DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND SOUTHWEST
1220 PACIFIC HIGHWAY
SAN DIEGO, CA 92132-5190

5090
Ser JE30.MQ/0421
February 24, 2011

Mr. Scott Smale
DoD Branch Supervisor
Bureau of Corrective Actions
Nevada Division of Environmental Protection
901 S. Stewart Street, Suite 4001
Carson City, Nevada 89701-5249

SUBJECT: REMEDIAL PROJECT MANAGER FINAL MEETING MINUTES, NAVAL AIR STATION FALLON, FALLON, NEVADA

Dear Mr. Smale,

Enclosed is one copy of the final meeting minutes from the September 29, 2010 Remedial Project Manager Meeting at Naval Air Station (NAS) Fallon, Fallon, Nevada.

Please call me at (619)-532-4176 if you have any questions regarding this submittal.

Sincerely,

R. Michael Quesada
Lead Remedial Project Manager
By direction of the
Commanding Officer

Enclosure: Final Remedial Project Manager Meeting Minutes, Naval Air Station Fallon, Fallon, Nevada, prepared by Tetra Tech EM Inc., under NUS CLEAN contract N62467-04-D-0055, Delivery Order 0300, dated February 2011.

Copy to:
Robert Earney, NAVFAC Southwest
Becky Kurtz, NAS Fallon
Barbara DeAngelis, Tetra Tech EM Inc.
Ken Powell, Tetra Tech EM Inc.
Shirley Fu, Tetra Tech EM Inc.
Kathy Monks, Tetra Tech EM. Inc.
NAVFAC Southwest, Admin Record

REMEDIAL PROJECT MANAGER MEETING

FINAL MEETING MINUTES

NAVAL AIR STATION FALLON

SEPTEMBER 29, 2010

Attendees	Affiliation
Mike Quesada	Naval Facilities Engineering Command, Southwest (NAVFAC SW)
Robert Earney	NAVFAC SW
Chantry Davis	NAVFAC SW
Stephen Banister	NAVFAC SW
Scott Smale	Nevada Division of Environmental Protection (NDEP)
Mary Siders	NDEP
Raj Krishnamoorthy	Naval Air Station (NAS) Fallon
Chuck Deverin	NAS Fallon
Shirley Fu	Tetra Tech EM Inc. (Tetra Tech)
Kathy Monks	Tetra Tech

MEETING SUMMARY

A remedial project manager (RPM) meeting for NAS Fallon was held at the office of the Nevada Division of Environmental Protection (NDEP), Bureau of Corrective Actions, in Carson City, Nevada, on Wednesday, September 29, 2010. The purpose of the meeting was to discuss the soil gas investigation and vapor intrusion (VI) risk evaluation methodology conducted as part of the remedial investigation (RI) for Naval Air Station (NAS) Fallon.

The following meeting agenda items were discussed and are summarized in these meeting minutes:

- Results from the first rotation of soil gas sampling conducted in May 2010
- Modeling-based approach for predicting indoor air concentrations and estimating health risks from vapor intrusion
- Criteria for determining action/no action for the vapor intrusion exposure pathway
- Path forward for completing soil gas sampling
- Schedule for completing the RI.

The following presentation materials are included in an attachment:

- RPM meeting agenda
- PowerPoint slide presentation titled "Naval Air Station Fallon Soil Gas Investigation and Vapor Intrusion Risk Evaluation Methodology Sites 2, 3, 4, 14, 16 and UST-R Site 2"
- Table 1: Summary of Analytical Results for Active Soil Gas Samples, Phase I Investigation (May 2010) – By Site
- Table 2: Summary of Analytical Results for Active Soil Gas Samples, Phase I Investigation (May 2010) – By Building

Additional "hit maps" that show the analytical results for the first rotation of soil gas sampling (that is, the Phase I investigation results) were distributed by e-mail to the participants in advance of the meeting for review. The maps are included as an attachment to these minutes.

