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U S NAVY RESPONSE TO THE U S EPA REGION I COMMENTS ON THE BUILDING 81 UTILITY SURVEY AND PREFERENTIAL FLOW INVESTIGATION WORK PLAN

07/02/2015

RESOLUTION CONSULTANTS

Navy Response to Comments (RTCs), July 2, 2015
Building 81 Utility Survey and Preferential Flow Investigation Work Plan,
February, 2015
Former NAS South Weymouth, MA

Environmental Protection Agency (EPA) Region I
Comments, March 18, 2015

Introduction:

The potential role of subsurface utilities with respect to groundwater flow and contaminant migration has been a long-standing open question at Building 81 and other sites at the Former NAS South Weymouth, Massachusetts. The relatively shallow nature of the groundwater table presents many situations where interactions between buried utilities and groundwater, particularly during high water table conditions, may be expected. In response to longstanding EPA comments on the subject, subsurface utilities at the adjacent Building 82 site were investigated in later stages of the RI/FS. These efforts determined that the subsurface utilities at that site do indeed have a profound influence on groundwater flow at the site-scale. More recently, during late fall 2014, subsurface utilities were again called into question with respect to the potential for unintended interactions with injected permanganate solutions during an ISCO remedial pilot test. Once again, the buried utility lines were confirmed to be "preferential pathways" in the area of the pilot test, and caused permanganate migration well beyond the pilot test area, eventually discharging to surface water.

Building 81 represents a similar situation. The former Building 81 area is essentially surrounded by subsurface utilities of various types. A substantial complex corridor of subsurface utilities exists in the subsurface beneath Shea Memorial Drive to the west. Additional buried utilities are present beneath Redfield Road to the north, and subsurface drain lines are also likely present in the paved areas south of the former building. EPA has offered numerous detailed comments on this subject in the past. Given the upcoming plans for remedy implementation at the Building 81 site, which will involve injection of remedial amendments into the subsurface, identification and clarification of preferential pathways involving buried utilities is a priority. Findings from these efforts may necessitate changes to the remedial approach and monitoring strategies.

Response: Navy agrees a utility survey and preferential flow investigation is a priority. Evaluation of utilities and preferential pathways will be performed prior to commencing remedial action. As discussed during the May 7, 2015 Project Manager Meeting, Navy proposes a phased approach to the utility and preferential flow investigation with the immediate goal of determining if PCE is entering the utility corridor now.

Resolution Consultants' approach to the Building 81 Utility Investigation and Preferential Flow Investigation Work Plan included the following primary goals:

- to identify and confirm the location and depth of utilities,
- ensure safe drilling, and
- evaluate whether utilities may impact the distribution and transport of injected amendments and/or chlorinated volatile organic compounds (CVOCs) in groundwater by comparing utility depth and location with depth of both groundwater and CVOCs in groundwater.

In addition, evaluation and corrective actions are planned to address the 31 existing open bedrock boreholes at the site related to previously performed in-situ chemical oxidation (ISCO) injections.

EPA's main comments were regarding assessing the potential for preferential flow at the site.

In the preferential flow portion of the investigation, Resolution Consultants' approach was to determine if CVOCs or injected amendments in groundwater had the potential to enter the utility corridors near the site.

CVOCs:

Groundwater sampling conducted as part of the Remedial Investigation (RI) measured significantly lower concentrations of CVOCs in groundwater in the shallow overburden (near the water table) than in deep overburden. If CVOCs are not present upgradient and at the same depth of the utilities, then it could be assumed that CVOCs are not entering the utility(ies) and that preferential transport of CVOCs via the utility corridors is unlikely. The primary objectives for the originally proposed investigation on preferential flow of CVOCs were to answer three questions:

Initial objectives were:

- Where are the utilities (vertically and horizontally)?
- Where is the water table (and compare with the depths of utilities)?
- Where is the PCE vertically (and compare with the depth of utilities)?

The work plan stated that recommendations for further investigation would be made, if warranted. It was assumed that if CVOC migration in the utility corridors was likely, then a follow-on investigation or mitigation activities would be proposed and addressed in the next version of the Building 81 RD/RAWP.

Injected Amendments:

An additional purpose of the utility investigation was to evaluate the potential for injected bioremediation amendments to enter subsurface utilities. Resolution Consultants' approach included identifying the vertical distribution of CVOCs to assist in determining what depth intervals require injection (i.e., do not inject amendments near utilities if not required). In addition, the location of proposed injection points and the vertical interval for injection (and assuming mounding of groundwater near the injection points) would be compared with the location of subsurface utilities. Based on the observations of the initial utility investigation,

mitigation measures, if warranted, would be incorporated into the Building 81 RD/RAWP, including the possibility of adjusting vertical injection interval, lining utility pipes, and/or removing certain injection points, to reduce the likelihood that amendments would enter utilities.

