USACE SPRING VALLEY FUDS PROJECT **AGENDA**

Inter-Agency Partners Meeting

TIME	TOPIC	DISCUSSION LEADER	PREPARATION	OBJECTIVE
Thursday, May 31, 2012				**[Upcoming Meetings: June 21st, July 26th (?)]**
9:15 – 9:35	Check-in / Review Ground Rules	S. Hirsh		Introductions of new attendees/ Personal check-in / Review Ground Rules/Lunch planning
9:35-10:05	Glenbrook Road	B. Barber/Parsons		Discuss Draft RAWP
10:05-10:15	Document Tracking Matrix for MMRP/HTW	L. Reeser/ Parsons	Partners Review	Review pending documents
10:15-10:35	Open Issues and New Data	S. Hirsh		
10:35 -10:50	Partners' Parking Lot	S. Hirsh	Partners Review	
10:50-11:00	Agenda Building	S. Hirsh		
11:00	**Adjourn Regular Partners Meeting**	S. Hirsh		
11:00 – 11:10	BREAK		$ to Betsey	
11:10-1:30	Groundwater Meeting	T. Beckwith		Review Sampling Results since November 2011 (quarterly, MP-2, MP-4, MW-44)
	Groundwater (con't.)	T. Beckwith		- Discuss completed anomaly investigations at Kreeger Hall - Review MW-44 drilling effort
…	" "	T. Beckwith		- Review groundwater elevation data
	" "	T. Beckwith		- Discuss MP-2 and MW-44 chemistry data
[12:00]	Working Lunch			
	Groundwater Next Steps	T. Beckwith		- Determine if additional data is needed to complete RI - Determine future groundwater monitoring requirements - Discuss overall status of groundwater study and path forward to Decision Document.
1:30	Adjourn Groundwater Meeting	S. Hirsh		

Spring Valley Groundwater/Partnering Meeting
May 31, 2012
Spring Valley Trailer Conference Room

Name	**Organization/Address**	
Sherri Anderson-Hudgins	CEHNC	**X**
Thomas Bachovchin	ERT	
Brenda Barber	CENAB	**X**
Todd Beckwith	CENAB	**X**
Frank Bochnowicz	CENAB	
Bethany Bridgham	American University	
Jessica Bruland	ERT	**X**
Sean Buckley	Parsons	**X**
Jack Choynowski	Shaw	
Paul Chrostowski	CPF Associates, AU Consultant	**X**
Tom Colozza	CENAB	
Jennifer Conklin	DDOE	
Kathy Davies	US EPA Region 3	**X**
Dr. Peter deFur	Environmental Stewardship Concepts/RAB TAPP Consultant	**X**
Diane Douglas	DDOE	**X**
Bill Eaton	URS	**X**
Brandon Fleming	USGS	**X**
Clem Gaines	CENAB, Public Affairs	**X**
Alma Gates	RAB Member - Horace Mann Rep.	**X**
Steve Hirsh	US EPA Region 3	**X**
Betsey Hutton	ERT- Community Outreach Team	**X**
Leigh Isaac	Environmental Stewardship Concepts	
David King	CENAB	

Carrie Johnston	RCAI - Community Outreach Team	**X**
Neil Jones	ERT	
Brian Junck	Weston	
Dan Noble	CENAB	**X**
Jon Owens	CENAB	
Randall Patrick	Parsons	**X**
Lan Reeser	CENAB	**X**
Mike Rehmert	CENAB	
Paul Rich	Parsons	
Allen Shapiro	USGS	
Jim Sweeney	DDOE	**X**
Fan Wang-Cahill	Parsons	**X**
Ethan Weikel	CENAB	**X**
Nan Wells	ANC3D Commissioner	**X**
Cheryl Webster	CENAB	
Maya Werner	ERT - Community Outreach Team	
Laura Williams	Environmental Stewardship Concepts	
Bruce Whisenant	CEHNC	**X**
Doug Yeskis	USGS	

Summary of May 31 Spring Valley Partnering Meeting

Consensus Decisions

- No consensus decisions were made.

May 31, 2012 Action Items

- USACE will evaluate potential structural monitoring at 4835 Glenbrook Road during the 4825 Glenbrook Road remedial effort, as requested by AU.
- URS will provide the fourth quarterly sampling results in spreadsheet format to the Partners, as requested by P. deFur.
- USACE will prepare a work plan for follow-on groundwater study efforts.

Thursday, May 31, 2012

Check-in

The Partners conducted their normal check-in procedure.

Mary Fox of Johns Hopkins University attended the groundwater portion of the meeting.

A. 4825 Glenbrook Road Work Plan

The goal of this segment of the meeting was to discuss the accelerated schedule guiding the decision-making process and the upcoming remedial action for the 4825 Glenbrook Road site.

USACE-Baltimore and Parsons provided an update on the contents of the draft site-specific 4825 Glenbrook Road Draft Remedial Design and Remedial Action Work Plan.

The draft work plan details presented below are pre-decisional and have not been formally approved to date. This information is not intended for public discussion at this time, and was released to share with the Partners. Some of this information was previously presented at the April 2012 Partnering meeting.

Remediation Goals: Remaining arsenic contamination will be remediated to the Spring Valley cleanup level of 20 mg/kg. Excavation areas across the property will be remediated to achieve a munitions and explosives of concern hazard assessment (MEC HA) ranking of Hazard Level 4, which is defined as low potential explosive hazard conditions.

Specific Remedial Action Objectives: These include preventing direct contact with soil characterized by a non-carcinogenic Hazard Index (HI) exceeding 1 or a cancer risk exceeding $1x10^{-4}$, both of which were derived from the 4825 Glenbrook Road site-specific RI/FS and DD. Additional objectives include removal of recovered chemical warfare materiel (RCWM) and discarded military munitions (DMM) documented as an explosive hazard, to eliminate unacceptable risks or hazards which will allow for unrestricted and unlimited exposure and use of the property. This third objective was reworded to include specific language for reducing MEC-related risks based on feedback from the U.S. Army general counsel.

Purpose: The 4825 Glenbrook Road remedial design and remedial action work plan provides details of planned intrusive activities designed to achieve the remedial objectives.

Scope: The work plan defines the high-probability and low-probability protocols to remove, assess, and dispose of soil and any potential RCWM, laboratory waste, and other suspect AUES-related debris remaining at the site. The work plan also describes the removal and disposal of the property residence and appurtenances, and presents the site restoration approach once all remedial activities are completed. Restoration activities include but are not limited to clean soil backfill, seeding the property, and stabilizing or reinstalling property boundary fences.

Demolition Plan Scope (prepared by a contractor) and Guidelines: The three-story structure will be removed systematically from the top of the structure to the basement slab, where possible, using a track excavator. No demolition will be performed below the slab, and several features that come into contact with soils will not be disturbed: the basement floor, the exterior basement walls, the backyard patio, and the front porch. (These structural features will be removed during the high-probability phase of the remedial effort.) Removal of all structures above the first floor, along with extraneous non-structural basement walls, will be conducted according to guidelines established in the USACE Safety Manual dated 15 September 2008.

These guidelines include building and public space permit applications, most of which have been obtained. The AU permit is pending completion of lease negotiations. Engineering surveys are underway and environmental surveys to document hazards such as asbestos and lead are pending. (The survey results will be submitted to the Partners for review prior to demolition.) Prior to demolition, all utility lines at the property boundary will be disconnected and universal waste streams such as light bulbs will

be removed. All air conditioning units have already been removed and the Freon was collected from a licensed company. The approved work hours will be Monday through Friday, from 8:00 AM to 5:00 PM. Dust will be controlled using wet demo methods, and noise will be within DC regulations. Construction debris will be shipped offsite to an appropriate landfill using roll-offs or demo trailers, and materials including metals, concrete, and brick will be taken offsite to a recycler when there are no associated hazards. Site access will be restricted to authorized personnel and patrolled by a contracted security guard after hours.