Mr. Mike Quesada began the meeting with introductions and a general overview of the two operable units (OUs) at NAS Fallon. The active soil gas (ASG) survey was conducted as part of the RI; the first phase of the soil gas survey was conducted in May 2010 using Summa canisters for soil vapor collection. Ms. Shirley Fu presented the objectives for the meeting, stressing the importance of discussing and resolving any issues on the methodology and approach to the remaining soil gas sampling and risk assessment evaluation.

RESULTS FROM THE MAY 2010 (FIRST ROTATION) OF SOIL GAS SAMPLING

Ms. Fu first summarized the RI approach for NAS Fallon. She indicated that an initial RI had been completed in 1994 by another consultant. Many of the sites had not been advanced beyond the RI phase to feasibility studies but went directly to the removal phase via Engineering Evaluation/Cost Analysis and Action Memorandums. In consultation with NDEP, the Navy resampled soil and groundwater at the sites in 2007 and 2008 to characterize more recent environmental conditions and to ensure that laboratory detection limits would be adequate in order to use the sampling data in risk assessments. Collection of soil gas data was not planned until after the soil and groundwater sampling was completed and the analytical results were reviewed so that the presence and location of volatile chemicals could be confirmed.

Ms. Fu said that the first phase of ASG sampling was conducted in May 2010 and focused on collecting near-slab samples around occupied buildings. Phase I ASG sampling locations were selected based on proximity to currently occupied buildings and in areas where previous soil and groundwater contamination "hot spots" were delineated. Phase II sampling is planned for November 2010; the additional sampling locations are based on analysis of the Phase I ASG results.

Dr. Mary Siders asked if any sub-slab samples were collected or are planned to be collected during the Phase II soil gas sampling. Ms. Fu replied that sub-slab sampling is not currently planned; however, sub-slab sampling would be considered if additional near-slab sampling indicated the potential for risk greater than 10E-06. Mr. Quesada added that sub-slab sampling most likely will not be necessary because vapor intrusion risks do not appear to be a significant, based on the vapor analytical results obtained to date.

Dr. Raj Krishnamoorthy asked why no soil gas samples were collected at buildings in the vicinity of underground storage tank-restoration (UST-R) Site 1. Ms. Fu replied that no enclosed and occupied buildings are at this site.

Ms. Fu discussed the deviations from the work plan/sampling and analysis plan (WP/SAP) that occurred during the Phase I ASG sampling. Out of 135 ASG sampling locations that were planned, only 85 locations were actually sampled. As a result of an exceptionally high spring rainfall season, resulting saturated soils, and unanticipated rising water table conditions, the actual placement depth of the soil vapor probe was less than 5 feet below ground surface (bgs) for approximately 50 percent of the samples, less than the intended placement depth of about 6 to 8 feet bgs. Additionally, one ambient air blank per day was planned; however, in actuality only one ambient air sample was collected at the beginning of the Phase I ASG sampling event. Slide 7 in the attached PowerPoint presentation compares the number of planned versus actual samples collected and the planned versus actual sample collection depth for each site. Mr. Quesada added that because many naval facilities are coastal, groundwater can be very shallow (less than 5 feet bgs); however, the soil gas samples the Navy has collected at these facilities with shallow groundwater are considered reliable and representative.

Ms. Fu directed the meeting participants' attention to a series of base maps (e-mailed to the participants ahead of time for review) that show, for each site included in the soil gas investigation, the buildings selected for soil gas sampling, the number of hours of weekly occupancy for each of the buildings, the locations that were sampled for soil gas during Phase I, the locations for Phase I sampling that were planned but not sampled because of the saturated soil conditions, and the analytical results for all chemicals detected during the Phase I sampling investigation. Tables 1 and 2 (attached to the meeting minutes) summarize the analytical results for the ASG samples collected during Phase I of the investigation. Petroleum hydrocarbons, chlorinated solvents, and chlorofluorocarbons were detected in the ASG samples. Ms. Fu said that although step-out sampling was initially proposed for Phase II, the Navy has determined the Phase II sampling would involve collection of the remaining ASG samples near building slabs at locations where samples were not previously collected plus resampling at some of the locations where volatile chemicals were detected in May (Phase I). By focusing future sampling efforts in target areas around the building slabs and in areas where volatile chemicals have been detected, the Navy will work with the NDEP to make better decisions using conservative sampling results.

