

**North Pole Refinery Technical Project Team**  
**January 18, 2012**  
**DHSS Anchorage Offices – 3<sup>rd</sup> Floor Conference Room**  
**Anchorage, AK**

**Technical Project Team Members in Attendance**

Dr. Dave Barnes	UAF, Civil and Environmental Engineering, Department Chair
Bill Butler	City of North Pole (telecon)
Cindy Christian	DEC, Drinking Water Program, Compliance Manager (telecon)
Ann Farris	DEC, Contaminated Sites Program, Project Manager
Loren Garner	FHRA, Groundwater Program, Manager
Nim Ha	DHSS, Acting Program Manager, EPHP
Elizabeth Page	Koch Remediation & Environmental Services (telecon)
Shannon Price	Flint Hills Resources Alaska (telecon)
Jeanne Schwartz	DEC, Industry Preparedness Program (IPP)

**Support Personnel in Attendance**

Rebecca Andresen	Arcadis
Brian Angerman	Barr Engineering (telecon)
Steve Bainbridge	DEC, Director, Contaminated Sites Program
Stephanie Buss	SPB Consulting, Toxicologist
Todd DeJournett	Barr Engineering (telecon)
Denise Elston	DEC, SPR-Contaminated Sites, Program Specialist
Jim Fish	DEC, SPR-Contaminated Sites, Program Specialist (telecon)
JoAnn Grady	Grady and Associates, Team Facilitator
Brad Koons	Arcadis, Principal Engineer (telecon)
Kimberly Lake	Johnson Wright (telecon)
Mark Lockwood	Shannon & Wilson (telecon)
Johnny Mendez	DEC, Drinking Water Program
Meg Michell	Environmental Standards, Inc. (via telecon)
Andrew Ohrt	Arcadis
Phil Roberts	Williams, RP
Gary Remple	Barr Engineering (telecon)
Max Schwenne	OASIS Environmental, Project Manager
Eric Zentner	Boreal Communications Strategies

**INTRODUCTIONS AND ACTION ITEM REVIEW**

The meeting began at 9:00 Alaska time as team members introduced themselves and reviewed the action items from the previous meeting. The team discussed the first action item. Ms. Farris said that

the EPA agreed that the state's data validation process is acceptable. The team agreed that all other action items from the previous meeting had been completed. The team reviewed and approved the agenda of the meeting after making minor changes to the order of the presentations.

### **COMMENTS ON THE SITE CHARACTERIZATION REPORT**

The team discussed the draft version of the Site Characterization Report (SCR). Mr. Schwenne outlined a list of data gaps which he suggested the team address during the subsequent meetings of the Site Characterization subgroup. Several team members remarked that it would be premature to decrease the frequency of the gauging and sampling of monitoring wells in the project given that data gaps remain with regard to the extent of the plume, the movement of contamination within the vertical gradient, and the influences of permafrost and seasonal change. Ms. Farris commented that most of these data gaps highlight the question of how sulfolane is getting into the deeper down-gradient areas. Dr. Barnes added that, currently, the site model reflects the regional characteristics of the project area; but he expressed concern that if the frequency of monitoring and gauging is decreased, the team may miss some of the data necessary to make the model more reflective of local site conditions.

The team further discussed the aforementioned data gaps. Mr. Schwenne suggested that the Site Characterization subgroup should continue to discuss the possibility of adding additional monitoring wells, and, perhaps, additional well transects to further characterize the site. He added that the subgroup needs to discuss how it will sample sub-permafrost areas. Mr. Garner said that while Flint Hills Resources Alaska (FHRA) agrees, in-part, to the aforesaid comments, they question whether they should maintain the frequency of the monitoring of certain groups of similar wells that may be producing redundant data sets. He explained that due to the severity of the winter temperatures FHRA has had to prioritize the sampling of project wells according to the meaningfulness of the data they are expected to deliver. The team agreed that the monitoring plan is important and should be further discussed in future subgroup meetings.

