

**APPENDIX G**  
**REVIEW COMMENTS AND RESPONSES**

**REVIEW COMMENTS AND PARSONS RESPONSES ON THE DRAFT RESULTS REPORT FOR THE DEMONSTRATION OF NO-PURGE GROUNDWATER SAMPLING DEVICES AT FORMER MCCLELLAN AFB, CALIFORNIA**

<b>REVIEWER: Don Vroblesky (USGS)</b>					
<b>Item No.</b>	<b>Section</b>	<b>Page(s)</b>	<b>Line(s)</b>	<b>Comment</b>	<b>Response</b>
1	2	2-3	9	Suggest adding the line: “PDBS samples also are not subject to volatilization loss by degassing during effervescence when the samples are acidified for preservation in highly alkaline waters because the alkalinity from the aquifer does not penetrate the membrane.”	The text will be modified as recommended.
2	2	2-3	15-18	The discussion regarding the difficulty of obtaining redox sensitive solutes because of oxygenated water in the samplers is untested and speculative. It may not be true. Especially if the samples are filtered. The sentence should be deleted.	Sentence will be deleted as recommended.
3	3	2-3	21-23	In light of comment 2, the sentence beginning with “Therefore” should be replaced with:”Because the entrapped air reduces sampler permeability, the air should be removed prior to use by flushing the samplers with water. “	The text will be modified as recommended.
4	2	2-5	13	Delete the reference “Vroblesky and Pravecek, 2002”	Reference will be deleted.
5	2	2-5	21	Add the reference “A potential disadvantage of this sampler is that it may begin to biodegrade in some groundwater systems (Vroblesky and Pravecek, 2002), . . . “	The text will be modified as recommended.
6	5	5-4	25- 28	I agree that it took a significant time to purge the pores in this initial field demonstration where we were doing this just about for the first time. I have toyed with these things since then and have found more efficient ways to do it. However, I don’t recall that it also took a fairly significant amount of time to construct and attach the samplers to the deployment string. Constructing them simply consisted of putting caps on the ends and putting them into a mesh sleeve. Attaching them did not take significantly more time than the other devices. I’m not saying that these are great samplers, but I would rather not see them get bad marks where perhaps the marks are not justified. A possible suggestion is to change the text to “Specifically, a significant amount of time was taken in purging the samplers of residual air. If the sampler is ever developed commercially, it is reasonable to expect that the degassing could be done more cheaply and efficiently prior to delivery.”	The text will be modified as recommended.

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7	7	7-2	26	Suggest adding the line: “PDBS samples may be advantageous when sampling for VOCs in waters where matrix interferences, such highly turbid or alkaline conditions, may compromise results.”	The text will be modified as recommended.
8	Appendix D	23		The trend line on the graph of PSMS versus RPPS for 1,4-Dioxane doesn’t look real. It doesn’t match the data and it is not a 1:1 line either.	It is difficult to see the data points for 1,4 dioxane because they are obscured behind data points for other analytes. If the other data points are deleted, it can be seen that the dioxane trend line fits the dioxane data points reasonably well.
9	Appendix B	4		Graph of MW0242 dioxane has an anomalous X in the explanation and graph	The anomalous X will be deleted from the legend and graph. As indicated on pg 3-10 of the draft report, no Snap™ Samples were collected from MW242.
10				I think you have done a very good job putting this together. It is well organized and readable, and you tried to be fair.	Thank You—comment is appreciated!

<b>REVIEWER: Don Gronstal (AFRPA McClellan)</b>					
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1	General			The report style appears like it’s trying to please everyone to some degree. Like if a negative point is made on a sampler, then an offsetting positive point is made later on. This is OK, but the reader wants to know which way to go in selecting an alternative. So a clear path, if there is one, needs to summarize each section and leave the reader with the most relevant points.	We tried to be fair, objective, and factual in our comparisons and conclusions. In many cases definite, ‘black and white’ conclusions could not be derived from the data comparisons performed. Section 7 does indicate the sampler that we felt performed best overall in terms of comparison to the conventional sampling results, and also indicates analyte groups that each sampler could be used for in a technically viable sense. We feel that stronger conclusions would

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					'overstep' the bounds of the comparative analyses performed. However, a summary table will be added to Section 7 in response to other comments (including #2 below) to help clarify and reinforce conclusions and recommendations.
2	General			A chart showing the Major Pro's and Con's may be a good way to document the findings. This chart should differentiate between sampling only for VOCs and all constituents.	See response to comment #1. A table showing the major pros and cons for each sampler identified in the draft report will be added to Section 7. Specifically, for each tested no-purge sampler, this table will show it's estimated suitability for use with the various analytes targeted during this study, advantages, disadvantages, and any other pertinent comments.
3	General			I don't think the statistical tests, again from most readers' point of view who don't talk in that language, can be used to make a clear decision on which method is best to use. Using scatter charts and qualitative discussions, make some recommendations based on the lab sampling data. As the Diffusion Team has said many times, each method is OK. They each represent a different picture of the water quality. One is not correct and the rest incorrect. But there must be a way (without statistics) to qualify the findings and lead the reader to some logical choices for a particular sampling situation.	The comment makes an important observation—that statistical tests alone cannot be used to clearly indicate which method is best to use for each analyte group. However, we felt that the same observation is also true for the other non-statistical comparison methods. No single method, by itself, will likely give the whole picture. This observation led to our decision to use a suite of qualitative and quantitative (including statistical) comparisons (e.g., as opposed to only qualitative or only statistical) to maximize the chances of observing noteworthy trends. Combined, they provide a more complete indication of how the various data sets compare with each other. It is also important to note that each sampling method

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					may not be accurately measuring the concentrations of each analyte. Some analytes may not efficiently pass through the wall of a particular sampler, as has already been demonstrated to be true for the PDBS method. Therefore, each method may not be OK for all analyte groups. Therefore, the potential exists for some methods to be 'incorrect' in some cases. One objective of this comparative evaluation was to shed light on this issue.
4	1.1	1-1	19	Change (AFB0 to (McClellan) so that future references are clear.	This change will be made.
5	1.1	1-1	24	Drop AFB after McClellan. Recommend using this format through the report. I won't flag the rest of the examples.	This change will be made in the text, but the titles of all tables and figures will be left as is.
6	1.5	1-5	11-14	The importance of vertical stratification issues needs to be discussed. Even if only some sampling methods have usable data, they should be evaluated.	The following text will be added to this bullet item to indicate the importance of being able to determine the vertical variation in dissolved contaminant concentration:  <i>“This will allow comparison of sampling results from less-depth-discrete methods (i.e., 3-volume purge and low-flow purge) with results from more depth-discrete methods. This topic is of interest because the degree to which low-flow purge provides a depth-discrete sample is not well-defined.”</i>
7	1.5	1-5	22	Define PSD. I could not find it spelled out and it's not on the list of acronyms.	“PSD” will be changed to “PDS” (passive diffusion sampler), and this acronym will be defined in the list at the beginning of the report.

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8	1.5	1-5	18-20	The use of minimum volumes needs some justification, ie reference the ITRC study that demonstrated that labs can achieve desired results when tasked to do so with better equipment and better process controls in the lab.	The following text will be added to line 13 in Section 3.2.3 to expand on the minimum volume issue as requested: <i>“An ITRC Diffusion Sampler subteam has estimated the minimum sample volumes required for common environmental analytical methods; details are available on the ITRC diffusion sampling website at <a href="http://64.203.146.40/news.asp#41">http://64.203.146.40/news.asp#41</a>.”</i>
9	2.1.1	2-3	1-6	A chart of the recommended equilibrium times for each sampler would help the evaluation. Add this to the summary chart discussed above.	Readily available information on equilibration times will be added as additional narrative in the text. The budget is insufficient to do more detailed research into equilibration time information.
10	2.1.3	2-4	13	Is PSD or PSMS the correct name?	See response to comment #7.
11	3.1.1	3-1	22-23	Clarify that the Snap Sampler and HydraSleeve were deployed in only ten wells each.	Yes, this is true due to the fact that it would have been logistically too difficult to deploy both of these samplers in the same 4-inch-diameter well.
12	3.1.1	3-1	26	Reverse three-volume purge and low-flow purge/sample to be consistent showing which of these two methods occurred first.	These two methods will be reversed as requested.
13	3.3	3-10	1-7	Rather than dropping the vertical stratification data for all wells just because one well was faulty eliminates a critical component of the evaluation. There must be a logical way to evaluate this just for the nine OK wells.	The situation described in the referenced text did not result in the vertical stratification data being dropped from use.
14	3.4	3-11	21	Were the trip blanks analyzed by the labs? If not, why?	The laboratory inadvertently did not analyze the Phase 2 trip blank; we were not able to determine the specific reason. The Phase 3 trip blanks were analyzed.

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15	3.4	3-12	1-3	There is a lot of these errors in the report. Explain the impact of not collecting the field blanks.	<p>The following text will be added to the end of Line 3 on page 3-12: <i>“Therefore, information regarding precision of the HydraSleeve® sampling process based on MS/MSD results and the impact of potential matrix effects on the analytical testing is not available.”</i></p> <p>The following text will be added to the end of line 23 on page 3-11: <i>“As a result of the lack of trip blanks during Phase 2, the degree to which low-level VOC detections may be attributable to cross-contamination during sample shipping and handling cannot be fully confirmed.”</i></p> <p>The following text will be added to the end of line 30 on page 3-11: <i>“In the instances where field samples designated as MS/MSDs were not analyzed as such, measurements of accuracy and analytical precision based on MS/MSD results were not developed for samples collected using a given sampling method.”</i></p>
16	4.2	4-1	8	Define a Level III validation.	<p>The first paragraph of Section 4.2 will be deleted and replaced with the following text:</p> <p><i>“A project-specific ‘Level III’ data validation protocol was performed, which evaluated sample data and QC data and results summarized on AFCEE reporting forms. In performing the data validation, it was assumed that the laboratory’s</i></p>

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					<p><i>documentation was acceptable and that the data reported by the laboratory were an accurate representation of the raw data. The raw data were not reviewed. A complete review of the applicable data was performed, and the project-specific QAPP and the McClellan QAPP 5.0 were used as the primary tools in the validation of the data.</i></p> <p><i>The data quality assessment report (Appendix A) is based on the reviewed information, and on the data quality specifications of the project QAPP, as well as Sections 1-17 of the McClellan AFB QAPP 5.0 and the appended SOP McAFB-028 (“Data Review Procedures”) and SOP McAFB-029 (“Data Validation Standard Operating Procedures”).”</i></p>
17	4.2	4-1	14-18	Need to discuss the errors in collecting some of these samples.	See response to comment #15.
18	4.3	4-2	2-4	Vertical flow issues are not being evaluated. This needs a better discussion.	<p>Vertical flow in the sampled wells was not measured or evaluated in any way. The following text will be added to the end of line 4:</p> <p><i>“When a low-flow sample is collected, determining the portion of the screened interval of the aquifer that contributed water to the sample is problematic.”</i></p>
19	4.4	4-3	2-4	The qualitative review being discussed did not provide clear final conclusions. See No. 1 & 2 above.	Comment noted. See responses to comment #s 1 and 2.

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20	5	5-2	3	Initial setup costs are important in the decision process to chose a sampling method. Some attempt to quantify this parameter needs to be included.	Initial setup costs cannot be accurately derived for the demonstration that was performed. We used a subcontractor to perform the low-flow and 3-volume methods, and some of the diffusion samplers (e.g., PsMS, RPPS) were being used for the first time, necessitating experimentation and development of field procedures. In addition, setup costs will be somewhat site- and project-specific. For these reasons, we would prefer to leave these out of the cost analysis rather than risk providing inaccurate information.
21	5	5-2	17-18	Field filtration is part of the process, so it should be included. ????	The decision to field-filter a sample is often analyte, well-, and/or site-specific and is not automatically associated with use of a particular sampling method. For example, it is not realistic to assume that pumped or grab samples will always require filtration. Therefore, it seems reasonable to leave this out of the cost analysis.
22	5	5-3	6-13	IDW should also be evaluated. The actual volumes of water disposed would be a good comparison and a cost could be estimated.	The cost for IDW disposal varies substantially from site to site depending on the disposal mechanism used. Due to the inability to accurately estimate 'typical' disposal costs, we feel that it would be best to recognize that sampling approaches that generate significant IDW requiring disposal have the potential to be substantially more expensive depending on the disposal mechanism than approaches that do not generate significant IDW. This observation is included in the referenced text.

