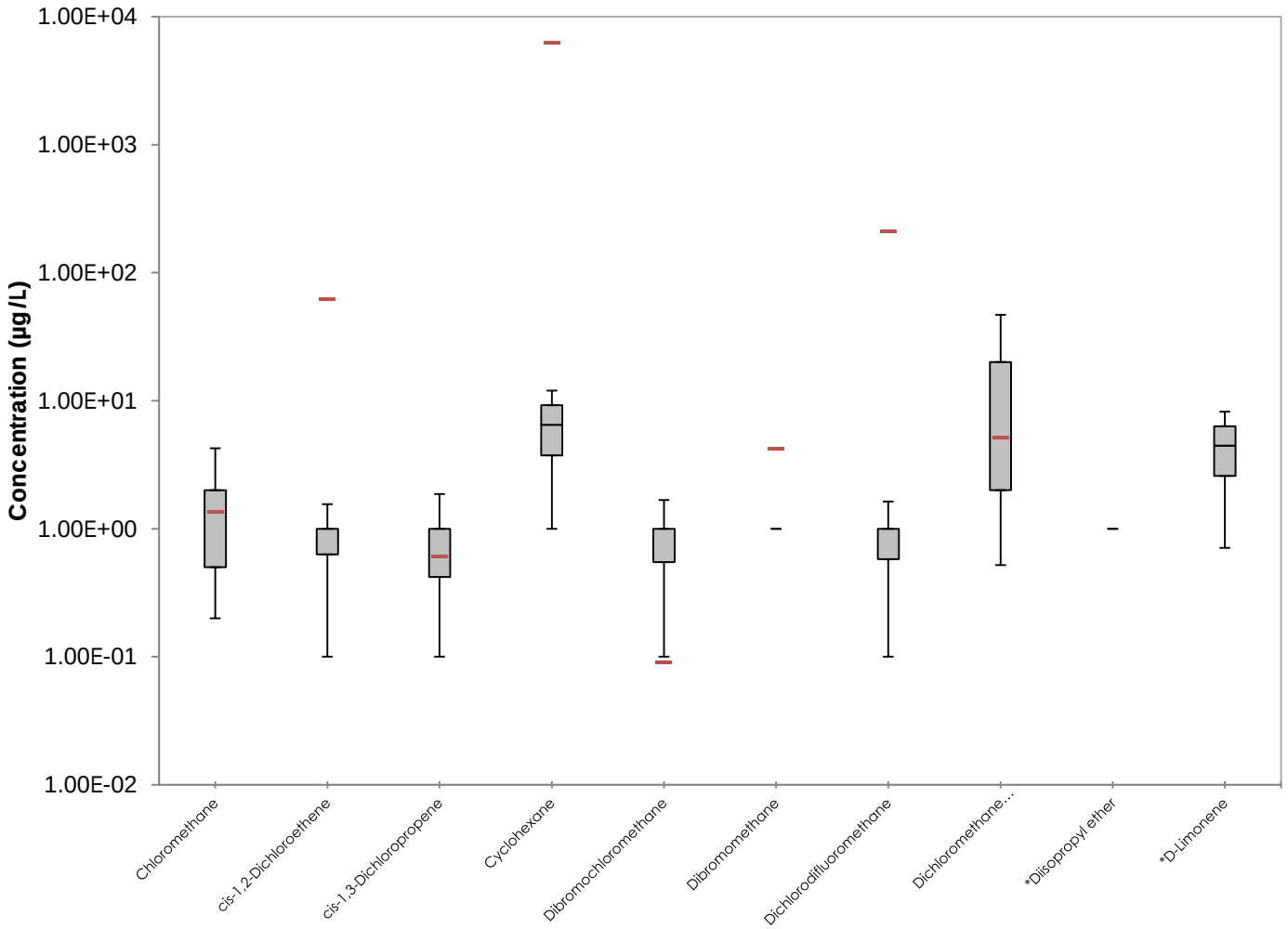
P:\PRJ4\CAWP\HW0989\CPA-FTF DUE (May 2014)\[Figures B-5 - Soil Vapor Boxplots (Updated June 2015).xlsm]B5H