### **DATA REPORTS**

The team briefly transitioned to a discussion on ways to improve the exchange and presentation of project data deliverables. Ms. Farris commented that under the current system of database sharing, the regulatory agencies must wait for a period of up to three months between the time that data is submitted and the time that it is validated and can be reviewed. She asked whether the team had any suggestions on how to streamline the system by presenting validated data to the team before processing it into more lengthy reports. Mr. Garner said that FHRA is currently working with Shannon & Wilson to create a web interface which will allow team members more timely access to project data. He said that the project is in its first phase during which they will migrate the existing data from Access to a sequel server. Mr. Garner said that it will likely take a few months to work out security issues and verify that the new system is fully functional. He asked the team members whether they had any ideas regarding applications that they would like to see incorporated into the system.

The team continued its discussion on the proposed server. Several team members suggested that it would be useful if the server were designed in such as way that they could use it to generate an

automatic Excel spreadsheet for a given subset of wells to simplify the analysis of concentration trends. They added that it would be particularly helpful if the spreadsheet could be saved as a text file that could be incorporated into other applications. Ms. Elston informed the team that the Alaska Department of Environmental Conservation (ADEC) is currently working to streamline the access to the existing project database. She suggested that the department coordinate its efforts with FHRA and Shannon & Wilson.

**ACTION ITEM:** Ms. Elston will schedule a meeting with Mr. Cliff Jones to discuss the development of the new project database.

**ACTION ITEM:** Mr. Garner will provide to Ms. Elston the contact information for Mr. Jason Weed.

### **COMMENTS ON THE SITE CHARACTERIZATION REPORT CONTINUED**

The team revisited its discussion on how it will address data gaps that have been identified in the draft SCR. Mr. Schwenne presented a series of slides showing the proposed locations for additional monitoring well clusters and transects. He pointed out the location of monitoring wells that have been equipped with pressure transducers and suggested several additional monitoring wells wherein additional transducers should be installed. Dr. Barnes added that the intent behind the proposed transducers is that they provide the team a better understanding of how the vertical gradient affects the movement of contamination in the down-gradient areas.

The team considered the possibility of adding additional monitoring well transects. Ms. Farris reiterated that it may be necessary to establish additional transects in order to fully explain the concentrations of sulfolane that have been found at depth. She added that the team must thoroughly understand the vertical movement of the plume before it can confidently decide between the alternative remediation options and before it can evaluate the efficacy of the remediation efforts. Mr. Schwenne asked Dr. Barnes if he would consider where it would be best to place an additional transect for the purposes of the degradation study.

**ACTION ITEM:** Dr. Barnes will consider where it would be best to place an additional transect for the purposes of the degradation study.

The team took up consideration of a figure depicting the contour lines for the concentrations of sulfolane within the project area. Mr. Schwenne commented that the figure should have some notation of the uncertainty associated with the lines delineating the northern edge of the plume since the wells used to generate these lines are as far as two thousand feet apart. The team discussed the possibility of adding additional monitoring wells to better define the concentration of sulfolane along the northern boundary of the plume. The team agreed that the decision of whether to install additional wells along the northern boundary would be largely determined by logistical considerations associated with that area.

The team continued its deliberation on the proposed efforts to further characterize the vertical profile of the project site. Mr. Garner informed the team that FHRA's technical team intends to add additional

wells to well clusters MW 302, 303, and 304 to a depth of 90 to 95 feet in order to refine the delineation of non-detects along the lower bounds of the transect. Mr. Schwenne asked Mr. Garner and Dr. Barnes to consider whether it would be worthwhile to place a shallower well near MW 303 for the purposes of vertical profiling. The team agreed to take up further consideration of the possibility during the next meeting of the Site Characterization subgroup.