Excavation Areas: The site was divided into five excavation areas, reflecting two low-probability areas (A/B) and three high-probability areas (D/E/F) that will be addressed via different intrusive approaches. Area C encompasses the burial pit 3 area where No Further Action (NFA) was approved as this area was previously excavated to bedrock.

Revised Probability Assessment: A revised probability assessment is in preparation to address the probability of encountering MEC within high-probability and low-probability areas at the site. Based on the following timeline of AUES-related items found at Pit 3, USACE does not anticipate finding additional MEC/MD items at the site.

- Between 2007 and 2008, a total of 22 MEC items and 80 MD items were recovered in the original burial Pit 3 location and the first ECS extension.
- Between June 2008 and April 2010, a significant volume of soil was removed from burial Pit 3 extensions during a total of 170 excavation days. Only 1 additional unconfirmed MEC item and 4 additional MD items were recovered. (The MEC item was unfuzed and is considered unconfirmed because the presence of energetic material could not be determined.)
- The most recent item found at the property was co-located with the sewer line restoration effort in January 2011 and was identified as MD.
- No fuzed and fired UXO items have been found at the 4825 Glenbrook Road site to date.

The revised probability assessment concludes that it is unlikely that an additional MEC item will be found at the site, within the remaining high-probability and low-probability soil removal areas. While the probability is considered seldom or remote, it cannot be entirely ruled out. Based on this assessment, the remedial action will proceed with engineering controls for solely chemical components pending review and signature of the revised probability assessment by the USACE-Baltimore Colonel.

Maximum Credible Event (MCE) Definitions: The DOD defines two concentrations (**AEGL-2** and **TEEL-2**) that were evaluated as the MCE for each potential airborne contaminant at the site. The definitions and toxicological end points of both values are the same, but the Temporary Emergency Exposure Limits (TEEL) represents the DOD's temporary value until the chemical is reviewed and approved during the Acute Exposure Guideline Level (AEGL) process. The **AEGL-2** and **TEEL-2** are defined as the airborne concentration (ppm or mg/m^3) of a substance, above which it is predicted that the general population (including susceptible individuals) could experience irreversible or other serious, long-lasting, adverse health effects or an impaired ability to escape in the unlikely event of an unplanned, accidental chemical release.

Protective AEGL/TEEL values were evaluated for a total of four contaminants: lewisite, arsenic trichloride, hydrogen chloride, and phosgene oxide. The AEGL-2 for lewisite is proposed as the MCE (29 meters). This is the most conservative distance that covers all other possible MCE scenarios: the TEEL-2 for arsenic trichloride (29 meters), the AEGL-2 for phosgene oxide (12 meters), and the AEGL-2 for hydrogen chloride (20 meters).

Engineering Control Structure (ECS) Alternatives: Three alternatives were evaluated as possible engineering control structures to be used during high probability excavations. These include evacuation

(without a protective structure), a tent with a chemical agent filtration system (CAFS) (Option 1), and a vapor containment structure (VCS) with a CAFS (Option 2). **ECS Option 1** was recommended because it controls the MCE, does not require site evacuation during the MCE, and accommodates site constraints. The tent with CAFS was successfully used during the 2009-2010 high probability test pit excavations at the site, during which closed laboratory glassware containers containing chemical agent and agent breakdown products were recovered. In contrast, the evacuation alternative only meets the MCE control criteria, and Option 2 (a rigid structure which was used during high probability burial pit 3 investigations) does not accommodate site constraints.

Noise Analysis Objectives, Methodology, Results, and Recommendations: Noise levels from the CAFS and the emergency generator were evaluated to ensure that they will not exceed the District of Columbia's regulatory limit of 60 dBA at the property line during high probability operations. Noise control measures were identified to address any noise volume exceedances.

Baseline noise measurements were completed at the 4825 Glenbrook Road, and the CAFS and generator operations were tested at ECBC for comparison purposes. Computer modeling analyzed possible noise impacts and control measures.

Based on the proposed CAFS and generator configuration, noise levels were below the regulatory limit at the adjacent 4835 Glenbrook Road property boundary. Noise level exceedances at the adjacent 4801 Glenbrook Road property boundary will not impact the house but requires the use of enclosure panels, door supports, and fan silencers to reduce noise levels to acceptable levels at this property boundary. Noise levels will be within DC limits at all property boundaries during the cleanup process.

Noise-generating equipment will be turned off during evenings, weekends, and holidays and other extended breaks. Noise from the emergency generator cannot be abated but the generator will only run for approximately 30 minutes per week, and the potential need to run the generator during lengthy holidays and extended breaks will be determined.

Proposed Technical Approach: Overall activities include constructing and repositioning the protective engineering control structure, excavation of large areas of soil, excavation of remaining small areas of arsenic-contaminated soil, and excavation of AUES-related items remaining in the front yard adjacent to the porch. The basement slab will be removed under high probability protocols followed by soil excavation as necessary to address any potential AUES-related items or contamination present underneath the house footprint.

Site preparations will include abandoning the existing water utility line and rerouting the sewer line via an L-shaped trench in the backyard. Seven low probability test pits in the backyard will be excavated concurrently, including five additional test pits between the property boundary and the Kreeger Music Roadway to ensure any potential AUES-related items in this area have been identified and removed. Other site preparations will include removal of the wooden fence along the 4801 Glenbrook Road property boundary and installation of a temporary green screen fence that allows access along the property line. Slopes and retaining walls along the 4801/4825 Glenbrook Road property boundary will be supported and stabilized using speed shoring, soldier piles, or another approved system.

Soil excavation will be completed in the front yard and the front half of the basement footprint, followed by repositioning the protective structure and excavating the remaining portion of the basement footprint and the back yard, including the retaining wall.

Confirmation sampling is proposed in all excavated areas. Sidewall samples will include surface samples (6 inches bgs or below previous backfill materials) and subsurface samples (6 inches above the excavation floor), along with mid-point samples for all excavations that exceed a depth of 5 feet. Floor samples will be taken once undisturbed saprolite or bedrock is encountered where possible (if there is no refusal from the equipment).

House Integrity Evaluation: An evaluation of the 4835 Glenbrook Road house was completed to prevent structural impacts during the remedial effort, using available engineering drawings and known property elevations and distances. The retaining wall along the 4835/4825 Glenbrook Road property boundary will be removed in 4-foot sections, and soil adjacent to the retaining wall footer will be excavated during retaining wall removal where possible. Structural impacts to the 4835 Glenbrook Road house foundation and slab are not anticipated based on the retaining wall footer situated at the same elevation. Hardscape at the 4835 Glenbrook Road property must also be protected, and A/C systems and utilities (a water line and a sewer line) at the property must be rerouted during Area B soil excavations.

Tentative Document Schedule: An accelerated document review schedule is underway for the following work plan documents. (Details of planned review time frames were provided at the January 2012 Partnering meeting.)

- The Demolition Plan was finalized in February 2012. This document was incorporated into the Site-Specific Work Plan so that both documents can be reviewed concurrently.
- The draft final Chemical Safety Submission (CSS) Annex for Remedial Action is currently under review, with finalization anticipated in July 2012 pending approval of the revised probability assessment.
- The draft Site-Specific Work Plan for Remedial Design and Remedial Action is currently under revision by USACE to incorporate additional Partner comments, with the draft final anticipated in early July 2012 and finalization anticipated by August 2012.

Tentative Remedial Action Schedule: Three phases of remedial action are planned: demolition, the remaining low probability test pits in the back yard including the utility trench, and all planned high probability and low probability soil removal areas.

