FORMER NAVAL AIR STATION MOFFETT FIELD
RESTORATION ADVISORY BOARD MEETING
MAY 11, 2017

NOTE: An acronym list is provided on the last page.

Subject: RESTORATION ADVISORY BOARD MEETING MINUTES

The Restoration Advisory Board (RAB) meeting for Former Naval Air Station (NAS) Moffett Field was held on Thursday, May 11, 2017, at the Senior Center in Mountain View, California.

Community RAB Members in attendance:

Gabriel Diaconescu, Rebecca Kohn, Libby Lucas, Diane Minasian, Bob Moss, Lenny Siegel, Peter Strauss, Greg Unangst, Dan Wallace, and Steve Williams

Regulatory Agency and Navy RAB Members in attendance:

Alana Lee and Jackie Lane (U.S. Environmental Protection Agency [EPA]), Jim Sullivan (Navy)

Other Navy, Regulatory Agency, National Aeronautics and Space Administration (NASA), Planetary Ventures (PV), City, and Consultant Representatives in attendance:

Genika Brown (63rd Regional Support Command, Army Reserve), Don Chuck (NASA), Wilson Doctor (Navy), Amy Estey (Chicago Bridge and Iron [CB&I]), Kimberly Finch (NASA), John Freeman (Intrinsyx/NASA), Rachael Hess (Gilbane), Carolyn Hunter (Tetra Tech), Lucrina Jones (EPA), Beth Kercher (Helios), Anthony LaMarca (PV), Jackie Lane (EPA), Dan Lohr (CES JV), Lisa Matichak (City of Mountain View), Nihal Oztek (PV), Luis Rivero (NOREAS), Mark Roberts (Kemron), George Sloup (NASA), and Michael Yurovsky (CB&I)

Other Community Members and Agency Representatives in attendance:
Perry Palmer (Chair, Mountain View Homeowners Association)

WELCOME

Jim Sullivan (Navy RAB Co-chair) and Greg Unangst (Community RAB Co-chair) opened the meeting at 7:00 p.m. and welcomed everyone in attendance. Mr. Sullivan reviewed the RAB agenda and asked for any additional topics. Mr. Sullivan reorganized the agenda so the NASA and PV presentations were consecutive.

- RAB member Bob Moss asked if the group would be approving the RAB application submitted for consideration of Jane Horton's membership. Mr. Unangst said that Ms. Horton was not present at the meeting; therefore, the RAB postponed the application vote until Ms. Horton attended.

APPROVAL OF MEETING MINUTES

Mr. Sullivan asked for corrections to or comments on the draft minutes for the November 10, 2016, RAB meeting. Minor editorial changes were submitted to the Navy for the November 10, 2016, RAB meeting minutes. With the noted revisions incorporated into the Draft RAB meeting minutes for November 10, 2016, they can be finalized.

NAVY ANNOUNCEMENTS

Mr. Sullivan announced Navy Remedial Project Manager Steve Hall is leaving the Navy project team. A new Navy team member will be identified to manage Mr. Hall's projects, including Site 28 Traffic Island and Site 26, including Hangars 2 and 3.

Mr. Sullivan distributed a document sign-up sheet for RAB members to request copies of upcoming deliverables; see table below.

Document Sign-Up Table

	DOCUMENT	APPROXIMATE SUBMITTAL DATE
1.	Hangars 2 and 3, Draft Site Investigation	July 2017
2.	Site 28, Draft 2017 Vapor Intrusion Air Sampling Results	July 2017
3.	Site 28, Final Remedial Design, Remedial Action Work Plan	July 2017
4.	Site 26 Eastside Aquifer Treatment System (EATS) Final Technical Memorandum for Pre-Design Investigation	August 2017
5.	Site 26 Final Remedial Design Remedial Action Work Plan (RD/RAWP)	August 2017
6.	Site 14 South, Final 2016 Annual Report	August 2017

RAB COMMUNITY CO-CHAIR UPDATE

Mr. Unangst prepared a brief presentation on the history of the Moffett RAB. He explained the RAB was formed in 1994, initially with meetings every month. Beginning in 2006, RAB meetings began to meet every other month, beginning in 2012 meetings were held every quarter, and since 2016 meetings are held twice a year. The decrease in meeting frequency corresponds to the Navy transitioning the operations and maintenance of sites to NASA. As time has passed, the Navy's presence on the base has diminished. He noted the RAB charter for former NAS Moffett Field has not been updated since 1995. Mr. Unangst explained the mission of the RAB and its benefit to the Navy, stakeholders, and surrounding community.

Mr. Unangst reviewed current environmental projects ongoing at Moffett Field and the Moffett area. He said nine community RAB members held a strategy meeting in April 2017 to discuss ways the RAB could move forward to continue outreach on the various programs of interest to the surrounding community. The RAB discussed the possibility of combining with Middlefield Ellis and Whisman (MEW) community group but agreed to keep the RAB meetings separate. The RAB is also considering joining already established EPA-led community meetings and inviting others to provide updates. Mr. Unangst said the RAB members also discussed the possibility of involving local universities in RAB participation, expanding community outreach to include local tenant agencies, responsible parties, and residents, and updating the RAB Charter. Mr. Unangst said there is a similar community group in Tucson, Arizona that was a RAB who had multiple agencies contributing resources and updates that may be an example for former NAS Moffett Field to consider.