General Comments:

1. *Given that the Human Health Risk Assessment conducted during the Remedial Investigation showed vapor intrusion risks to future residents and future construction workers and that off-site utility corridors have not been evaluated for vapor migration, EPA requests that this investigation include a vapor survey, with the collection of passive vapor samples. Sample data is needed to evaluate if these utility corridors are acting as a preferential pathway for vapor-phase contamination. Note that EPA had provided this comment on the Feasibility Study and it was decided at that time that this issue would be addressed during pre-design activities.*

   Response: Evaluation of whether the utility corridors are acting as a preferential pathway for vapor-phase contamination is not included in the work plan. As discussed during the May 7, 2015 Project Manager Meeting, Navy is pursuing a phased approach. If during this investigation it is concluded that CVOCs in groundwater are migrating in the utility corridor at levels that indicate a potential vapor phase concern, additional investigation on potential vapor-phase contamination will be considered.

2. *EPA also commented heavily (during the Feasibility Study phase of the project) on the need for additional source characterization in all intervals as pre-design activities. Consideration should be given to better characterizing the source area at this time, in parallel with the utility survey and preferential flow investigation.*

   Response: Additional source area characterization was included in the Draft Remedial Design/Remedial Action Work Plan dated April 2, 2015. Specifically, nine direct push groundwater profiling points were proposed (Figure 6-1 in the RD/RAWP) in source, biobarrier and downgradient areas (3 more points than in the Utility Survey and Preferential Flow Work Plan). Each point will consist of collecting groundwater samples every two to four feet from the water table down to a depth of refusal to offer vertical resolution of the CVOC contamination in groundwater to better define the vertical extent of enhanced bioremediation injections and to identify vertical intervals requiring additional remedial focus. Based on EPA comments, these additional groundwater profiling points will be done in conjunction with the Preferential Flow Investigation.

   In addition to supplemental source area characterization, the Draft RD/RAWP (Section 3.1) includes expanded treatment areas based on review of existing site data. Additional injection points are proposed below the historic excavation area. An elevated PCE concentration was detected (5,900 µg/kg) from a sample collected below the excavation depth near the former tank at depth of 12 to 14 feet bgs (B81-SO-108-1214).

Expanding the overburden TTZ to include this area will accelerate overall site cleanup by treating residual PCE source material and minimizing recontamination of treated areas. In addition it will reduce the risk of PCE potentially migrating into utility corridors. The expanded overburden TTZ area is approximately 285 square feet. Groundwater elevation contours indicate a northwesterly direction of groundwater flow from the overburden source area (historic excavation and overburden TTZ).

The selected remedy does not address VOCs in groundwater migrating to the northwest (towards well B81-MW- 38I). One additional line of injection points will be established between the overburden TTZ and the overburden biobarrier. The purpose of the additional line of injection points will be to:

- intercept groundwater containing PCE that might not be treated by the biobarrier at the western portion of the site or the overburden TTZ (flowing towards well MW-38I and/or groundwater profiling location GP-B04);
- accelerate attaining RGs in overburden groundwater; and,
- reduce the potential for PCE to migrate into utility corridors.

3. *It has been asserted at BCT meetings recently that the groundwater table is at a lower elevation than the subsurface utilities at Building 81, and therefore by implication, the utilities are not influencing groundwater flow. As stated previously, EPA disputes this conception, and we hypothesize rather, that the utilities, and/or bedding material associated with them, are in direct contact with groundwater and likely have a significant effect on groundwater flow patterns, particularly at the site scale. In this regard, it is noted that all of the photographs provided in Appendix A indicated ponded water or subsurface features filled with water. While the work plan appears to attribute these occurrences to "plugged" drains, this has yet to be verified. The larger question is whether there is a systematic relationship between the subsurface engineered drainage system and the underlying groundwater. While the conventional thinking is for subsurface utilities to act as "sinks" to groundwater, the opposite is also possible (i.e., the utilities may be acting to recharge the underlying groundwater). For example, while the observed drains may or may not be "plugged," it remains possible that the network as a whole acts as a leaky "reservoir" to collect and distribute rainwater and snowmelt into the underground utility network and associated system of buried trenches, slowly releasing it to the aquifer through leakage or other mechanisms. Under this scenario, the utilities may act to recharge the shallow groundwater system in some fashion under the appropriate conditions. All possibilities need to be considered. In this regard, the work plan is lacking in that it does not currently contain provisions for developing a more highly resolved representation of the groundwater head field at the site scale, and in particular the potential role of underground utilities in this regard. Additional actions are needed. At a minimum, the following steps need to be added to work plan:*
   - *Invert elevations need to be surveyed for all accessible manholes, catch basins, or other subsurface structures and tied into the surveyed monitoring well network;*