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					As noted on page 5-3, lines 9-11, labor and equipment costs to collect and transfer IDW to the treatment plant were included in the cost analysis. Therefore, differences in IDW volumes between sampling methods were accounted for to some extent.
23	5	5-6 to 5-12	<b>See BOLD</b>	Tables on these pages have some print errors	Inspection of our hardcopy tables does not indicate print errors. This may be an artifact of your specific printer.
24	5	5-14	9-15	This disqualifier eliminates the cost comparison benefits from the study. Needs to be restated without the negative context.	The second to the last sentence in the referenced paragraph will be deleted. The last sentence of the paragraph will be revised to read: <i>“Prior to conversion from one sampling method to another, a more complete cost analysis that takes into account all site-specific cost factors should be performed.”</i>
25	6	6-1	all	Bingo. I know this is evident but to the outside reader, this is the critical decision logic which I speak to above. We try to hard to use math models to explain the differences.	Comment noted. See response to comment #3
26	6.1	6-2	23-30	If the low flow samples were also filtered, would this remove the comments. Why was low flow not filtered?	As stated in Section 6.1, in almost every instance, all conventional and grab samples collected for metals analysis were field filtered with a new 0.45-micron filter to remove particulates. Therefore, the low-flow samples were typically filtered.
27	7	all	all	It’s hard to get a clear view of an recommendations. This is one area where the report is trying to please all of the methods. I think a the report should state some specific choices and explain why.	Comment noted. See responses to comment #s 1 and 2.

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<b>REVIEWER: Kent Cordry, GeoInsight</b>					
<b>Item No.</b>	<b>Section</b>	<b>Page(s)</b>	<b>Line(s)</b>	<b>Comment</b>	<b>Response</b>
1	2	2-5	Fig 2.3	Photo is confusing. PsMS should be circled or photo cropped to only show PsMS.	The photo will be revised to eliminate confusion.
2	2.2.2	2-8	18	A second patent on the HydraSleeve was issued this week. Patent Number is <b>6,837,120</b>	The new patent number will be added to the text.
3	2.3	2-12	2	Probably a brief explanation of why a bailer was used to collect the 3-volume VOA sample would be helpful, i.e. it was the standard LTM sampling protocol for the site.	The text will be revised to read: “... <i>following completion of the purge, as specified in the McClellan QAPP (URS, 2003).</i> ”
4	3.1.1	3-1	23	Inevitably someone is going to ask why the Snap Sampler and HydraSleeve were not installed in the same well for comparison. I may have missed it, but I didn’t see an explanation in the report. Logistically, trying to install both devices in the same 4-inch well would have been risky, if not impossible. The metallic Snap Sampler with semi-flexible cables and the flexible HydraSleeve would have made deployment and retrieval extremely difficult. This may have been covered in the work plan but I think it needs to be mentioned in the report.	The sentence in lines 22 and 23 will be expanded to read: “... <i>was deployed in each well because concurrent deployment of both the Snap Sampler™ and the HydraSleeve® in the same 4-inch well would have made deployment and retrieval extremely difficult.</i> ”
5	6.1	6-2	9-10	I don’t think the Snap Sampler was used for CrVI analysis due to concern with its SS construction. It’s not shown in table 4.4.	The words “except for the Snap Sampler™,” will be deleted.

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<b>REVIEWER: Bob Sextro, Mitretek Systems</b>					
<b>Item No.</b>	<b>Section</b>	<b>Page(s)</b>	<b>Line(s)</b>	<b>Comment</b>	<b>Response</b>
1	1.5	1-5	8-28	These sampling, analyses and comparative criteria are really not, even in a general sense, Data Quality Objectives, but more just general criteria to support the objectives that were in the approved work plan for this data collection effort. However, the lack of fully developed true data quality objectives from the EPA's and/or McClellan's QAPP seven step processes does, in Mitretek's opinion, limit the robustness of this sampling, analyses and comparative effort. Future data collection efforts of this sort on behalf of AFRPA should always include the fully completed seven step data quality objective process which includes details of the decisions to be made with the data collected and specific decision rules that will used, including which comparative testing and/or statistics will be used, how they will be used, and how conclusions will be drawn..	The term "data quality objectives" will be replaced with "scoping guidelines" to distinguish them from DQOs developed using the 7-step process.
2	2	2-1	4-14	The very first sentence states that no-purge samplers rely on the natural flow of groundwater through the well screen, but neither this report nor the work plan indicate how the wells selected for sampling in this study were determined to have this important "natural flow condition". If this was not performed, even in some qualitative sense, the questions are why not and what are the potential problems with this comparability study if some of the wells do not have this "natural flow". A footnote to this comment is that these very items were discussed in some detail in both of McClellan's previous passive diffusion comparability reports and it was concluded that potentially several of the wells at McClellan may be fairly stagnant and have limited natural flow and therefore not be conducive to passive sampling techniques.	Ideally, a down-hole flowmeter or other technique would have been used in advance to help select the wells targeted for sampling. However, the project schedule was extremely compressed due to the need to use the funding available from McClellan AFB prior to a specific date, and the schedule did not allow for this type of testing prior to the well selection task. In addition, the project budget was not sufficient to permit natural flow testing to be performed. It should be noted that, to our knowledge, a threshold "natural flow" rate below which diffusion samplers are not valid has never been defined. According to the <i>Technical and Regulatory Guidance for Using Polyethylene Diffusion Bag Samplers to Monitor Volatile Organic Compounds in</i>

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					<i>Groundwater</i> (ITRC, 2004), PDB sampling is not recommended for wells in which water in the screened interval becomes effectively stagnant. Therefore, even if natural flow data had been obtained, it would not necessarily have definitively indicated whether a particular well was suitable for diffusion sampling.
3	3.2.1	3-7	15-23	This last paragraph in the section would appear to indicate that not all samples for metals analyses were field filtered based on turbidity measurements. Mitretek believes that it is important to capture somewhere in the tables in this report the wells and sampling devices for which field filtering was performed. Additionally, there should be at least a minimal discussion of filtration versus no filtration as it relates to the comparability of the metals data, including hexavalent chromium.	A column will be added to Table 3.3 to indicate which samples were field filtered. As stated on page 6-2, in almost every instance, all conventional and grab samples collected for metals analysis were field filtered. Discussion will be added to Section 6 regarding comparisons between metals results obtained from filtered vs non-filtered samples.
4	3.3	3-11	5-8	The information in this bullet of deviations from the work plan raises several questions and could have some affect on the results of this comparison. Initially, the laboratory did not perform the analysis as they were asked to do and, if used again by AFRPA contractors, should be audited for internal communication processes and actual analytical procedures at the bench along with their SOP for this compositing procedure. Secondly, SW-846 in method SW-8260B and section 7.5.7 does allow for compositing aqueous samples following a specific procedure which includes maintaining the preservation temperature of the samples. So, of course, this report must document, through a review of the lab's SOP and discussions with the actual analysts, how this compositing was done and if the EPA procedure was followed (if for instance the temperature control was not followed than all resulting data should be flagged as estimated). Finally, it appears that not all the samples were analyzed in this manner. So, as stated in the previous comment	The laboratory did not provide case narratives. The Sequoia laboratory volatiles department manager verbally communicated the sample handling and "compositing" procedure to the Parsons project manager and representatives. According to the laboratory representative, the procedure used was consistent with applicable EPA procedures, including the compositing of "chilled" samples, as identified in the referenced analytical method and the report.

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				regarding field filtering, the process used to analyze samples, either directly from one vial or via compositing, must be coded by sampling method and well. Then any qualitative or quantitative statements on how these occurrences may have affected the comparison should be so stated.	
5	4.2	4-1	All	This section may be in need of expanded text to discuss the outcomes of responding to the previous comments 3 and 4. Also, while there may have been few other data quality issues, all the important ones should be summarized in this section, perhaps in separate paragraphs so that the reader does not have to perform a detailed review of the information in Appendix A to understand any significant problems or concerns.	<p>The sentence beginning on line 22 will be deleted, and the following text will be added to the end of that paragraph:</p> <p><i>“A brief summary of the data validation results is provided in the following paragraphs, and more complete details are presented in Appendix A.</i></p> <p><i>Accuracy is considered acceptable for all VOC results, all 1,4 dioxane results, all anion results, all but one hexavalent chromium result, and all metals results with the exception of the aluminum result in several samples.</i></p> <p><i>Overall precision (sampling and analysis) is considered to be acceptable for all parameters, recognizing that, as shown in Table 3.7, a field duplicate HydraSleeve® sample was not collected. Therefore, information regarding precision of the HydraSleeve® sampling process is not available.</i></p> <p><i>Analytical precision is considered to be acceptable, recognizing that in the instances where project samples were not analyzed as MS/MSDs, measurements of accuracy and</i></p>

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<b>Item No.</b>	<b>Section</b>	<b>Page(s)</b>	<b>Line(s)</b>	<b>Comment</b>	<b>Response</b>
					<p><i>analytical precision were not developed for samples collected using a given sampling technology.</i></p> <p><i>Representativeness is considered to be acceptable for all parameters, with the exception of many of the extremely low (below or near the practical quantitation limit [PQL]) results for VOCs, anions, and metals that have been qualified as undetected (“U”) due to associated contamination of laboratory method blanks or field blanks.</i></p> <p><i>Completeness is considered to be acceptable for all parameters.“</i></p>
6	4.3	4-1/4-2	All	In looking back at Appendix B it is noticeable that not all the vertical concentration plots are included in this appendix. The text in this section must be expanded to include the rationale for including the plots that are there and for excluding the many others. Also, it is worth repeating here typically which data were used in the comparison, which was the maximum value, when the vertical plots would suggest the actual concentrations may have ranged from 2 to 3 times from lowest to highest, such as 10 to 30 ug/L for a given VOC.	(a) The following text will be added to the 1 <sup>st</sup> paragraph of Section 4.3 to more fully present the rationale for the graph selection: <i>“Graphs were prepared for one VOC of concern (TCE), one anion (sulfate), one redox-sensitive metal (iron), one metal that was less redox-sensitive (zinc), 1,4-dioxane, and hexavalent chromium.”</i> (b) On page 4-3 it is noted that, for instances where more than one value was available per comparison, the maximum value was used in the statistical analyses. The following text will be added to the end of Section 4.3: <i>“As noted in Section 4.4, for instances where more than one value was available per comparison, the maximum value was used in the sampling results comparison.”</i>

**REVIEW COMMENTS AND PARSONS RESPONSES ON THE DRAFT RESULTS REPORT FOR THE DEMONSTRATION OF NO-PURGE GROUNDWATER SAMPLING DEVICES AT FORMER MCCLELLAN AFB, CALIFORNIA**

<b>REVIEWER: Bob Sextro, Mitretek Systems</b>					
<b>Item No.</b>	<b>Section</b>	<b>Page(s)</b>	<b>Line(s)</b>	<b>Comment</b>	<b>Response</b>
7	4.4	4-3	8-10	This bullet dismisses the not detected (ND) pairs from further consideration. Mitretek believes that at least the semi-quantitative (not statistical) and qualitative comparison and discussion of NDs is a very important outcome of this study. There are obviously several important parameters that are typically found in the groundwater at the former McClellan AFB, including hexavalent chromium; 1,4-dioxane; and at least 4 VOCs such as TCE, PCE, cis-1,2-DCE and 1,1-DCA or carbon tetrachloride. Recommend that the number of comparable NDs by sampling method and these parameters be listed/provided along with some general qualitative discussion about these occurrences.	Comment noted. However, we believe that there is insufficient budget remaining to perform the recommended data compilations and analyses.
8	4.4	4-3	20-28	Indicate by sampling method and parameter or parameter group (i.e. metals, VOCs) how many of these substitutions were performed.	Comment noted. However, we believe that there is insufficient budget remaining to perform the recommended data compilation.
9	4.4.2.1	4-13	All	Indicate why the correlation coefficient (R) is not also used in association with the scatter plots. This coefficient was historically used in McClellan's previous sampling comparability reports and perhaps in ones performed at other facilities.	The R <sup>2</sup> values were used to evaluate the linear regression plots. These values were used to assign a level of confidence to the observation derived from the slope of the best-fit line. If the R <sup>2</sup> value was close to 1, more confidence was attributed to the conclusion derived from the slope, and vice versa. The objective of applying the linear regression test was to determine if one sampling method typically produced results that were comparable to another method. The slope permitted this type of conclusion to be drawn, whereas the R <sup>2</sup> value by itself did not.

