

North Pole Refinery Technical Project Team
February 21, 2013
Alaska Department of Environmental Conservation, Fairbanks Office

Technical Project Team Members in Attendance

Dave Barnes	UAF, Civil and Environmental Engineering
Tamara Cardona	DEC, Contaminated Sites Program, Project Manager
Ann Farris	DEC, Contaminated Sites Program
Jim Fish	DEC, Contaminated Sites
Loren Garner	FHRA, Groundwater Program, Program Manager
Mark Gebbia	Williams, Inc.
Nim Ha	DHSS, Community Education Specialist
Ali Hamade	DHSS, Toxicologist
Lee Johnson	DEC, Drinking Water Program
Paul Lhotka	DEC, Prevention Emergency Response Program
David Smith	Koch Remediation & Environmental Services

Support Personnel in Attendance

Cory Andersen	Barr Engineering (via telecon)
Rebecca Andresen	Arcadis (via telecon)
Brian Angerman	Barr Engineering
Michelle Barnes	UAF, Graduate Student
Robert Burgess	DEC, Student Intern
Stephanie Buss	SPB Consulting, Toxicologist
Bill Cutler	Integral (via telecon)
Todd DeJournett	Barr Engineering (via telecon)
Dave Dahlstrom	Barr Engineering (via telecon)
Denise Elston	DEC, SPR-Contaminated Sites, Program Specialist
JoAnn Grady	Grady and Associates, Team Facilitator
Steve Helgen	Integral (via telecon)
Brad Koons	Arcadis
Chris Kasanke	UAF
Michael Lilly	GW Scientific
Mark Lockwood	Shannon & Wilson
Andrew Ohrt	Arcadis
Jane Paris	ERM Alaska
Shannon Price	FHRA, Groundwater Program
Gary Remple	Barr Engineering (via telecon)
Max Schwenne	ERM Alaska
Eric Zentner	Boreal Communications

Management in Attendance

Steve Bainbridge	DEC, Contaminated Sites, Manager
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INTRODUCTIONS AND ACTION ITEM REVIEW

The team reviewed the action items from the previous Technical Project Team (TPT) meeting. The team determined that all action items had been completed. The team members introduced themselves and reviewed the agenda for the day's meeting. The team agreed to proceed with the meeting as outlined in the agenda.

THE ADEC/EPA MEETING

Ms. Cardona updated the team on a recent meeting between representatives of the Alaska Department of Environmental Conservation (ADEC) and the United States Environmental Protection Agency (USEPA). Ms. Cardona said that the objective of the meeting was to update the USEPA on the ongoing assessment and cleanup efforts at the refinery and to follow up on discussions between the agencies concerning the long-term management of the site. Ms. Farris reminded the team that the USEPA can elect to manage the cleanup of the site under its Superfund program since it has met the criteria to be included on the National Priorities List (NPL). The USEPA has the option, however, to assume a supporting role in the cleanup of the site while deferring the primary management of the site to ADEC. Ms. Farris said that the discussions between the state and USEPA will continue until both parties reach a formal conclusion on the management of the site.

THE OPEN HOUSE

The team discussed comments and concerns that were raised by the attendees of the 2/20/13 open house meeting. The team discussed, at length, a concern addressed to Ms. Ha that a meeting attendee, who said he represented a number of residents, expressed concern about a "sunset policy" for the Flint Hills water solution. Much discussion ensued, during which it was decided that the "sunset policy" probably referred to people who selected a cash settlement from Flint Hills to procure their own bulk water supplies, versus using the provider selected by Flint Hills. Mr. Smith clarified that FHRA offered residents who opted for the bulk water alternative the option to have FHRA provide the bulk water deliveries thru 3rd party water delivery companies or they could take responsibility for their own water fills and receive additional compensation for doing so. He said that the cash settlement was offered to allow residents flexibility in procuring their own source of bulk water, and was an option that the community requested, and was not an option that FHRA preferred or pushed to the community. There is no mechanism in place to ensure that the settlement money is spent on bulk water supplies as intended, nor is there a provision for future water supplies in the event that their supply runs out. Mr. Bainbridge commented that while FHRA might not be held responsible for the decisions of such residents, the concern represents a potential endpoint for exposure and thus it represents a matter of interest for the department.

The team continued its discussion on various comments and concerns that were voiced during the open house meeting. Ms. Ha said that she heard concerns about the adequacy of the disclosure requirements for transactions involving sulfolane-impacted homes. Mr. Bainbridge responded that while the state requires disclosure during such transactions, it is conceivable that a home owner could sell a home without filling out the required disclosure forms, i.e., cash transactions. The team discussed other, more

general questions and concerns that were heard during the open house meeting. Team members mentioned that they heard questions regarding the handling of health issues reported by community members, and concerns about movement of the plume, the adequacy of the department's outreach effort, the frequency of sampling events at the site, and the identification of areas affected by sulfolane-impacted ground water.