- *Water level elevations need to be measured for all accessible manholes, catch basins, or other subsurface structures; semi-permanent water level measurement points should be established at features of interest so that water levels in the engineered structures may be periodically measured for comparison to groundwater levels referenced to the same datum.*
- *Additional piezometer coverage beyond what is included in the work plan (discussed in the comment below).*

Response: EPA comments are acknowledged. As requested, invert elevations will be surveyed for all accessible manholes, catch basins, or other subsurface structures and tied into the surveyed monitoring well network within the study area. Water levels will be measured at accessible manholes, catch basins, and other subsurface structures and water level measurement points will be established to tie elevations to surveyed monitoring well network within the study area. Additional piezometers will be installed at each proposed vertical profiling point. If PCE migration in utility corridors is suspected, installation of additional piezometers may be pursued.

4. *<u>Groundwater flow assessment at underground utilities:</u> Buried underground utilities, and the coarse backfill associated with them, have been demonstrated to have a profound effect on ground water flow and contaminant migration at Building 82. However, this was not discernable until monitoring wells were targeted to specific utility features, affording a more highly resolved depiction of the groundwater head field at the appropriate scale. It is likely that buried utilities are also playing a role in ground water flow and contaminant migration at Building 81 and in the intervening area between Building 81 and Building 82. The buried utilities at Building 81 have not yet been directly targeted here for permanent piezometer or monitoring well installation. In particular, the massive utility corridor located generally beneath Shea Memorial Drive is potentially significant given the shallowness of groundwater and relatively shallow depths to bedrock. These utilities may be acting as a potential preferential migration pathway for contaminants in groundwater and/or gaseous phases. Additional investigations are needed. In addition to the vertical profiling locations proposed in the work plan, a larger number of additional drive-point locations and shallow water-table piezometer locations are necessary, as discussed in the comments below.*

   Response: As discussed in the Response in the Introduction, Navy proposes a phased approach to the utility and preferential flow investigation with the immediate goal of determining if PCE is entering the utility corridor now. Additional piezometers will be installed at each proposed vertical profiling point. If PCE migration in utility corridors is suspected, installation of additional piezometers may be pursued.

5. *An inspection of Figures 3-1, 3-2, and 3-3 from the Building 82 Remedial Investigation Addendum points to several issues which need to be considered in conjunction with a meaningful survey of underground utilities. These figures suggest, even though there is very little data, that the north-northwest to south-south east subsurface utilities*

associated with Shea Memorial Drive are profoundly affecting groundwater flow. For example, the general east-to-west ground water flow pattern is profoundly disrupted by anomalously low shallow head values from B81-MW-40S (Figure 3-1) and similarly anomalous head values from intermediate depth wells MW-40I, MW-42I, and MW-47I (Figure 3-2). The proximity of these wells to known buried utilities cannot be ignored. Further it is noted on Figure 3-3 that there is a significant southward slope to the utility system which needs to be further resolved. For example, invert elevations shown on Figure 3-3 in the vicinity of Building 81 and Shea Memorial Drive are few, but show the following:

Feature	Invert Elevation	Distance (ft) (NNW to SSE)	Elevation loss (ft)	Gradient
M136	146.9			
M140	145.7	~ 150	1.2	0.008
C614	151.2			
C615	150.0	~ 95	1.2	0.013

In both cases, this represents a significant gradient to the SSE, which is on the order of the local shallow horizontal groundwater gradients shown on Figure 3-1 (~ 0.026 in the Building 81 area). These limited data further support the potential for southward directed preferential flow via the subsurface utility network.

Response: Navy agrees there is a southward component of flow in the vicinity of Shea Memorial Drive. Invert elevations and water levels in accessible utilities will be measured in this area as provided in the Response to General Comment #3. Navy's goal will be to prepare water level contour maps similar to the Figures 3-1, 3-2, and 3-3 included in the Building 82 Remedial Investigation Addendum, but with additional resolution in the Building 81/Shea Memorial Drive study area.