Preliminary site mobilization activities, such as public space and building permit applications, are underway. House demolition is anticipated to begin in early August 2012, followed by initial low probability efforts in Summer and Fall 2012 (including test pits and trenches, utility rerouting, and site preparations for high probability efforts). High probability soil removal will tentatively begin in late Fall 2012, with completion anticipated in Summer 2013, barring additional delays. The remaining low probability soil removal actions will be conducted in Summer/Fall 2013, followed by site restoration. The remediated property will be returned to AU as early as December 2013.

Tentative Public Outreach Schedule: An informational community meeting will be held prior to house demolition. This community-wide meeting will present the general approach for the demolition process and will be held in July 2012.

Discussion – Pre-Decisional Details of the Draft Remedial Design and Remedial Action Work Plan

AU mentioned that the demolition plan is acceptable to the university, and AU signatures are anticipated pending resolution of remaining site access negotiations. AU is not currently at liberty to discuss these remaining issues.

USACE mentioned that planned safety distances are based on the maximum credible event (MCE) of 1 L lewisite. A maximum fragmentation distance (MFD) was not calculated because encountering additional MEC at the site is considered unlikely.

In response to EPA's inquiry, USACE confirmed that if a munition item is found, the remedial effort will be temporarily suspended and the item's contents will be fully assessed and the results discussed by the project team. If the item contains explosive or chemical fill, then the current engineering controls (including the MCE and MFD) will be re-evaluated.

N. Wells asked whether Glenbrook Road access will be restricted during the demolition effort. USACE replied that the street will be open but there may be limited lane closure. During past site efforts, Glenbrook Road has never been closed or intended for closure.

Discussion – Revised Probability Assessment

In response to AU's inquiry, USACE replied that the revised probability assessment is currently under review by the Partners. This document may be submitted to the USACE chain of command for signatures as early as today (late May 2012), followed by AU review. AU mentioned that the university administration has questions on this topic, and USACE replied that the revised probability assessment can be released to AU pre-decisionally.

USACE clarified that the single MEC item found since June 2008 was recovered during high probability test pit investigations in the front yard (test pits 120 and 134).

Peter deFur inquired about the list of all munition items removed from burial Pit 3 and the surrounding vicinity to date. USACE and Parsons replied that categorized MEC and MD information is available in the site-specific RI report. P. deFur acknowledged this and expressed interest in how the specific hazardous nature of each MEC/MD find is associated with the relationship between time (investigation effort) and the number of finds.

USACE asked EPA and DDOE if either agency would like to share any feedback on the revised probability assessment at this point. EPA replied that there are a few clarification points, such as sampling decisions that were made prior to S. Hirsh's involvement in the project, that he would like to discuss with USACE following the meeting.

Discussion – Remedial Objectives

Parsons noted that the proposed MCE of 1 L lewisite was calculated as 29 meters, which covers all other possible MCE scenarios: the TEEL-2 for arsenic trichloride (29 meters), the AEGL-2 for phosgene oxide (12 meters), and the AEGL-2 for hydrogen chloride (20 meters). Arsenic was also evaluated to ensure that the MCE addresses arsenic risks. This distance is calculated without consideration of the engineering control structures that will be in place to ensure the health and safety of the community.

EPA asked whether the AEGL-1 was evaluated for chemicals of concern. Parsons replied that the temporary TEEL-1 value was evaluated for arsenic trichloride due to the lack of a corresponding AEGL-1 value. Parsons added that the AEGL-2 was the previously proposed and approved value for Spring Valley, and EPA and P. deFur disagreed with this statement.

EPA noted that the use of AEGL-2 is not always the appropriate endpoint. EPA clarified that this decision was made for arsine because this chemical does not have an AEGL-1 or TEEL-1, but these more conservative and protective values should be used for chemical agents when possible to ensure that the general public receives more protection.

USACE mentioned that a "no significant effect" determination was made prior to establishing AEGL values. The AEGL values are essentially "no significant effect" values.

AU noted that they are fine with the use of AEGL-2 values because they have undergone the interagency peer review process, while the use of TEEL-2 values is less acceptable. AU expressed approval for all proposed protective criteria with the exception of the TEEL-2 value used for arsenic trichloride, which is still under evaluation by the university administration due to uncertainties associated with this surrogate value. USACE noted that no AEGL values exist for this chemical, which is why the approved MCE is based on 1 L lewisite under a very conservative scenario of no engineering controls.

USACE emphasized that engineering controls will be used during high probability efforts at the site. Significant findings are not anticipated in low probability areas, which comprise a small percentage of the work at the site, based on assessment of extensive previous test pit investigations and the excavation of the remaining low probability backyard test pits. If any items of concern are found in low probability areas, the remedial effort will be suspended until the protective structure can be repositioned as needed.

In response to EPA's inquiry, Parsons confirmed that an AUES-related bottle containing a trace amount of lewisite was previously recovered during the sewer line relocation in the backyard. This location is encompassed within high probability Area D.

AU asked whether EPA is willing to approve the use of the TEEL-2 to provide the university with a greater degree of comfort. Parsons noted that the DOE's AEGL board approved the use of the TEEL-2. EPA agreed to ask their agency's homeland security personnel for their recommendations, and requested a copy of the work plan presentation as background information to support this inquiry.

In response to N. Wells' inquiry, DDOE replied that their agency does not currently have the researchers or other resources available for reviewing whether TEEL values are acceptable alternatives for AEGL values. EPA added that DDOE continues to review all work plans and project reports. P. deFur and EPA explained that arsenic trichloride is a compound that has only been encountered at a single site and is not a commonly evaluated within environmental toxicology circles.

USACE asked whether the MCE zone will shift based on specific soil removal areas. Parsons replied that under the current MCE scenario, which conservatively assumes that no engineering controls are in place, all potential impacts will be limited to a total of 5 nearby residential properties along with a small portion of the AU campus.

Discussion – ECS Alternatives

USACE mentioned that the rigid VCS structure (evaluated as ECS Option 2) is not the preferred ECS alternative as it is not easily adapted to site topography and provides limited space for personnel and mechanical excavation equipment.

Discussion – Proposed Technical Approach

USACE mentioned that extensive engineering efforts have been conducted to ensure that the neighboring residences are not impacted by demolition and remedial efforts along the property boundaries.

EPA inquired about the site preparation details for setting up engineering controls in the backyard. USACE replied that soil will be leveled and removed under low probability protocols with perimeter air monitoring. Excavated soil will be shipped off-site. Similar leveling efforts were previously completed at the site, and additional leveling is required to prepare the entire engineering controls footprint. USACE confirmed that this area was previously extensively test pitted.

In response to EPA's inquiries, USACE confirmed that confirmation soil samples will be analyzed for chemical parameters. USACE and Parsons explained that removal and 1-foot over excavation of all soil will provide confirmation that potential risks associated with AUES-related glassware and MD items have been addressed. EPA expressed the opinion that 2 feet of over excavation is preferable, based on previous issues with the 1-foot distance used at Lot 18 and at the 4825 Glenbrook Road site. USACE noted that the 2-foot distance will be used in locations where AUES-related glassware is encountered.

In response to EPA's inquiries, USACE confirmed that sidewall confirmation samples will only be necessary in the backyard. Excavation of the front yard will extend to the very shallow Glenbrook Road curb, which is situated less than 2 feet bgs and was probably installed just above saprolite. All hardscape on the property including the front porch walkway will be removed (a traditional sidewalk along the street is not present). Previous soil excavation at the site included the entire side yard south of the house extending to Glenbrook Road, and completed front yard test pits were excavated to saprolite except for TP-120 and TP-134 where AUES-related glassware is still present. All arsenic-contaminated soil in the driveway was removed except for one small exceedance remaining underneath the retaining wall along the 4835/4825 Glenbrook Road property boundary.

In response to Parsons' inquiry, USACE confirmed that the front yard excavation area was extended to include the area between the retaining wall and the Glenbrook Road curb.