The RAB members discussed various models for community involvement groups that could be applied to Moffett Field. RAB member Peter Strauss asked who pays for the RAB in Tucson, Arizona. Mr. Unangst replied that EPA runs the meetings; the cost of remediation is spread across the responsible parties. Jackie Lane (EPA Community Involvement Coordinator) agreed that EPA Region 9 supports the meetings for the Tucson RAB.

- Mr. Moss asked about the process for revising the RAB Charter and how long it will take. Mr. Unangst said that the community RAB members must first decide the future of their mission. There is a mechanism in the current RAB Charter for amendments or revision that needs to be followed.
- RAB member Lenny Siegel asked about the basis for not wanting to combine the RAB with the MEW community group. Mr. Unangst said that there were differences in meeting style – the MEW mechanism of *ad hoc* meetings is sufficient for that community.
- City of Mountain View representative Lisa Matichak said the meeting schedule depends which side of Whisman Road is involved. Her understanding is the commercial owners on the east side of Whisman Road hold regular meetings with the EPA. She said the residential owners on the west side also have regular communication with EPA. The residential owners meet on other topics but will meet with EPA when needed. Alana Lee (EPA RPM) said there are separate meetings with the commercial property owners; some are standing meetings, some are responsible party-only meetings, and some are community meetings that are open to the public. The commercial owner and responsible party meetings are not open to the public. Ms. Lee said the community meetings are held as needed when information is available to share with the public.
- Mr. Strauss asked if EPA holds an annual technical meeting for the MEW public. Ms. Lee said EPA does not; the MEW has all-party (responsible party only) meetings are technical meetings, but are not open to the public and are on an as-needed basis. Mr. Strauss confirmed there are three separate EPA/MEW meetings: commercial, responsible party, and public, and Ms. Matichak advised not to include the RAB into a bigger community advisory meeting. Mr. Unangst agreed but would like some involvement in the MEW meetings and to invite RAB members to those meetings.

Mr. Unangst said the RAB can structure as a non-profit and under EPA if resources are available. He said there are several different directions the RAB can take and they should have a path forward in the next few months.

NAVY UPDATE

Mr. Sullivan announced the Navy believes it is time to adjourn the former NAS Moffett Field RAB. He explained the Navy RAB is defined by the Code of Federal Regulations (CFR) 32 Part 202 (RAB Rule). He said the RAB is codified as an advisory board to the Navy for the Navy's environmental program. Mr. Sullivan said the Navy's two main reasons for adjourning the former NAS Moffett Field RAB are:

- The Navy's environmental program is mature. This maturity is a credit to all who have participated in the process (Regulatory Agencies, RAB Community Members, Navy and others) to reaching this point.

- Other community interests at Moffett Field have been brought into the RAB meetings that are not part of the Navy program nor can be defined as advisory to the Navy's programs or operations.

The adjournment of the Navy RAB does not preclude other forums from being established or evolving; it only means that the Navy RAB would be adjourned. He said there is a specified process for adjournment in the RAB Rule, which begins with consultation with the Regulatory Agencies, RAB, and other community stakeholders. He said the Navy marks May 11, 2017, as the beginning of that process. The Navy discussed the RAB adjournment with the Regulatory Agencies during an earlier meeting on the date of this RAB meeting. The Navy is seeking comments from the RAB and the community on the adjournment proposal over the next 30 days (by June 15, 2017). Comments can be sent by e-mail or postal letter to Mr. Sullivan for consideration. The Navy will evaluate the comments received and render a decision based on the evaluation. He said RAB adjournment is an evolution of the good work done over the last 23 years by the Moffett Field stakeholders.

Questions and discussion followed regarding the lack of any announcement of this Navy proposal prior to the RAB meeting and not having it specified as an agenda item with time allotted, which negatively affected the time available for other planned agenda items at this meeting. RAB members also noted the lack of any alternative forum for Navy issues, and that RAB meetings should continue until there is another suitable forum. RAB members also asked that the Navy clarify the RAB Rule criteria that is being used for proposing the RAB adjournment.

A motion was made and passed requesting that the Navy not take any action on RAB adjournment until after the next RAB meeting, scheduled in November 2017.

- Mr. Strauss said this meeting is the only forum to talk about Navy issues. Until the community RAB members make a change, the Navy RAB should be retained. He added the Navy still has projects ongoing that are a concern to the community and he hoped the regulators, Mr. Unangst, and others can work to identify a different forum.
- Mr. Unangst asked for clarification for Navy involvement at Moffett Field and any future forum. Mr. Sullivan said the Navy would still provide updates as requested in public forums and community outreach as specified by the regulatory agencies under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) program.
- Mr. Siegel read from the RAB rule and noted five situations where the RAB may be dissolved. He asked which of the five qualify for Moffett RAB dissolution. Mr. Sullivan said the RAB rule allows for interpretation by the base commander.
- Mr. Siegel read the five reasons and said that to adequately comment on dissolution he needed to know how the Navy's current situation qualifies to adjourn the RAB. Mr. Siegel said he agreed that the Navy's role has diminished but he did not agree that the RAB should be dissolved until another forum is in place.
- RAB member Steve Williams said he agreed with Mr. Siegel's request for more information on the Navy's interpretation of the RAB rule. He said that this announcement was news that was not on the agenda. He asked if this Navy decision was

sudden and could not be included on the RAB agenda and asked what the Navy was seeking with the announcement at this meeting. Mr. Sullivan said the Navy had begun the adjournment process with this announcement and was seeking community comments over the next 30 days. Mr. Williams acknowledged the Navy's intent but questioned the timing of the announcement, without agenda notice, and pointed out the next RAB meeting is not scheduled for another 6 months. He explained the meeting was now behind schedule and the RAB adjournment issue should be further discussed. He asked that an explanation be provided later because of time constraints.