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<b>REVIEWER: Bob Sextro, Mitretek Systems</b>					
<b>Item No.</b>	<b>Section</b>	<b>Page(s)</b>	<b>Line(s)</b>	<b>Comment</b>	<b>Response</b>
10	4.4.2.2	4-14	23	This sentence indicates that the “median RPD” was calculated. This should probably be clarified as to the ranking procedure used and that the median is then “selected” as the middle value of that ranked data set of calculated RPDs (if the number of values is odd). It could represent a value that was “rounded-off” or calculated as the mean RPD of the middle two values if the number of values is even.	The following text will be added to line 23 to clarify the ranking procedure and the determination of the median RPD: <i>“...was calculated by ranking the RPD values from lowest to highest and choosing the middle value of the ranked set of calculated RPDs. If the number of RPD values was even, then the median was selected as the mean RPD of the middle two values.”</i>
11	4.4.3	4-15	All	Based on the discussion derived from comment number 7, it would appear appropriate to address this ND comparability in the holistic comparison at least as a separate comparison criterion or bullet to discuss. Perhaps additional text is also warranted regarding this in section 6.	Comment noted. However, we believe that there is insufficient budget remaining to perform the recommended data compilations and analyses.
12	Tbl. 5-2	5-13	NA	From the information provided in the earlier tables 5-1, for a facility like McClellan, Mather or Castle that already have dedicated pumps and equipment for low-flow sampling, it appears that their cost would be about \$90 less per sampling event. Shouldn’t this table have a foot note to the effect that at facilities already set to do low-flow sampling the cost is some \$ less than as performed and priced for this study.	It is apparent in Table 5.1 that the cost estimate includes costs for purchase of dedicated pumps. If this equipment has already been purchased, then the reader can readily subtract this cost to obtain a more site-specific estimate.
13	6.1	6-2	23-30	Again perhaps a footnote is warranted for this discussion of turbidity related to low-flow sampling. This issue needs to be kept separate from McClellan’s use of dedicated pumps at many wells to perform low-flow sampling. The footnote should just indicate that this turbidity could be caused by placing newly decontaminated submersible equipment that was not dedicated to a given well and was operated by personnel that do not normally sample at McClellan. This finding of higher turbidity should not be extrapolated to infer that McClellan’s use of dedicated low-flow equipment results in higher turbidity than conventional 3-volume purge.	Text will be added to indicate that use of dedicated pumps may result in lower turbidity.

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<b>REVIEWER: Bob Sextro, Mitretek Systems</b>					
<b>Item No.</b>	<b>Section</b>	<b>Page(s)</b>	<b>Line(s)</b>	<b>Comment</b>	<b>Response</b>
14	7	7-2/7-3	All bullets	These final conclusions are not always obvious. For instance, the report indicates that Snap Sampler appears to be a viable method for monitoring VOCs, yet in looking at Table 4.6 it shows that the Snap was greater than low-flow and 3-volume purge both and 3-volume flow is greater than low-flow. This would mean the Snap is much greater than low-flow, yet the final conclusion is that it is viable for VOCs. Why? Also, the report concludes that RCS's viability for VOCs is not supported by this report, yet the holistic information in table 4.6 indicates RCS is equal to low flow but less than 3-volume purge. Again, explain the conclusion of lack of support when the Snap was not equal in either case and is said to be viable. Clearly, this requires more explanation.	The following text will be added after "methods" on line 17, pg 7-2: <i>"A particular grab or diffusion sampling device was considered to be viable when the analyte concentrations obtained using that device were similar to or higher than obtained using conventional sampling methods. Conversely, if the results obtained using the grab or diffusion device exhibited low bias relative to the conventional results, then the ability of that device to accurately detect concentrations of that particular analyte group was considered to be suspect. In summary, high bias was considered to be acceptable, but low bias was not."</i>
15	Apdx A	NA	NA	This data assessment is silent as to the compositing of samples for VOC analysis and the fact that some samples were analyzed in this way and other were analyzed directly from the one preserved vial (this information should be available in the case narratives for the VOC analytical batches). Depending on the outcome of the further review and questioning of the lab about this episode and their procedure used, the affects on sample representativeness and how the lab's case narrative addresses this should be discussed in this appendix.	The laboratory did not provide case narratives. The Sequoia laboratory volatiles department manager verbally communicated the sample handling and "compositing" procedure to the Parsons project manager and representatives. According to the laboratory representative, the procedure used was consistent with applicable EPA procedures.

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<b>REVIEWER: Roger Peebles, Mitretek Systems</b>					
<b>Item No.</b>	<b>Section</b>	<b>Page(s)</b>	<b>Line(s)</b>	<b>Comment</b>	<b>Response</b>
1.				<p>The report does not include a thorough discussion of flow in well bores, both under natural and stressed conditions. Without an understanding of the dynamics of water movement, and the uncertainties in our understanding, the assumptions about what water the samplers are sampling are flawed. This is especially troublesome when the report discusses stratification in the wells, and how the samplers reflect this phenomenon. Mitretek recommends that a section be added to the report that discusses flow in well bores and identifies that uncertainties, and how they affect the interpretation of the results obtained by each device and each method.</p> <p>The report also makes a number of statements that are technically incorrect and that apparently stem from the lack of understanding of the processes that are at work in a well bore. Several of these statements are identified in the specific comments that follow.</p>	<p>Part 1: This is a relatively broad, general comment that would be difficult to adequately address in this report, especially given the limited budget available. It seems that the well hydraulics would be site- and well-specific, and we do not have adequate data to accurately discern the nature of these hydraulics and therefore know how they may impact interpretation of the sampling results. We were not scoped to use a borehole flowmeter to measure in-well horizontal or vertical flow. The hydraulics would stem from a combination of the stratigraphy and hydraulic properties of the portions of the aquifer screened by the well, the well properties itself (i.e., properties of the screen and filter pack and the degree to which the well has been properly developed or has become plugged over time), and the nature of the stresses imposed due to pumping.</p> <p>For these reasons, we would prefer not to add the requested section to the report. However, some new text is being added regarding uncertainties related to the source of water during low-flow sampling (see responses to Don Gronstal comments 6 and 18). Therefore, the concerns expressed in this comment may be at least partially addressed by edits prompted by other comments.</p> <p>Part 2: Comment noted; see responses to specific comments below.</p>

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<b>REVIEWER: Roger Peebles, Mitretek Systems</b>					
<b>Item No.</b>	<b>Section</b>	<b>Page(s)</b>	<b>Line(s)</b>	<b>Comment</b>	<b>Response</b>
2.	3.2.3.1	3-8	18	The report states: “Steady-state conditions in a well are reflective of steady-state conditions in the surrounding aquifer.” This is not always true. The screened portion of a well is a vertical column of virtually infinite hydraulic conductivity placed in a medium of finite conductivity, which is often layered. The distribution of contaminants in this column can be significantly different from the adjacent aquifer under equilibrium conditions. Please revise or remove this statement.	The referenced sentence will be removed.
3.	1.5	1-5	15	The report states: “Time lag between sample collection using different methods will be minimized to avoid bias of the comparative evaluation by temporal fluctuations in groundwater quality.” Temporal fluctuations in groundwater quality in the aquifer are on a scale of months. It is not clear that this data collection constraint was necessary.	Comment noted. The time scale of temporal fluctuations in the McClellan wells was not well defined at the time of project scoping. The referenced data collection constraint was believed to be a conservative, common-sense approach to eliminating or minimizing the influence of one variable (temporal fluctuation in groundwater quality).
4.		1-5	21	One of the DQOs is “One or more “baseline” sampling methods will be included to provide data against which the results of the alternative PSD and grab samplers can be compared.” It is unclear what is to be gained by comparing methods. The methods sample different water. A comparison is misleading, and may lead the reader of the report to conclude one method is better than another. This DQO should not have been included in the study.	It is recognized that different sampling approaches (e.g., active vs passive) sample different water. However, it is also true that some methods may not be technically suited for use in sampling particular analytes (e.g., as a result of sampler construction issues such as the type of membrane in a diffusion sampler). One way to discern this is by doing a comparative study that incorporates use of known and widely-accepted sampling methods. In addition, the diffusion and grab samplers were deployed at the same depth in the same wells, often at the same time. Given that these are no-purge samplers, they should in general be sampling the same water. Therefore, comparison of results obtained with these samplers seems justified. The decision to include conventional “baseline” methods is more fully discussed on page 6-1 of the report.

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<b>REVIEWER: Roger Peebles, Mitretek Systems</b>					
<b>Item No.</b>	<b>Section</b>	<b>Page(s)</b>	<b>Line(s)</b>	<b>Comment</b>	<b>Response</b>
5.	2.1	2-2	4	The report states: “Because of this quality, diffusion samplers are representative of a time-weighted average of chemical concentrations in groundwater.” This statement is incorrect. A diffusion bag comes into equilibrium with the surrounding water. The concentration in the bag is that of the surrounding water, not a time-weighted average.	The referenced statement comes from Table 1-2 of the ITRC document entitled “Technical and Regulatory Guidance for Using Polyethylene Diffusion Bag Samplers to Monitor Volatile Organic Compounds in Groundwater.” Similarly, the USGS (2001) PDBS guidance document referenced in the draft report states that “PDB samples integrate concentrations over time.” The diffusion sample does not instantaneously equilibrate to the groundwater quality in the well; therefore, it is somewhat of an average concentration over a given time period. For example, if the concentration of a given compound in the well water at time 1 is 50 µg/L, and the concentration gradually increases over a period of 24 hours to 500 µg/L at time 2, the concentration in a PDBS at time 2 would not be 500 µg/L; rather, it would likely be between 50 and 500 µg/L because it would be gradually transitioning from the condition at time 1 to the condition at time 2. In contrast, a grab sample collected at time 2 from the same depth would likely detect the 500 µg/L concentration.
6.	2.1.1	2-3	2	The report states: “Groundwater samples collected using the diffusion samplers are thought to be representative of water present within the well during the previous 24 to 72 hours.” This is incorrect. See comment 4.	See response to comment #5.
7.	2.3	2-10	18	The report states: “Ideally, by placing the inflow port of a pump at a prescribed depth within the screened interval of a well, and by withdrawing water at a slow rate, groundwater will be drawn from the aquifer into the well only in the immediate vicinity of the pump.” In practice this never occurs. Low flow purge cannot be used to demonstrate “stratification.”	Text has been added per Don Gronstal comments 6 and 18 to indicate uncertainty in the source of the low-flow sample. In addition, the following text will be added to the end of line 23: <i>“In practice, however, when a low-flow sample is collected, determining the portion of the screened interval of the aquifer that contributed water to the sample can be problematic.”</i>

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<b>REVIEWER: Roger Peebles, Mitretek Systems</b>					
<b>Item No.</b>	<b>Section</b>	<b>Page(s)</b>	<b>Line(s)</b>	<b>Comment</b>	<b>Response</b>
8.	6	6-1	8	This section has a discussion of the differences in samples that are taken by the various devices and methods. Include this discussion in the Introduction to the report so the reader knows up front that these methods are different and should not be compared. Mitretek recommends that the individual subsections of Section 6 be removed from the report, since they provide no useful information.	<p>Section 6 contains the meat of the discussion of the comparison results. Removal of Sections 6.1 through 6.8 would negate the primary objective of the comparative evaluation and the resulting report would fall far short of achieving the objectives agreed upon in the work plan stage. However, the text beginning on page 19 of page 1-1 will be revised as follows per the comment:</p> <p><i>“Analytical results from these samplers are compared to “baseline” analytical results from samples collected using conventional (low-flow and three-well-volume purge) techniques for all analytes. As described at the beginning of Section 6, the conventional techniques represent baseline data only in the sense that they are the commonly-used sampling methods that are generally accepted by the regulatory community. Therefore, they do not necessarily represent the correct answer (only a different answer).”</i></p>
9.	7	7-1	12	The report states: “From a performance perspective, the HydraSleeve® and Snap Sampler™ methods typically produced results that are most similar to the more conservative (i.e., higher- concentration) results obtained from the two conventional sampling methods.” This statement illustrates a fundamental problem with comparing the methods. It can be interpreted that the two grab samplers are “as good as” the conventional methods. This is misleading, and may cause the user of the method	One objective of this study is to compare the diffusion and grab sampler results to the conventional results. The referenced text is simply a factual statement that was added to provide the reader with some sense as to how the various methods compared. There is sufficient cautionary text in Section 6 and elsewhere in the document to indicate to the reader that they should not assume that the methods sample the same water and produce the same results.