6. <u>Utility Corridors:</u> *Further assessment of the utility system needs to more carefully consider the geometry and spatial position of the as-built system, as a whole, and as individual components. Upon further examination of the utility plan provided (Figure 1-1), it is clear that the utility systems can be divided into several north-south and east-west trending "utility corridors" which may or may not act in concert. As shown on the figure, the utility systems may be thought of as separate and distinct "bundles" which likely share a common large trench feature into which they were installed (although this needs to be verified). Acting on this premise, EPA has assigned/labeled the utilities into 7 separate larger-scale features shown on EPA Figure 2, below, as follows:*

- *North-south Utility Corridor 1 (NSUC 1)*
- *North-south Utility Corridor 2 (NSUC 2)*
- *North-south Utility Corridor 3 (NSUC 3)*
- *East-West Utility Corridor 1 (EWUC1)*

- *East-West Utility Corridor 2 (EWUC2)*
- *East-West Utility Corridor 3 (EWUC3)*
- *East-West Utility Corridor 4 (EWUC4)*

Additionally, there is the possibility of another east-west subsurface drain south of Building 81. These "corridors" need to be assessed individually for contaminant migration potential. This will require a much greater number of piezometers than the current work plan allows for.

Response: As discussed above, Navy proposes a phased approach to the utility and preferential flow investigation with the immediate goal of determining if PCE is entering the utility corridor now. Additional piezometers will be installed at each proposed vertical profiling point. If PCE migration in utility corridors is suspected, installation of additional piezometers may be pursued. EPA conceptualization of the seven utility corridors is pertinent and Navy will continue use of this naming convention or similar naming convention, as appropriate, as the activities associated with the Utility Survey and Preferential Flow Investigation proceed.

7. *<u>Hydraulic monitoring points</u>: Additional drive point locations beyond the 6 proposed in the text are needed in order to resolve the site hydrology, let alone contaminant distribution uncertainties. It is highly unlikely that the proposed 6 "profile" borings specified in the work plan will provide sufficient resolution on utility influences on groundwater to identify preferential pathways should they exist. Further, the chemical results to be collected from the vertical profile samples will not be interpretable in the absence of a more fully resolved picture of the shallow groundwater hydrology. For example, (one plausible scenario), identification of CVOCs at proposed locations GP-UI2 and GP-UI3 and absence or very limited levels of CVOCs at GP-UI5 and GP-UI6 (e.g., similar to past sampling results), would simply confirm the current limited understanding of the role of underground utilities, and would not rule out the possibility of NSUC 1 or NSUC 2 acting as preferential pathways. It is possible that these utility corridors are acting as "drains", which effectively "relocate" contaminated water to the south, or perhaps they are having the opposite effect (e.g., as ground water "mounds"), which would also tend to inhibit groundwater flow from east-to-west. While either scenario could explain the east-west CVOC distribution at the site, neither would be consistent with the groundwater flow depiction as presented in the current CSM. In order to address the potential for preferential flow with respect to the several utility corridors, let alone the specific utilities, a much greater number of piezometers than the current work plan allows for will be required. EPA's initial recommendations for proposed locations are shown in the figure attached below (see Figure EPA 1), and discussed further in the following comments.*

Response: The additional piezometers recommended by EPA were discussed in the May 7, 2015 Project Managers meeting and it was agreed additional investigation, including piezometer installation, could be pursued after injections, if warranted. As discussed

above, Navy proposes a phased approach to the Utility Survey and Preferential Flow Investigation with the immediate goal of determining if PCE is entering the utility corridor now. Additional piezometers will be installed at each proposed vertical profiling point. If PCE migration in utility corridors is suspected, installation of additional piezometers may be pursued.

8. *Drilling approaches: In order to cost-effectively install the proposed greater number of shallow piezometers, we recommend using a portable impact hammer to install shallow drive-point piezometers to a depth within or just greater than the known base of the adjacent utilities/trenching. These points would be for water level measurement only, and would need to be surveyed into the sample grid; permanent installation techniques may not be necessary. While EPA is not opposed to using vertical profiling equipment as discussed in the current version of the work plan, we believe that the hydrology needs additional clarification before additional samples should be collected for chemical analysis. If vertical profiling approaches are used for all or part of the piezometer installations, it should be noted that a piezometer should be installed at all drive-point locations at the maximum depth of penetration, presumed to be the top-of-bedrock surface; a five- to ten-foot screen should be installed here.*

   A technical meeting is recommended to determine the final number and locations of such piezometers as well as the most robust yet cost-effective drilling approach. Results of geophysical surveys (see below) and updated utility plans (as requested above) will be needed before piezometer locations can be finalized. Use of an "air-knife" at all locations should be required in order to minimize intersection or disruption of utilities, even when utility locations and depths are better understood from geophysical or other data.