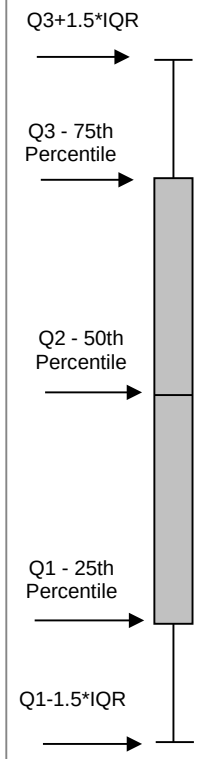


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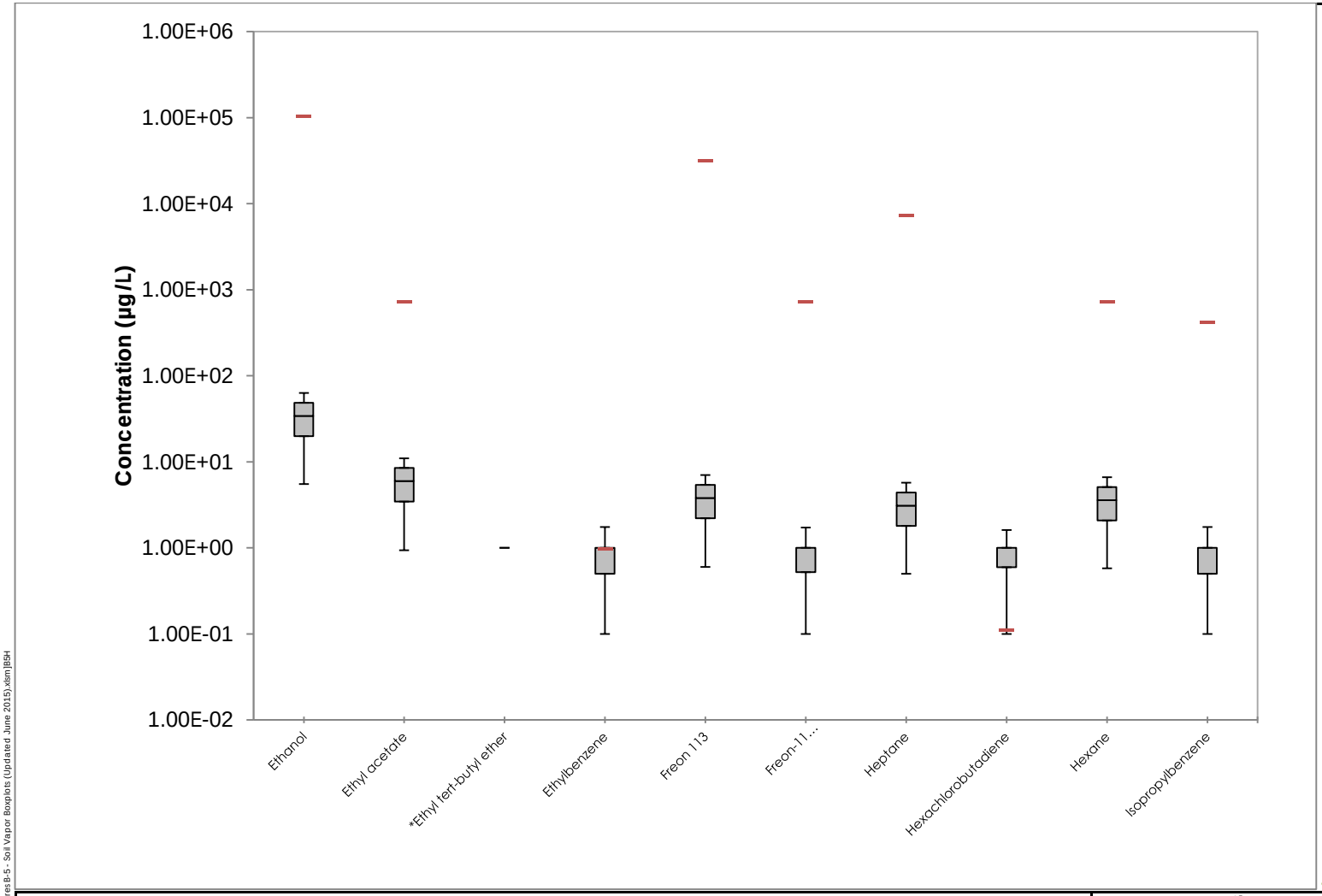
Figure B-5F