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<b>REVIEWER: Roger Peebles, Mitretek Systems</b>					
<b>Item No.</b>	<b>Section</b>	<b>Page(s)</b>	<b>Line(s)</b>	<b>Comment</b>	<b>Response</b>
				or the regulator to assume the methods produce the same results. In this statement it is also incorrect to characterize the conventional methods as “higher-concentration.” Both methods are composites, which average high and low concentrations, and can never reproduce concentrations as high (or low) as the grab samplers.	<p>The referenced statement does not say that the conventional methods are higher-concentration. The text states that the HydraSleeve and Snap Sampler results were generally similar to the higher of the two conventional sample results.</p> <p>It seems possible to envision situations where a composite method could produce results that are higher in concentration than a grab method. For example, the grab sample may be collected from a portion of the water column in the well that contains relatively low analyte concentrations. In contrast, a conventional pumped sample may be drawn preferentially from a more permeable zone that is a preferential contaminant migration pathway and that contains relatively high analyte concentrations.</p>
10.			14	<p>The report states: “Both of these methods are characterized as grab-type samplers, and although they do allow for well equilibration, they do not use diffusion as the operative mechanism, therefore the results obtained are more of a “snapshot” in time.”</p> <p>Mitretek disagrees with this statement. Because the diffusion bags come into equilibrium with the surrounding water, they are as much a “snapshot” as the grab samplers.</p>	Disagree; see response to comment #5.

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<b>REVIEWER: J. Kamine, Tom Cudzilo, Ann Lack, URS</b>					
<b>Item No.</b>	<b>Section</b>	<b>Page(s)</b>	<b>Line(s)</b>	<b>Comment</b>	<b>Response</b>
1	General			Overall, the report is well written. The text, tables, and figures are generally well presented and clear.	Comment noted and appreciated.
2	2.0	2-12	NA	Please add a table summarizing the features (size, construction material, pore size, liquid volume capacity, advantages/disadvantages, etc.) of each no-purge sampling device.	This table will be added to Section 2. However, advantages/disadvantages of the samplers will be included in Section 7 rather than in this table.
3	5.0		NA	During the low flow purge activities at the former McClellan Air Force Base (McAFB), the sampling team consists of one person except at wells located at high vehicle traffic areas where the sampling team consists of two people. It may be possible to use a sampling team of one person during the field activities utilizing no-purge sampling devices. Please evaluate whether a sampling team of one person could be used during the field activities for each type of no-purge sampling device.	Based on our experience to date, use of two-person sampling teams for diffusion and grab samplers is efficient. Often, the sampler deployment and retrieval occurs at a relatively rapid rate, and use of two people allows for sampling-related paperwork to be performed without slowing down the deployment/retrieval operation. The proper resolution of this comment depends on the degree to which the cost analysis should be representative of the McClellan sampling program as opposed to a more generic program such as is currently assumed by the cost analysis. If it is decided that the costs should be specific to McClellan then the assumption of a two-person team for the low-flow method will be changed to 1.X people per team to account for the information provided in the comment. Parsons will dialogue with URS to determine the proper value for 1.X. Otherwise, we will continue to assume a 2-person sampling crew for cost analysis purposes.

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<b>REVIEWER: J. Kamine, Tom Cudzilo, Ann Lack, URS</b>					
<b>Item No.</b>	<b>Section</b>	<b>Page(s)</b>	<b>Line(s)</b>	<b>Comment</b>	<b>Response</b>
4	3.0	Table 3.6		<p>The laboratories that currently analyze samples for the McClellan GSAP Quarterly Monitoring Project were contacted to find out the minimum volume they would require to meet our project needs (QAPP requirements and data consistency). The volumes required by these laboratories are higher than what is presented in Table 3.6 as shown in the attached table. Where possible, the volumes indicated is a reduction from current volumes used for this project.</p> <p>The sample volumes listed in the table are representative of the minimum volume required for one sample analysis and do not provide enough sample for dilutions, re-analyses, or matrix spike/matrix spike duplicates (MS/MSDs). Field duplicates also need for each analysis, requiring twice as much volume for the analyses chosen for the duplicate.</p>	<p>Comment noted. We recognize that there will be situations where site- or project-specific data quality objectives and QA/QC requirements will prevent use of some of the tested samplers due to volume limitations. This needs to be evaluated on a case-by-case basis. If analysis for a large target analyte list using multiple analytical methods is required, then at least some of the tested samplers may not have sufficient volume to satisfy primary and QA/QC sample volume requirements. While the technology demonstration was performed at McClellan AFB, the objective was not solely to determine whether these samplers could be used at that installation. Rather, the results can be used to help assess the applicability of these samplers for use at any site.</p>
5	4.0	Figures 4.2-4.6	NA	<p>These figures are an excellent summary of data analysis. Portions of these could be used in Section 6.0 to support the points made there.</p>	<p>Thank you. The information presented in Section 6 was largely derived from Tables 4.2-4.6. See also the response to comment #6.</p>
6	6.0		NA	<p>This section provides a discussion of the results of the demonstration qualitatively. A tremendous amount of work was expended to compare the analytical results between the sampling methods using the three evaluation processes. A discussion of the results by each evaluation process should be added to this section of the report. For the “other quantitative comparative” section, please include a discussion of the results to support whether there is a relationship between the two sets of data.</p>	<p>Each evaluation process shown in Tables 4.2-4.6 only provides part of the story. That is why the various evaluation results were combined in a “holistic conclusion” which represents our best assessment of the comparison results. Including a discussion of the results of each evaluation process in Section 6 would result in a narrative representation of what is in Tables 4.2-4.6, and would result in a long and wordy section that,</p>

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<b>REVIEWER: J. Kamine, Tom Cudzilo, Ann Lack, URS</b>					
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					in our opinion, would not be significantly more enlightening. We would prefer to summarize the holistic conclusions.
7	6.0		NA	Please add a table summarizing the results in Item No.6.	A summary table will be added to Section 7 to support the narrative discussion of the holistic conclusions (see response to Don Gronstal comment #2).
8	6.0	All	NA	The method-by-method analysis is based on general statements like the one below. Statements should be supported with graphs or tables instead of general text statements.	The general statements in Section 6 are derived directly from tables in Sections 4 and 5. Addition of a summary table to Section 7, as requested in Comment #7, will help support the general statements.
9	6.0	All	NA	This section would benefit from a brief analysis based on analytes. In other words, a summary of results for VOCs by all methods, another for metals by all methods, etc. These could be supported by x-y scatter plots or tables. I think readers would be specifically interested in an interpretation of the most technically favorable method by analyte. The information is in the section; it is just not readily assimilated.	Additional subsections will be added to Section 6 to include analyte-specific conclusions in addition to sampler-specific conclusions.
10	6.1	6-3	1-7	The text speculates that “low flow samples” have concentrations greater than other sample types because of the low carbon steel well casing and screen materials. This statement is in error. With the exception of MW-72 and MW-174, the well materials are PVC or stainless steel casing and stainless steel screens.	This text will be removed.
11	7.0		NA	Please add a table showing whether a no-purge sampling device is recommended for future use at McAFB by analytical method.	We would prefer to let those people most familiar with McClellan AFB and the sampling program requirements make that judgment based on the information provided in the report. The report will, as much as possible, provide the ‘raw materials’ to use as a basis for that judgment.

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<b>REVIEWER: J. Kamine, Tom Cudzilo, Ann Lack, URS</b>					
<b>Item No.</b>	<b>Section</b>	<b>Page(s)</b>	<b>Line(s)</b>	<b>Comment</b>	<b>Response</b>
12	7.0	7-1	16-17	Text here and in earlier sections indicates that Hydrasleeve and Snap Sampler methods represent “a snapshot in time” because they collect a sample in a short time period. The text seems to indicate this is a negative feature. However, this is someone misleading, in that all of the sampler collect samples over a “short” time frame with respect to the movement of groundwater.	The referenced text was not meant to be interpreted as a negative comment. We agree with the comment regarding the sampling time frame relative to the movement of groundwater. However, the grab samplers do provide more of a ‘snapshot’ than the diffusion samplers which have variable equilibration times. This can be significant at sites where groundwater velocity is rapid (e.g., more than 1 ft/day). To clarify this text and avoid any negative connotations, the following text will be added to the end of the referenced sentence: <i>“It should be noted that all of the diffusion and grab samplers collect samples over a ‘short’ time frame with respect to the groundwater velocity at many sites.”</i>
13	7.0	All	NA	The statements here would have been better supported in a table or matrix. A matrix of methods across the top and check marked or “yes”/“no” in rows related to suitability for VOCs, metals, etc. would be more readily interpreted.	A summary table will be added (see response to Don Gronstal comment #2).
14	Appendix B	All	NA	For reader clarity, the “Depth Interval” axis should be labeled “Shallow” “Middle”, “Deep”, instead of “3”, “2”, “1”. Although the graphic suggests that “3” = “Shallow” and “1” = “Deep”, that is not explained, and tables in Sections 3 and 4 do not use numbers for the depth intervals.	These edits will be made on the appendix graphs.
15				Please add the field notes as an appendix.	Field notes will be added as an appendix.

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<b>REVIEWER: J. Rogalla, URS</b>					
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1	4.4	4-2	5-27	<p>This comment is limited to the comparison of the low-flow (micro-purge) and 3-volume purge methods. Category 5 on p. 4-2 indicates that all detected metals results were pooled to perform statistical tests and comparisons between the various sampling methods. Pooling the metals data provides only a very general basis for comparison, and the outcome of the various statistical tests must be presented with this caveat because the results may be misleading if considered to be representative of individual metals. We are in the process of comparing metals results for a much larger number of McClellan wells (more than 250), and the comparability for individual and pooled metals does not agree with the results presented in this report. Table 4.1 in this report concludes the populations for all data for the two methods do not differ, and show a correlation of 0.99. The conclusion is that the two methods provide comparable data. Table 4.5 indicates that for metals, the low-flow concentrations are greater than the 3-volume purge samples, with a correlation of 93%. While these results may be true for the pooled data, we suspect that much of this apparent agreement is influenced by the higher concentrations. The metals data set spans several orders of magnitude as indicated by the scatter plot in Appendix B, and it appears the correlation is strongly influenced by the extremes. A closer look at the comparability for individual metals does not support the same conclusion and therefore could be misleading.</p> <p>Our evaluation so far includes 6 selected metals (Sb, Ni, Cr, Tl, Fe, Ba,) and CrVI. The low-flow results tend to have higher concentrations for some, but not all metals in this evaluation, but that is the only similarity we have noted so far between the two data sets. We are still evaluating whether the variability between the pairs of results is within the historical concentration range for each</p>	<p>The comment raises an important issue that should be introduced in the report. There is insufficient budget to perform an evaluation of individual metals and present the results and conclusions of these metal-specific evaluations, as listed in the recommendation at the end of the comment. However, the following new paragraph will be added after line 3 on page 6-2:</p> <p><i>“It should be noted that sampling results were quantitatively compared using groupings of analytes rather than specific analytes (e.g., all metals rather than individual metals such as aluminum and zinc, and all VOCs rather than specific VOCs such as trichloroethene). Pooling data for a multitude of analytes provides a general basis for comparison, but the comparison results may not be representative of how each of the individual analytes compared. For example, a more extensive study is underway that is comparing individual and pooled metals results obtained from more than 250 McClellan wells using both low-flow and 3-volume purge methods, and the results of this comparison obtained to date do not agree with the results presented in this report (URS, 2005). Therefore, the comparison results presented in this report may not definitively determine comparability among the different sampling methods.”</i></p>