N. Wells inquired about the potential for contamination extending onto the neighboring 4835 Glenbrook Road property, considering that the property boundaries were defined after World War I and subsequently would not demarcate AUES contamination. USACE explained that test pits were previously completed throughout the 4835 Glenbrook Road property. Although contamination extending beyond the property boundary is not anticipated, the retaining wall will be removed and confirmation sidewall and floor sampling will be conducted along the property boundary. Approximately 6 to 8 feet of property is situated between the house chimney and the retaining wall. USACE stated their position that all contaminated areas at 4835 Glenbrook Road have been addressed, and AU noted that they do not necessarily agree with this position.

AU asked whether 4835 Glenbrook Road building movements and vibrations can be monitored to ensure that structural damage does not occur (particularly due to the proximity of the chimney), similar to the crack monitoring conducted at the AU campus Public Safety Building. USACE has not evaluated the need for this type of monitoring at this time and will look into this possibility.

Discussion – Public Outreach

USACE emphasized that house demolition is anticipated prior to the start of the AU academic school year in mid-August to minimize disruption to the campus community. Alma Gates, RAB Member, added that Horace Mann Elementary School students will walk past the 4825 Glenbrook Road site on their way to school in the fall.

N. Wells emphasized the community's concerns regarding the anticipated informational community meeting time frame, which conflicts with vacation schedules and other commitments. This topic may require discussion at an ANC meeting in advance of the informational meeting. USACE replied that barring additional schedule delays, the informational community meeting will be scheduled for late July. Community Outreach added that the intended meeting time frame is July, and at this point there do not appear to be schedule issues that would delay the meeting until August.

N. Wells expressed concern that schedule delays may push the meeting into the August time frame, which would be unacceptable, and recommended that USACE commit to holding the meeting before August. USACE noted that the informational meeting cannot be scheduled until the Decision Document is signed (with the final approval and signature anticipated in late June 2012

Discussion – Public Protection

USACE explained that the public protection plan is pending approval of the MCE, which was discussed during today's meeting as a pre-decisional distance for public protection.

In response to EPA's inquiry, Community Outreach confirmed that the five individual homeowners who are potentially impacted by the MCE have been contacted, to be followed by individual or group discussions of the upcoming demolition and remedial efforts. EPA replied that although this does not replace the need for an informational community meeting, discussing this issue with these neighboring homeowners individually makes sense, because it allows them to express their concerns openly and honestly.

Next Steps

USACE will evaluate potential structural monitoring at 4835 Glenbrook Road during the 4825 Glenbrook Road remedial effort, as requested by AU.

B. Groundwater: Evaluation of Fourth Quarterly Sampling Results

URS reviewed perchlorate and arsenic sampling results for the fourth quarterly sampling event.

Quarterly Sampling: The quarterly sampling event was completed in May 2011, August 2011, November 2011, and February 2012 respectively. Approximately 21 groundwater monitoring wells and 14 surface water locations were sampled as part of this event.

(Details of the first and second quarterly sampling results were initially described at the June 2011 and September 2011 Partnering meetings, respectively, followed by discussion at the November 2011 Groundwater/Partnering meeting. Details of the third quarterly sampling results were discussed at the January 2012 Partnering meeting.)

Overall Conclusions: Arsenic and perchlorate concentrations were consistent with levels measured during previous sampling events. No anomalous detections were observed.

During the fourth quarterly sampling event, arsenic concentrations did not exceed the Maximum Contaminant Level (MCL) of 10 μg/L (ppb) in any of the groundwater or surface water sampling locations. Arsenic values of interest that were below the MCL but noticeably above the reporting limit included the Sibley Sump (5 ppb), MW-8 (4.6 ppb), and MW-24 (7.9 ppb).

Perchlorate exceedances of the 15 μg/L (ppb) interim drinking water health advisory level during the fourth quarterly sampling event were limited to the Sibley Sump (24 ppb), PZ-4S (28 ppb) and PZ-4D (39 ppb) on the AU campus near Kreeger Hall. Perchlorate concentrations did not exceed the advisory level in any of the surface water sampling locations. Perchlorate results below the advisory level but above trace concentrations included MW-21 (5.2 ppb), MW-22 (13 ppb), and SW-25 (11 ppb).

In conjunction with previous sampling efforts, these quarterly sampling results provided evidence that arsenic and perchlorate concentrations in Spring Valley groundwater continue to decrease over time. However, contaminant concentrations varied slightly between sampling rounds, as expected. Ultimately, conclusions about trends in groundwater chemistry depend on how the sampling results are interpreted by different agencies and individuals.

Discussion – Quarterly Sampling Results

USACE clarified that the fourth quarterly sampling event was conducted in early February 2012. URS added that a total of four quarterly sampling rounds were completed, each separated by a time frame of three months.

AU mentioned that perchlorate concentrations at PZ-4S have apparently declined over time and plateau. URS concurred with this observation.

URS agreed to provide the fourth quarterly sampling results in spreadsheet format to the Partners, as requested by P. deFur.

Discussion – Seasonal Variation in Quarterly Sampling Results

URS mentioned that seasonal variations in perchlorate and arsenic concentrations were not observed to date, based on the quarterly sampling effort. The current weight of evidence suggests that perchlorate concentrations in Spring Valley groundwater are attenuating over time, based on consistently low and consistently decreasing perchlorate detections from numerous sampling locations in the Spring Valley FUDS. This long-term trend is unrelated to seasonal effects.

In response to DDOE's inquiry, URS replied that statistically valid decreases in perchlorate concentrations with high statistical confidence levels were observed at specific monitoring locations over time, such as MW-25. Apparent decreases in perchlorate concentrations without significant trends were observed at other locations. Statistical techniques cannot be solely applied to the quarterly sampling results due to the small data set containing relatively high data variability.

Next Steps

URS will provide the fourth quarterly sampling results in spreadsheet format to the Partners, as requested by P. deFur.

C. Groundwater: Evaluation of Sampling Results for Recently-Installed Wells

URS reviewed perchlorate and arsenic sampling results for MP-2, MP-4, and MW-44.

MP-2 and MP-4: MP-2 was installed on the 4800 block of Glenbrook Road, across the street from the disposal pit area at the 4825 Glenbrook Road site. MP-4 was installed on the 4900 block of Rockwood Parkway, several hundred feet southwest and down gradient of MP-2. (Details of down-hole geophysics and profiling results and recommendations for FLUTe sampling intervals were described at the November 2011 Groundwater/Partnering meeting.)

Both deep wells were initially sampled in March 2012, followed by resampling of MP-2 in May 2012.

- MP-2 perchlorate detections ranged from 5.8 ppb to 27 ppb across 8 sampling intervals. Arsenic concentrations were fairly uniform and ranged from 7.5 ppb to 15 ppb. These arsenic results were not surprising based on historical arsenic detections in nearby wells, including MW-24/25.
    - All MP-2 intervals were re-sampled in May 2012 to confirm that arsenic detections were associated with groundwater chemistry instead of arsenic temporarily leaching into the groundwater from the FLUTe liners (which previously occurred at MP-3). Confirmation sampling results (7.4 ppb to 18 ppb arsenic and 4.5 ppb to 26 ppb perchlorate) were comparable to the initial sampling results. Arsenic leachate testing confirmed that the blank and ported FLUTe liner materials were non-detect for arsenic, and these FLUTe liners were manufactured from the same lot of material as the liners used at MP-4 (which was non-detect for arsenic).
- MP-4 was non-detect for perchlorate and arsenic in all 9 sampling intervals. These results match non-detect and trace results obtained for MP-3 (which lies down-gradient from MP-4 and serves as a sentinel deep well to assist in determining if the AU perchlorate plume and the Sibley Sump perchlorate plume are connected).