   Response: For the direct push points proposed, all points will be air knifed to a minimum depth of 5 feet and potentially deeper it utilities are believed to be set deeper. As indicated in Response to General Comment #2, each direct push point will consist of collecting groundwater samples every two to four feet from the water table down to a depth of refusal to offer vertical resolution of the PCE contamination in groundwater. Following collection of groundwater samples, piezometers will be installed at each location. Note that refusal may be encountered before reaching bedrock. If PCE migration in utility corridors is suspected, installation of additional piezometers may be pursued.

9. *Geophysical methods and approach: While EPA concurs with the use of geophysical methods, particularly GPR, it is noted that little detail is provide in the plan, and no specificity whatever is provided regarding "other" methods which may be used in conjunction with GPR or if GPR is ineffective. It should be noted here that GPR signal is often strongly attenuated by the water table. As such, depending on the water-table's relative position with respect to the utilities, it is not clear that GPR alone will provide*

sufficient resolution with respect to utility/trench locations and depths. Additional specificity is needed in regards to specific GPR approaches (e.g., frequencies survey spacing, etc.). Please also provide a working version of the survey grid proposed for GPR surveying for discussion purposes. It is understood that survey lines cannot yet be finalized in the absence of a comprehensive utility plan map.

Response: Additional details will be provided in the Work Plan as requested, if GPR is ineffective, a Radio Frequency Survey or an Electromagnetic Survey may be conducted.

Given the potential number of utilities in the area, the contractor may use a combination of techniques depending on the condition encountered. The contractor objective will be to locate utilities location and depth. GPR limitations are acknowledged and effective use can vary widely depending on the soil matrix. In addition, if insufficient resolution in an area prevents confident interpretation of utility location or depth, an air knife location will be selected and performed to confirm utility location/depth in the field.

10. <u>Buried Utilities</u>; <u>additional investigation approaches</u>: *In addition to the proposed drive-point piezometer installations, given the obvious health and safety considerations, specialized approaches such as the use of passive soil vapor detectors or other minimally invasive techniques should be considered in terms of augmenting resolution with respect to utility locations and depths, and potential to act as preferential pathways for vapor- or water-phase contaminants. Are there approaches, such as video surveys or tracer testing, which may be adapted from the utility industry practices which could assist here?*

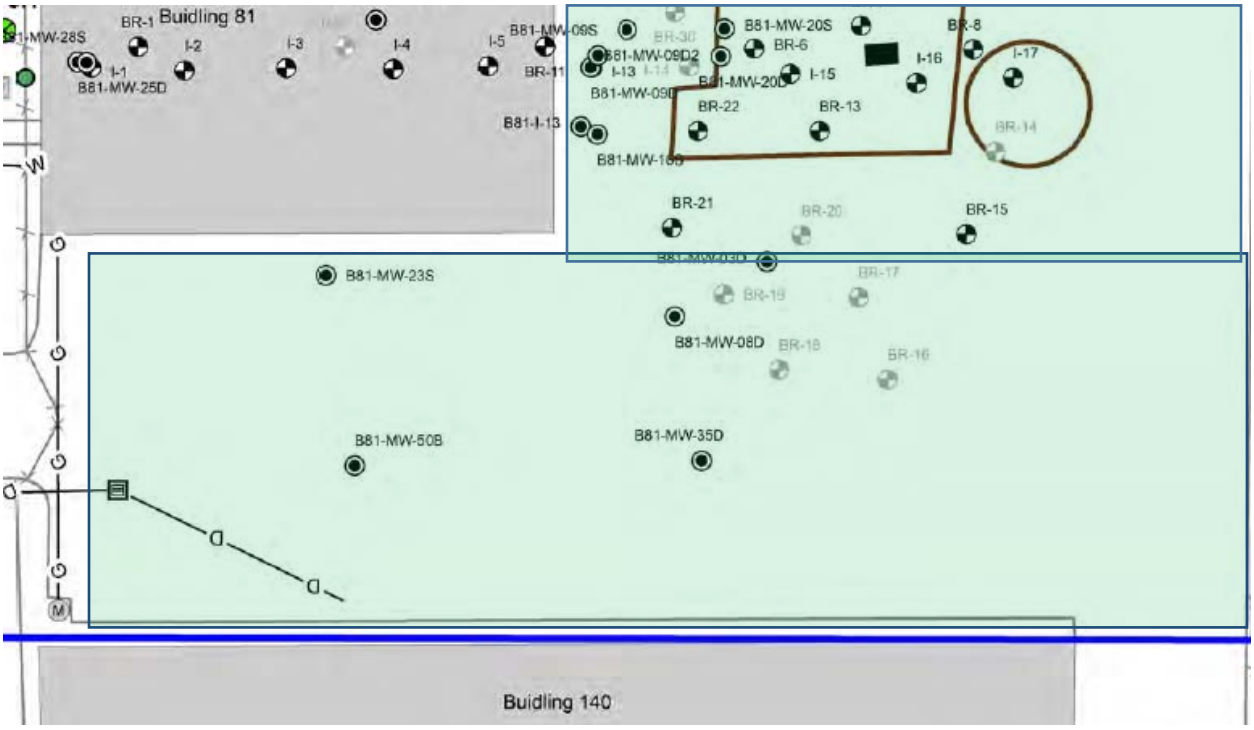
    Response: A video survey of the drain line will be conducted to assess the integrity of the piping. As a precautionary method, if the video survey indicates that the drain line integrity is compromised, then the pipe will be lined.