ACTION ITEM: Loren will forward Ann the methodology used by FHRA to calculate the amount of the settlement offered to residents that chose the bulk water option.

SITE CHARACTERIZATION-DATA LOGGER ERROR ANALYSIS

The team undertook a lengthy discussion regarding comments received from Cory Anderson on Dr. Barnes' data logger error analysis. While conceptually there were not major disagreements on the analysis, the SC subgroup members used the discussion time to clarify differences between the approaches used by Cory Anderson and Dr. Barnes

There were further discussions on the magnitude of the error. Mr. Dahlstrom showed some example data in which the well movement exceeded maximum head differences, thereby rendering vertical gradient calculations impossible. Dr. Barnes concurred with the analysis results and observed that we just have to accept that there is a large degree of error in some wells. He identified that long well screens are another source of error in vertical gradient calculations. Mr. Lilly added that professional judgment is important in identifying problem wells or well clusters that cannot be used in gradient analysis.

Mr. Garner stated that Barr would move ahead with Dr. Barnes recommendations, and that subgroup discussions will continue to refine the analysis. Cory Anderson said that he would apply Dr. Barnes' methodology to an example data set from Flint Hills. Mr. Garner added that as soon as the subgroup has a clear SOP, they will begin calculations with the data logger data.

SITE CHARACTERIZATION: IDENTIFICATION OF DISCONTINUITIES IN THE PERMAFROST WITHIN THE PROJECT AREA

Dr. Barnes presented an overview of his preliminary plans to conduct a study to identify discontinuities in the permafrost beneath the project area. He said that prominent permafrost experts have stated that such discontinuities would be expected to exist at the Flint Hills site and could have a major effect on the groundwater flow regime, both subpermafrost and supra-permafrost. Dr. Barnes said that incorporating the location of discontinuities within the groundwater model will improve its accuracy and make it a more reliable tool for use in future remediation efforts.

Dr. Barnes said that it will likely be possible to locate the discontinuities by measuring the amounts of naturally-occurring stable isotopes of oxygen and hydrogen. He explained that the water in the sub-permafrost and supra-permafrost portions of the aquifer originate from different regions and they are subject to different environmental conditions as they flow into the project area. These different conditions will cause the isotopes to fractionate in different ways which will hopefully allow researchers

to differentiate between the different water sources. Dr. Barnes added that he has also identified anomalies in the temperature gradients at the site that could be a further indication of the presence of discontinuities. He explained that water collected from deeper areas within the aquifer are generally warmer than water at the surface, unless it is in contact with the permafrost. Dr. Barnes noted, however, that water taken from a number of wells has shown a reversal in this trend which could be explained by warmer water going through discontinuities as it moves towards the surface. Dr. Barnes said that he will propose that the stable isotope tracing study be accompanied by a more comprehensive investigation of the thermal anomalies. Dr. Barnes has identified wells for inclusion in the stable isotope study.

The team transitioned into a more general discussion on the local and regional hydrology as it relates to the Tanana River. Mr. Lilly explained that, on a large scale view, the North Pole area is located in a discharge area of the Tanana Valley. The Tanana River is being fed by subpermafrost base flow year-round and that the recharge zone for the subpermafrost aquifer is in the Alaska Range. During the summer, high water levels in the Tanana will also feed shallow groundwater, and local flow systems that are permafrost and terrain-controlled can cause temporary, local reversals in the overall groundwater flow direction. Ms. Farris remarked that the state has some reservations about some of the more detailed hydrological assumptions in the groundwater model which should be addressed in future subgroup meetings.

SAMPLING PRIORITIES

Andrew Ohrt provided details about the current sampling priorities and status. FHRA's highest priority locations include sentinel wells, wells with increasing trends, remediation performance monitoring, primary source area wells, and wells critical to the groundwater model. The second priority locations include the VPT and some property boundary locations. The secondary source locations are considered third priority, and all remaining wells are fourth priority. Mr. Garner observed that their list of priorities should coincide with what DEC has requested. Ms. Paris commented that there is overlap between Dr. Barnes' list of wells and the list of wells requested by DEC for a second sample event in 1Q 2013. Ms. Paris and Mr. Garner agreed to review and further discuss the list at upcoming subgroup meetings.

Ms. Paris inquired as to the status of the sub permafrost private well sampling, noting these are the wells from which Dr. Barnes would like to gather samples. Mr. Garner stated that FHR has most agreements in place to conduct that sampling. He added FHRA would rather collect the samples in March and it will work well to collect samples for UAF in conjunction with other work.