- Mr. Moss agreed with the RAB member's concerns and said that it was essential that the community is informed and involved, which means having an active organization like the RAB. The community has a right to be informed, to come to meetings, address and be aware of issues, provide feedback, and not be abandoned. Mr. Sullivan agreed and said that the Navy will continue to provide community outreach separate from the RAB.
- Mr. Williams requested confirmation that the Navy has announced an official action during the meeting that has a 30-day deadline for public comments and this is the first notification of the action. He asked for clarification that this announcement was a formal action that needs RAB attention. Mr. Sullivan agreed that it was an official action.
- Mr. Williams said he wanted it on record that this formal Navy action was in process without previous consultation with the RAB and that it was not on the agenda. Mr. Sullivan said the Navy was making the announcement and seeking public feedback. Mr. Williams said in 30 days the Navy will make a decision even though this was the RAB's first and only opportunity to be involved in the process. Mr. Sullivan said the Navy will accept the comments and then there would be a period afterwards, during which the comments will be evaluated.
- Ms. Lee said the EPA agrees that the RAB had not been properly notified and suggested an extension of the 30-day comment period, with written notification of formal action and the start of a comment period sent out to all RAB members and community. The written notification should also provide the Navy's rationale for RAB adjournment.
- Ms. Lane said the RAB should ask for a formal extension if the Navy will not consider the EPA suggestion. Mr. Sullivan said the Navy will take the EPA suggestions into consideration.
- Mr. Williams requested the Navy's action to adjourn the RAB be tabled. He said the RAB will not have another opportunity to be involved in the decision for dissolution until the next meeting in November 2017.
- Mr. Unangst agreed the process to adjourn the RAB should slow down and provide the community proper time to get a new meeting format in place.
- RAB member Rebecca Kohn made a motion for the comment period to be extended to six months. Mr. Sullivan said the RAB can make a motion, but the decision will ultimately be the Navy's. Mr. Sullivan said the Navy would provide additional information to the RAB later, though he cannot commit to anything at this time. He said that good information has been shared but the Navy will need to take it under consideration.

- Mr. Siegel commented that there are some people in the federal government who think the rules of the federal government do not apply, and then their decisions do not hold up. The adjournment process must be done using the steps outlined in the RAB rule. If the Navy goes against the RAB rule, actions can be taken to reverse it.
- Mr. Siegel made a motion that the RAB formally requests the Navy not take any action on RAB adjournment until after the next RAB meeting, scheduled in November 2017. He noted the Navy can opt to ignore the RAB's request but would be in violation of the RAB rule.

SITE 26 REMEDIAL ACTION UPDATE

Rachael Hess (Gilbane) provided an update on the Site 26 remedial action (RA). She said the purpose of the RA is to reduce six chlorinated hydrocarbon chemicals of concern (COC) in shallow groundwater to below the remedial action objectives (RAOs).

Site 26 is located in the northeastern portion of former NAS Moffett Field, within Operable Unit (OU) 5. Prior activities at Site 26 include Hangars 2 and 3, former industrial wastewater holding ponds, underground storage tanks (USTs), and the runway apron.

The site consists of two VOC plumes (southern and northern) in the upper portion of the shallow A aquifer – 8 to 35 feet below ground surface (bgs).

Field work in the treatment areas is planned to start in late fall 2017, pending work plan approval. Water level measurements from Site 26 groundwater monitoring wells will be collected in September 2017. The long-term monitoring (LTM) program will start after RA is complete in the treatment areas.

RA in three treatment areas includes installation of additional monitoring wells and baseline monitoring of selected wells in the treatment areas, bioremediation by injection of emulsified vegetable oil (EVO) and augmentations with microorganisms, and performance monitoring during the process. The process will provide a carbon source and help establish a reducing environment to enhance biodegradation of COCs. The bioremediation amendments (EVO and microorganisms) will be introduced into the aquifer using direct push techniques (DPT). The RA in the treatment areas will require approximately 89 injection points, almost 40,000 pounds of EVO, approximately 72 liters of microorganisms, and 45,000 gallons of water. Groundwater will be obtained from nearby extraction wells or hydrants as needed. Ms. Hess explained the proposed injection area layouts on site figures.

The proposed EVO reagent is small, droplet-sized EVO or equivalent and the microbial culture will be a *Dehalococcoides mccartyl* high density culture that will be added to the EVO tank immediately before injection. The plan is to start injections near the monitoring wells to allow for real-time monitoring of the effects of the injection and to evaluate the effectiveness of the radius of influence during injection. The idea is to monitor the chemical pressures and parameters to observe if there are changes in water quality parameters (pH, dissolved oxygen, and oxygen reduction potential) that would identify a positive effect. Areas B1 and B2 have fine-grained sediments so the team will be looking for potential daylighting of fluids during injection. Various tools and techniques will be used to optimize injection in those areas, which could include varying from single depth injections or injecting from bottom up to top down, depending on site conditions during treatment. Also, treatment in the Areas B1 and B2 where vinyl chloride is the COC may emphasize injection of beneficial microorganisms to help with the

reducing environment. The objective of LTM is to demonstrate natural attenuation is occurring. LTM will start after RA injection is complete. LTM will be considered complete after monitoring shows COC concentrations remain below RAOs.

Site access to the three treatment areas is being coordinated with NASA and tenants so as to not disrupt tenants' operations. Access to the B1 and B2 treatment areas will be coordinated with Google bus parking schedules. Potential access limitations to Areas B1 and B2 may also be encountered because of the burrowing owls. Work areas will be optimized to reduce the footprint of the field work area.

