



Environmental Remediation Subcommittee

Thursday, February 4, 2016 @ 5:00 p.m.

Agenda

Chair
Renie Barger

Vice-Chair
Mike Kemp

Subcommittee Members

William Murphy
Nancy Duff
Tom Grassham
Mike Kemp
Kevin L. Murphy
Carol Young

Call to Order

Introductions

Overview of C-400 Phase IIb Treatability Study

Next Steps and Actions

Southwest Plume SWMUs 211-A and 211-B Final Characterization

Next Steps and Actions

Adjourn

Jennifer Woodard
DOE DDFO

Buz Smith
DOE Federal Coordinator

Board Liaisons

April Webb
*Division of Waste
Management*

Julie Corkran
Environmental Protection Agency

Mike Hardin
Fish and Wildlife Resources

Stephanie Brock
Radiation Health Branch

Support Services

EHI Consultants, Inc.
111 Memorial Drive
Paducah, KY 42001
Phone 270.554.3004
Fax 270.554.3248

www.pgdpcab.energy.gov



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MANAGEMENT**

**U.S. Dept. of Energy
Paducah Site
Citizens Advisory Board
Remediation Subcommittee
C-400 Interim Remedial Action Phase IIb Steam Injection
Treatability Study Report**

Tracey Duncan – FFA Manager, DOE

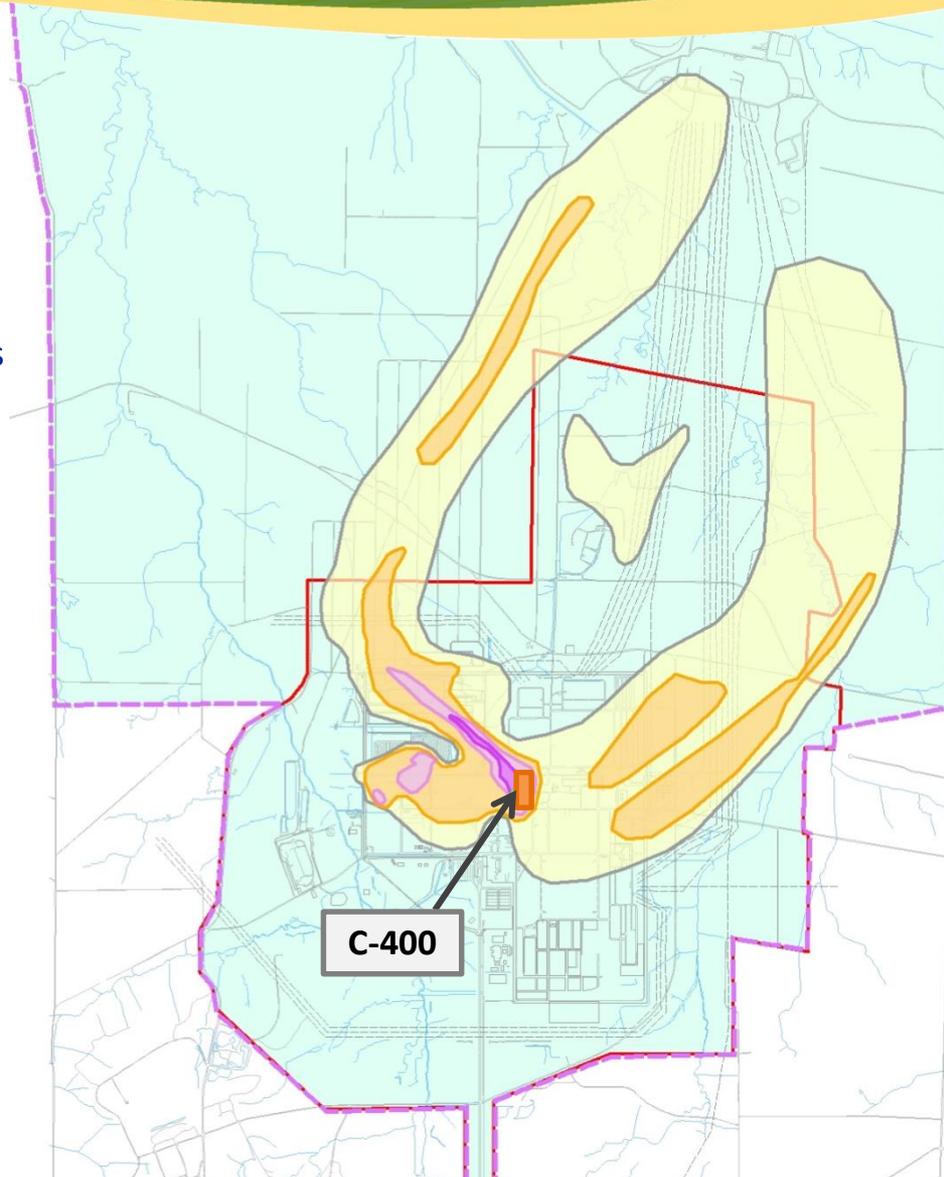
February 4, 2016

- Treatability Study conducted from April 9, 2015–June 30, 2015
- Principal Study Questions:
 - “Under what conditions can steam be injected into the Regional Gravel Aquifer (RGA) to develop a technically effective steam front as a basis for preliminary technology design and cost estimation?”
 - ❖ 20 ft. radius of influence for steam injection wells
 - ❖ 500 lbs./hr. in shallow injection interval
 - ❖ 1000 lbs./hr. in deep injection interval
 - “How does steam injection using two injection intervals (middle and lower RGA) differ from injection using a single deep injection interval?”
 - ❖ Benefit of higher steam injection rates in lower RGA screen demonstrated more horizontal steam flow at the RGA/McNairy interface