<u>*Specific Comments*</u>*:*

1. *Page 1, Paragraph 1, Introduction: The text refers to the Building 81 Pilot Test Work Plan. However, at the last BCT meeting (March 12, 2015), the Navy indicated that a pilot test would not be conducted at the Building 81 site. The text should be revised appropriately.*

    Response: Requested change will be made.

2. *Page 1, Paragraph 2, and Figure 1-1: The text lists the general areas of the site where subsurface utilities are present. Absent from this list is the paved area south of Building 81 and north of Building 140 where EPA has observed subsidence and other visual evidence of buried subsurface utilities, probably storm drain lines, in past site visits. The green-shaded area in the figure below also needs to be included with respect to identification and assessment of buried utilities. Please submit a plan showing the proposed GPR survey grids.*



Response: The paved area south of Building 81 and north of Building 140 will be included in the GPR survey. The GPR survey grids will be developed by the selected subcontractor.

3. *Page 1; Building 81 Utilities: EPA supports the Navy's goal of delineating the existing subsurface drains and other utilities present beneath the former building's slab foundation. In order to assist in this effort a true large-scale engineering diagram which indicates the as-built locations of all such features needs to be created and/or compiled/modified from existing information. This critical information is incomplete on Figure 1-1 and needs to be submitted to the BCT prior to intrusive activities. Previous figures included in RI/FS documents do not include sufficient detail. The updated figure should include all specific features, particularly those discussed in the work plan, such as the "floor drains", "a steam pit", etc. Such features should be labeled and given unique identifiers for future reference. It should also be noted that as in other areas at NAS SOWEY, the as-built engineering drawings do not always reflect the current layout; verification of the presumed utilities in the subsurface is therefore a necessary part of the process.*

   Response: An updated large scale engineering figure including the features and labeling requested will be prepared.

4. *Page 1; Building 81 floor drains and steam pit: As discussed in the previous comment, a detailed plan is needed for the former Building 81 footprint which locates the 2 floor drains described in the work plan as well as the steam pit. As well as locating the named*

features, related structures such as catch basins, the connection points and extent of related drain lines need to be mapped out on a detailed plan and verified in the field.

Response: The floor drains and stream pit will surveyed and be included on the updated large-scale engineering figure. Other utility structures will also be included on the map and verified in the field.

5. *Page 1: A functional assessment of Building 81 drains and related features is needed in order to verify assumptions made in the work plan, such as condition, functionality, extent, and connectivity of specific features. For instance, regarding the first of two floor drains described, it is stated that, "The Remedial Investigation (RI, 2011) reports that this drain still appears to function as rain and snowmelt drain from this feature, presumably to the sanitary sewer." This is an important presumption that needs to be verified. For instance, if the drain is <u>not</u> connected to the sanitary sewer, and perhaps dead-ends to the subsurface beneath the slab, the drain may now represent a direct conduit for "rain and snowmelt" into the groundwater. Similarly, a second drain is described as follows, "The other floor drain is at the base of a steam pit and discharged to a storm drain catch basin to the south via a 4-inch cast iron pipe." The work plan subsequently contradicts this with the following statement, "it is not known whether a floor drain exists at the base of the pit." Is there a drain here or not? Where is the "storm drain catch basin" located? Where is the "4-inch cast iron pipe" located? What/where are the other pipes related to the steam pit discussed in the plan? Are these features connected to the larger utility network? How are they functioning? All of these questions will need to be addressed in order to place the observations of "ponded water" into a meaningful context in relation to the site groundwater system. Please see general comment above.*