### **SUMMARY OF RECENT SITE CHARACTERIZATION EFFORTS**

Mr. Garner presented a series of slides summarizing the results of recent site characterization efforts. He said that FHRA is reevaluating the location of the 10 ppb contour line on the concentration map based on recent data from private wells located on the outer edge of the affected area. The team reviewed a slide showing the depths and locations where permafrost has been discovered in the project area. Ms. Farris asked Mr. Garner whether he has come to any conclusions regarding the possible interaction between the permafrost and the vertical movement of contamination. Mr. Garner replied that the presence of variable amounts of contamination at depth in wells through permafrost suggest contamination may not be getting to depth only along thawed wells. It may indicate that permafrost is driving the contamination to depth or that contamination may be transported beneath the permafrost.

The team discussed Mr. Garner's remarks. Several team members agreed that drilling monitoring wells through the permafrost layer seems to be warranted given the importance of understanding whether it is, in fact, a confining layer. The team considered how it could evaluate the movement of contamination as it moves about a permafrost layer. Dr. Barnes suggested that the team attempt to find a well that goes through the permafrost that is located near an area that is free of permafrost. The team could then determine whether the well boring altered the distribution of contamination in the area by comparing it to the existing gradient in the adjacent permafrost-free area. Mr. Garner said that FHRA has identified a residential well located on Tanana Drive that might prove to be a suitable candidate for such a comparison. He said that FHRA is continuing to look for similar wells to better understand the relationship between permafrost and the contamination gradient.

Mr. Schwenne asked whether FHRA has encountered any other confining layers in the 100 to 150 foot zone. Mr. Garner replied that that project drillers have encountered a fairly consistent layer of dense material in the 125 to 130 foot depth range. He said that this layer has been encountered in a number of places and that it is the only subsurface feature that has been encountered on the site other than sand and gravel. Mr. Garner said he believes that the dense layer is only a few feet thick since drillers have been able to penetrate it within the extent of their equipment. Dr. Barnes commented that it will be important to determine whether the dense layer is acting as a confining layer since that would affect the movement of contaminants within the affected area.

The team transitioned to a broader discussion on whether any trends have yet been identified with regard to the vertical gradient. Mr. Garner said that while the existing data generally suggests an upward vertical gradient, early transducer data has indicated that seasonal reversals have occurred. He noted that the data from the transducers and data well loggers is somewhat limited at this point, but

FHRA hopes to include a robust analysis of the topic in the final report after more data becomes available.

## **COORDINATION OF RESEARCH PROGRAMS**

Dr. Barnes and Ms. Andresen described project-related research programs that are currently being pursued by The University of Alaska Fairbanks (UAF), Barr Engineering, and Arcadis Environmental. Ms. Andresen said that Barr Engineering is performing bench testing and observational studies to better understand the behavior of sulfolane in the in-home treatment systems and in the refinery's remediation system. The topics of these studies include the degradation of backwash solids under anaerobic conditions and the analysis of factors affecting the natural attenuation of sulfolane in the project area. Arcadis is currently conducting stable isotope research as well as biotrap studies to assess the viability of microbial attenuation at the site.

Dr. Barnes said that since there seems to be some overlap between the research that is being conducted by UAF and that which is being conducted by Arcadis and Barr, it will be important to establish regular communication between these organizations to prevent the unnecessary duplication of efforts. He reminded the team that some of the university's researchers involved in this project are world-renown experts in their fields and he stressed the importance of coordination on topics where their expertise can be brought to bear. Dr. Barnes said, specifically, that there is considerable uncertainty regarding the movement of water around frozen soil and this is reflected in the character of the local site model. He suggested that the expertise of the University researchers could prove highly useful in elucidating the highly localized mechanisms that may be governing the movement of contaminants throughout the plume.

The team discussed how communication would proceed between the university and the private researchers. Ms. Farris said that she asked ADEC's Mr. Jim Fish to facilitate communications between the organizations at every available opportunity. She said that she would create a schedule for these meetings and present it to FHRA and its contractors for their consideration. Mr. Garner commented that it would be useful to include updates on these collaborative efforts during meetings of the Site Characterization subgroup.