MODELING-BASED APPROACH FOR VAPOR INTRUSION RISK EVALUATION

Ms. Fu directed the discussion to the modeling-based approach that the Navy will use to predict indoor air concentrations and estimate health risks from vapor intrusion (Slide 9). The vapor intrusion risk evaluation consists of three steps. Step 1 involves calculating risk-based concentrations for indoor air (RBC-IA) for a current industrial worker scenario. Future vapor intrusion risks will be reassessed only if site or building uses change. The U.S. Environmental Protection Agency (EPA) default inhalation assumptions for an industrial worker include an exposure time assumption based on a 40-hour work week; however, actual exposure times in the buildings at NAS Fallon vary from 2 to 40 hours per week. Dr. Krishnamoorthy recommended modeling both the actual building exposure times plus the EPA-recommended scenario for 40 hours per week of exposure. If the modeling results indicate that there is not much risk at 40 hours, then there would be no need to recalculate for changes in building use in the future. Mr. Scott Smale agreed with Dr. Krishnamoorthy's suggested approach. Mr. Quesada mentioned that an initial screening evaluation completed for the Phase I soil gas results involved evaluating all chemicals based on 40 hours of weekly exposure, providing a worse-case scenario. Mr. Quesada agreed that the models will include evaluation of the risk scenario for 40 hours per week of exposure. Ms. Fu explained that Step 2 involves calculating site- and building-specific risk-based concentrations for soil gas

(RBC-SG). The calculations will involve use of the Johnson and Ettinger model to derive soil gas-to-indoor air attenuation factors. These factors will be applied to the RBC-IAs to calculate RBC-SGs. As part of the Phase II investigation, the buildings will be inventoried for dimensions and air exchange requirements. The interior ceiling height of the building will be used in the volume calculations; this height is the most important of the building dimension parameters. Step 3 involves calculating vapor intrusion risks using the risk ratio method; that is, the ratio of the measured soil gas concentration to the RBC-SG. Risks from vapor intrusion will be assessed for each building. Vapor intrusion risks and hazards will be added to the risks and hazards assessed for soil in the RI human health risk assessments for each Installation Restoration (IR) site.

Ms. Fu then discussed the preliminary risk screening evaluation that was completed for the Phase I soil gas results. As part of the vapor intrusion risk methodology that was outlined in the soil gas investigation work plan, a Tetra Tech geologist identified various subsurface soil types at NAS Fallon. Although many types of soils have been identified, sandy soils, which are considered the most permeable of all soil types, were used in the preliminary risk screening evaluation of the Phase I results to provide the most conservative results and to simplify the modeling. The results of the screening evaluation are presented in Slide 13 of the PowerPoint presentation (attached). The preliminary risk evaluation indicates that the vapor intrusion results are low. Tetrachloroethene is the only chemical that is slightly elevating the risk for Site 4 at 2E-06. Risk and hazard drivers for Site 16 include benzene, ethylbenzene, and 2,2,4-trimethylpentane. EPA has not developed toxicity criteria for 2,2,4-trimethylpentane, so hexane was used as a surrogate. Use of hexane as a surrogate for inhalation toxicity resulted in a hazard index of 6 for 2,2,4-trimethylpentane. Trimethylpentane is associated with gasoline and vapor fuel exhaust, and is used as an octane booster; its occurrence may be related to vehicle use or leaking vehicle fuel near the location where it was detected in soil gas. Ms. Fu indicated that, of all the soil gas samples collected during Phase I, trimethylpentane was detected at only one sample location at Building 16 (Site 16). Mr. Quesada mentioned that additional ASG samples will be collected during Phase II in areas where trimethylpentane was detected.

Ms. Fu explained that vapor intrusion is a relatively new science and that a number of uncertainties are associated with the vapor intrusion evaluation process (Slide 14). She said that the HHRAs for the NAS Fallon sites would include an uncertainty analysis of the vapor intrusion risk results. These uncertainties include the sampling depth of less than 5 feet bgs for a number of the soil gas samples (about 50) and the variability and heterogeneities in soil types observed at NAS Fallon. The HHRAs will also include a sensitivity analysis of some key parameters in the Johnson and Ettinger model, such as water-filled porosity and comparison to attenuation factors for similar sites and chemicals in EPA's vapor intrusion database. Ms. Fu mentioned that considerably more vapor intrusion data are available now then when the EPA vapor intrusion database was developed in 2002, and that the database can be a useful tool to benchmark results.