Mr. Schwenne noted there were several wells that probably do not have to be sampled, at least not quarterly, and suggested that the subgroup identify those wells. Mr. Garner stated they have not fully identified that list of wells as some are sentinel wells for the main plume and they are FHRAs top priority. He will add the topic for discussion at the upcoming subgroup meeting so as to be able to come to agreement on the list of wells that do not have to be sampled on a quarterly basis.

Mark Lockwood asked how the second sampling of the wells will affect the schedule for the next quarter. Mr. Garner stated his assumption is that FHRA will target mid second quarter rather than do two samples again in the second quarter.

Ms. Paris offered that the request was never intended to ask FHRA to sample all the wells twice a quarter, rather that they specifically target the first quarter since water levels are low and March is the closest to a steady state. After evaluating the results, DEC can determine whether there will be need for additional monitoring at a higher frequency than quarterly. She added she does not anticipate it will be all 30 wells. The need is to get a best estimate of trends in these locations.

ACTION ITEM: The Site Characterization Subgroup will address the issue of monitoring well prioritization and facilitating Dr. Barnes' stable isotope study at the next subgroup meeting

INTERIM REMOVAL ACTION PLAN (IRAP) DISCUSSION

The team undertook a brief discussion on the status of comments on the IRAP. The team agreed that recent subgroup meetings discussing the IRAP had been useful. Ms. Cardona stated she had subsequent discussions with FHRA that outlined additional steps that were in need of clarification in the document. Mr. Garner stated DEC's suggestions were helpful, and FHRA would be moving forward to address the steps outlined by DEC. He asked if there would be any additional comments to consider, and when FHRA might receive them. Ms. Paris said they were working on additional comments. Ms. Cardona suggested a comment matrix be developed that distinguished between the immediate needs for approval of the IRAP, and the requirements which will need to be addressed in the future as final remedy discussions begin. Mr. Smith indicated FHR technical team is focusing on the correct level of detail for an interim action and asks that DEC and its consultants keep this in mind during discussion and review. DEC and its consultants acknowledged that they are aware of it only being an interim measure at this time.

ONSITE AND OFFSITE DATA GAPS

Mr. Ohrt gave a brief presentation on the location of additional wells that FHRA has proposed to install offsite. The offsite monitoring well information will also be presented in the upcoming 2013 Site Characterization Work Plan (SCWP). He said that in addition to data from these new monitoring wells, the work plan will also include updated versions of the cross sections from the original Site Characterization Report (SCR), as well as permafrost measurements and data that have been collected from transducers that have been installed in certain wells, once the datalogger SOP is finalized.

The team discussed Mr. Ohrt's presentation. Ms. Paris acknowledged that, without having considered the existing property restrictions and other logistical challenges, it appeared that it might be helpful to add a few more monitoring wells in certain places, especially along a transect between Monitoring Wells (MWs) 161 and 164 where there is a scarcity of data. Mr. Garner replied that his team is reviewing the updated cross sections to determine where it may be practicable to place additional transects. Ms. Paris commented that while the proposed additional wells look like a good start, the members of the Site Characterization subgroup will want to review the data as it comes in and further discuss whether the proposed wells are adequate to characterize the flow path of the contamination.

ACTION ITEM: Mr. Lockwood will create a map of the project area showing areas that are restricted due to access issues and logistical considerations. Flint Hills will submit a 2013 Offsite Characterization Work Plan by March 12. Private well data will be added to the database by mid-March.

The team transitioned to a broader discussion of the data gaps that have been identified by ERM in the Onsite 2013 Site Characterization Work Plan. Ms. Paris said she felt that the data gaps related to priority monitoring locations, the comprehensive hydrological conceptual site model, and multi-level well transects located down-gradient of the refinery either have been addressed, or are currently being addressed by the Site Characterization subgroup. The team discussed the proposal to add pressure transducers to certain wells. The team agreed that it would continue reviewing incoming data and its Standard Operating Procedures (SOP) to determine how it would deploy pressure transducers in project wells. The team reviewed the status of its plans to sample deep residential wells. Mr. Garner said that his group will add its data from these wells to the sampling and analysis plan once it is validated.

The team engaged in a lengthy discussion regarding the data gaps related to sulfolane in surface water. Ms. Buss suggested that it may be prudent for the team to reevaluate some of the assumptions in the site's ecological scoping document given the limited sampling of on-site and off-site surface water, the relatively high pore water measurement, and the limited background information on the ecological impacts and degradation properties of sulfolane. She said that she felt it was particularly important that the team conduct additional off-site sampling. Ms. Cardona acknowledged that the limited surface water samples represent a data gap and concurred that the FHRA should propose to take additional surface water samples. The team discussed certain issues related to the sampling of surface water and whether the aforementioned samples, taken in the winter, were truly representative of surface water rather than groundwater. Mr. Smith said that FHRA would probably have to have some internal discussions on the issue before it was able to commit including any additional sampling of surface water in the work plan.