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				<p>well because the samples in the larger data set were collected at different times.</p> <p>We evaluated the data produced for this study for the same metals and the results are similar – limited correlation and lack of comparability for the individual metals. The data set presented in this report should not be affected by temporal variation (as may be occurring with the larger data set we have available), so the lack of direct comparability appears to be real and should not be ignored. It may be that, for metals, comparing the results from only one sample event by each sampling method may not be sufficient to determine comparability among the methods.</p> <p>Recommendation: clearly state the masking effect that using pooled metals data may be having on the outcome of the statistical tests and conclusions presented in this report – this may apply to all sampling methods, not just the low-flow and 3-vol. purge methods. Identify the limitations this places on the interpretation of comparability between the methods or perform an evaluation of individual metals and present the results and conclusions that can be drawn from them.</p>	

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1	4	4-3	8	Exclusion of the paired data when both results were not detected reduces the size of the dataset and the resulting power of all the subsequent analyses. Non-detected data has as much analytic value as does detected data, therefore, all non-detected data should be used.	This study focused on comparing sampler results in instances where detectable concentrations of target analytes were present. There are two problems with comparing two non-detect values: 1) arbitrarily assigning a value for a non-detect result in cases where detection limits varied between samples would yield a comparison of different results where none may exist. 2) comparison of same results could cause the opposite problem—an appearance of sameness where there may not be; see also comment 4 below regarding statistical artifacts in the Sign Test using same-number comparisons. For VOCs there was a relatively large number of non-detects because the total number of target analytes (i.e., the full 8260B TAL consisting of 68 compounds) likely greatly exceeded the actual number of VOCs present in the groundwater (e.g., at sites contaminated solely by chlorinated solvents). In this case, if the ND pairs had been included, it is possible (and maybe even likely) that they would have masked any real differences in detected concentrations of chlorinated solvents that may have been present.
2	4.4.1.1	4-4	25	The statement on the normality testing for the data distribution says that duplicate results were included in the data set that was tested and that the results that were not detected or were rejected during data validation were excluded. The inclusion of duplicate results biases the outcome of this normality analysis, and should be excluded. A statement should be added to the text to describe how the duplicate results are treated.	Even if exclusion of the duplicate data had altered the outcome of the normality testing (which is unlikely given that there were 251 primary samples and only 11 field duplicates), we used non-parametric tests which are not dependent on the presence of a particular data distribution.

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3	4	4-5	Table 4.1	The validity of pooling all the analytical results (1,4-dioxane, anions, hexavalent chromium, metals, and VOCs) into a single summary table for evaluation is questionable. These summary data may be misleading when compared with the results for the individual tests.	The pooled results are simply an illustration tool. It is really the only way to do a summary analysis of the whole comparison study. The individual comparisons in Tables 4.2 - 4.6 should be used to evaluate a particular device's utility for that analyte class. It is anticipated that those who want detailed information will look closely at the individual comparisons and not just the overall pooled results. The comparison information developed in the report is derived entirely from Tables 4.2 – 4.6.
4	4	4-12	6	Use of the Sign Test has the potential to be a problem. The conventional use of the Sign Test excludes paired comparisons in cases of ties, i.e., when the results of the two items being studied are equal. This may be acceptable for the small proportion of ties typically encountered in uncensored data, but for a larger proportion of ties it is not. Ignoring tied pairs will inflate the Type I, false positive error rate, artificially lowering the reported p-values and potentially indicating a statistically significant difference where there is none. An alternative is to use the Modified Paired-Sign Test, which incorporates ties in the analysis.	According to “Applied Probability and Statistical Methods” (Canavos, 1984), exclusion of tied pairs may present a problem if “ties are numerous and the original number of pairs is very small.” In the dataset used for comparison purposes, there were 290 ties out of 5043 comparisons, or 5.8% ties, which doesn't seem to fit the scenario quoted above. In addition, the results of the Sign and Wilcoxon tests, both of which are non-parametric statistical tests designed to compare populations, agreed 74 of 87 times, correlating to an 85% agreement rate. This supports the observation that there were not significant problems with the Sign test. Exclusion of the ND-ND comparisons (see response to comment #1) limited the number of tied pairs in the dataset.

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					<p>The percentage of ties by analyte group is: 3.1% for dioxane, 23% for anions, 6.7% for hexchrome, 2.0% for metals, and 4.7% for VOCs. Nearly half of all ties (49%) occurred for anions. Therefore, one would anticipate that, if statistically significant differences were erroneously indicated by the Sign test due to exclusion of ties, they would most likely have occurred during analysis of the anions data. For two of the four instances where the results of the Sign and Wilcoxon tests disagreed for anions, the Sign test indicated no statistically significant difference and the Wilcoxon test indicated a statistically significant difference. There is no apparent correlation between a high percentage of ties and instances where the Sign test indicated a statistically significant difference and the Wilcoxon test did not (for example, in the two instances where the Sign test did not indicate a significant difference and the Wilcoxon test did, the percentage of ties was 26%. In comparison, in one instance where the Sign test indicated a difference and the Wilcoxon test did not, the percentage of ties was 8%). Fourteen of the 17 “holistic” conclusions for anions indicated equivalence between the two sampling methods being compared, further indicating that these final conclusions were not substantially influenced by any potential erroneous differences resulting from exclusion of ties in the Sign test.</p>

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					<p>Tables 4.2-4.6 were examined to determine whether there were instances where the p-value was very close to the critical value but slightly lower, indicating instances where the Modified Paired-Sign Test may raise them enough to indicate that there is no significant difference in the paired results. The critical value was 0.1, corresponding to a threshold value of 90%. There were only two instances where the p-value was between 0.05 and 0.1, including 3-volume/RCS for anions, and HydraSleeve/PsMS for VOCs. In the first instance the percentage of ties was 8.3% (2 out of 24) and the holistic conclusion was that 3-volume = RCS for anions; therefore, the Sign test result did not overly influence the final conclusion. In the second instance the percentage of ties was 2.2% (2 out of 90) and the Sign test results were consistent with the Wilcoxon test and RPD test results, and the X-Y scatter Slope test was borderline. In summary, this analysis of p-values does not indicate significant problems with false-positive differences being erroneously identified.</p> <p>It should also be noted that if the outcomes of all four comparison tests performed were not internally consistent, then a “holistic” qualitative review of the data was performed prior to deriving a final conclusion regarding</p>

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					how two samplers compared. Therefore, in all instances where the Sign test indicated a statistically significant difference and at least one of the other comparison tests did not, further review of the data was performed prior to deriving the holistic conclusion.

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1	2-1	2-1	23	Replace “in the surrounding formation” with “in that interval of the well”	Change will be made.
2	2.1.1	2-2	11	Are you sure this is PVC? From what I remember the cap material looks like HDPE or polypropylene. Confirm with Brad Varhol.	PVC will be changed to HDPE.
3		2-3	12	I think the diameter is 1.25 or 1.5 rather than 1. Confirm with Don V.	Will be changed to 1.5” OD
4		2-3	20-28	It seems that if disadvantages are bulleted, advantages should be bulleted too.	The disadvantages are much more “wordy” than the advantages, and the bullet format facilitates their presentation. No change proposed.
5			Figure 2.3	Maybe you can put a circle around the PSMS so people don't get confused about which sampler is which. In this photo, your eyes are drawn to the PDB and RPPS.	The PsMS in the photo will be labeled.
6		2-6	18	Delete “However,”	Change will be made.
7		2-7	17	Insert “high density” before “polyethylene” and “HD” before both instances of “PE”	Change will be made.
8		2-8	1-2	Insert “at the wellhead” after “pulled”; delete “The PE tubing around the trigger cable is fixed in place at the well head.”	Change will be made.

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9		2-8	11	Replace “Larger samplers are currently in development to accommodate larger bottles and other material composition.” With “A 125ml sample bottle is currently in development to accommodate larger volume needs. Other sampler and bottle material compositions are available or are being developed to accommodate different sampling needs. For example, a fully non-metallic sampler is now available for metals sampling.	Change will be made.
10		2-8	13-16	New connectors change the dimensions as follows: The diameter of the sampler apparatus is 1.66 inches. The length of the device is approximately 8 inches with a single sampler and vial, 16inches with two samplers and two vials, and 24 inches with three samplers and three vials. The longest distance between the end openings of the three-vial configuration is 19 inches.	We would like the text to state the dimensions of the sampler actually used during the demonstration. Therefore, this text will not be changed. However, new text will be added to present the information in the comment.
11		3-6	18	This was probably LDPE tubing not PVC tubing	Change will be made.
12			Table 3.4	Maybe use "Sample Dates and Temporal Separation" for the title of this table	We would prefer to keep “Time Lag”—this is the term used in many PDBS reports prepared to date.
13		3-8	17	Insert “used in this study” after “device” ...This added because other volumes are available (i.e. the new 125 ml Snap; or the 2.5 L Hydrasleeve). It wouldn't be fair to say these are THE sample volumes available for these devices.	Change will be made.
14		4-2	3-4	Replace “despite the fact that the degree to which this method is depth-specific is uncertain.” With “despite uncertainty about the depth-discrete nature of a low-flow sample.”	Change will be made.

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15		4-3	20-28	When one device shows a detect and other does not, using 1/2 the MDL is not an accurate quantitation. Performing stats with those "numbers" will probably cause problems for the correlations and slopes. Did you compare results when excluding comparisons where there was an ND for either method?	No, comparisons were not performed that excluded instances where there was an ND for one method but not the other. We felt that deleting instances where there was an ND for either method from the comparative analyses would potentially do more harm than good, and that using one-half of the MDL for the non-detected analyte was the most logical approach. Using ½ the detection limit for non-detect results in the statistical analysis is consistent with recommendations in USEPA's (1989) <i>Risk Assessment Guidance for Superfund (RAGS)</i> where it states that, "If there is reason to believe that the chemical is present in a sample at a concentration below the sample quantitation limit (SQL), use one-half of the SQL as a proxy concentration."
16			Table 4.1	The Snap shows important consistencies here, but I'll place comments at the specific summary sheets	No response required.
17			Table 4.1 though 4.6, note "e"	Highlighting should be for the R <sup>2</sup> rather than the slope. Shading should indicate confidence in the significance (like Wilcoxon over 90%), not the magnitude of the difference.  Same comment for all the tables	The yellow highlight is used to indicate whether the results of each comparison test indicate that the two populations or similar or different. Therefore, the highlighting needs to be associated with the slope, not the R <sup>2</sup> (see also response to Bob Sextro comment # 9).
18			Table 4.2	Note Snap comparisons are consistent with VOCs (higher than all other, equal with 3 volume); Also, there are no inconsistencies (Hydrasleeve > PSMS but PSMS = 3 volume and Hydrasleeve = 3 volume	Comment noted.