**ACTION ITEM:** Ms. Andresen will send to Mr. Barnes her slide summarizing the ongoing research that is being conducted by Barr Engineering and Arcadis Environmental.

**ACTION ITEM:** Ms. Farris will send Ms. Andresen the contact information for Mr. Fish to ensure that he is cc'd on the list on ongoing research.

## **SOURCE REMEDIATION UPDATE**

Mr. Angerman gave a brief summary of the recent performance of the refinery's remediation system. He said that throughout the 4<sup>th</sup> quarter of 2011 the flow rate for the system's groundwater recovery and treatment unit averaged 366 gallons per minute (gpm) as compared to the 132 gpm in 2009 and 204 gpm in 2010. As this point, the Granular Activated Carbon (GAC) system has processed 86 million

gallons of water without breakthrough. Barr Engineering theorizes that the prolonged life of the GAC system is due to the degradation of sulfolane which has been observed throughout various points in the treatment system.

Mr. Angerman said that in 2011, 3603 gallons of Light Non-Aqueous Phase Liquid (LNAPL) contamination were recovered by the system as compared to 635 gallons in 2009 and 3634 gallons in 2010. He noted that seasonal recovery wells R-32 and R-33 would be down for the winter and that the collection system from S-50 had been moved to R-21 due to freezing issues. Mr. Angerman said that they observed significant increases in the recovery rates of recovery wells R-21, and R-40. He added that once it is warm enough to use the portable recovery unit, they will begin conducting weekly recovery events at O-11 and O-13, the new observation wells located near the truck racks.

### **AIR SPARGING PILOT TESTS**

Mr. Angerman updated the team on the status of the air sparging pilot tests. He reiterated that recent data from the remediation system and bench testing have indicated sulfolane is removed from contaminated water at an encouraging rate when the water is aerated in the presence of iron solids. Mr. Angerman briefly described the monitoring system that is being implemented to measure the removal of sulfolane from contaminated water as it passes through various points along the remediation system. He described the location and orientation of a system of sparge points and sparge lines that will be put into operation to determine the radius of influence of the sparging mechanism. The data from this system will then be applied during the development of the full scale system.

### **BENCH TESTING**

Mr. DeJournett described the results of the ongoing bench testing that is being conducted to clarify the mechanism by which sulfolane is being removed as it passes through the various components of the remediation system. Mr. DeJournett said that Barr Engineering believes that the removal mechanism appears to be associated with iron solids that have been backwashed off of the sand filter and have collected in gallery ponds at the refinery. The results of synthesized oxide testing seem to indicate that there are abiotic and biotic factors contributing to the reduction process. Mr. DeJournett said that the reduction process does not seem to be affected by cold temperatures as demonstrated by observations of continued removal throughout the winter months and by bench tests that were run at a temperature of two degrees Celsius. He said that while the removal occurs at faster rate and is more complete under aerated conditions, it has been observed under non-aerated conditions as well.

### **THE FEASIBILITY STUDY**

Mr. Ohrt presented an update on the status of the development of the Feasibility Study (FS). He outlined the Remedial Action Objectives (RAOs) for soil, groundwater, and LNAPL which have been formulated by his team and which will serve as the underpinnings of the FS as prescribed in the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), ADEC's August letter, and guidance directives set forth by the Interstate Technology & Regulatory Council (ITRC). The team deliberated on the use of the terms "mobility" and "migration" as it is applied to the RAO for LNAPL. Ms. Farris

recommended that the drafters refer to ADEC regulations when making decision regarding the use of these and other key terms during the drafting process.