The team revisited its earlier discussion on current on-site data gaps. The team agreed to defer further discussion on sampling Granulated Activated Carbon (GAC) to the degradation subgroup. The team touched on its ongoing discussion of whether additional efforts are required to adequately delineate the vertical distribution of the Light Non-Aqueous Phase Liquid (LNAPL) contamination at the site. Ms. Paris said that she would consult with Mr. Haas and report his specific concerns on the issue with the team.

ACTION ITEM: Ms. Paris will contact Mr. Haas and report to the team his concerns about FHRA's proposed efforts to delineate the vertical extent of the LNAPL contamination at the site.

The team took up discussion of ERM's proposal that FHRA collect soil gas data at the site. Ms. Paris reminded the team that the purposes of the proposal are twofold, to determine the potential of exposure to soil gas through the intrusion of vapor into on-site buildings, and to determine the viability of bio-venting as a remediation technology. Mr. Ohrt informed the team that his group is still evaluating the potential for vapor intrusion into on-site structures by reviewing their engineering plans to determine whether they have adequate vapor barriers. He added that, at this point, his group feels that it would be premature to establish a soil gas sampling plan for the site. The team discussed whether an

assessment of soil gas data is applicable to the fulfillment of safety requirements at the site. Mr. Smith stated that FHRA is working to determine if vapor intrusion is potentially not applicable to the scenario for current risk, and that addressing it in the future with an IC may suffice. Ms. Farris asked whether there were any disadvantages to collecting soil gas data. Mr. Koons replied that, from a remediation standpoint, there is no disadvantage to collecting the data, aside from the cost. Ms. Farris further suggested that soil gas may also be a simpler way to approach vapor intrusion risk than performing indoor air sampling.

The team discussed LNAPL and associated data gaps. Ms. Farris stated the department wants to further understand how areas on the refinery where there is sulfolane in LNAPL relate to areas, such as the wastewater area, where LNAPL is not present. She would like to understand that relationship, and specifically how it relates to Geomega's model. She asked for more data on micro-slices and the LNAPL partitioning so as to better understand the relationship. She furthered that it supports the fundamental understanding of the sources and that reflects back on understanding the modeling effort.

The team agreed to further discussions on the data gaps to the site characterization subgroup for resolution.

THE DEGRADATION SUBGROUP

Chris Kasanke from UAF delivered a brief report to the team reviewing the current status of degradation studies being conducted on sulfolane at the university. He reviewed the process by which degradation is being tested. They are currently on day 120 of incubations from onsite soil and groundwater spiked with sulfolane. The GC/MS broke down on Day 20; there were no indications of degradation through that period. Samples collected after Day 20 were frozen to preserve them until the GC machine was repaired, on February 10. Initial indications are that the incubations show some evidence of degradation, although there are quality control issues to be worked through. He thought that by the next team meeting, they should have more solid information to share regarding the outcome, but at this juncture, they can cautiously suggest that some degradation of sulfolane is occurring. He they are monitoring the pH levels, as literature has reported that sulfolane degradation is correlated to a drop in pH due to sulfuric acid.

Mr. Garner offered that he had not forgotten that UAF requested additional soil and water samples from them, and offered that if UAF could let him know their specific needs for the samples, he should have the opportunity in the next months as they drill new wells, to provide those samples. Mr. Kasanke said he would get that information to Mr. Garner by email.

ACTION ITEM: Mr. Kasanke will send Mr. Garner specifics regarding soil and water sampling needs.

THE DRINKING WATER SUBGROUP

Mr. Johnson, Mr. Price, and Mr. DeJournett updated the team on recent developments within the drinking water subgroup. Mr. Johnson said that the department recently approved the installation of the public treatment system at the North Pole Christian School and they are now processing the smaller

Class C systems. He is working with Mr. Price to update and streamline the spreadsheet they are using to track the systems as they move through the approval process. Both ADEC and FHRA will be able to see each other's updates in real time once they are complete.

The team discussed the backwashing procedure for the residential Point of Entry (POE) systems. Mr. DeJournett briefly described how the systems are backwashed, the frequency of backwashing, and the approximate volume of the wastewater that is released into the septic or soil absorption systems during the backwashing process. Ms. Cardona suggested that it would be helpful to sample the wastewater from the backwashing to understand how sulfolane behaves under anaerobic conditions. She said it would be best to sample the backwash shortly before, and then sometime shortly after, the carbon filters on the system are exchanged.

NEXT STEPS The team discussed the schedule for the upcoming TPT meetings. The team tentatively agreed hold the next TPT on April 17th, and the following TPT meetings on May 16th and June 18th in Fairbanks, Alaska.

The team adjourned at 4:00 PM Alaska Time.