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19			Table 4.3	<p>These are pretty solid statistics for the Snap and Low Flow, RCS and RPPS. These should probably be green, don't you think?</p> <p>Also, the Sign and Wilcoxon tests showing difference on LF-PSMS indicates the results are different, but the xy slope shows the difference is small (small but significant). If you define 10% as equal, then these statistics support that. Compare this to 3 volume vs Hydrasleeve, a green comparison. The xy shows good correlation with a higher result for the Hydrasleeve, but less clear difference with the Sign and Wilcoxon. All that indicates is the data is noisy. That shouldn't qualify it as "more equal" than LF-PSMS</p>	<p>The comparison between Snap and Low Flow was shaded orange because the median RPD was between 10 and -10. Since all of the test results were not internally consistent, the conclusion was not green-shaded. The comparison between the RCS and RPPS was shaded orange because both the median RPD and scatter plot slope tests were not consistent with the results of the statistical tests. The color-shading employed in these instances are consistent with the guidelines that were established for the comparisons and described in the table footnotes. Performing these comparisons required that rules be established and followed in order to make the comparisons as transparent and consistent as possible; the rules that were devised were those that made the most sense to us. We acknowledge that other sets of rules could be developed and applied that would result in differing conclusions, and that the comparison results that were derived are not perfect in all instances. In fact, it would not be surprising for five people to develop five different sets of decision rules. The color shading does not change the conclusion, but it does provide a "flag" or indication that not all comparisons were internally consistent. We would prefer to leave the color shading unchanged.</p>

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20			Table 4.6 overall	<p>Note all 5 Snaps have <math>R^2 &gt; 0.88</math>; (0.88, 0.90, 0.93, 0.95, 0.99);</p> <p>4/5 Snaps are over 0.90; mean of 0.93</p> <p>1/6 3 vol are over 0.90; mean <math>R^2</math> of 0.63</p> <p>4/6 LF are over 0.90; mean <math>R^2</math> of 0.86</p> <p>1/5 Hydrasleeves are over 0.90; mean <math>R^2</math> of 0.64</p> <p>2/6 PDBs are over 0.90; mean <math>R^2</math> of 0.78</p> <p>3/5 RCS are over 0.90; mean <math>R^2</math> of 0.91</p> <p>0/5 PSMS are over 0.90; mean <math>R^2</math> of 0.51</p> <p>1/5 RPPS are over 0.90; mean <math>R^2</math> of 0.85</p> <p>All RPDs lean toward higher values for the Snap (-17.0 to -53.3).</p> <p>All XY slopes lean toward higher values for the Snap (1.04 to 1.77 w/ a mean of 1.37 and a median of 1.38)</p> <p>All "Wilcoxon" results are greater than 96% 4/5 were 100%.</p> <p>All 5 "Sign" results are greater 99%.</p> <p>This strongly suggests the differences are real.</p> <p>All the other methods have more ambiguity and less compelling statistics. Most have poorer correlations with each other than they have with the Snap. What does that mean? It means the Snap is actually closer to the real answer.</p> <p>Why do I say that? Comparison of two perfect data sets would yield a 1:1 slope and a perfect <math>R^2</math> of 1.0. Add random noise to</p>	<p>Some of the statistics cited in the comment do not appear to be entirely correct. For example, 1 of 7 3-Vol comparisons have a slope greater than 0.90 (not 1 of 6). Similarly, 2 of 7 RPPS slopes exceed 0.90, with a mean <math>R^2</math> of 0.73, not 0.85.</p> <p>In general however, the evidence cited in the comment does indicate that 1) comparisons involving the Snap Sampler have a lower overall degree of data scatter about the best-fit trend line, and 2) VOC concentrations obtained with the Snap Sampler tend to be higher than concentrations obtained with other samplers (this trend is noted in Section 7 of the draft report). We agree that these results suggest that the Snap Sampler provided a more accurate accounting of actual VOC concentrations present in the well water, on the average. The text in Section 6.4, starting in the 2<sup>nd</sup> paragraph, will be revised an expanded to read:</p> <p><i>“The fact that water for VOC analysis does not have to be transferred from the Snap Sampler™ into separate sample containers appears to be the most reasonable explanation for the relatively higher VOC concentrations obtained using this method. The lack of sample transfer eliminates the potential for VOC loss as a result of sample transfer. The developer of</i></p>

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				<p>one of those data sets and the slope will still be 1:1 but the R2 will degrade. Add random noise to both data sets and you still should be close to 1:1 slope, but the R2 will deteriorate more. If that Snap shows better correlations to all the other methods than any of them show to each other, it means the Snap data set has less noise about the actual concentration.</p> <p>As far as slope is concerned, a similar argument can be made. If the correlations are good and consistent across wide concentration ranges, they are more likely to be right. This is true even if a certain method is "biased" in one direction, for example. The slope could be 1.2, but if the R2 is very good it just means the "bias" is very consistent (in other words, correctly reflecting a result that shows a 1:1 correspondence). If one method consistently picks up 80% of a contaminant over a wide concentration range, that ratio is meaningful.</p> <p>From this analysis, LF, RCS and Snap show the most consistency with the other methods. They have a more 1:1 relationship with the others, even if that relationship is skewed. 3Vol PSMS and the Hydrasleeve show the least consistency.</p>	<p><i>this sampler reports that results of other tests also exhibit the same higher-concentration trends for VOCs as seen in this study (Britt et al.,2005). For anions and 1,4 dioxane, it is not clear why the Snap Sampler™ concentrations were typically higher than those in samples collected using other methods.</i></p> <p><i>It should be noted that the relatively high VOC concentrations in the Snap Sampler™ may also be due, at least in part, to differences in how these samples were treated at the laboratory. As stated in Section 3.3, most of the VOC samples submitted to the analytical laboratory in 20-ml vials (i.e., samples collected using the PDBS, RPPS, RCS, PsMS, and HydraSleeve®) were composited at the laboratory into one 40-ml vial for analysis. Therefore, most of the VOC samples collected using no-purge techniques, except for the Snap™ samples, underwent two episodes of sample transfer (one in the field and one at the laboratory). These transfers may have resulted in some VOC loss and increased the “noise” or variability in these no-purge VOC data sets. The VOC data suggest that minimizing VOC sample transfer can result in more accurate</i></p>

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					<i>detection of VOC concentrations present in the well water. The data also indicate that caution is advised when scoping the use of 20-ml VOA vials for VOC sample collection. The ability of the laboratory to analyze VOC samples contained in 20-ml vials without sample transfer should be assessed, and use of 40-ml vials wherever possible is recommended.”</i>
21			Table 4.6 LF/RCS line	LF-PSMS has a pretty low R2 to call "green, ="	Per the comparison system that was established, the green color is appropriate. The table footnotes indicate that a lower confidence is associated with the slope value. See also the response to comment #19.
22			Table 4.6 3V/PDBS line	3WV-PDBS, pretty different and pretty low R2  positive RPD and slope <1 conflict	See the response to comment #19. These are very good and perceptive comments. It is true that there was a subjective/qualitative element to derivation of the holistic conclusions. The comparison method does boil a lot of information down into a single holistic conclusion, but we felt that that was necessary—we didn’t feel that it was appropriate or realistic to present all of the nitty-gritty details, ifs, ands and buts for each of the sampler pairs such as are presented in these comments. The following text will be added to the end of Section 4.4.3 to indicate that readers

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					<p>interested in particular samples need to look in detail at all of the results presented in the comparison tables, rather than only at the holistic conclusions. The information presented in this comment will be given as an example of a sampler pair that was termed “equal” in the holistic conclusion but that had some indications of differences: <i>“However, if the reader is interested in better understanding the comparison results for particular analytes and/or sampling methods, they are encouraged to perform a detailed review of all of the comparison results presented in Tables 4.1 through 4.6 rather than limiting their review to the holistic conclusions. For example, the holistic conclusion for comparison of VOC concentrations obtained using the 3-volume purge and HydraSleeve® methods is that these methods provided essentially equivalent results. The orange highlight indicates a lower degree of confidence in this conclusion because the results of all of the comparison tests were not internally consistent. Further inspection of the comparison results shown in Table 4.6 indicates that the Sign and Wilcoxon tests both indicated that the two data sets are statistically similar. However, the RPD and X-Y Scatter Slope/R<sup>2</sup> tests both indicate differences in the data sets. The slope</i></p>

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					<i>result (0.59) indicates that the VOC concentrations obtained using the 3-volume purge method tended to be higher than the concentrations obtained using the HydraSleeve®. However, the relatively low R<sup>2</sup> value (0.50) indicates a high degree of scatter about the best-fit trend line and a correspondingly low confidence that the slope value is accurate and meaningful. Therefore, some comparisons termed “equal” in the holistic sense are more equal than others (i.e., “equal” defines a range of conditions rather than one specific condition).”</i>
23			Table 4.6 PDBS/PSMS line	PDBS-PSMS...pretty different and pretty messy to call equal. Slope of 0.41 and Wilcoxon of 0.92	See response to comment #22.
24			Table 4.6 overall	I noted at least one incongruity  PSMS = PDB PSMS = LF PDB > LF  I don't think it necessitates a change, just wanted to point it out	These apparent inconsistencies result from the fact that, in addition to the statistical and other quantitative comparison tests shown in Tables 4.1 through 4.6, a more qualitative review of the data also was performed that factored into the holistic conclusions. The qualitative review of the data is described on pages 4-15 to 4-16.
25		4-13	16, 19-20	It looks like the highlight is when the slope is between 0.90 and 1.10, not when R2 is less than a threshold value. See comment above to tables	The words “ <i>based on the magnitude of the slope</i> ” will be added to the end of the referenced sentence in line 16.
26		4-14	15	RPD = 100* $\left[\frac{(A-B)}{(A+B)}\right]/2]$	Correction will be made.

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27		5-2	5-8	35 feet of water in a 50 foot well seems unusual. 50 feet seems fair, but a typical well like this would be submerged somewhere between 0 and 20 feet, maybe 10 feet on average, not 25 on average. People will think we're sandbagging the purge time and disposal if we're too generous with the waste volume.	The data presented in Table 3.2 indicate that having at least 35 feet of water in the well is common at McClellan AFB (or for any other site where multiple vertical zones are monitored separately. The well depth was reduced for the cost analysis given that most sites do tend to have shallower wells than McClellan AFB.
28		5-3	13	Insert at end of paragraph: "It is anticipated these costs would be similar for all methods except 3 volume purging, which could be substantially higher."	The following text will be added to the end of the paragraph: " <i>The 3-Volume Purge method would typically be expected to have the highest IDW disposal costs.</i> "
29		5-3	15	This might also be a 3 volume and LF expense greater than all the others. If sampling takes 3 or 4 days rather than 1 or 2, there are more operational expenses not reflected just in labor (auto rental days, hotel days, travel to the site, etc.)	Mob-demob costs do not necessarily include operational expenses associated with a longer field program. Therefore, the fact that the field program would likely take longer to accomplish using conventional sampling methods does not necessarily invalidate the assumption that mob-demob costs for all methods would be similar. Mob-demob costs for conventional sampling could potentially be greater than for diffusion and grab sampling due to the greater amount of equipment and supplies required. However, that may not always be true. For example, at some sites the equipment and supplies are owned by the contractor or property owner and stored at the site between events, minimizing the time required to prepare for the next sampling event. Given the difficulty in quantifying differences in mob-demob costs between methods, we would prefer to leave this assumption intact.

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30		5-3	26	<p>That multiplier is low. <b>Material cost</b> is only one aspect of the cost of devices like these. The markup from ALL costs should be 40-50%. With design, patents, inventory, financing, marketing and the like, the multiplier of material cost, should be at least 3 to 4x.</p> <p>Ask Don V. or Columbia about <b>material</b> cost for PDBs, and Kent about Hydrasleeves, or Dave Kaminsky on the <b>material</b> cost/price of disposable bladder pump bladders that sell for \$10. You'll find the multiplier is much more than 2 x.</p>	Based on dialogue with the Snap Sampler and HydraSleeve vendors (ProHydro and GeoInsight), this is a reasonable comment. A multiplier of 4x will be used.
31		5-4	14	<p>Replace “the most expensive of the” with “more expansive than the other” and add “, but it still was substantially less than the purge methods.” at the end of this sentence.</p> <p>I don't disagree, but this is misleading.</p> <p>First, see the cost comments on Table 5.1.</p> <p>The costs are more than the others but they are in the range of passive devices, and much less than the pump methods.</p>	This change will be made.
32		5-4	15	Replace “relatively high” with “higher”	This change will be made.
33		5-4	16	<p>Delete end of sentence “this sampler is only cost effective for longer-term use (e.g., greater than 5 years).”</p> <p>This is not accurate. My calculations show that amortizing the Snap Samplers over just 4 sampling events gets you to break-even.</p>	This change will be made.
34		5-4	18	Replace “less competitive than any of” with “more expensive than”	This change will be made.