CRITERIA FOR DETERMINING ACTION/NO ACTION FOR THE VAPOR INTRUSION EXPOSURE PATHWAY

Ms. Fu discussed the criteria that the Navy would use to determine the need for remedial action for the vapor intrusion pathway. Consistent with the methodology that the Navy and NDEP agreed to for the HHRA methodology in December 2008, the need for action will be determined by comparing the vapor intrusion risk results to the EPA risk management range of 1E-06 to 1E-04 for cancer risks and threshold hazard index (HI) of 1 for noncancer hazards. Chemicals which pose cancer risks that exceed the EPA point of departure will be identified. Identification of chemicals of concern and the need for remedial

action will be based on results that exceed the risk management range (1E-04) for cancer or the threshold HI of 1 for noncancer.

PATH FORWARD FOR COMPLETING SOIL GAS SAMPLING

Ms. Fu discussed the path forward for completing the soil gas investigation (Phase II). Based on the results of the Phase I ASG sampling, the objectives for Phase II sampling have shifted from the recommendations for step-out sampling presented in the WP/SAP addendum. Approximately 50 near-slab samples were not obtained during the Phase I (May) sampling event. These locations will be sampled during the Phase II investigation. However, because the results of the Phase I investigation are associated with relatively low risks, the remaining sampling will be to focus on near-slab sampling rather than sampling at step-out locations. Mr. Quesada said that, in previous discussions, Mr. Ramon Naranjo of NDEP favored near-slab ASG samples, rather than step-out sample locations. Additionally, as part of Phase II, some of the Phase I sampling locations will be resampled to confirm results where samples were collected at depths of less than 5 feet bgs, to confirm unexpected results, and to confirm results at locations where the leak check compound was detected. A helium shroud will be used for leak detection in Phase II so that quantitative leak detection and the potential for short-circuiting with ambient air at shallow sample locations can be conducted in the field, rather than after laboratory analysis is completed. Ambient air blanks will be collected on a daily basis, as discussed in the WP/SAP. Ms. Fu added that when the vapor intrusion risk assessment is being completed, the HHRAs will be updated with more recent groundwater data, such as the results from the basewide groundwater monitoring program.

Dr. Siders said that she had a few questions and comments about the sampling and modeling protocol:

1. Does the field crew note barometric pressure and wind speed? Ms. Fu responded that the field crews note both in the field notebooks. (Follow-up information obtained after this meeting: Ms. Fu was informed that the field crews did not record barometric pressure and wind speed; however, these measurements are recorded by NAS Fallon on an hourly basis.)
2. How are potential indoor air sources handled; for example, is an indoor air background vapor sample collected so that a distinction could be made between activities associated with indoor air in the buildings versus those vapors detected in the soils that would be associated with subsurface soils and groundwater? Ms. Fu replied that ambient indoor air samples were not collected; however, the soil gas concentrations measured during Phase I are low and the preliminary screening risk evaluation did not show risk issues, so indoor air is not a concern.
3. Dr. Siders pointed out the importance of soil moisture content to the model input. Ms. Fu said soil moisture was measured in the field during Phase I and would also be measured in Phase II. Ms. Fu acknowledged that soil moisture, which is used to calculate water-filled and porosity, is a very sensitive model input parameter. The vapor intrusion modeling will be based on the EPA-recommended value for water-filled porosity for the soil types identified. The range of moisture levels measured in the field would be evaluated for the sensitivity analysis.
4. How are preferential pathways being handled? Ms. Fu explained that corridors, such as pipelines, that would represent potential pathways exist but that they are considered a source of uncertainty.

Dr. Krishnamoorthy noted that screening with the EPA 40-hour exposure criterion, rather than building-specific exposure times, may provide a conservative estimate of vapor intrusion risks. This approach would be more conservative than using current building occupancy estimates and then having to readjust and recalculate in the future. Mr. Smale asked how many buildings were not taken into account during the Phase I sampling and about the chances that the analysis would proceed beyond the screening level.