- Mr. Strauss commented that the agenda topic included Site 26 RA and Hangars 2 and 3 remedial investigation; he asked if the hangars are included in this presentation. Mr. Sullivan reported that the Navy is planning the Hangars 2 and 3 investigation and is currently contracting for the work. The Navy and regulatory agencies are in discussions on the scope of work. The Navy expects to submit a draft work plan in summer 2017 for comment. The proposed schedule begins the investigation field work in fall 2017 in conjunction with other work in the Site 26 area.
- Mr. Siegel asked (based on work conducted so far at Site 26) if the Navy has a sense of the contamination that is present at Hangars 2 and 3, and if there is a distinct plume or if the contamination is an extension of Site 26. Mr. Sullivan said that the type and extent of contamination will be evaluated during the Hangars 2 and 3 investigation. The Navy has a conceptual model that the contamination may be related to the existing Site 26 plume; however, the sampling planned during the Hangars 2 and 3 investigation will delineate where the source or sources are located.
- Mr. Siegel asked if the Hangar 3 structure poses any investigation obstacles. Mr. Sullivan said the Navy and contractor held a site walk before the RAB meeting and that the observed site conditions can be managed.
- Don Chuck (NASA) asked if the Site 26 remediation and Hangars 2 and 3 investigation would be conducted simultaneously. Mr. Sullivan said the work would be conducted in parallel. Mr. Chuck commented that the Hangars 2 and 3 should be evaluated before Site 26 remediation begins since the Hangars could be a source for Site 26, and the Site 26 remediation could change course based on the investigation of Hangars 2 and 3. Mr. Sullivan said the Navy has an option for Site 26 to expand the work if needed and adapt to new site conditions.
- Mr. Siegel commented that Site 26 includes part of the hangars and asked if NASA is concerned with indoor air and vapor intrusion for the hangar areas south of the Site 26 boundary. Mr. Chuck said NASA's concern arose after PV found soil gas issues and the expectation of a continuing source to groundwater contamination that the Site 26 RA would not address. NASA requires the source and extent of contamination to be identified before it will take responsibility for the site. Mr. Sullivan said the Navy has committed to moving forward with the Hangars 2 and 3 investigation. The work plan will be developed with input from all stakeholders before field work begins.

BUILDING 88/SITE 28 TRAFFIC ISLAND STUDY UPDATE

Mr. Sullivan introduced the Traffic Island site adjacent to Hangar 1 and Building 88. A treatability pilot study has been completed at the site, which is the focus of the presentation.

Michael Yurovsky (CB&I) said the treatability study fieldwork was conducted in 2015, with groundwater monitoring completed in 2016. He said the sources of contamination at the Traffic Island includes part of the MEW plume, with most contamination originating from Building 88 (former drycleaner operations). The goal of the study was to establish technology to remediate the site which has deep contamination at 120 feet bgs in an area with residual dense non-aqueous phase liquids (DNAPL) and high concentrations of chlorinated ethenes in groundwater. The study was conducted to evaluate the effectiveness of treatment on the mass of contaminant.

Mr. Yurovsky explained the affected groundwater zones: A-aquifer upper (0 to 35 feet bgs) and lower (35 to 65 feet bgs), and B2-aquifer (65 to 120 feet bgs). The site area is approximately 16,000 square feet and contamination was caused by a collapsed sewer downgadient from Building 88. The study included injection of substrate at 24 locations between September and November 2015 and May 2016, with five rounds of post-treatment monitoring conducted between December 2015 and October 2016, at 14 existing and newly installed groundwater monitoring wells.

Mr. Yurovsky reviewed figures showing the A-aquifer and B2-aquifer pretreatment conditions and indicated the highest concentrations of contaminants are nearest the Building 88 collapsed sewer source.

The injection technology used a direct push top-down procedure with a combination of zero valent iron and emulsified lecithin substrate. Zero valent iron will destroy chlorinated ethenes on contact for quick degradation and destruction. The soluble substrate was injected with a microbial culture of *Dehalococcoides*, allowing bioremediation to degrade the contaminants. The injection was a difficult application because of a utility corridor and storm drain, and generally difficult subsurface geology. The injections were conducted at a very high pressure and caused hydrolytic fractures. Four locations were repositioned and injection was completed in May 2016.

Mr. Yurovsky said post-injection performance monitoring was completed over five events; one week after injection, one month after injection, and three quarterly events. He reviewed graphs showing how the injection affected the subsurface and groundwater with reducing conditions created and the degradation of ethenes started, the substrate distribution of organic carbon needed for microbes to grow, and changes in ethene concentrations. As the parent contaminants were destroyed, concentrations of daughter products increased. This process is normal with biological treatment, and the daughter products will continue to degrade over time. The technology worked well in groundwater but also in soil. Groundwater in the monitoring wells outside the injection area have also been affected by the treatment. Similar results have occurred in the deeper aquifer.

Mr. Yurovsky reviewed the groundwater results for the six treatment wells showing baseline and October 2016 concentrations. The chlorinated ethenes have decreased substantially except for degradation daughter products, which have increased.

Mr. Yurovsky said that the successes include mass reduction of contaminants and production of ethene. He noted that ethene also does not persist in the aquifer and will degrade to methane, carbon dioxide, and water. Some challenges encountered included surfacing of injectate at some locations and injectate interfering with sampling at some monitoring wells. The main problem with the injection was the distribution.