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35		5-4	20-21	<p>Delete “assuming that the life-span of the Snap Sampler™ is longer than that of the dedicated pumps.”</p> <p>You don't need the Snap Samplers to last that long to be less expensive than the pump methods. Even if you were replacing the Snap Samplers every 5 years (which I don't think you'll need to do), the dedicated cost would be the same as the dedicated low flow system.</p> <p>See next edit and comment.</p>	This change will be made.
36		5-4	22	<p>Add at end of paragraph: “The Snap Sampler itself seems is likely to have an extended life. Replacing trigger linkage parts or other maintenance may be needed rather than full replacement of the samplers. For the cost calculation we assumed replacement parts and maintenance would be equivalent to replacing 1/3 of the sampler cost over the course of the program.”</p> <p>I think there will be some cost of maintaining the Snap Samplers short of complete replacement. I think a 1.33 multiplier is a fair assumption</p>	<p>This change will be made. However, the text will be edited to read: “<i>The manufacturer of the Snap Sampler (ProHydro, Inc.) states that the Snap Sampler itself seems likely to have an extended life, and that replacing trigger....</i>”</p> <p>This way it is clear who is making this assumption.</p>
37		5-4	25	<p>Re: Significant. This only takes a minute or two doesn't it? Maybe "significant" is too strong. Replace with “some” ?</p>	This text will be revised per Don Vroblesky comment #6.

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38		5-4	29	Is the streamlined version included in the cost comparison? I would think it should, or could be reasonably estimated. A degassed RPPS delivered by a vendor floating in a water bath. The sampler cost and shipping would be higher, but the prep would then be comparable to the other methods.	The streamlined version was not included in the cost comparison. It is recognized that the costs associated with the various samplers is, to some extent, a moving target due to continuing development. However, we will use the costs actually incurred in the field during the development but add caveats in the text regarding future developments.
39		Table 5.1 3V	Sampling pump lifespan	seems like a low life span if it is dedicated to this site (the whole cost is allocated to this site, it should only be used twice per year)	Agreed. Rental costs for an electric submersible purge/sample pump will be used instead of purchase costs. This will result in a lower cost per well per event.
40		Table 5.1 3V	Pump tubing, # or units	Shouldn't this be 50-55 feet per well, per event? (or maybe it would be dedicated to the well, and last several events, maybe 2 years?)  You wouldn't move the same tubing around between wells would you?	It is our understanding that the pump tubing for the 3-Vol sampling is decontaminated after each well and moved from well to well.
41		Table 5.1 3V	Controller and field meter cost	These two probably wouldn't be dedicated to only one site. Maybe a per event fee (rental) would be better instead of an amortized capital expense.  The existing cost is $\$27 + \$52.50 = \$79.50$ ; $\$79.50 \times 20 = \$1,580$ per event for the controller, generator and field meters. A bit steep. To rent a generator, controller, and all the field meters would probably be on the order of \$600, or \$30 per well per event, a reduction of \$49.50.	Agreed. Rental costs for a controller, field meters, and generator will be used instead of purchase costs.

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42		Table 5.1 3V	Teflon bailer	Seems low for a Teflon bailer. An HDPE bailer would cost about \$6, but a Teflon bailer would be at least \$12 (for a 1 ft one) and maybe as much as \$30 for a 3 foot one). It would be worth checking with Brad Varhol or another vendor on Teflon bailer pricing.	The cost for a Teflon bailer will be checked and revised as appropriate.
43		Table 5.1 3V	Polypro cord	\$20 for 1000 feet of this rope? what a deal! Is it really that cheap?	Yes
43		Table 5.1 LF	Controller, generator and field meter cost	Same pricing comment as for 3 volume ( #41)	Submersible low-flow pumps are often dedicated to the well unless the sampling is performed using a peristaltic pump. Dedicated low-flow pumps are used at McClellan AFB. Therefore, the pump price will remain unchanged. However, rental costs will be used for a generator, controller, and field meters.
44		Table 5.1 LF	Sample collection labor	This should be pretty low, you just unhook the tube from the flow cell and start filling bottles. It shouldn't be any longer than the PDBS (6 min)	Per our field notes, the overall labor time for the low-flow sampling shown on the table is correct.
45		Table 5.1 Snap	Capital and Recurring costs	add line, "sampler equipment maintenance", \$60 over the course of the 20 years. = \$4.50 per well per event	This change will be made.
46		Table 5.1 Snap	Sampler bottles	These are \$16 now, or \$48 per event and in case of 2 vials required, only \$32.	This change will be made.
47		Table 5.1 Snap	Trigger with reel	This should be \$30, or \$0.75 per event	This change will be made (note, cost of \$40 was used per Sandy Britt follow-up comment)..

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48		Table 5.1 Snap	Total capital and recurring costs	<p>This should be 69.42</p> <p>Of course, if you need only two bottles for your long-term sampling (which is fine in many circumstances), this is further reduced to about \$47.30.</p> <p>So far, the majority of people who have tested the Snap Sampler have been using just two.</p>	<p>The total cost will be revised as indicated in the responses to the above comments. Given that sample volume was a critical component of this demonstration, and we went out of our way to maximize the volumes achievable, we will continue to assume use of 3 bottles as was done for this demonstration. Text will be added to indicate that use of two bottles is possible for some applications.</p>
49		Table 5.1 Snap	Labor portion of this table, overall comment	<p>To make all of the no-purge methods consistent, all the possible tasks for all the samplers should be listed. Those that don't use a specific task could say "0" for that line.</p> <p>I think they all should have the following numbers:</p> <p>1) <u>Set up and tear down</u> (opening and closing the well, taking water level measurement) (7 min for Snap; 6 for PDBS)</p> <p>{ The only difference between The Snap and PDBS is pulling the trigger. This should be 7 min rather than 10 }</p> <p>2) <u>Sampler Retrieval and Redeployment</u> (7 for Snap; 6 for PDBS)</p> <p>3) <u>Sampler Bottle Removal and Replacement</u> (8 for Snap; 0 for PDBS).</p> <p>{ I think this is conservative, I would guess it may be more like</p> <p>4. Sampler bottle removal (6 minutes) plus replacement (8 min) seems very high, especially if you are going to add time for</p>	<p>Labor estimates for the Snap Sampler were based on our field notes; no changes are proposed.</p>

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				<p>preservation too.</p> <p>During retrievals, my notes indicate the retrieval efforts for the Snap were only marginally longer than the Hydrasleeve (30-40% longer, not nearly twice as long, as these cost analyses predict).}</p> <p>4) <u>Sample bottle filling</u> (0 for Snap; 4 for PDBS, or 6 to be consistent with others, but I think 4 is fair for all the methods)</p> <p>5) <u>Sample preservation, labeling, lab pack, and cooler prep</u> (6 for Snap, 2 for PDBS)</p> <p>6) <u>Sampler filling and replacement</u> (0 for Snap; 6 for PDBS)</p> <p>7) <u>Decontamination</u> (2 for Snap; 1 for PDBS)</p> <p>Total task time makes 30 min for the Snap; 25 min for the PDBS (Snap adds time for pulling the trigger, slower retrieval speed, loading and unloading bottles, and preservation, but eliminates sample bottle filling and refilling samplers for redeployment.)</p>	
50		Table 5.1 Snap	Total cost	My changes bring this down to \$130.42 with three samplers and \$108.30 with two... still higher than all the other passive methods but closer, and still much less than the purge methods.	The total cost will be revised per the responses to the above comments.
51		5-13	Table 5.2	<p>purge methods will probably be less by about \$50 with my rental suggestion</p> <p>Snap will be less by \$25 to \$47</p>	Rental costs will be used as appropriate as described in responses to comments 39, 41, and 43. Snap sampler costs will be revised as described above.

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52		5-13	22	Snap samples seal while submerged in the well, so field (ambient) blanks would not generally be needed for this method, while they may be indicated for all of the other methods.	The following text will be added to line 22: <i>“Snap™ Samplers are sealed shut while still in the well; therefore, collection of ambient field blanks should not be necessary when using this device (compared to other methods where the sample is transferred into sample bottles above-ground).”</i>
53		6-1	13	Replace “Clearly these methods would” with “These methods might”	This change will be made.
54		6-1	14	Delete “portions of the aquifer under different”  Not really different portions of the aquifer. The samples from all of these methods collect water from near the well at the time of sampling. Even 3 well volume sampling is reaching out only a foot or two from the well. During the recent equilibration period, the passive samplers are also capturing the concentrations of formation water that is with a foot or two of the well.	Disagree. It is possible and even likely that no-purge and purge methods obtain water from different portions of the aquifer. The degree to which this is the case will be site- and well-specific. However, to clarify the text, the sentence will be revised to read: <i>“... monitoring different flow conditions and potentially also different volumes of the aquifer”</i> .
55		6-1	16 17	Replace “thought” with “considered by some” Replace “depth” with “interval”  QED now says LF represents the whole well screen. And my sand tank work also suggests in-well mixing may cause some degree of flow-weighted averaging effect, so it's not so clear-cut that LF samples "are thought to represent...a discrete sample depth... "	This change will be made.

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56		6-1	22-27	I think you can make some sweeping conclusions. See below.  Also, all the passive methods are <u>measuring</u> the same thing, aren't they?	Comment noted. See response to comment #57.
57		6-1	26 27	Add "purge and no-purge" before "sampling" Add "may" before "actually"	This change will be made.
58		6-2	5-9	These observations might each point to error in this method.	Comment noted.
59		6-2	10	Insert "which was not tested for this analyte" after "Snap Sampler"  Hex chrome was not tested with the Snap Sampler.	This change will be made.
60		6-2	13-22	This does not explain why the losses were different compared to different passive devices and 3 volume. (xy slopes of low flow compared to the other methods were: 0.99, 1.16, 1.20, 1.22, 1.41, 1.52 and 1.77; of these only the 1.16, 1.20, 1.22 and 1.77 had R2 over 0.90; the 1.77 with an R2 of 0.99 was the Snap.) This implies low bias for LF of about 20% compared to RPPS, RCS, and Hydrasleeve (1.20/1.00). It also implies an almost 80% low bias compared to the Snap (1.77/1.00). Or, to look at it another way, if the RPPS, RCS and Hydrasleeve remove the heat bias from the LF, but not the pour bias, they still have about a 50% low bias compared to the Snap (1.77/1.20).  All with great R2 correlations. ..that's a finding.  Now, I'm not saying the Snap is really 50% higher than all the other methods. The comparison with 3 volume is much less dramatic, for example. But the consistency across all methods is striking. This should be called out.	Agree that sample temperature may not be the full explanation for the observed differences in VOC concentrations, and we are open to other ideas. However, we believe that sample temperature may have played some role in causing the observed differences. The text states that temperature "could at least partially explain why the VOC concentrations in the low-flow purge samples...." This text seems reasonable, and no changes are proposed.  The "high bias" of the Snap relative to the other samplers is discussed in Section 6.4.