MW-44: MW-44 was installed in March 2012 on the AU campus. This well was originally planned as a multi-port deep well (MP-1). Due to the presence of competent bedrock at a shallower depth than was anticipated, (encountered at approximately 52 feet bgs) and the risk of losing drilling equipment from bedrock caving inward (at approximately 100 feet bgs), MW-44 was screened between 80 to 95 feet bgs (as opposed to 200 feet bgs). This well provides a third discrete sampling interval at this portion of the AU campus: PZ-4S (shallow), PZ-4D (slightly deeper), and MW-44 (deep).

MW-44 was sampled in March 2012.

- MW-44 was non-detect for arsenic, with an elevated perchlorate concentration of 34 ppb. The field duplicate sample was almost identical (33 ppb perchlorate). This concentration is similar to recent perchlorate detections observed nearby at PZ-4S/4D. Based on these results, the AU perchlorate plume appears to extend to a minimum depth of 80 to 95 feet bgs (the MW-44 screened interval depth), and the source of perchlorate detected at MW-44 is not a source of arsenic.

Overall Conclusions: Perchlorate and arsenic sampling results from MP-2, MP-4, and MW-44 were highly reproducible based on initial and field duplicate samples and MP-2 resampling.

Discussion – Drilling and Development of MW-44

URS mentioned that MW-44 was drilled by the same personnel that drilled MP-2 and MP-4, allowing for comparison of well development results.

In response to inquiries from AU and EPA, URS and USACE replied that the 15-foot screened interval depth of MW-44 (80 to 95 feet bgs) is well below the 10-foot screened interval depth of PZ-4D (with a maximum depth of 63 feet). PZ-4D was screened at a soil interface where hollow stem auger refusal

occurred deeper than anticipated, and bedrock material was not encountered in contrast to other AU campus wells where bedrock was encountered at shallow depths. The loose material encountered during MW-44 drilling is not surprising based on the conditions previously observed during PZ-4D development.

In response to P. deFur's inquiry, URS and USACE replied that MW-24 and MW-25 are screened at significantly shallower intervals (approximately 25 feet bgs) compared to PZ-4D.

EPA inquired about potential remaining issues associated with arsenic leachate from the FLUTe liners. USACE clarified that the liner ports are manufactured separately from the liner itself. The blank and ported liners previously installed at MP-3 both contained arsenic, while the tubing and other components did not. No arsenic was detected in the material used to manufacture the liners for MP-2 and MP-4.

EPA noted that well construction may have influenced the arsenic results by inadvertently connecting the discrete sampling intervals and introducing arsenic into other intervals. USACE acknowledged this possibility and stated that connectivity would be addressed later during the presentation.

Discussion – MP-2 Sampling Results

URS confirmed that Packer testing was not conducted at MP-2 or MP-4.

USACE mentioned that perchlorate and arsenic concentrations were slightly lower in the first interval (MP2-1), indicating that the shallowest groundwater chemistry may have been diluted by mixing with water in the overburden soil. URS and USACE agreed that perchlorate concentrations were slightly lower in the shallowest three intervals. USACE questioned whether this represents an actual trend of higher concentrations at depth.

The Partners briefly discussed the similarity of arsenic concentrations across all sampling intervals at MP-2. Arsenic contamination from the FLUTe liners was ruled out based on arsenic leachate testing, non-detect arsenic concentrations at MP-4, and the consistency of arsenic concentrations over time (whereas leaching would decrease over time, resulting in lower arsenic concentrations during re-sampling). Interconnected sampling intervals caused by well construction flaws were ruled out because distinctly different arsenic concentrations were observed at each interval. The second set of sampling results were consistent with the initial results, indicating little if any changes over time or between individual sampling intervals. USACE noted that the similarity of arsenic concentrations can be associated with many factors, including the degree of natural groundwater mixing in highly-fractured bedrock as opposed to isolated groundwater flowing through discrete separate fractures.

URS noted that groundwater flow observations at MP-2 were consistent during the well development and liner installation process. Based on heat pulse flow meter (HPFM) surveys, groundwater enters the borehole and flows upward to the surface under ambient conditions. Higher groundwater pressure at depth was also observed after groundwater flow was sealed by the FLUTe liner. Under ambient conditions, groundwater flows into each sampling interval tube and can only rise as far as the water pressure allows, with higher static water levels measured for deeper sampling intervals. URS explained that higher groundwater pressure at the bottom of the borehole is common in a groundwater discharge area such as Spring Valley, while groundwater in a higher-elevation area tends to flow downward and seep into valleys.

USGS mentioned that the MP-2 and MP-4 boreholes were constructed via the same methodology used at MP-3. Well completion was followed by one day of geophysical tests and installation of the blank FLUTe liner the following day.

USGS inquired about the deep well purging protocol and asked whether it is possible that upward groundwater flow masked the true groundwater chemistry in the shallowest intervals. USACE replied that a different volume of purged water was calculated for each deep well interval to minimize the risk of sampling stagnant water. MP-2 sampling efforts were approximately two months apart, suggesting that the consistent sampling results were accurate, but USGS's concern is valid. It is possible that shallow groundwater concentrations in MP-2 will decrease with time while deeper concentrations will remain

consistent. For example, significant upward groundwater flow in MP-3 caused USACE to question the validity of the initial sampling results due to potential impacts of groundwater mixing.

In response to EPA's inquiries, USACE confirmed that purging groundwater in the sampling tubes is an easy task. The water levels of other sampling intervals can be measured during the purging process to assess whether multiple intervals appear to be interconnected. EPA added that water pressure could also be monitored in locations further from the influence of MP-2.

Discussion – MP-2 Sampling Intervals

The Partners discussed the possibility that MP-2 sampling intervals are interconnected. Based on the geophysical logs, MP-2 intersects with significantly more bedrock fractures compared to the other two deep wells, and there may be a degree of connectivity despite the different groundwater pressures for each interval. Groundwater mixing may occur due to vertically connected bedrock fractures outside of the borehole or due to a weak FLUTe liner seal between sampling intervals. The relatively large gap between sampling intervals MP2-4 and MP2-5 appears to create two separate groundwater flow zones: a deeper interconnected zone with a slightly higher water head, and a shallower interconnected zone with a slightly reduced water head. Alternatively, if an additional sampling port had been installed in that gap, it might show a more continual increase in water pressure with depth, suggesting that connectivity is not divided into shallow and deep zones. If sampling intervals are connected via a highly-fractured bedrock environment, then fewer FLUTe sampling intervals may be sufficient for providing groundwater data in future deep wells.

In response to USGS's inquiry, USACE expressed confidence that the ported FLUTe liner provided a tight seal between sampling intervals, based on the different groundwater pressures at each interval as well as consultations with the manufacturer to address this concern. USACE acknowledged the possibility that sampling intervals separated by smaller gaps may be sealed less tightly.

USACE confirmed that MP-2 sampling intervals can be purged to measure effects on water pressure, as suggested by EPA, and added that it may be difficult to distinguish whether a tight seal is present due to the numerous bedrock fractures that are present.

USACE mentioned that under ambient conditions, the water pressure of each interval decreases with well depth, except for the deepest interval where fewer bedrock fractures are evident. This overall continuous trend may not be expected if each interval receives groundwater from completely separate fractures. Additionally, water pressure in different intervals would likely equilibrate quickly if groundwater was able to bypass the sealed ports due to well construction flaws, and EPA pointed out that under this scenario the water chemistry may not have equilibrated as readily as the water pressure.

URS suggested that small local changes in groundwater table elevation could be connected to deeper groundwater via fractured bedrock, serving as a conduit for high water table pressure and relatively shallow perchlorate contamination to flow downward and into the borehole and then back to the surface. DDOE and EPA added that this scenario is based on the assumptions that the MP-2 sampling results represent valid concentrations and that the sampling intervals are connected.