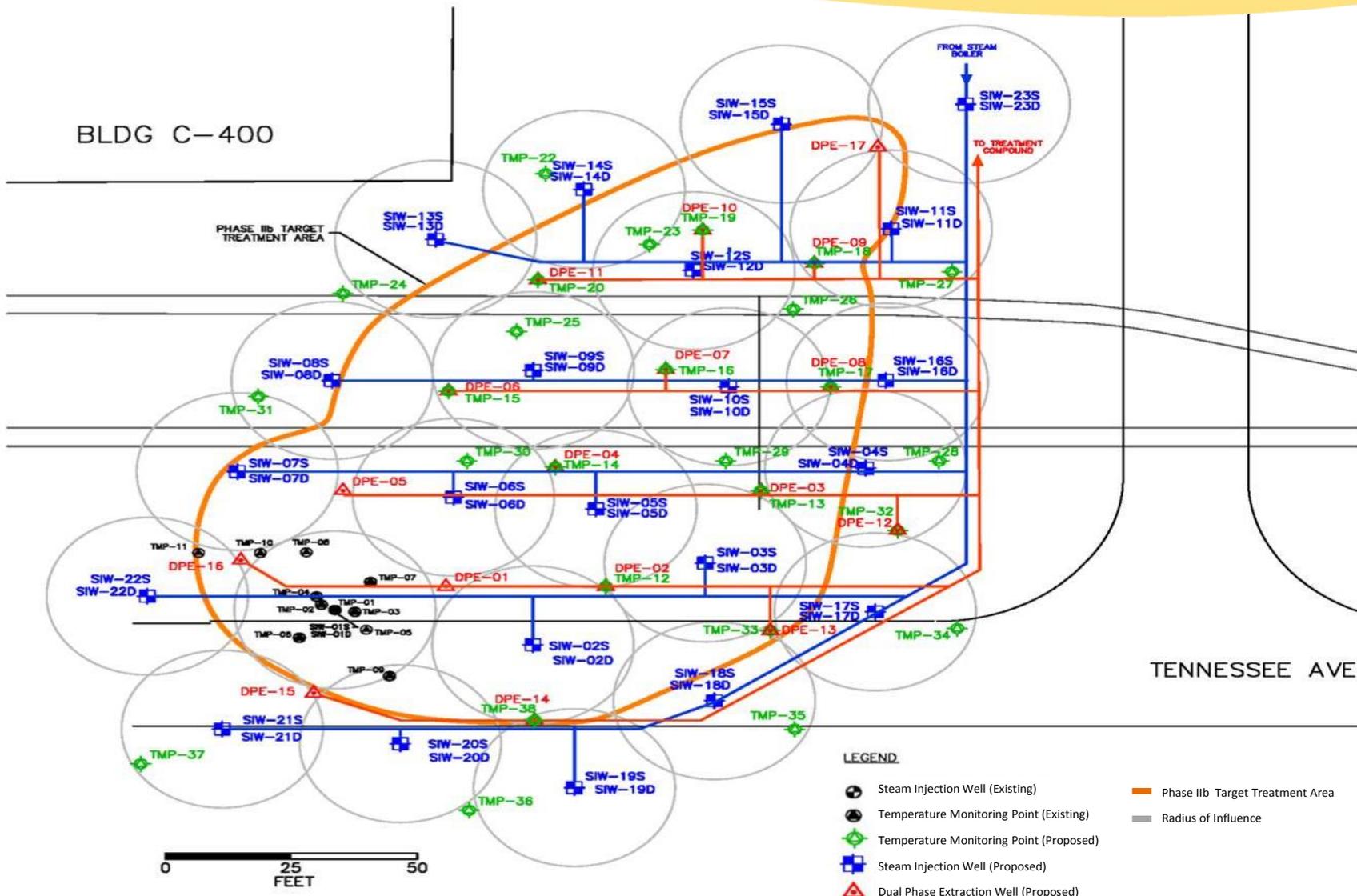


- Steam injection technology proved to be technically effective and implementable in the hydro-geologic conditions tested
 - No evidence of extreme steam rapid buoyancy
- DOE developed a preliminary conceptual design for full-scale implementation if steam is chosen as the final remedy

- The preliminary conceptual design for full scale implementation is comprised of the following:
 - 23 dual nested steam injection wells
 - ❖ 1 existing and 22 new steam injection wells
 - ❖ 1500 lbs./hr. in each steam injection well
 - 1000 lbs./hr. in lower injection screen
 - 500 lbs./hr. in upper injection screen
 - 17 dual phase extraction wells
 - 38 Temperature monitoring points
 - ❖ 11 existing
 - ❖ 12 new collocated in dual phase extraction wells
 - ❖ 15 new in individual boreholes



Conceptual Well Field Layout



- Submitted the D1 Treatability Study Report to EPA/KY on 12/21/2015, ahead of the 12/28/15 enforceable milestone
- An agreement among all parties for the Phase IIb remedy selection is needed upon Treatability Study Report approval
- Deadline to submit the D1 Proposed Plan to EPA/KY is 110 days after approval of the Treatability Study Report



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Paducah Site
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Remediation Subcommittee
SWMUs 211-A and –B Final Characterization
Summary Report Addendum and Letter Notification**