- Intrinsyx representative John Freeman commented that vinyl chloride was shown as increasing on a number of the presentation slides. His understanding is that this increase is a typical occurrence from microbial injection; he asked if the vinyl chloride increases are a concern based on the toxicity of vinyl chloride. Mr. Yurovsky said reduction is a necessary step in sequential degradation in the dechlorination process. That is why a microbial culture was used that has been proven to degrade vinyl chloride. Although the concentrations of vinyl chloride were elevated after treatment, reduction will continue and concentrations of vinyl chloride should be close to zero in a few months.
- Mr. Siegel commented that this presentation and the Site 26 presentation are identified different microbial injections, both using *Dehalococcoides*, but different strains. He asked if there was a technical reason for using different strains or if the reason was contractor proprietary. Mr. Yurovsky replied that the strains are basically the same microbial culture but with different commercial names. Mr. Siegel asked if the microbes were from NAS North Island and Mr. Yurovsky said that is its origin.

Mr. Sullivan said in the context of the larger environmental program at Site 28, the process is source reduction for the Traffic Island area. He said the Navy is evaluating the data from the treatability study, which will determine follow up steps to be taken.

Mr. Chuck commented that he noticed vinyl chloride increased rapidly in one area and asked if there will be a need for another injection to lower the concentrations. Mr. Sullivan said that need will be assessed after the data has been evaluated; vinyl chloride will continue to degrade and those results will be provided in the Navy's report. Mr. Chuck asked if using the high-pressure hydrofracturing has exacerbated the vapor intrusion pathway issue in the proximity of the Moffett Museum. Mr. Sullivan said he was unaware of any direct correlation of the vapor intrusion and the treatability study project, but such influences should be considered.

Kim Finch (NASA) commented that the Navy is evaluating the success of the injections by looking at the dissolved concentrations in groundwater; her understanding is that high concentrations have indicated the presence of DNAPL, and that source material may be absorbed to formation material. She asked what would be the duration of the monitoring, in order to evaluate desorption. Mr. Sullivan said the Navy has conducted the planned amount of monitoring (one year of quarterly monitoring). The next step is compiling the treatability study report; further work will be determined based on the report.

SITE 28 VAPOR INTRUSION (VI) UPDATE

Mr. Sullivan explained the Site 28 vapor intrusion update consisted of two parts: ongoing air monitoring sampling and a specific plan to conduct vapor intrusion mitigation in six buildings. Wilson Doctor (Navy RPM) began the presentation with the air sampling update. He presented a schematic of the vapor intrusion pathway to illustrate the mechanics of vapor intrusion. VOCs migrate from the groundwater and intrude into structures through cracks or openings in floors. Vapor intrusion can be influenced externally by weather and barometric pressure, internally by building heating and ventilation effects, and by soil and other conditions.

Mr. Doctor referred to the site figure and identified the structures under Navy responsibility. Twenty-three structures are being monitored annually. Chemicals of concern include the chlorinated solvents PCE and TCE.

Mr. Doctor summarized past sampling activities beginning in 2012 to current. Air sampling and soil gas and groundwater investigations were conducted.

- May - June 2012: Indoor Air Sampling
- May - June 2013: Soil Gas and Groundwater Investigation
- February 2014: Indoor Air Sampling
- September 2015: Groundwater Investigation
- January 2016: Indoor Air Sampling
- January 2017: Indoor Air Sampling
- Building 10 – Sampled Quarterly. Building 10 has a concrete-lined utility corridor that connects Building 10 to Hangar 1. A blower system was installed in the utility corridor as an interim remedy to reduce vapor intrusion in Building 10. Quarterly sampling verifies that the blower system is operating and working.

Prior to air sampling, walk-through surveys are completed to confirm that no conditions in the buildings have changed, no new chemicals are stored, and no modifications have been made to air systems. Facility managers are interviewed to identify any changes. Air quality is screened with a photoionization detector (PID) during the walk-through survey, which aids in optimizing air sampling locations, if needed. Generally, air samples are collected in the same locations for consistency in the data.

Mr. Doctor reviewed results for samples collected in 2017. A total of 211 samples were collected from the 23 buildings and outdoors:

- 169 indoor air samples (first floor and basements)
- 13 pathway samples (crawl spaces, elevator shaft)
- 29 outdoor ambient air samples (background)
- Includes eight samples from Building 10

Samples were collected using 6-liter Summa canisters, which are calibrated under vacuum. Buildings were sampled for 8, 10, or 24 hours, depending on use and occupancy. Buildings with a heating, ventilation, and air conditioning (HVAC) system were sampled during equipment operation and over extended HVAC shutdown periods. Samples were collected within the breathing zone and analyzed for the COCs TCE and PCE.

The sample results are compared against long-term exposure cleanup levels in the EPA ROD Amendment for Vapor Intrusion. Based on the findings, the buildings are classified using a tiering system as noted in the ROD.

- Tier 1 is a building where indoor air concentrations are above the cleanup goals with or without operating engineering controls. A response action for a Tier 1 building would be to implement a remedy or engineering control to reach the cleanup goals.
- Tier 2 is a building where indoor air concentrations are below the cleanup levels while an engineering remedy is in place to reach the cleanup goals. A response action for a Tier 2 building would be to ensure continued operation of the remedy and to implement long-term monitoring and ICs.
- Tier 3A is a building where indoor air concentrations are below the cleanup levels without engineering control in place or operational, but are above outdoor air

concentrations. A response action for a Tier 3A building would be to implement long term monitoring and ICs. An engineered remedy is not required.