The Partners also briefly discussed the consistency of MP-2 sampling results between March and May 2012. Well construction flaws are unlikely to have caused higher perchlorate and arsenic concentrations at depth, but it is possible that the overall similarity of concentrations between intervals may have been caused by insufficient purging and upward flow of mixed groundwater.

USACE reemphasized that MP-2 intervals will be repurged to examine changes in water pressure of each sampling interval. If one interval is purged and the water pressure in the other intervals drops to match that of the first interval, this would suggest either a well construction issue or a highly fractured interconnected bedrock environment. A more gradual change in the water pressure of other intervals would likely result from an interconnected network of tiny discrete bedrock fractures. USACE added that fairly low transmissivity is anticipated based on the existing different water pressure heads.

Next Steps

USACE will purge MP-2 sampling intervals to measure effects on water pressure of other sampling intervals and gain insight on whether the intervals are interconnected.

D. Groundwater: Horizontal and Vertical Elevation Data

URS reviewed groundwater table elevation and extrapolated contours in the vicinity of MP-2.

Purpose: URS presented a groundwater table contour map to provide a conceptual view of possible horizontal and vertical groundwater flow patterns in the vicinity of MP-2. Known groundwater elevations were plotted in vertical space and a contour line was drawn to represent these discrete observation points. Linear interpolation was used to fill in gaps between known groundwater elevations. The ground surface and the horizontal and vertical scales in feet were shown without exaggeration.

Overall Groundwater Flow: Spring Valley groundwater generally flows in a southwesterly direction.

Flow Net A-A': Groundwater table contours were shown for a series of monitoring wells extending in a southwesterly direction, from the southern portion of the AU campus and the 4825 Glenbrook Road area to MW-39. These contours appear to shift from vertical upward flow to horizontal seepage that discharges to surface water at East Creek. This interpretation is corroborated by previous perchlorate detections in East Creek.

Flow Net B-B': Groundwater table contours were shown for a series of monitoring wells extending in a northwesterly direction, trending from MW-27 along the eastern side of East Creek to MP-3. These contours appear to discharge to surface water at East Creek. This interpretation is corroborated by previous perchlorate detections in East Creek.

Discussion – Groundwater Contours

The Partners briefly discussed the implications of the groundwater table contours that were inferred from known groundwater elevations. USACE mentioned that a clear trend in groundwater head is not always evident, and complex fracture zones can create different groundwater flow paths that eventually reach similar groundwater table elevations. Groundwater does not always need to travel long horizontal distances to reach different vertical elevations. EPA and P. deFur added that although PZ-4 is located further away from MP-2 compared to other nearby wells, there is still a viable pathway for the shallow perchlorate plume at PZ-4S to provide the source for deeper perchlorate detected at MP-2.

EPA noted that the groundwater chemistry data at MP-2 are not necessarily valid depending on the impacts of groundwater connectivity, and USACE confirmed that they are not making conclusions based on the presented information.

P. deFur asked what type of MP-2 purging data would be required to provide conclusions about groundwater connectivity. EPA replied that removal of sufficient groundwater from one interval to empty another interval would be useful, and USACE added that the rate of water pressure change in shallow intervals would be informative.

DDOE noted the importance of transmissivity in determining the purging volume and time frame. USACE confirmed that transmissivity was estimated for each sampling interval.

DDOE inquired about the possibility of another groundwater source fracture that has not been examined at MP-2. USACE explained that the weight of evidence points toward interconnected sampling intervals due to highly fractured bedrock, based on the large number of fractures detected in the geophysical logs and the decrease in water pressure from deep to shallow intervals. DDOE replied that the sampling intervals would have to include all of the relevant fractures. USACE clarified that there may be a sufficient number of fractures to ensure that the deeper groundwater is still able to flow upwards into shallower areas.

In response to DDOE's inquiry regarding the deep wells, USACE replied that the number of fractures typically decreases with depth, and the geophysical data for MP-2 showed a higher number of fractures compared to MP-3 and MP-4. USACE acknowledged that due to variability in fractured bedrock, MP-2 and MW-44 are not representative of fractured bedrock conditions across the site, but the vicinity of MP-2 appears to contain numerous fractures that may provide a conduit for interconnected groundwater flow.

In response to USGS's inquiry, USACE confirmed that all of the deep wells are installed in the same groundwater formation.

URS mentioned that there is a fairly significant elevation difference between the ground elevation and the groundwater table in the vicinity of MW-25 and MW-26. Just west of MP-2, the inferred water table reaches the ground surface at an approximate elevation of 299 feet, suggesting that the perchlorate plume seeps to the surface and discharges into East Creek in the vicinity of MP-2. Similar groundwater seepage into East Creek appears to occur further west near MP-3.

USACE noted the challenges in determining the groundwater flow path between two known water table elevations. Variables include fracture angles and preferential pathways through connected fractures.

The Partners briefly discussed whether a relatively rapid change in water table elevation (e.g., an increase in groundwater head from 302 feet at MP-2 to 306 feet at a nearby well) could be examined via a chemical tracer or another methodology. Local fracture zones may be connected and provide a preferential pathway that creates higher water pressure. EPA replied that this type of information would be difficult to measure on such a small distance scale and cautioned against projecting these contours back to a potential source of groundwater pressure. The depth of one or more perchlorate plumes (shallow and/or deep plumes) in this area will be difficult to discuss until the validity of MP-2 groundwater chemistry is examined, along with additional well data that provides a more complete three-dimensional picture of groundwater flow.

URS and USACE acknowledged that vertical contour information was derived from limited deep well data, providing a very broad and simplified picture of groundwater flow at a local scale. To date, all deep wells have exhibited upward groundwater flow, suggesting that higher elevations act as groundwater recharge areas while lower elevations provide an upward groundwater gradient.

EPA mentioned three potential scenarios for groundwater plume discharge into MP-2 and East Creek. There may be a shallow perchlorate plume, a deep perchlorate plume, or shallow and deep perchlorate plumes that both discharge to surface water. DDOE added that an undetected perchlorate plume may potentially be located deeper than MP-2.

E. Overall Status of Groundwater Data Quality Objectives

URS briefly reviewed the status of data quality objectives (DQOs) addressed by the groundwater study efforts.

Data Quality Objectives

- Does a portion of the perchlorate plume migrate deeper into the bedrock aquifer? **(Nearly Completed)**
- Do groundwater and surface water arsenic and perchlorate concentrations change seasonally? **(Completed)**
- Is there any connection between the AU perchlorate plume and the plume detected in the vicinity of Sibley Hospital? (**Partially Completed)**
- What is the source of the AU perchlorate plume? **(Inconclusive)**

- What is the potential for human exposure to groundwater and surface water and, if exposure potential exists, what are the associated health risks? **(Pending)**
- Do estimated human health risks indicate a requirement for groundwater remediation? **(Pending)**

Discussion – Status of Data Quality Objectives

URS mentioned that a definitive source of the AU perchlorate plume has not been identified to date, based on extensive investigations completed near the suspected source area. AU added that non-definitive sources have not been identified either. URS acknowledged that elevated perchlorate concentrations in groundwater currently provide the only indication of a perchlorate source in this area.

URS noted that significant seasonal changes in perchlorate and arsenic concentrations were not observed in groundwater or surface water, based on the quarterly sampling results.

Discussion – Groundwater Discharge to East Creek

The Partners briefly discussed how much of the AU perchlorate plume appears to discharge locally to surface water in East Creek. This plume flows southwest toward East Creek and MP-3, and perchlorate was not detected in any MP-3 intervals during multiple sampling rounds. These results indicate that the AU perchlorate plume discharges to surface water before reaching MP-3. Alternatively, the AU perchlorate plume may flow past MP-3 via bedrock fractures that are not connected with this deep well.