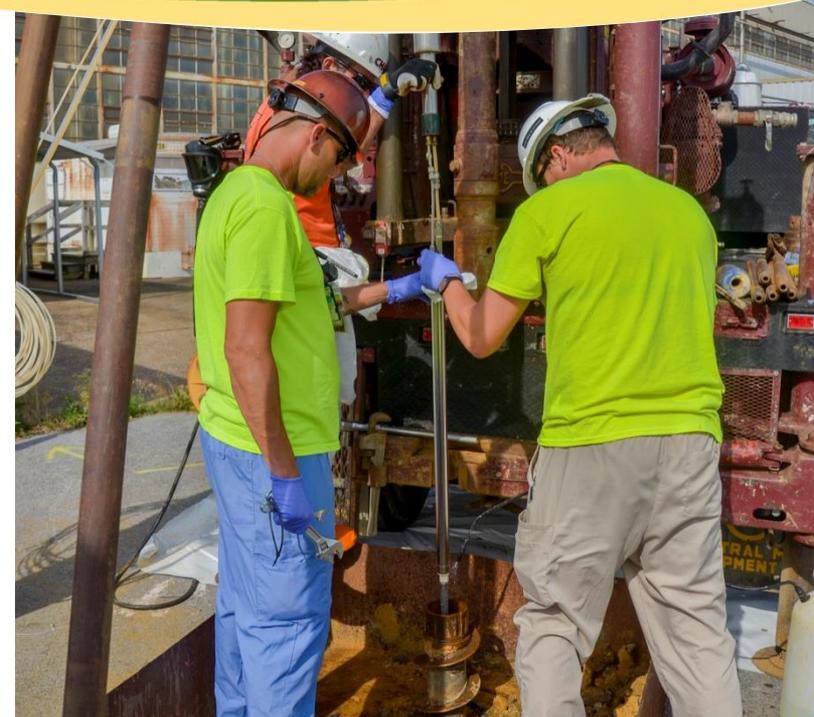
Tracey Duncan – FFA Manager, DOE

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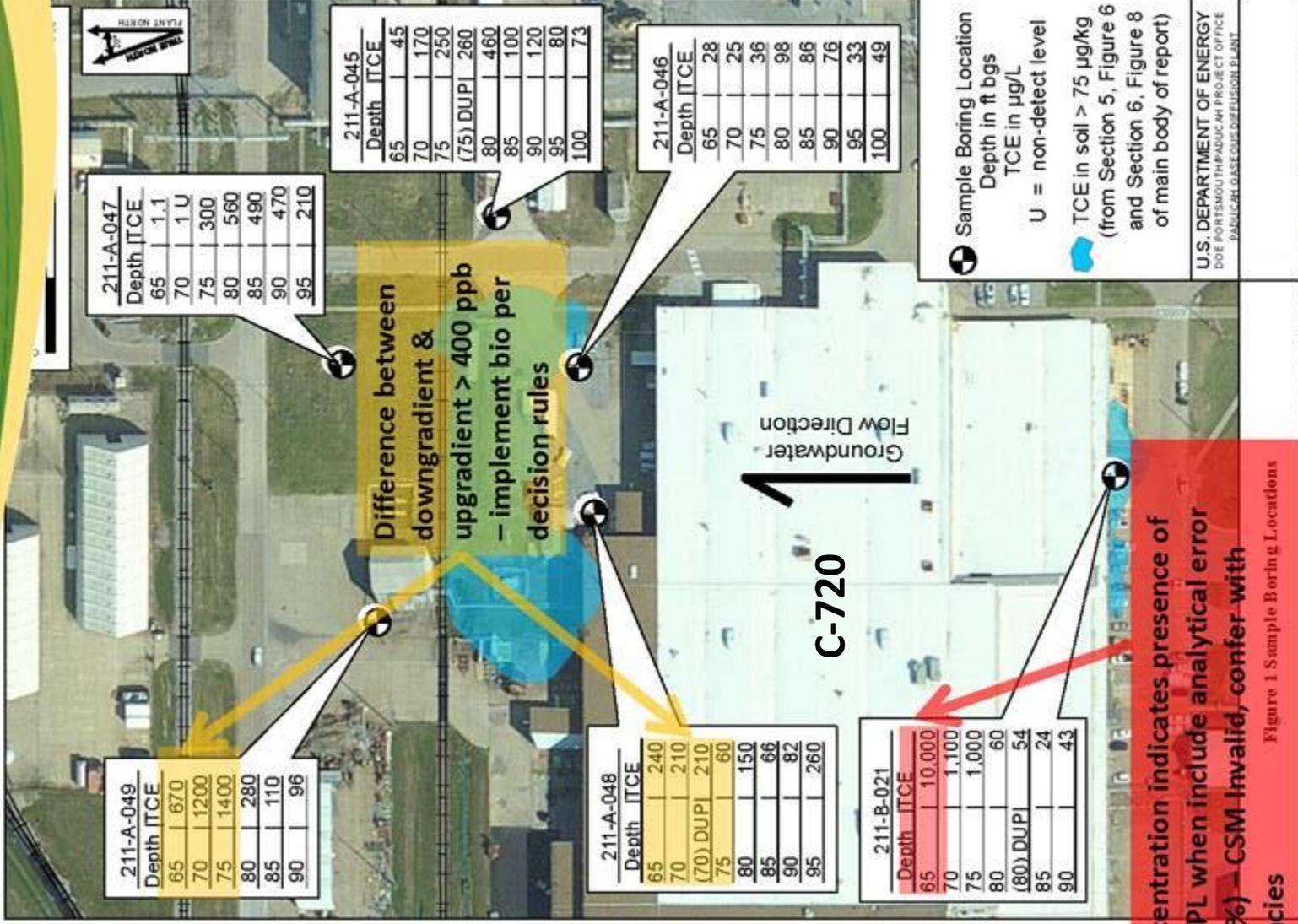
- Southwest Plume Sources Record of Decision (ROD) (March, 2012) included Bifurcated remedy for SWMU 211-A and 211-B for Trichloroethene (TCE) sources in Upper Continental Recharge System (UCRS) soils (down to 60')
 - Long Term Monitoring (LTM) or Enhanced Bioremediation LTM
 - Remedies in the ROD would address sources in the UCRS
 - Remedial action selected based on Remedial Design Support Investigation (RDSI)
 - RDSI focused on soils in the UCRS; sampling initiated in July 2012
- RDSI and Letter Notification – December 2013
 - Recommended LTM
- EPA requested additional information – Regional Gravel Aquifer (RGA) investigation – February 2014
- Sampling and Analysis Plan – February 2015
 - Included decision rules to evaluate data
- Field sampling – June 2015