Mr. Quesada replied that the Navy collected samples around most of the buildings but there may be as many as 20 buildings that were not sampled. Ms. Fu clarified that the HHRA would include a site-specific vapor intrusion risk evaluation for all buildings, and that the screening evaluation discussed during this meeting was completed only to provide an initial evaluation of the Phase I results.

Dr. Krishnamoorthy asked Dr. Siders whether EPA requires sampling in or under the buildings. Dr. Siders replied that EPA is currently writing the guidance; many unknowns are associated with collecting indoor air samples as a result of multiple indoor air sources and extraneous factors. Dr. Siders suggested that if the risk estimates are above 1E-06, then the Navy may want to consider collecting sub-slab samples at worse-case scenario buildings. Dr. Siders added that sub-slab samples could be used for comparisons to ambient indoor air samples, based on specific chemicals detected and chemical ratios. These types of comparisons enable identification of vapor compounds associated with activity inside buildings versus the soil beneath. Mr. Smale added that he would discuss with Mr. Naranjo that there has to be a reason to believe that there is a potential connection between ambient air in the buildings and in the soils and groundwater to justify ambient air sampling. Dr. Krishnamoorthy provided a schematic illustration to inquire if there may or may not be a direct connection between open air in buildings and subsurface vapors or vapor intrusion. Dr. Siders used the same schematic to comment that the building acts as a "vacuum cleaner" and that attenuation can occur at the slab but can also be influenced by variations in wind speed and barometric pressure. Components of the illustration included potential connections and varying fluctuations between groundwater and subsurface soils; penetration between subsurface soils, ground surface and the building slab; ambient air in the building; engineering controls, such as heaters, fans, and air conditioning; and wind speed.

Mr. Quesada stated that he was concerned that the buildings are industrial and that the existing building uses might be a driver; Occupational Safety and Health Administration (OSHA) standards are used because of the industrial building uses. He questioned NDEP as to how OSHA limits would factor into indoor air. Mr. Smale said that he is concerned only with concentrations in soil and groundwater; those factors are the only portion that he can control, rather than contaminants detected in the building. Mr. Smale stated that his main focus is how the sampling and modeling effort is going to support a site closure strategy. Dr. Siders commented that nothing she has seen (presented during the meeting) indicates a significant risk from groundwater that would necessitate sampling indoors. Based on the results presented, it appears that indoor air sampling is not necessary; however, she believes that all variables should be considered and acknowledged as uncertainties. Dr. Krishnamoorthy said that any recommendations for indoor ambient air sampling would have to be discussed with the Commanding Officer at NAS Fallon.

Mr. Quesada said that he would follow up with Mr. Naranjo and schedule a team call to further discuss the ASG sampling and risk assessment. Mr. Smale asked about the timing for using the risk assessment results for site closure strategies. Mr. Quesada replied that the strategies would be developed on an OU-specific basis, but risks will be evaluated per site. Ms. Fu added that risk assessments have been completed for both soils and groundwater. The HHRA for groundwater considers the drinking water and construction worker scenarios. Dr. Krishnamoorthy said that Navy will review the risk-based results and identify a series of remedial action objectives in support of the feasibility study. Mr. Quesada mentioned that the applicable or relevant and appropriate requirements (ARARs) analysis will include federal and state regulations and guidelines. He also questioned Mr. Smale about the "bright line analysis" (total petroleum hydrocarbon [TPH] results that exceed 100 parts per million [ppm] in soils). Mr. Smale replied that the TPH bright line of 100 ppm is being replaced with four options for closure:

1. Cleanup strategies can continue to be based on the "bright line" for TPH of 100 ppm; however, it will not be held as a cleanup standard.
2. Cleanup strategies can be based on risk-based screening levels (RSLs). This would include a constituent analysis. As an example; if certain constituents such as benzene or hexane are not detected then a TPH value greater than 100 ppm may be accepted. Mr. Deverin questioned the use of hexane as a surrogate to identify trimethylpentane as an octane booster. He mentioned that he had not noticed detection of hexane in the analytical results. Ms. Fu replied that hexane is a hydrocarbon chain and is not included in the EPA Method 8050 analysis. Mr. Smale said that NDEP will provide future guidance based on direct contact exposures and exposure to groundwater; however, this guidance is still being evaluated and prepared.
3. The third cleanup option involves assessment using the standard "a through k" analysis, considering a site-specific identification of the potential risks.
4. The fourth option Mr. Smale discussed is using the American Society for Testing and Materials (ASTM) risk-based corrective action approach to assess circumstances that may allow some contaminated materials to be left in place.