URS mentioned that there does not appear to be a connection between the AU perchlorate plume and the plume detected in the vicinity of Sibley Hospital, based on recent sampling results and the plausibility of groundwater discharge into East Creek. EPA expressed concern that groundwater from the AU perchlorate plume may flow deeper than or around MP-3 and resurface in the vicinity of the Sibley Sump, resulting in two connected plumes. EPA reflected on the similar perchlorate concentrations that were recently detected at the Sibley Sump and in the deepest interval of MP-2. USACE acknowledged that although an unknown fraction of the perchlorate plume discharges into the creek, it is possible that another portion of the perchlorate plume travels below the 200-foot depth of MP-3 and resurfaces. Groundwater elevations will be further examined to determine whether re-emergence of the same perchlorate plume at the Sibley Sump is a reasonable scenario.

The Partners briefly discussed perchlorate concentrations previously detected in East Creek, which historically measured as high as 9 ppb. Storm water utilities potentially leak and discharge to the creek, but dilution of perchlorate in creek water is more likely caused by clean subsurface water from overburden soil. Surface water flow in local creeks is not highly dependent on storm water, except for within a day or two of major storm events, because they are primarily recharged by groundwater. For example, low variability in perchlorate concentrations has been observed at SW-11 since 2009.

In response to DDOE's inquiry, URS clarified that the decrease in perchlorate concentrations further downstream is consistent with the addition of more groundwater reaching the surface and diluting the creek water. This decrease is potentially statistically significant. Any downstream increases in perchlorate concentrations would not necessarily be caused by a different perchlorate source. USACE added that an additional surface water sampling location closer to MP-2 may be worthwhile for future sampling.

DDOE expressed the opinion that a larger and more rapid decrease in perchlorate concentrations would be observed along the creek if it was being diluted by clean groundwater, unless significant amounts of groundwater containing perchlorate are surfacing at the creek. URS and USACE noted that the attenuation rate of perchlorate in creek water depends on the volume and locations of groundwater discharge, as well as the dilution by precipitation and associated overland flow. It is possible that most of the groundwater discharge occurs in the headwater portion of the stream.

P. deFur and USACE briefly discussed the option of collecting a series of surface water samples simultaneously along the creek to obtain a more complete profile of perchlorate concentrations. This would be an easy task assuming that the necessary rights-of-entry are granted at the desired locations.

Next Steps

Surface water sampling in East Creek will be planned to obtain a more complete profile of perchlorate concentrations.

E. Overall Status of Groundwater Study and Path Forward to Decision Document

URS briefly reviewed additional proposed groundwater study efforts.

Additional Deep Well: Installation of an additional deep well near Kreeger Hall on the AU campus is proposed. This well would be constructed close to MW-44 to assess bedrock and groundwater flow conditions between 100 feet and 200 feet bgs. (This depth range lies between the maximum depth of MW-44 and the maximum depth of the existing deep wells, respectively). A small number of well intervals will be screened in lieu of FLUTe sampling.

MP-2: Potential connectivity between sampling intervals at MP-2 will be examined via follow-up purging and resampling.

Semi-annual sampling: Future groundwater and surface water monitoring will continue to focus on arsenic and perchlorate as the parameters of interest. Semi-annual sampling is proposed at a selected number of existing groundwater monitoring wells and surface water locations, as well as the proposed new deep well, based on the results of the quarterly sampling effort. Surface water samples in East Creek are also planned to assess perchlorate concentrations.

RI Report: Development of the groundwater Remedial Investigation (RI) report will include a groundwater human health risk assessment (HHRA). The focused Feasibility Study (FS) report, Proposed Plan (PP), and Decision Document (DD) will be incorporated into the Site-Wide FS, PP, and DD.

Tentative Schedule: The additional deep well may be installed as early as July/August 2012. A white paper focused on the groundwater RI report will be prepared during Summer 2012, followed by preparation of the draft final RI report in December 2012 and the final RI report in March 2013.

Discussion – Tentative Schedule

USACE noted that the tentative conceptual schedule for the RI/FS/PP/DD documents represents an aggressive time frame, based on the groundwater study questions discussed at today's meeting.

Discussion – Follow-on Groundwater Efforts

USACE mentioned that a Sibley Sump sample for isotopic perchlorate analysis was collected. Analytical results are anticipated in late July 2012. (Details of this effort were described at various prior Partnering meetings.) EPA and USACE added that this information may be helpful in answering questions about the perchlorate source.

EPA clarified that the USACE's suggestions for future groundwater monitoring, including specific wells identified for sampling, will be detailed in a work plan and reviewed by the Partners. Consensus decisions are not requested during the current meeting. USACE added that this abbreviated work plan will outline all proposed upcoming groundwater efforts, including the additional planned deep monitoring well, purging and re-sampling of MP-2, and collecting surface water stream samples.

EPA suggested that the consensus Partners hold a conference call in Summer 2012 to address the remaining agenda issues (document tracking, open issues and new data, and the Partner's Parking Lot).

Discussion – Additional Deep Well

In response to AU's inquiries, URS and USACE confirmed that the additional planned deep groundwater monitoring well will be installed in front of Kreeger Hall on AU's campus, as close to MW-44 as possible. Active well construction will require a time frame of approximately two to three days.

In response to DDOE's inquiries, USACE clarified that the deep well will not consist of an open borehole. The well casing will be installed to a depth of 100 feet, followed by drilling and well development to a depth of 200 feet during the first day. Geophysical tests will be conducted on the following day. Based on the results, two intervals will be selected for screening and sampling within the 100 to 200 ft depth range. These proposed nested screening intervals will be discussed with the Partners the following day to obtain concurrence, similar to groundwater meetings held in the past. No more than two or three screened intervals are permitted by general well installation regulations.

USACE explained that based on geological conditions observed at MW-44, bedrock will likely be encountered at a shallower depth than 100 feet bgs. The primary concern is the bedrock competency below 100 feet bgs. At MW-44, the drilling equipment could not advance deeper than 100 feet due to rapidly falling and collapsing bedrock material.

In response to USGS's inquiry, drilling water will contain a fluoride-bromide tracer, similar to the tracer used at MP-3, and purged groundwater will be pumped out of rubber-sealed sampling intervals.

In response to EPA's inquiry, USACE clarified that well development will be targeted by zone, using air rotary drilling that forces water, cuttings, and air out of the borehole top. If the well is not developed, fractures may become plugged with air and mixed groundwater, which would then require additional efforts to equilibrate each affected fracture. EPA expressed the opinion that early well development may have caused issues at existing deep wells, and expressed their preference for using packer testing to isolate and pump groundwater from specific intervals.

DDOE expressed concerns regarding the risk of deep aquifer perchlorate contamination flowing up or down the borehole and contaminating other fractures within the same screened interval. EPA mentioned that the screened intervals may span 10 or 20 feet, and closely-spaced fractures within these intervals would likely be interconnected. USACE explained that the proposed well development process is considered just as protective as for the previous deep wells, as the borehole will not be open any longer. The amount of information gained from this process will match that of other deep wells, with the exception of FLUTe liner transmissivity data.

The Partners briefly discussed whether installation of a blank FLUTe liner is necessary, as suggested by DDOE. USACE noted that if the geophysical results show that three discrete intervals are insufficient, then a blank FLUTe liner can be ordered and installed within three days. Pre-manufacturing a blank liner for a depth of 200 feet would be a costly contingency plan, considering that the borehole will be open for a very short time frame, relatively small and low-transmissivity fractures are anticipated at depth, and no more than three deep well sampling intervals have been selected below 100 feet bgs to date.

In response to DDOE's inquiries, USACE replied that work plan development, the drilling contract, and the well installation time frame would ideally be completed during Summer 2012 prior to the AU campus academic semester. Protective contingencies will be established to ensure that the borehole is not left open due to unforeseen circumstances, with the worst case of filling the entire well with acceptable material.