P:\PRJ4\CAWP\HW0989\CPA-FTF DUE (May 2014)\[Figures B-5 - Soil Vapor Boxplots (Updated June 2015).xlsm]B5H



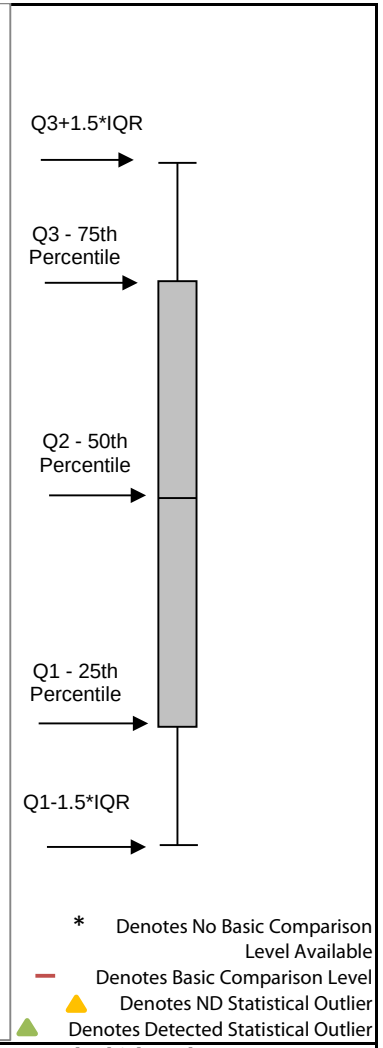


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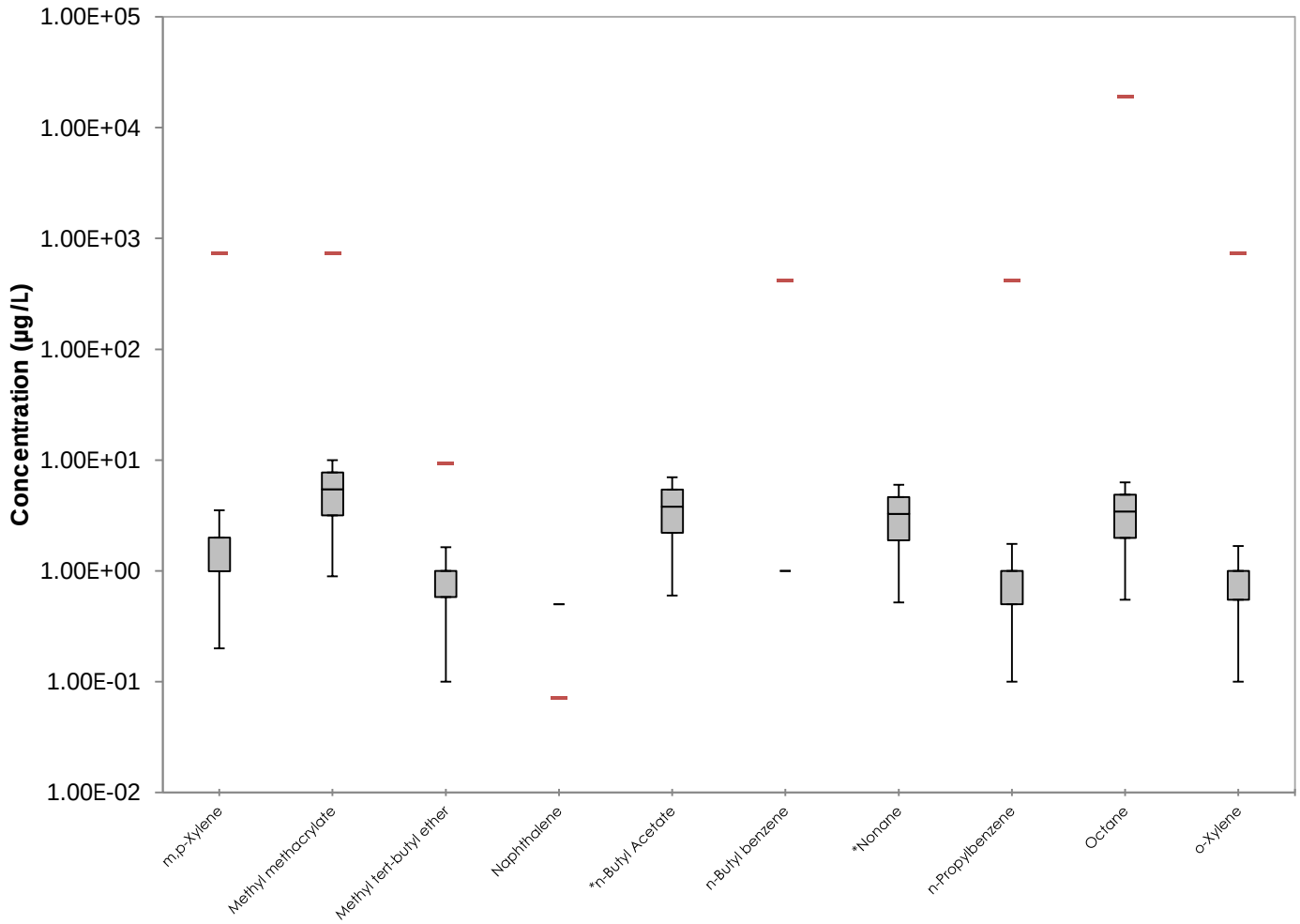
Figure B-5G