Dr. Krishnamoorthy asked how the risk-based screening approach is used for the cleanup strategy; for example, are RSLs enforceable? Mr. Smale said that RSLs are enforceable only in terms of deriving decision criteria for cleanup that all parties will accept. Mr. Smale also added that, depending on the cleanup strategy selected and the potential for risk, the Navy could leave some contaminated materials in place. Dr. Krishnamoorthy raised the issue of asymptotic leveling of contaminant concentrations during treatment. Mr. Smale said that the "reasonableness" of continuing with treatment would have to be considered. The Navy would have to prove that the treatment is no longer effective if MCLs are not met. For example, the Navy should continue with the remediation system until it is no longer effective and asymptotic conditions demonstrate that it additional cleanup is no longer effective, it can be shown that the plume is not migrating, or until MCLs are met. Dr. Krishnamoorthy asked Mr. Smale his opinion as to when asymptotic conditions have been quantified and met. Mr. Smale stated that asymptotic conditions are determined based on a reasonable interpretation on a site-by-site basis, and the way that they would be determined (calculated) would need to be established with Mr. Naranjo. Mr. Smale said that effectiveness of groundwater cleanup, and ultimately site closure, requires (1) a complete understanding of the nature and extent and stability of the contaminant plumes; (2) indication that fringe migration is not reaching more receptors; and (3) assessment of groundwater conditions on future receptors based on the existing conditions and of characteristic factors such as the concentrations of total dissolved solids, aquifer productivity (for example, low yield), and land use controls (such as municipal codes that prevent well installation). Dr. Krishnamoorthy asked why risk-based cleanup criteria are not being considered for groundwater cleanup criteria. Ms. Fu said MCLs for many chemicals are much less stringent.

SCHEDULE FOR COMPLETING THE RI

Ms. Fu presented the schedule for the Phase II ASG sampling. The proposed Phase II sample locations will be provided to NDEP for review on October 8, and the Navy is requesting NDEP comments by October 15. The investigation will be conducted in mid-November and the validated data will be received in January 2011. The HHRAs will be updated to incorporate the ASG results, vapor intrusion risks, and the groundwater data to include more recent sampling results. Finally, the draft RI reports will be submitted to NDEP for review during the spring of 2011, as shown in slide 19 of the attached PowerPoint presentation.

Meeting Action Items:

- **Mr. Quesada said that he would follow up with Mr. Naranjo and schedule a team call to further discuss the ASG sampling and assessment.**
- **Ms. Kathy Monks will prepare and distribute the meeting minutes from the September 29, 2010, RPM meeting for NAS Fallon to the Navy for review and comment.**

Naval Air Station Fallon
Remedial Project Manager Meeting Agenda
Wednesday, September 29, 2010
9:00 a.m.

1. Results from first rotation of soil gas sampling (May 2010)
    a. Analytical results
    b. Changes from sampling and analysis/work plan

2. Modeling-based approach for predicting indoor air concentrations and estimating health risks from vapor intrusion
    a. Re-cap of work plan approach
    b. Preliminary risk estimates for rotation 1 results
    c. Quantitative uncertainty analysis of vapor intrusion risk results

3. Criteria for determining action/no action for vapor intrusion exposure pathway
    a. EPA risk management range
    b. Current vs. potential future exposure scenarios

4. Path forward for completing soil gas sampling
    a. Near-slab samples not yet collected
    b. Rotation 1 results to confirm
    c. Step-out samples based on rotation 1 results

5. Schedule
    a. Completion of soil gas sampling
    b. RI reports