Additional Site Characterization at Solid Waste Management Units (SWMU) 211-A and 211-B

- Groundwater Samples collected in 6 locations
- Sampled on 5 foot intervals in RGA through hollow stem auger borings (~65 feet to 100 feet deep)
- Samples analyzed for:
 - Trichloroethene (TCE)
 - Degradation products:
 - 1,1-dichloroethene (1,1-DCE)
 - Cis- and trans-1,2-DCE
 - Vinyl chloride (VC)
- Data Reported in Addendum to Field Characterization Summary Report – provided to EPA and Kentucky, December 2015
- Recommendation for Remedy in Letter Notification – provided to EPA and Kentucky, December 2015



Results from Additional Investigation



Concentration indicates presence of DNAPL when include analytical error (+10%) – CSM Invalid, confer with agencies

Figure 1 Sample Boring Locations

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- SWMU 211-A
 - Conceptual site model (CSM) valid
 - Recommend bioremediation LTM for west side
 - Recommend LTM for east-side

- SWMU 211-B
 - Potential for dense non-aqueous phase liquid (DNAPL) in (UCRS) and upper RGA
 - CSM invalid
 - Remedies from ROD are not effective for treatment of DNAPL
 - Recommend FFA Parties hold discussions to evaluate impacts of potential DNAPL, consistent with decision rules to identify potential alternative remedies



PADUCAH GASEOUS DIFFUSION PLANT CITIZENS ADVISORY BOARD

115 Memorial Drive • Paducah, Kentucky 42001 • (270) 554-3004 • info@pgdpcab.org • www.pgdpcab.energy.gov

Paducah Gaseous Diffusion Plant Citizens Advisory Board Environmental Remediation Subcommittee Session Summary February 4, 2016

The Citizens Advisory Board (CAB) met at the Environmental Information Center (EIC) in Paducah, Kentucky on Thursday, February 4th at 5:00 p.m.

Board members present: Bill Murphy, Judy Clayton, Mike Kemp, Tom Grassham, Renie Barger, and Ben Peterson.

DOE and subcontractors present: Tracey Duncan, Buz Smith, David Dollins, DOE; Eddie Spraggs, Pro2Serve (P2S); Eric Roberts, Jim Ethridge, EHI.

Board Regulators present: Julie Corkran, U.S. EPA; Stephanie Brock, Brian Begley, KY Department of Waste Management

Public present: none

Roberts opened the meeting and called for introductions. He then turned the meeting over to **Duncan** for a presentation on the C-400 Phase IIb Treatability Study. This study looked at the possibility of treating the TCE contamination in the groundwater with steam.