### **THE TOXICOLOGY SUBGROUP**

Ms. Buss updated the team on recent developments within the Toxicology subgroup. She informed the team that sulfolane was nominated to the National Toxicology Program (NTP) by the Board of Scientific Counselors in December. Ms. Buss said that there was strong, unanimous support among the board members for conducting additional toxicological research on sulfolane. During the next stage of the process, the board will assign a principal investigator and a team of researchers to design a study package for the chemical which will be proposed for funding.

**ACTION ITEM:** Ms. Andresen will schedule a call with Dr. Laurie Haws to further discuss the nomination of sulfolane to the NTP.

The team transitioned to a discussion on the imminent release of the EPA's Provisional Peer Reviewed Toxicity Value (PPRTV) for sulfolane. Ms. Farris said that she expects that the PPRTV will be released by the end of the week. She clarified that while it is not specified in regulation, ADEC's standard policy prescribes the use of the PPRTV to set site specific cleanup levels and evaluate the risk at the site. She added, furthermore, that ADEC management has indicated that they intend to use the standard policy at this site.

### **THE CHEMISTRY SUBGROUP**

Ms. Buss updated the team on recent developments within the Chemistry subgroup. She said SGS, a project laboratory, recently developed a water extraction procedure which resolves previous issues caused by interference from petroleum constituents in soil samples. The Chemistry subgroup granted the laboratory tentative approval for the use of the procedure which has allowed them to successfully rerun the samples that were previously subject to the interference. SGS is currently in the process of validating the data from these reruns. Ms. Andresen commented that they are waiting for the subgroup's decision on how to handle holding time and freezing issues associated with the rerun samples before the results of their analysis can be incorporated into the RA. Ms. Buss indicated the subgroup is to meet the following Friday to discuss these issues.

Ms. Buss continued her discussion on the approval of the water extraction procedure. She said that the subgroup intends to meet once more to review the Standard Operating Procedures (SOP) document for the procedure before it finalizes its approval. Ms. Farris reminded the team that the department intends to modify the key elements documents from this project so that they can be used throughout the state by other laboratories that are conducting analyses of sulfolane affected media.

### **RISK COMMUNICATION UPDATE**

Ms. Grady updated the team on recent developments within the Risk Communication subgroup. She said that the project newsletter is in its final review and should be ready by the upcoming Friday. Ms. Grady remarked that the subgroup made a close review of the results of the project survey and attempted to draft the newsletter to accommodate the suggestions of its respondents. Ms. Farris gave a brief summary of her recent presentation to Representative Tammy Wilson and Senator Coghill. She said that the legislators expressed concern about a scenario in which FHRA or other subsequent owners of the refinery may not be able to cover the long-term costs of maintaining the in-home treatment systems. She said that Senator Coghill requested information on the monthly costs associated with the operation of these systems.

### **THE DHSS HEALTH CONSULT**

Ms. Ha said that the Department of Health and Social Services (DHSS) is planning to release the next version of its health consultation for contaminated groundwater on the following day. She said that this version of the health consultation will mainly be a compilation of previous factsheets, but its summary of the recent data from the Alaska Cancer Registry and Alaska Birth Defects Registry has not yet been presented to the public in factsheets, workshops, or public meetings. Ms. Ha reiterated that the data from the registries do not indicate any unusual rates of birth defects or cancer in the project area.

Ms. Ha said that, in addition to the information from the registries, the next version of the health consult will include notification that the department has revised one of its recommendations concerning the use of sulfolane impacted groundwater. She said that when the NTP's advisory board discussed the nomination of sulfolane, several of its toxicologists questioned whether an exposure pathway exists in the possibility of residents inhaling water droplets while using impacted water to shower. In light of these concerns, the department has decided to revise its recommendation to include the uncertainty surrounding this pathway until the NTP has a chance to full address the pathway of concern.