EPA suggested that groundwater could also be pumped from the borehole as a contingency until the well can be screened or a liner can be installed. DDOE noted several issues that would have to be resolved. USACE and EPA replied that heat pulse flow meter (HPFM) results would provide the necessary groundwater flow rates to calculate the volume of water to pump out of the borehole, and the pumped groundwater can be containerized in the back of a truck. Based on very low flow rates under ambient conditions in existing deep wells (up to 0.1 gpm), only a few thousand gallons of pumped groundwater over a few days would be anticipated. Very low flow rates would be expected from intervals below 100 feet bgs, and the drilling process would not have continued if a large fracture was unexpectedly encountered.

DDOE expressed the opinion that excluding the use of a blank FLUTe liner does not appear to be protective. USACE clarified that a blank liner was installed in existing deep wells for the purpose of sealing the borehole for a couple of months while the specific ported FLUTe liner intervals were

discussed, chosen, and manufactured. The new deep well will consist of an open borehole for a couple of days while Partner decisions are made. EPA added that the number of well screens will be decided immediately and installed the following day, unless a larger number of intervals are necessary, in which case a blank liner will be manufactured and installed while the FLUTe liner intervals are selected.

USACE emphasized that the advantage of a ported FLUTe liner is that multiple intervals can be sampled quickly despite time frame limitations and property access restraints. In this case, installing a traditional screened deep well makes sense because very few (one to three) sampling intervals are anticipated based on the bedrock geology of existing deep wells, where only one or two intervals of interest were identified below 100 feet bgs. If more than a couple of fracture zones are identified by geophysical tests, then a blank FLUTe liner can be installed until the Partners have the opportunity to reconsider the planned sampling methodology.

DDOE noted that the relatively short planning time frame may impact the Partners' ability to make timely decisions regarding the new deep well, due to schedule constraints. USACE clarified that the details can be planned in advance. The technical details of well drilling, installation, and geophysical tests match the protocol used at other deep wells. The only difference is that upon review of geophysical data, the Partners will decide whether to construct a couple of screened intervals the following day or install a blank FLUTe liner after the three-day manufacturing and shipping time frame.

Discussion – Purging MP-2

EPA emphasized the need to purge MP-2 with the goal of examining the impacts of FLUTe sampling interval placement on the groundwater chemistry results. This effort may show that two or more intervals were interconnected and that the data were inaccurately attributed to discrete sampling intervals. It is possible that a smaller number of FLUTe sampling intervals would have been sufficient at MP-2.

USACE mentioned that the purging and resampling results may lead to additional questions regarding the groundwater chemistry and connectivity of sampling intervals at MP-2. These results will also provide valuable information for the groundwater RI report.

EPA added that depending on these results, another new monitoring well down-gradient of MP-2 and East Creek may be valuable for assessing whether the two perchlorate plumes are connected.

Discussion – Semi-Annual Sampling

USACE agreed with EPA's request to conduct semi-annual sampling in the spring and fall time frames to ensure that impacts of extreme weather conditions are accounted for.

EPA asked whether groundwater RI decisions will be made based on existing deep well sampling data. Each deep well has been sampled once to date, and at least two more deep well sampling efforts are preferred prior to assessing groundwater risks in the draft RI report (particularly at MP-4). USACE agreed that additional deep well sampling is necessary.

In response to EPA's inquiry, USACE replied that wells discontinued from sampling will not be abandoned but will not be proposed for sampling during the next couple of years.

Discussion – Nature and Extent of Perchlorate Plumes

DDOE asked whether the Partners feel that they understand the nature and extent of perchlorate and arsenic plumes in Spring Valley, based on the information available to date. USACE replied that additional groundwater data will be collected to provide an even more comprehensive picture.

In response to DDOE's inquiries, USACE and URS confirmed that perchlorate concentrations at MW-44 and PZ-4D were almost identical and are presumably derived from the same source. PZ-4D is situated slightly upgradient and approximately 20 feet away from MW-44. Groundwater flows from PZ-4D in a southwesterly direction toward MW-44.

DDOE inquired about attempts to identify the AU campus perchlorate source and mentioned the possibility of detecting a future spike in perchlorate concentrations. USACE replied that no specific perchlorate sources were identified during the perchlorate source investigation or the co-located geophysical investigation, despite the relatively high perchlorate concentrations detected in the vicinity of PZ-4S. A vegetated 15-foot by 15-foot area in the vicinity of Kreeger Hall was inaccessible for geophysical surveys and well drilling, and horizontal drilling in this area is not planned.

USACE clarified that the initial PZ-4S perchlorate concentration of 71 ppb spiked to the highest recorded detection to date of 147 ppm, then declined over time and leveled off at the current elevated perchlorate concentration.

AU discouraged the idea of further perchlorate source investigations in the vicinity of Kreeger Hall. Although the proposed additional deep well is a reasonable and useful effort, further pursuit of the perchlorate source is unlikely to yield valuable results. It appears that a discrete perchlorate source is not present. The current goal is to delineate the perchlorate aqueous area boundary and ensure that planned efforts (such as the new deep well) will not interfere with AU campus activities.

DDOE asked whether it is acceptable to detect evidence of a perchlorate source that presumably originated a century ago and conclude that the source cannot be located. USACE replied that if perchlorate had historically spilled on the ground surface and was retained within clay zones of the confining overburden soil, it could have been released during a major storm event, creating an untraceable perchlorate plume. Most of the soil in this area is not saturated, and perchlorate would not necessarily quickly wash from shallow overburden into the groundwater without assistance from extreme weather.

USACE emphasized that the perchlorate plume may not have originated from a specific point source. Other possibilities include the use of road flares. The general age and source of the perchlorate at PZ-4 and MW-44 may be identified by the pending isotopic analysis results. AU clarified that isotopic analysis will not distinguish between specific man-made sources, such as a historical AUES propellant and recent road flare use. Perchlorate may have been deposited in soil or groundwater at any point since 1918, and it was not a widely-used material. It is possible that a chemist poured a beaker full of perchlorate into the soil outside of Kreeger Hall.

USACE added that the perchlorate levels detected in groundwater are feasible even if they originated many years ago. The perchlorate plume is a relatively localized contamination area with an unknown source, compared to pervasive and widely dispersed contaminants such as arsenic in soil with a known AUES-related source and use. Overall, the nature and extent of perchlorate is more important than the identity of the original perchlorate source for managing groundwater resources.

DDOE questioned whether a couple of deep monitoring wells are sufficient for determining the nature and extent of the AU campus perchlorate plume in groundwater. USACE clarified that the perchlorate plume has been delineated and bounded by several shallow, deep, and temporary wells.

Next Steps

USACE will prepare a work plan for follow-on groundwater study efforts.

G. Document Tracking Matrix for Hazardous Toxic Waste (HTW) and Military Munitions Response Program (MMRP)

The goal of this segment of the meeting was to review the comment due dates on HTW and MMRP draft reports and the status of the documents.

The Partners will briefly review the status of several documents at the next meeting.

H. Open Issues and New Data

The goal of this segment of the meeting was to share issues not on the agenda for possible placement on a future agenda and to share new data that became available since the last Partnering meeting.

No open issues or new data were presented.

I. Partner's Parking Lot

The goal of this segment of the meeting was to review and update the Parking Lot list.

The "Partners Parking Lot" is an informal list designed to assist the Partners in tracking ideas, collaborations, research and tasks. The list is not a formal document specifying actions that must be taken.

The list was not discussed due to time constrains, and will be reviewed at the next meeting.

J. Agenda Building

The next meeting is scheduled for Tuesday, July 17, 2012.

K. Adjourn

The meeting was adjourned at 1:29 PM.