- Tier 3B is a building where indoor air concentrations are below the cleanup levels without engineering control in place or operational, and concentrations are at outdoor concentrations. A response action for a Tier 3B building would be to implement ICs. An engineered remedy or long-term monitoring is not required. (An example of an IC would be written agreement to not penetrate the slab without permission.)
- Tier 4 is a building where multiple lines of evidence show there is no potential for vapor intrusion. No action is required for Tier 4.

During the 2016 tier evaluation three buildings (Buildings 45, 126 and 567) were identified as Tier 1 based on one or more samples exceeding clean up goals for TCE or PCE. The remaining buildings were identified as Tier 3A. The 2017 sampling event tiering evaluation will be included in the Draft 2017 IR Site 28 Air Sampling and Vapor Intrusion Tier Response Evaluation Report (scheduled for June/July 2017). Mr. Doctor concluded the presentation and asked for comments.

- Mr. Siegel asked if any real-time sampling has been conducted or considered. Mr. Doctor said real-time sampling was implemented one time at Building 10 as a comparison and to help identify source areas. Widespread use of real-time sampling is not implemented as Summa canister collection is preferred for long-term monitoring. The Navy is also trying to incorporate passive sampling technology.

Mr. Doctor began the vapor intrusion mitigation portion of the presentation. As previously discussed, multiple rounds of air monitoring have been conducted. Methods to implement mitigation measures were identified based on the 2014 air sampling tier evaluation. Six buildings ranked as Tier 1 or Tier 2 were identified for mitigation measures:

- Building 10
- Building 16
- Building 126
- Building N210
- Building N239
- Building N239A

Vapor intrusion mitigation methods identified include:

- Eliminating intrusion pathways = fill subsurface vaults, seal floor cracks, seal floor drain/pipe penetrations
- Increasing building ventilation = increase air exchange rate, provide fresh air sources, modify HVAC
- Sub-slab ventilation/depressurization = install depressurization system (piping, blower, vent) and exhaust outside the structure.

After mitigation measures have been implemented, the Navy will conduct long-term air monitoring to verify compliance with the ROD indoor air cleanup levels.

The draft vapor intrusion mitigation work plan was submitted in March 2017. The final work plan is scheduled for summer 2017. Field work is scheduled to start in the fall 2017 and

continue through spring 2018. The draft completion report is scheduled for summer 2018, with the final report in winter 2018.

- Mr. Siegel asked if there are any planned procedures to ensure that the system is running consistently enough to fulfill the mitigation role when HVAC is used as a mitigation measure. Mr. Doctor said operational procedures would need to be developed to ensure the HVAC is operating correctly.
- Mr. Siegel said the equipment operation goes above and beyond climate control. Mr. Siegel asked if the building occupants have been notified of the air quality results and mitigation requirements. Mr. Doctor said the occupants have been notified through NASA and facility site managers; field work and air sampling are also communicated.
- Mr. Siegel asked at what point in the process and what time of year would confirmation sampling be conducted. Mr. Sullivan said the confirmation sampling schedule is provided in the draft work plan. The process is to implement the remedy, wait 30 days, and then collect confirmation samples. If the remedy is successful, the building will be moved to the long-term monitoring program. If the remedy is unsuccessful, then an alternative mitigation measure will be implemented.
- Mr. Siegel commented that the worst-case condition scenario is usually monitored in other parts of the country to confirm the remedy is effective, and not just based on a 30-day post-implementation schedule. The Navy has been conducting its long-term monitoring events in the winter when slightly higher concentrations were observed.
- Mr. Siegel commented that he believes the Navy is doing good work, but it will require ongoing community oversight, especially with the concerns expressed by NASA regarding employee exposure. He added that he would not want to see the RAB forum of oversight disappear while these projects are still underway.
- Mr. Strauss referred to the proposed mitigation measure of active sub-slab ventilation/depressurization and commented that he understands these methods to be two different approaches — sub-slab ventilation and sub-slab depressurization — and asked for clarification. Mr. Doctor referred to the project consultant. Dan Lohr (CES JV) said the systems are partial ventilation with the primary objective of depressurization by establishing a pressure differential between indoor air and the sub-slab space. With negative pressure below the slab, the mechanism for vapor to enter the building is effectively eliminated. There is a component of ventilation because the air is being drawn from below the slab, which is why it is presented as both ventilation and depressurization. He added that this mitigation measure is not a vapor extraction system, which utilizes an actual ventilation system.
- Mr. Chuck referenced back to the vapor intrusion mitigations and commented on NASA's expectations. He said NASA does not believe HVAC is a preferred method for mitigation. It leaves NASA responsible for maintaining the systems and some HVAC systems are old. NASA is expecting the Navy to look at sub-surface technologies first, before proceeding with HVAC as a mitigation measure. NASA will follow up its concerns by letter to the EPA.
- Ms. Lee commented that the EPA 2010 ROD Amendment for the Vapor Intrusion Pathway (EPA 2010) defines the selected vapor intrusion remedy. Although various

mitigation measures are being discussed, the EPA preferred remedy is a sub-slab ventilation or sub-slab depressurization system. In some cases, the HVAC system can be employed, but only if the facility owner agrees to its use and which has to be in place before the remedy is implemented. In some cases, HVAC is the only alternative because of the limitations of sub-slab installation; however, this alternative has to be a verified condition.

NASA UPDATE

Ms. Finch provided an update for NASA activities.