   Response: The floor drain and steam pit are identified in the Work Plan and Navy agrees that these are potentially important site features and their functionality and potential connection to other site utilities is not well understood. The Work Plan will be edited to more clearly indicate that the location, functionality and potential connection of these features will be assessed. If geophysical methods and field observations cannot determine the true function of these features, a video survey will be conducted on these features.

6. *Page 3, Manholes, and Figure 1-1: EPA recommends assessing all accessible manholes, catch basins, utility boxes, and other subsurface vaults in the site area. Such assessment should include depth to water measurements (if water is present) and invert depths from a fixed reference point. The fixed reference points and invert elevations need to be marked for subsequent surveying so that they are effectively tied into the site survey grid. An examination of Figure 1-1 indicates that, at a minimum, the following features exist in the site area and need to be assessed as discussed above:*
   - *Manholes (15)*

- *Catch Basins (6)*
- *Utility Boxes (2)*

It is recommended that each feature be assigned a unique identifier for future reference.

Response: Invert elevations and water levels in engineered structures (when accessible) will be measured. This will include the manholes (15), catch basins (6) and utility boxes (2) referenced above. A unique identifier will be assigned to each feature.

7. *Page 2, Site Utilities, Bullets: as stated in previous comments, the various specific utilities and related features need to be comprehensively verified and compiled on a detailed engineering plan for the site.*

   Response: As indicated in the Response to Specific Comment #4, a detailed engineering figure will be prepared for the site.

8. *Page 2, Site Utilities, 7th bullet: A revised plan needs to specify which drains are storm drains and which are sanitary lines. For example, the first bullet here refers to, "a drain line which extends from the northwest corner of the Former Building 81 slab." It is further stated that this line is, "believed to be connected to the sanitary sewer system." However, the detail provided on Figure 1-1 is not sufficient to verify this, as the connecting feature is simply labeled as "Drain Line" on Figure 1-1.*

   Response: The term "drain" will no longer be used because as EPA comments suggest it leads to confusion. Instead, the terms "storm drains" and "sanitary sewer" will be utilized. "Storm drains" will refer to the system that collects stormwater that is routed and discharged to open ditches, collection basins and local water bodies (e.g., TACAN outfall), while "sanitary sewer" will refer to the system that collects sanitary waste and is routed to the Town of Weymouth Sewer System.

9. *Page 3, 2nd bullet: The bullet identifies a task related to identifying any "potential preferential pathways to subsurface utilities by in-situ remediation treatment and the need to move or remove injection points." It is presumed that this comment refers, at least in part, to existing injectors and/or monitoring points installed during previous characterization and remedial efforts. EPA supports this effort, but a detailed list needs to be generated of any wells or injectors proposed for plugging/abandonment so that efforts may first be taken to fill data gaps. For example, it is understood that no borehole geophysical data was collected from most of the bedrock injection wells when they were installed for previous ISCO efforts. It may now be advisable to look at the borehole geophysical data that is available and possibly to collect more borehole data (e.g., ATV/OTV logs, etc.) in an effort to clarify interconnections in the bedrock fracture system before boreholes are permanently abandoned. Further discussions are needed.*

Response: The Work Plan will be modified to include an evaluation and corrective actions to address the 31 existing open bedrock boreholes at the site related to previously performed ISCO injections. A detailed list will be made regarding the intended future use of existing bedrock wells, dates of sampling and recent PCE concentrations and the activities performed at each well in the past (e.g., geophysical logs). The update will also include wells where additional geophysical logging will be performed.

10. *Page 3, 3rd bullet; manholes: As noted in the comments above, there are additional features beyond those listed here that need to be inspected. EPA recommends assessing and mapping all accessible manholes, catch basins, utility boxes, and other subsurface vaults in the site area.*

    Response: Requested change will be made as discussed in the Response to Specific Comment #6.