P:\PRJ4\CAWP\HW0989\CPA-FTF DUE (May 2014)\[Figures B-5 - Soil Vapor Boxplots (Updated June 2015).xlsm]B5H



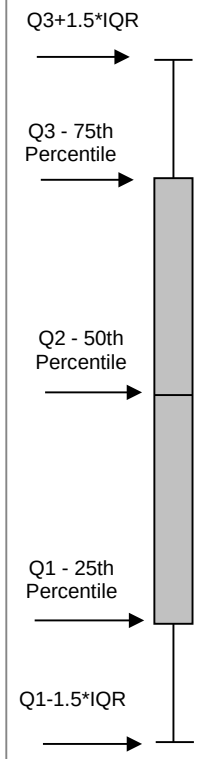


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Figure B-5H

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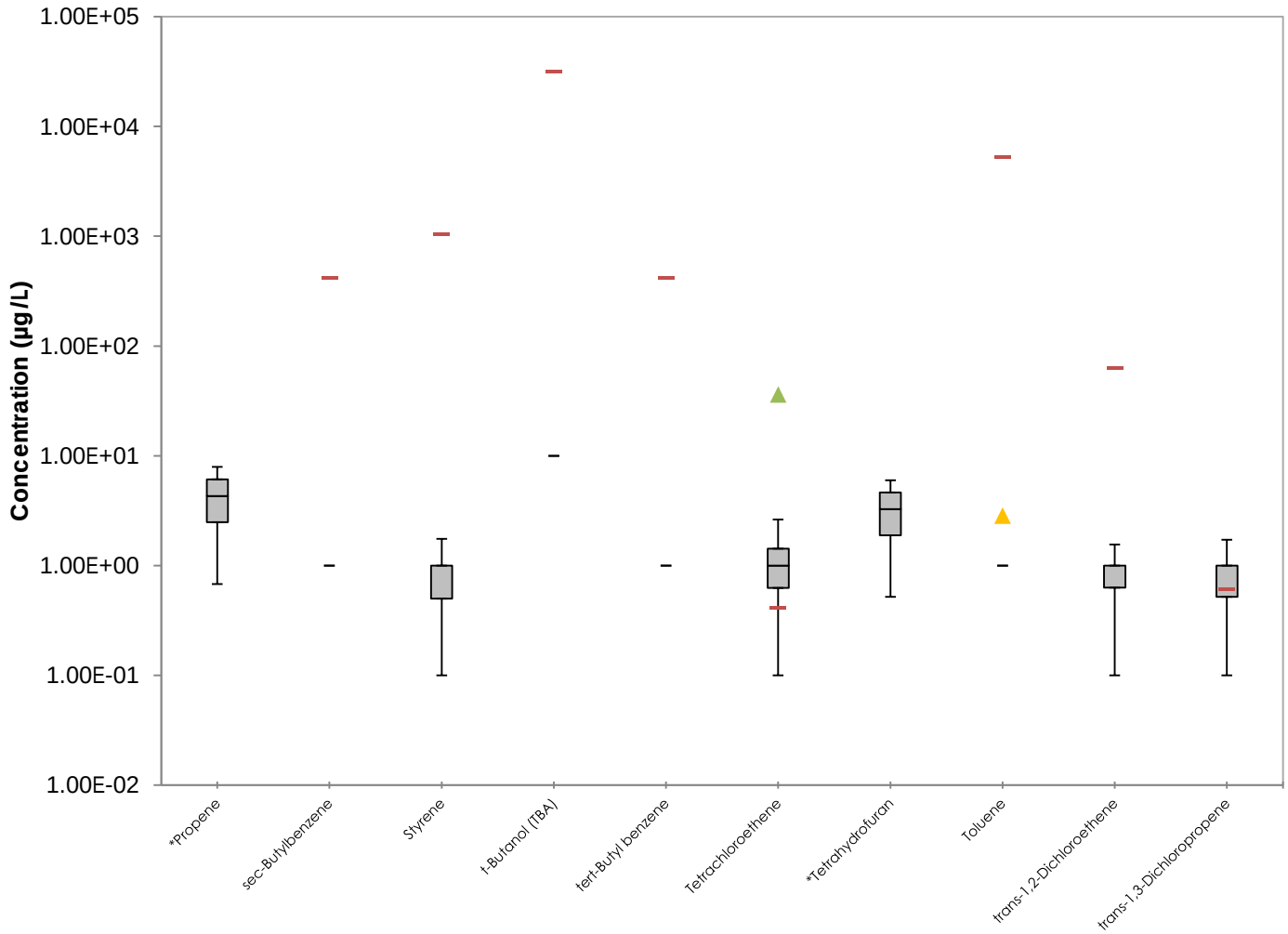
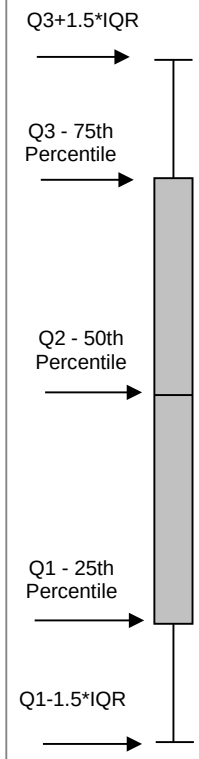
P:\PRJ4\CAWP\HW0989\CPA-FTF DUE (May 2014)\[Figures B-5 - Soil Vapor Boxplots (Updated June 2015).xlsm]B5H





* Denotes No Basic Comparison Level Available

Denotes Basic Comparison Level

Denotes ND Statistical Outlier

Denotes Detected Statistical Outlier

Notes:

ug/L= micrograms per liter
ND = non-detect
IQR = interquartile range equals the 3rd quartile (75th percentile) - 1st quartile (25th percentile)
Half of the sample quantitation limit is used for nondetects unless otherwise noted.

Soil Vapor Box and Whisker Plots - Volatile Organic Compounds
Closed Ponds Area and Former Tank Farm
Henderson, Nevada