Kemp asked what the main differences were between the steam treatment and the electrical resistance heating (ERH) treatment that had been done. **Dollins** said that one of the main concerns with the steam treatment was not to push the TCE out further in the groundwater. He indicated that the idea was to see how far the steam would cover without pushing the TCE out, so that each steam injection point would not be close together and would make using it cost effective. **Murphy** asked if the steam front was a pressure or temperature process. **Dollins** indicated that they were trying to achieve a high enough temperature to volatilize the TCE. **Murphy** asked if the steam treatment was effective at moving the TCE. **Dollins** indicated that that was not the purpose of this study. It was to see if the steam would push out the TCE and there not be any steam to immediately return to the surface by the shortest route. **Dollins** said that it did not do that.

Kemp asked what the total area that would be covered by the steam treatment. **Duncan** indicated that it was around 1,000 square feet. **Kemp** then asked what was meant by pounds per hour. **Duncan** said that it was pounds of injection pressure per hour.

Clayton asked if one of the boiler units at the site were to be used for this project, what would happen if it went down. **Duncan** indicated that if they were to implement this project, they would build in a backup unit to handle that situation.

Roberts asked if the steam project would be easier to keep running than the ERH project was. **Duncan** said that the ERH system was a much more complex system than the steam would be, and hopefully would not be as hard to keep running continuously.

Begley said that one of the problems with the ERH project was the fast moving groundwater made it hard to maintain the temperature needed for the technology to work, at depth. He also said that he was very pleased with the results of the treatability study using steam. **Duncan** added that ERH would not have been cost effective because for it to work properly, more electrodes would have to be installed and installed closer together.

Kemp asked if tweaking the groundwater models affected the number of wells. **Corkran** indicated that everyone was confident that the steam technology would work, but the parties had not discussed the details of implementing it.

Clayton asked is this is technology that could be used elsewhere. **Dollins** said that it could.

Murphy commented that the steam injection used dual phase extraction wells, and asked if it would pump both water and vapor. **Dollins** indicated that it would.

Duncan said that the time period between April 25 and May 3 was targeted for resolution among the parties for using the steam injection as a treatment for this project. **Dollins** said that the cost estimate for this project was from \$23M to \$50M, and the Proposed Plan be issued around the first of August.

Roberts asked if there was potentially more of the source TCE under the C-400 building than not under it. **Duncan** indicated that potentially there was, and now that DOE had the plant back, they would be able to investigate that further.

Kemp asked what the length time to operate the steam injection to complete the project. **Duncan** and **Dollins** was not sure of the length of time required to complete the project.

Peterson commented that he thought that it would be prudent to investigate what was under the C-400 building and clean up the source of the plume before proceeding further with technologies to clean up the plume. **Corkran** indicated that the regulators were interested in proceeding with doing that as well as treating the plume at the same time.

Duncan then gave a presentation on the Southwest Plume SWMUs 211A and 211B TCE source areas. These areas are north and south of the southwest corner of the C-720 Maintenance building at the site. Additional groundwater samples were collected for the investigation to see if the contamination was located deeper in the soil than originally expected. The result was that there was contamination at deeper levels than expected.

Roberts asked for a comparison of the C-400 plume and the SWMUs 211 A&B plume. **Dollins** explained that the 211 A&B plume was estimated to have between 3 and 50 gallons of TCE. He indicated that the C-400 plume already had 1,127 gallons extracted from the upper region, and had an estimated between 500 and 4,500 gallons in the lower area remaining. **Begley** pointed out that the 211 A&B area was similar in that it was not known if the plume was under the building and how much contamination was at that location. **Duncan** indicated that DOE was requesting that the regulating parties meet to determine what the next step would be for this project.

Roberts asked what DOE would expect from the subcommittee as far as a recommendation. **Duncan** said that she would like to see a recommendation or comments as to what the Board prefers as a

remedy: bioremediation or long term monitoring. **Kemp** indicated that he didn't think the CAB could offer a recommendation concerning a technical decision.

Murphy asked what the timetable was for this project. **Woodard** said that for this project, DOE would need a recommendation by March 16 or around that time.

The meeting adjourned at 6:35 pm.