11. *Page 3, 4th bullet: EPA has no objection with the 6 locations selected for additional groundwater profiling. However, it may be premature to determine the best points for additional chemical sampling (e.g., vertical profiling) until the hydraulic role of subsurface utilities in groundwater flow and contaminant migration is better understood. As stated in the general comments above, EPA believes a much larger number of inexpensive water level monitoring points are needed to provide a sufficient level of hydraulic resolution regarding the potential influences of the various N-S and E-W trending utility corridors on groundwater flow.*

    Response: EPAs comments are acknowledged. Navy proposes a phased approach and given the schedule for Building 81 (new injection wells to be installed by December 2015), will profile nine locations during this phase of the investigation as discussed in the response to General Comment #2. Additional piezometers will be installed at each proposed vertical profiling point. If PCE migration in utility corridors is suspected, installation of additional piezometers may be pursued.

12. *Page 3, Methods, Visual Inspection: Please see general comment above regarding number/types of features to be included in visual and related inspections.*

    Response: Responses to General Comments are provided above.

13. *Page 3, Methods, Geophysical approaches: While the use of GPR is concurred with, additional specificity is needed with respect to proposed geophysical approaches. Please see general comment above.*

    Response: As discussed in the response to General Comment #9, given the potential number of utilities in the area, the contractor may use a combination of techniques depending on the condition encountered. Once a subcontractor is selected, a more specific approach will be developed.

FIGURE EPA 1 – EPA PROPOSED PIEZOMETERS

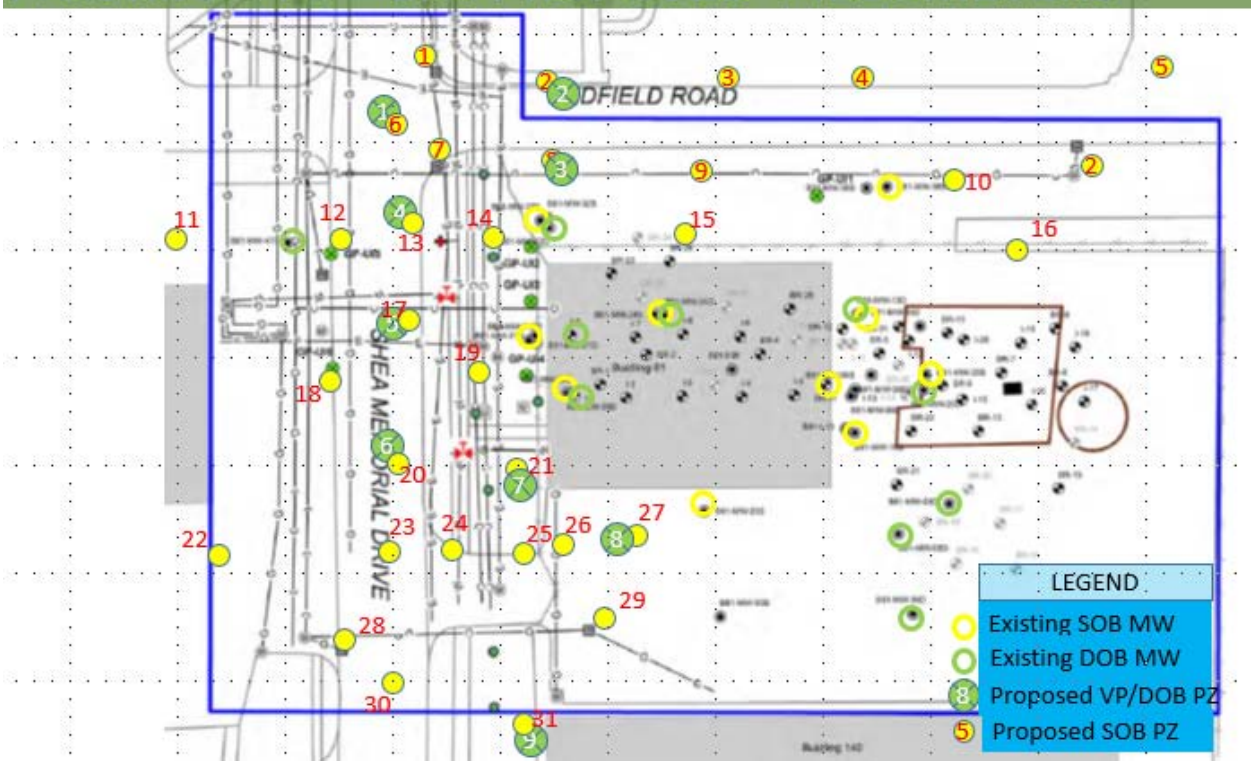


FIGURE EPA 2 - PROPOSED PIEZOMETERS AND UTILITY CORRIDORS