- Area of Investigation (AOI) 6 project was a soil removal at the former storm drain ditch (Lindbergh Ditch). The project removed approximately 3,600 cubic yards of soil contaminated with lead and polychlorinated biphenyls (PCBs). The remedial action completion report was submitted and no action further was approved by the regulatory agencies.
- AOI 14 former soil fill area. Currently in a non-time critical removal action process. The action memorandum was published in March 2017, and the draft soil removal action work plan is currently under agency review. NASA hopes at a future meeting to provide an update on the process.
- NASA vapor intrusion area of responsibility. NASA has completed three rounds of air sampling. Based on the results for the seven NASA buildings, NASA is proposing Tiers 3B/3A (long-term monitoring and ICs); the plan is under agency review.
- Three Navy sites transferred to NASA.
    - Site 28 West-side Aquifer Treatment System (WATS). NASA has been operating the groundwater system since October 1, 2016, and has completed a number of system repairs, and recently submitted the annual progress report for the system (April 2017).
    - Sites 1 and 22 landfills. The landfills were transferred to NASA operations on October 1, 2016. NASA has been conducting operations and maintenance and recently submitted the annual progress report (April 2017).
    - Site 29 Hangar 1 (update deferred to PV).

PV UPDATE

Anthon LaMarca provided the PV update. He said the field work portion for a pilot study at Hangar 1 has recently finished. The purpose of the study was to evaluate the most effective methods for removal of the lead-based paint and coatings on the steel structure and concrete. He said various removal methods were tested for efficiency and collection procedures, and some methods were surprisingly successful. He is looking forward to reviewing the report, which will be submitted to the agencies for recommendations. Hangar 2 is in the process of structural renovations, including; timber, exo-skeletons installation, and hangar door and box beam rehabilitation. He said PV is also planning for a sub-slab depressurization system in a few weeks. At Hangar 3, significant repairs and stabilization measures have been completed, but additional deterioration of main wood supports has been identified. Currently, the hangar is stabilized; no further work or repairs will be conducted until renovation and engineering options can be evaluated to reduce deterioration. The airfield infrastructure needs to be upgraded, such

as pavement, lighting, and navigation aids for the active user of the airfield (Air National Guard). Also, there has been some minor cleanup of the golf course and clubhouse structure.

- Mr. Siegel said he and the community appreciate the work PV has done. He asked if there are any construction plans for the Bayview Parcel and if there are any contamination issues that might affect work there. Mr. LaMarca said he is not involved with that parcel and deferred to NASA. Mr. Siegel asked when construction on Bayview Parcel is expected to start and if the parcel has any contamination issues typical for the area. Mr. Chuck said the main construction on the Bayview side is widening and completion of RT Jones Road. NASA is preparing the main intersection of Moffett Boulevard and RT Jones Road, and the main gate of NASA Ames is closed as a result of detours. Some grading work has been done at the Bayview site, and PV is preparing dewatering at the site, where NASA has been involved. NASA's concern was the Orion Park plume is close to the site and the PV dewatering process may cause the plume to migrate. He said he does not know when building construction is planned to start.
- Ms. Lee commented that EPA has some involvement because of the contamination. She said the TCE contamination in the Orion Park area does extend across RT Jones Road. The ongoing work has been along the road and the dewatering that has been done as part of those projects. The plans have been submitted to EPA for review and approval because of concerns of potential impacts from dewatering and then disposal of the water. She said there has been significant trenching as part of the road work. EPA has required trench sampling for potential impacts to construction workers and assessing TCE levels in trenches.
- RAB member Libby Lucas asked if it would be possible to receive a report of the monitoring of this work. She noted her concerns with the proximity of Stevens Creek and the Bay Wetlands and potential hydrogeologic influences with groundwater contamination or seawater intrusion. She said she would like to see details on implementation and analytical results as the work progresses. She asked if there is a mailing list to receive informational updates. She added her main concern is the wetland and its vegetation.
- Mr. Siegel asked NASA if there is a consideration of any type of barrier, such as a permeable reactive barrier, to be used in conjunction with the dewatering. He said the Mountain View City Council had a developer that did not want underground parking because of the concern that dewatering would spread the Teledyne/Spectra Physics plume. He commented that he hopes NASA is looking at potential remedies before there is problem. Mr. Chuck said there is a plan to install a barrier if needed, though it is not a reactive barrier. He said it is part of the process and NASA has installed several monitoring wells to monitor groundwater levels. He spoke with the project hydrogeologist and PV's contractor appeared have done a good job working on the issue - it was a NASA concern as well. He said NASA will be monitoring water levels and chemicals in the groundwater to ensure work is not intercepting the TCE plume. He said NASA was initially concerned with how PV came up with their plan, but after discussions with the team and review of the design, which is based on similar projects they completed in the area, he believes they have resolved the issue.

- Mr. Siegel referred to the Hangar 3 discussion, noting uncertainty with the structure's condition, and asked Mr. LaMarca if demolition is being considered. Mr. LaMarca replied it is not at this time. The situation was continual repairs to the structure and each repair causing failure of other components resulting from settling over time. The uncertainty is whether the repairs are making the structure better or worse. Structural engineers are evaluating the issue to identify a remedy and the interior is laser-scanned on a regular basis to monitor movement. Right now, PV is observing the building to see if anything changes without additional repairs or if the building remains the same.
- Mr. Siegel commented that fairly high levels of vapors were detected in the building and asked if the building is usable, or currently being used, or if there is restricted access. Mr. LaMarca said the Air National Guard has rights to Hangar 3, use of the two-story sheds for engine repairs, and for storage space. Currently with the structural issues, PV is not interested in using Hangar 3 for anything other than storage.
- Mr. Williams commented that at one time there were some aggressive timelines for reskinning of Hangar 1 that were announced publicly and now appear to have been dropped. He said he understands that PV is working on a study to identify the most efficient technology to remove the coatings. He asked if it was possible for PV to make any public statements about the goals for reskinning the hangar, removing the toxic materials, and moving on to the next steps. Mr. LaMarca said he was unaware of previous public announcements regarding the reskinning schedules and apologized for not knowing that information. He said for Hangar 1 PV has laid out a high-level schedule that looks at all components of the project, equipment, scaffolding, remediation technologies, and new methodologies. He said after all the steps are completed PV is projecting completion of the reskinning by 2025.