Geosyntec consultants

Figure B-5I

Huntington Beach | 22-Jun-15

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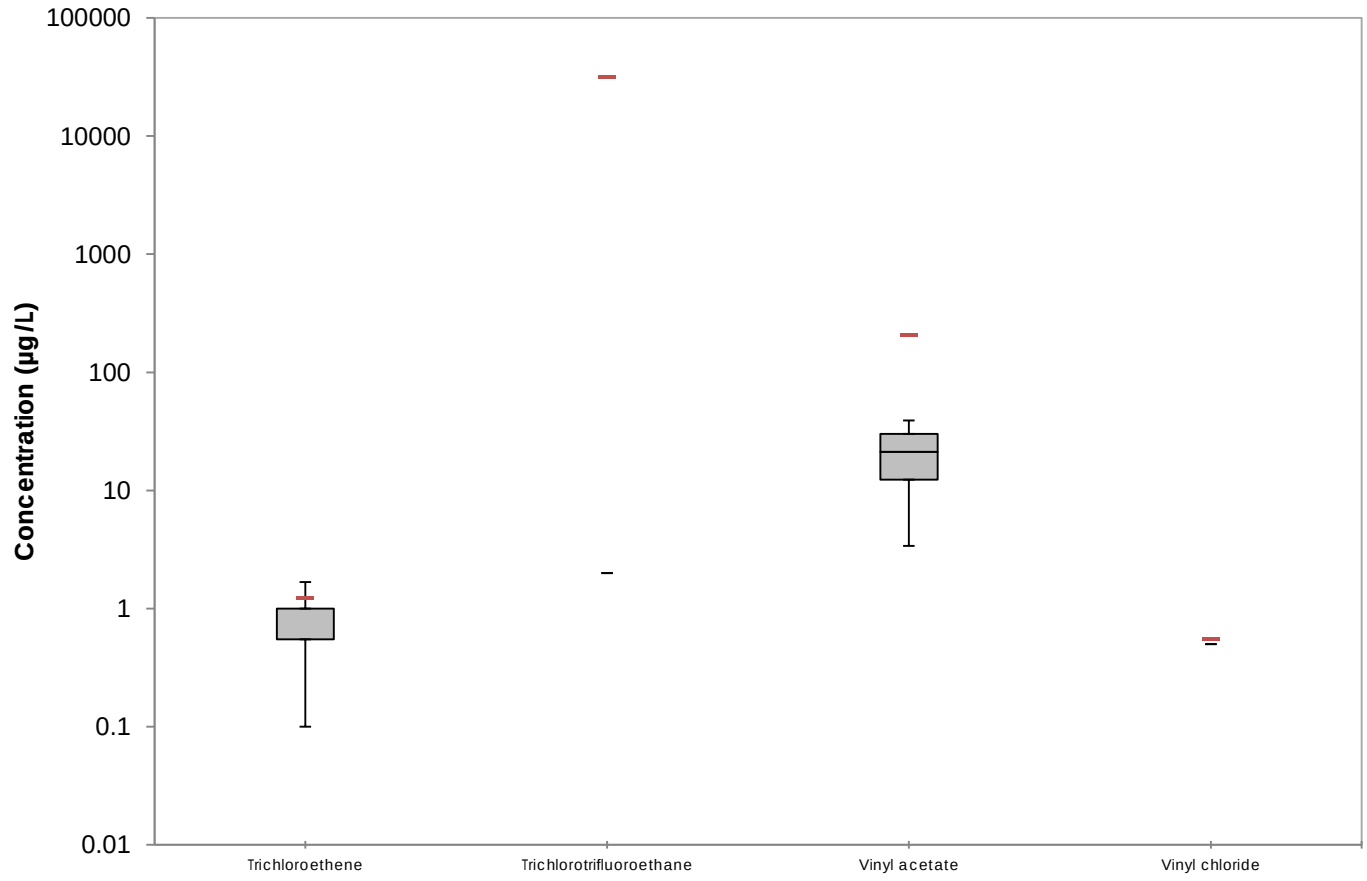

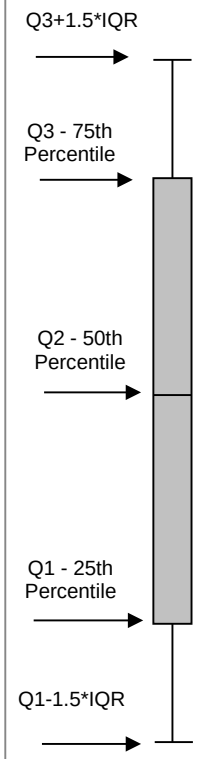

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Soil Vapor Box and Whisker Plots - Volatile Organic Compounds Closed Ponds Area and Former Tank Farm Henderson, Nevada

Geosyntec consultants

Figure B-5J

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APPENDIX C

DATA VALIDATION AND LABORATORY REPORTS – GEOSYNTEC

(Included on DVD)

APPENDIX D

DATA VALIDATION AND LABORATORY REPORTS – HARGIS

(Included on DVD)

APPENDIX E

SUMMARY REPORT WITH LABORATORY REPORTS – SECOR

(Included on DVD)