### **DRINKING WATER SUBGROUP**

Mr. Price updated the team on recent developments within the Drinking Water subgroup. He said that FHRA has had 284 properties with detections outside of the city water main system. FHRA is currently providing one of the three long-term solutions at 237 locations which include 133 in-home treatment systems, 79 bulk water tanks, and 25 locations that have been placed on long-term bottled water delivery. Mr. Price said that FHRA's efforts to provide a permanent solution to all affected homeowners are still underway as there are about 70 homeowners awaiting the installation of their systems and there are about 35 people who are still deciding amongst alternatives.

Mr. Price briefly updated the team on the recent actions that FHRA has taken to address a handful of complaints about excessive amounts of copper in the water from the bulk tanks or treatment systems. He said that FHRA has identified seven locations that had copper levels at or above the state's action level of 1.3 ppm, the highest of which was 2.5 ppm. At each of these locations, the majority of the copper piping was grounded at the time the system was installed. FHRA determined that the copper originated primarily from electrolysis between dissimilar metals within the plumbing systems at the

residences, and has remedied the problem by bonding and grounding all visible segments of copper piping in the plumbing systems and changing the bulk water source for one bulk tank system.

Ms. Christian reviewed the latest sample results for the NP public water system, taken on December 19<sup>th</sup>. She said that at Well B, the sample results continue to be a non-detect for sulfolane. She said sampling will now switch to a quarterly schedule for the next year.

She added that Northern Testing has been conducting the sampling to date, but that the City of North Pole had requested to take over the sampling of the wells themselves; ADEC has agreed to this proposal.

## **THE RISK ASSESSMENT REPORT**

Stephanie Buss reported on the status of her review of the Risk Assessment (RA). She stated that her comments were complete on the report, and while in general the report was agreeable, there were a few discussion points to be pursued, mainly those concerning pore water data, soil water data, EPC calculations, resulting risks, and the absence in the document of the final COPC screen table.

The most significant concern regarding the RA was the lack of information or data addressing the pathway between groundwater and surface water. Ms. Farris questioned how it was to be addressed. She commented that if there is a connection, the report will need to address it as a complete pathway, or otherwise demonstrate that it is not. She stated that the assumption in the RA was that it was NOT a complete pathway. Ms. Buss agreed and stated the difficulty is that if the pathway is complete, it will need to be quantified and there is no data or model at this time to accomplish that task. Ms. Andresen agreed that data is needed and added that there is a plan in place to collect the data, but it will not be available before February 6<sup>th</sup>, the due date for the RA.

The team discussed ways in which to address the dilemma, suggesting that the RA be allowed to proceed as a draft final with the assumption that the connection to surface water is a complete pathway and with an addendum addressing that pathway added in the final version of the RA. It was stated this would be sufficient to the team.

Ms. Buss commented on the remainder of concerns regarding the report. She stated she will review the full COPC screening with the next draft, adding as a caveat that she has not checked the calculations or full screening since not all the data was incorporated into the draft RA. She said she would complete that review during the next draft of the document. She also stated that she felt the discussion on the risk and hazard sections needed work so that it would be transparent to the reader what risks and uncertainties exist at the site. She also cautioned against averaging only four vegetable samples to determine a bio concentration uptake factor.

Ms. Farris brought forth the PPRTV value for discussion with the team and stated that ADEC would most likely be set their reference dose using the EPA PPRTV toxicity value. She said the PPRTV number is expected be released by next week.

## **DELIVERABLES AND UPCOMING MEETINGS**

The team discussed upcoming comment resolution meetings and the deliverables that are associated with them. Mr. Garner stated that February 6<sup>th</sup> is the due date for the final groundwater model report and RA. The SCR final is due February 24<sup>th</sup>, and the draft on-site FS is due February 25<sup>th</sup>, the final on-site FS is due April 28<sup>th</sup>.

The team agreed to set up two site characterization meetings: January 20<sup>th</sup> and January 31<sup>st</sup>.

The next TPT is scheduled for March 7<sup>th</sup> and will be held in Anchorage. The following TPT is now set for May 1 in Fairbanks and will be accompanied by a Community Open House the evening of the 1<sup>st</sup>.