Mr. Sullivan commented that there is a difference between the sub-slab concentration and what is present in indoor air. He said the sub-slab values and indoor air values may be different.

As a result of time constraints, Mr. Unangst asked if the last speaker Mr. Freeman could delay his presentation; Mr. Freeman agreed and provided a brief summary of his project.

Mr. Freeman said NASA Ames in conjunction with NASA Environmental and their on-site contractor, Earth Resources Technology, are pushing for a new green biotechnology using poplar trees to draw groundwater to 30 feet bgs, accumulate the TCE, and degrade it internally using a native poplar endophyte screened specifically for degradation of TCE. The endophyte uses the TCE as a carbon source and degrades it fully to chloride. He said the technology has phenomenal results from the test site, with test wells both upstream and downstream going from high concentrations to non-detectable for many of the contaminants. Internal tree core samples were also collected, which showed 1,000-fold difference in the inoculated versus un-inoculated trees. The poplar TCE phytoremediation processes has been supported by the EPA for more than 15 years; more information can be obtained from EPA at the clu-in.org website. What is different about this study is the use of an endophyte to increase the degradation rates and influence the survival rates of the trees. This technology can be implemented in other areas, and the site will be expanded from a test site into an actual functional phytoremediation area where the plume comes across Highway 101 and enters the base.

Mr. Unangst said the technology sounds impressive and the RAB would definitely be interested in hearing more about it later.

PUBLIC COMMENT / QUESTION PERIOD

Mr. Sullivan opened the RAB meeting for questions or comments from the public for items other than what has been discussed.

- Mountain View Commercial Owners Chair Perry Palmer said he has heard that there was consideration of adding the MEW area to the RAB. He thinks the view of the commercial owners is similar to that of the residential owners for keeping the meetings separate. He said the commercial group is made up of owners for 37 properties that share 85 percent of the square footage in the MEW area. He said they have quarterly calls with EPA Region 9 management and one annual meeting with the project management.

REGULATORY AGENCY UPDATE

Ms. Lee said during VI sampling in January 2017 at former NAS Moffett Field, there were high enough COC concentrations at Building 126 that it could not be occupied until the indoor air concentrations are managed. Ms. Lee said NASA took immediate action, and increased operation of the HVAC system at Building 126. The long-term remedy for Building 126 is to install a sub-slab depressurization system.

Ms. Lee said that EPA is looking to include phytoremediation treatment capabilities for the MEW sites, similar to the Navy's feasibility study for Site 26.

Ms. Lee said that she and Ms. Lane would help identify a future mechanism for community outreach and meetings for the RAB.

FUTURE RAB MEETINGS

Mr. Sullivan asked for future RAB topics, noting the Navy activity will be presented similar to this evening's meeting. Suggested future RAB topics included a phytoremediation presentation and the RAB adjournment status. Mr. Sullivan said he can be contacted for future RAB topic suggestions via e-mail or phone prior to the next RAB meeting.

Tentative Next RAB Meeting

Thursday, November 9, 2017

ADJOURN

Mr. Sullivan thanked all present for attending. The meeting was adjourned at 9:15 p.m.
The Navy can be contacted with any comments or questions:

Mr. Jim Sullivan
Base Realignment and Closure (BRAC) Environmental Coordinator, Former NAS Moffett Field
BRAC Project Management Office West
Navy BRAC PMO West
33000 Nixie Way, Building 50 Room 207
San Diego, CA 92147
Phone: (619) 524-4048
E-mail: james.b.sullivan2@navy.mil

Final RAB Meeting Minutes are posted on the Navy's environmental website at:
http://www.bracpmo.navy.mil/brac_bases/california/former_nas_moffett_field.html

Respectfully submitted,

James Sullivan

Former NAS Moffett
Field RAB Navy Co-Chair

ACRONYM LIST

AOI — Area of Investigation
bgs — Below ground surface
CB&I — Chicago Bridge and Iron
CERCLA – Comprehensive Environmental Response, Compensation, and Liability Act
COC — Chemical of concern
DCE — Dichloroethene
DNAPL — Dense non-aqueous phase liquid
DPT — Direct push technology
EPA – U.S. Environmental Protection Agency
EVO — Emulsified vegetable oil
LTM — Long-term monitoring
MEW – Middlefield Ellis Whisman
MNA — Monitored natural attenuation
NAS – Naval Air Station
NASA – National Aeronautics and Space Administration
PCE – Tetrachloroethene
PID — Photoionization detector
PV – Planetary Ventures
RAB – Restoration Advisory Board
RAO — Remedial action objective
ROD — Record of Decision
TCE – Trichloroethene
VC — Vinyl chloride
VI – Vapor Intrusion
Water Board – San Francisco Bay Regional Water Quality Control Board
WATS – West-side Aquifers Treatment System