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61		6-3	1-8	<p>Delete whole paragraph.</p> <p>These wells have been installed for many years...they probably aren't leaching anymore.</p> <p>Plus, the passive methods would also pick up the "leached" metals, not just low flow.</p>	<p>This change will be made. See also response to URS comment #10.</p>
62		6-4	10-12	<p>After "...VOCs," delete remainder of sentence, replace with "most for 1,4 dioxane, and most for anions. However, the 1,4 dioxane comparisons included few data points; and the Snap Sampler was comparable with three volume purge samples for VOCs. For anions, low flow and the Hydrasleeve were higher than three volume purge by about the same amount as the Snap Sampler. For VOCs, the statistical treatments of the Snap Sampler data were generally stronger than the other sampling methods. The Sign and Wilcoxon tests usually showed clear distinction between data sets. XY trendline regressions showed that correlations between the Snap and each of the other methods were generally better than the other methods had with each of the others. The Snap was the only method to have good correlation coefficients with all of the other methods (lowest R2 was 0.88).</p> <p>Higher concentrations for the Snap Sampler were also corroborated by the Sign, Wilcoxon and XY data.</p>	<p>We would prefer to retain the text recommended for deletion because it provides as much or more information than the recommended replacement text. However, the following text will be added after "constituents" in line 12: <i>"It should be noted that the 1,4 dioxane comparisons included few data points."</i></p>
63		6-4	18	<p>After "...methods" insert: ", however, the Hydrasleeve and low flow were higher than 3 well volume by a similar amount. The low flow, Hydrasleeve and Snap Sampler methods are similar to each other in that they take sample directly from the well screen without a membrane filter. Three volume purging removes all well bore water." Add paragraph break, then...</p>	<p>The 1<sup>st</sup> sentence of the comment is not entirely correct—see the response to comment #62. No change is proposed.</p>

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64		6-4	18-19	Delete “Of the non-conventional sampling methods evaluated,” capitalize “The”	This change will be made.
65		6-4	19	Replace “the most expensive based on” with “more expansive than the other passive sampling methods, as shown in”	This change will be made.
66		6-4	23	<p>And end of the sentence, insert: ”, but as stated earlier, the vendor is developing a 125 ml sample bottle to accommodate somewhat larger sample volume needs. Other test studies also show the Snap Sampler to repeat the higher VOC concentration trends identified in this study (Britt, et al, in press).”</p> <p>Testing done with University of Waterloo with John Cherry and Beth Parker show similar trends. A paper is in prep with them as co-authors for that work, and an abstract for the Battelle-East conference has been accepted.</p> <p>Full reference: Britt, S.L., B.L. Parker, and J.A. Cherry, in press, 2005, Field Testing the Snap Sampler—A Comparison with Low Flow and Polyethylene Diffusion Samplers. Battelle In Situ and On Site Bioremediation Symposium, Baltimore MD, June 2005.</p>	<p>The following sentence will be added to the end of line 23: “<i>The vendor is developing a 125-ml sample bottle to accommodate somewhat larger sample volume needs.</i>”</p> <p>The following text will be added after “method” in line 16: “<i>The developer of this sampler reports that results of other tests also exhibit the same higher-concentration trends for VOCs as seen in this study (Britt et al., in preparation).</i>”</p> <p>This reference will be added to Section 8.</p>
67		6-4	28	Add sentence and the end of this paragraph: “The PDBS tended to have poorer XY trendline regressions than many of the other methods.”	The following sentence will be added: “ <i>The average correlation coefficient (<math>R^2</math>) value for the PDBS X-Y scatter plots (Table 4.6) is 0.67, which is relatively low and indicative of a relatively large amount of scatter in the data about the best-fit trend line. Low average <math>R^2</math> values also were obtained for the HydraSleeve<sup>®</sup> (0.64), PsMS (0.51), RPPS (0.73), and 3-volume purge (0.65).</i> ”

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67		6-5	16-18	All comparison anecdotes should be bulleted, or none of them should	This change will be made.
68		6-6	8 8-9	Insert “ the RCS sampler for” before “the McClellan...” Delete “results indicate...performance perspective. It”	The sentence will be reworded as follows: <i>“In general, the McClellan AFB demonstration results indicate that this sampling device was in a lower bracket in terms of its performance at this Base.”</i>
69		6-6	28	Delete “or Snap Sampler” On the range of costs, it is much closer to the other passive methods than the purge methods.	This change will be made.
70		7-1	18-19	Replace “significantly” with “substantially” add “, though both were much less expensive than the conventional purge methods.” To the end of this sentence.	This change will be made.
71		7-1	19	Delete “Furthermore”	This change will be made.
72				<p>Replace “has neither the volume limitations nor the metal reconstruction concerns of the Snap Sampler” with “allows more sample volume.”</p> <p>The Snap Sampler volume "limitation" only means that you collect only the water you need—2 or 3 VOA bottles already full of sample--and you don't have to throw any away.</p> <p>For larger volume needs, there is the 125 ml bottle.</p> <p>You can't sample for as many different analytes with the Snap, but that's a limitation for many of these devices. It shouldn't be called out especially for this device.</p> <p>The metal concern was never tested. Metals were not tested with the Snap in part because of money, not only because of sample volume or contamination potential. You only know if it is a problem if testing shows it to be so. Sample pumps are</p>	The text will be revised to read: <i>The HydraSleeve® was simpler to deploy and retrieve, and permits a larger volume of water to be collected. A fully non-metallic version of the Snap Sampler™ will soon be available in the event that the metal construction of the Snap Sampler™ tested in this study is of concern.</i>

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				made of stainless, the Hydrasleeve in this study had a stainless part, many of the wells in this study were made of stainless.  In any event, a fully non-metallic Snap Sampler is available.	
73		7-1	22 23	Delete “use in” Add “most” after “monitoring”	This change will be made.
74		7-1	25	Add “much” after “Although”	Text will remain as is.
75		7-1	26	Delete “still”	This change will be made.
76		7-1	26-27	Delete sentence starting with “However...”  PDBSs are mass produced	Text will be revised to read: <i>“However, if mass produced like the PDBS, it is assumed that the RCS, RPPS, and PsMS would be less expensive than indicated in Table 5.1.”</i>
77		7-2	5-8	Delete this paragraph  I don't think a winner should be picked. The reader can draw his/her own conclusion. Everybody has different needs. Some people might not want to filter metals samples; some people might want the lowest acceptable VOC results, some people may want to use the cheapest way to get VOCs only.  Some people value data quality over price, some people will value price over anything. These values are different for different people.  Notwithstanding the "adequately representative" discussion in the next paragraph, the conclusion that the Hydrasleeve is best ignores the elephant in the room that all of these methods are at least somewhat and sometimes seriously biased low for VOCs compared to the Snap Sampler--17% to 53% based on the median RPD comparisons and 4% to 77% based on the XY	As pointed out in the comment, the definition of “best” sampler may vary from person to person and situation to situation. Therefore, the text will be revised to be more factual in terms of the pros and cons of the various samplers in terms of cost and technical performance. A summary table that indicates this information will be added to Section 7.

**REVIEW COMMENTS AND PARSONS RESPONSES ON THE DRAFT RESULTS REPORT FOR THE DEMONSTRATION OF NO-PURGE GROUNDWATER SAMPLING DEVICES AT FORMER MCCLELLAN AFB, CALIFORNIA**

<b>REVIEWER: Sandy Britt, ProHydro, Inc.</b>					
<b>Item No.</b>	<b>Section</b>	<b>Page(s)</b>	<b>Line(s)</b>	<b>Comment</b>	<b>Response</b>
				<p>slopes. And the higher result must be closer to right. Right in the sense that the Snap captured water at that point in the well and returned it with the least loss. I can't think of any other reason for higher VOC results for the passive methods. The pump methods could introduce other artifacts (heat, tubing, colloids), but the passive methods shouldn't.</p> <p>Describing the Snap as the "most conservative from a protectiveness standpoint" is an obtuse way of saying its probably closest to right (see page 6-4, line 20). Shouldn't this result be identified in the conclusions?</p> <p>For anions, the Snap, Low flow and Hydrasleeves were about the same amount higher than 3 volume. These 3 methods have one thing in common: they collect water residing in the well, or mostly from water in the well in the case of low flow. This could mean that water in the casing somehow retains anions for some reason. 3 volume purging brings water in definitely from the outside formation, and the other passive devices could be just biased low just enough to look like the 3 volume, thereby making LF, HS and SS look high.</p> <p>I don't have a good explanation for the 1,4 dioxane, but there weren't very many samples to compare, and many of the comparisons showed fishy results (negative correlations and the like).</p> <p>In the end, with cost for the Snap really in the \$110 to \$130 range, (still a 50% savings over the purge methods), and the only sampler that has unbiased VOC results, I think, in my opinion, that if a winner should be picked, it should be the Snap</p>	

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				Sampler, despite the higher cost. But as I said earlier, I think there should be no winner selected. The reader can make his/her own judgment.	
78		7-2	24	Insert : “all of the compounds it was tested for in this demonstration:” before “anions”	This change will be made.
79		7-3	7	Replace “validated” with “repeated”	We feel that the term “validated” best expresses the intended message; no changes proposed.
80		7-3	12	Insert “and was not compared with the Snap Sampler)” after “methods”	The following text will be added: “and were not compared with the Snap Sampler™ results.”
81		Appendix D	x-y plots	<p>It might be helpful for the reader to group the plots for comparison to each of the other methods.</p> <p>The Low Flow comparison is nice right now, because you can page through all the other methods and look how they compare to LF all right in a row. Most of the others are spread out over the rest of the pages. It might be helpful for the reader who wants to see how the RPPS compares to all the other methods, to look at a set of RPPS plots, for example.</p> <p>I suggest that each of the methods be grouped and compared to each of the others in sets. There wouldn’t be exact repetition if you always put the subject method on the y-axis—where there is repetition, the axes would be reversed.</p> <p>For low flow you’d have:</p> <p>LF vs. 3V            LF vs. Hydrasleeve            LF vs. PDBS</p>	These are good suggestions. However, given the limited budget remaining for this task, we would prefer to focus the remaining budget on addressing comments that pertain to the substance of the main body of the report as opposed to reformatting these graphs. The reader is free to print out and arrange the graphs in a manner that is most helpful to them.

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				<p>LF vs. PSMS                      LF vs. RCS                      LF vs. RPPS                      LF vs. Snap Sampler</p> <p>Then, for PDBS, you'd have:</p> <p>PDBS vs. LF                      PDBS vs. 3V                      PDBS vs. Hydrasleeve                      PDBS vs. PSMS                      PDBS vs. RCS                      PDBS vs. RPPS                      PDBS vs. Snap Sampler</p> <p>Etc for the others....</p>	
82		Appendix D	x-y plots	<p>It would be helpful to list or make a table of correlation coefficients and Wilcoxon tests for each of the methods, compared to each of the others, maybe at the end of each of the list of xy plots. That way, someone who wants to print out pertinent information for the RCS, for example, just has to print those 8 consecutive pages to get a synopsis of the RCS comparison to all the other methods.</p>	<p>This information is readily available in the report to each reader to use in the way that benefits them the most. We would prefer to direct the remaining budget to address comments that impact the substance, conclusions, and recommendations of the report.</p>
83		Appendix D	x-y plots	<p>I noted a few points on the plots that look like they could be decimal place transcription errors. There are several anions results that sure look like they are an order of magnitude away from where they would fit right on the trendline.</p> <p>I numbered each of the plots 1-26 for reference.</p>	<p>There shouldn't be transcription errors because the data used for these graphs was transferred directly from the electronic laboratory deliverables to the project database to the report without manual data entry or transcription.</p>

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				<p><b>ANIONS</b></p> <p>On page 1, 2, 4, and 6 there is a LF result of about 20 ug/l that looks like it could be an error (comparison of this point is missing from pg 5 and 7, ?). The LF result would fit right on the trendline if it were 2 orders of magnitude higher.</p> <p>On pages 11 and 13 there is a 3 volume result around 1000 ug/l that would fit the trendline better if it was 100 ug/l</p> <p>On page 15, there is an outlier which would fit the trendline if it were moved by a factor 10 either up or to the left.</p> <p>On page 22, the one result above the trendline could move by a factor of 10 to move right on the trendline.</p> <p>On page 24, there is an RCS result around 30 with RPPS around 400</p> <p>On page 25, there are two outliers that are both off the trendline by about a factor of 10</p> <p>On page 26, there are 4 outliers. Two with RPPS results of about 500 and 20000 each look like if moved by a factor of 10, would fall on the trendline.</p> <p><b>VOCs</b></p> <p>On page 18, there is one outlier point (point farthest to the right) that would fit the other points better if it were moved either up or left by a factor of 10. This point looks like it's doing a lot of damage to the trendline position and R2 for this comparison (PDBS/PSMS)</p>	

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				<p>On page 20, there are two outlier points that toward the higher concentrations which look like they could move by a factor of 10 to much closer to the trendline.</p> <p>On page 22, there is one PSMS concentration around 9 ug/l corresponding to a RPPS result of around 90. Either changing would very much improve that R2 for the PSMS.</p> <p>for METALS, Cr6 and 14dioxane, the data are too scattered and busy to tell for sure, but there may be some there as well</p>	