



Water Demand and Forecasting Work Group

May 6, 2013 - Meeting Summary

Lonoke, Arkansas

This document provides a summary of the Water Demand and Forecasting Work Group (Work Group) meeting held on May 6, 2013 in Lonoke, Arkansas at the Arkansas Rural Water Association Training Facility. The Work Group is assisting the Arkansas Natural Resources Commission (ANRC) with the preparation of the update to the Arkansas Water Plan. Over the next 18 months several Work Groups (a Water Supply Availability Work Group has been meeting since April 2013) will assist ANRC in completing some of the more technical elements of the water plan update. Public Information and Stakeholder Involvement meetings will also be held over the next 18 months and the data and information developed with the assistance of the Work Group will be shared and discussed at these meetings. Please visit <http://www.arwaterplan.arkansas.gov/> for more information and about the Water Plan update.

This meeting summary is not intended to be a verbatim transcription of the meeting. The summary outlines the major discussion items and general comments and discussion topics that were raised during the meeting. Finally, CDM Smith and FTN Associates are Engineering and Water Resources consulting firms that are assisting ANRC with the Water Plan update. Members of these firms are referred to as Planning Consultants in the meeting Summary. Planning Consultant Mitch Horrie, Jessica Fritsche, and Rick Brown with CDM Smith were the primary speakers regarding the water demand sectors. The Planning Consultant Dennis Ford with FTN Associates presented on current and future Navigation in Arkansas.

Welcome and Introductions

The meeting began at 9:00. Edward Swaim, ANRC welcomed the Work Group and thanked the members for the support and participation in the Water Plan update and encouraged comments and questions. Ed noted that several ANRC staff are in attendance and available to answer program questions if they arise.

The Work Group and Guests introduced themselves.

The Planning Consultant then kicked off the meeting summarizing the progress made to date and thanked the members for the detailed and useful feedback provided throughout the process of developing the water demand (also referred to as needs) forecast. The Planning Consultant summarized the meeting handouts and outlined the agenda for the day. A PowerPoint presentation was utilized to help guide the meeting and provides additional details on the meeting content. The presentation is available for review on the Water Plan website.

The overall schedule was reviewed – the information discussed today will be developed into a final draft and presented at a more general level of detail at the June public meetings. After obtaining public and stakeholder feedback at the June meetings we will continue to work with the Work Group to finalize the forecast numbers and documentation through the summer with the goal of having final forecasts by August 2013.



Arkansas Water Plan Update



The Planning Contractor reviewed the planning region boundaries and reminded the Work Group that information will be developed at the county level and then at the region level and then focus the demands at the resource level (water quality, surface water, groundwater, fish & wildlife flows)

The following goals were established for the meeting:

1. Review and discuss draft water demand and forecast results
2. Obtain general agreement to proceed with finalizing draft results for presentation at the Upcoming Public Information and Stakeholder Involvement Meetings - June 2013

It was emphasized that **All Data is preliminary and Subject to Change.**

It was noted that the primary sources of water use data utilized in the forecasts comes from the ANRC's Water-use registration database (WUBDS), also referred to as the well registration database, and the Arkansas Department of Health's Public Water Supply Sanitary Survey data. The WUBDS is jointly managed by ANRC and the United States Geologic Survey.

Next the major technical elements of the Water Plan were reviewed (state and regional setting, water use and forecasts, water supply availability, and identification of any shortfalls between water needs and supplies and potential solutions to address the shortfalls).

The Planning Consultant highlighted the major Work Group activities and accomplishments:

- Full Demand Work Group meeting completed December 17, 2012
- Work Group members from each of the demand sectors have completed conference call(s) and had email updates and revisions to the initial methodologies
- Aquaculture and Shale Gas were added as subgroups
- Data availability did results in some "minor" changes to the original approach
- Work Group members have been very helpful in identifying information and enhancements to the demand methodology
- There have not be a significant number of comments and most challenges have been addressed
- We hope today's meeting will allow us to resolve remaining challenges and/or agree on how to proceed with resolution

Next the major themes associated with the comments received were outlined. The comments tended to focus on either the "driver" or "water use factor". Work Groups also spent some time working through which data set to utilize to ensure we had sufficient years of data and complete data from all areas of the state. Different data sets were compared and the best data set was selected. A quick summary of the major themes from each demand sector was highlighted (see PowerPoint for additional detail).

The Work Group felt the summary accurately highlighted the challenges and suggestions made over the last several months.

Question: How are we covering hydroelectric and recreation?

Answer: The assumption for hydroelectric will be that existing operations will remain constant over the planning horizon (hydroelectric will continue to contribute to Arkansas power production at its historic levels - no new or retired facilities). Specific water demands will not be specified because unit power production varies with each turbine type, lake levels, project authorization, and stored water is also subject



to losses from evaporation and this loss is not specifically linked to power production. Additionally since the water is not consumed and remains in channel it differs from traditional demand sectors. In regard to recreation this will be summarized as part of the supply availability Work Groups efforts.

The Planning Consultant reminded the Work Group that we will want to continue to revisit the Vision and Goals developed for the Water Plan update especially as we develop forecast information, water supply availability, and identification of shortfalls and potential solutions. Additionally, if you have thoughts regarding any policy recommendations as we complete our work please share those ideas with us. For example I have realized that some of the data sources used to generate forecasts have not been looked at closely since the last Water Plan update (over 20 years) so one policy consideration is that perhaps the Water Plan should be monitored and updated more frequently. Rick Brown then handed the discussion over to Mitch Horrie and he outlined the results of each water demand sector(s) that he has been working on.

Thermoelectric Energy Forecast

Mitch thanked the group for all of their help and perspective. He noted that the energy production forecast focuses on withdrawals and returns for cooling water needed in the thermoelectric power generation process. The overall approach – the capacity, type of plant fuel and cooling type drives how much water is needed for cooling. Our first step was to present literature values and consumptive values to the energy subgroup of the overall Work Group. We used Energy Information Administration (EIA) data by fuel type to derive existing and future power needs for existing plants in Arkansas. No new thermoelectric plants are currently planned based on a review of this data and review of applications for air quality permits. Additional biomass was identified as the most likely renewable source in the future but currently it is an extremely small component of the state's energy portfolio.

Our general approach didn't change too much from what was presented in December. We have developed spreadsheet models – which are mathematical relationships based on driver and unit rate of use - and these models let us develop results for each plant and cooling type.

The Planning Consultant summarized the plant types - we looked at 7 different types of plants – and each has its own specific withdrawal amounts and consumption. For cooling towers - what is withdrawn is consumed at higher rates vs. single pass which is only 1% consumptive.

As noted power generation scenarios from the EIA was used and we have projections through 2035 and these were extended to 2050. EIA has three scenarios a reference case, low economic growth, and a high economic growth and we used this information for 3 scenarios for the forecast.

Next data was presented for water demand by fuel source and it was noted that coal is the largest overall producer and largest water use. It was noted that overall only about 7% of the water that is withdrawn for cooling is consumed and 93% is returned to surface water. During the forecast period water demand is expected to increase between 15 to 33% depending on the growth scenario.

Question: Is power produced here and used here?

Answer: Arkansas is part of several power pools so the exact details would be very difficult to extract. The forecasted growth ties to the regional power forecasts so it is not just Arkansas specific and reflects more regional power generation trends and needs.



Comment: I think the forecasts look good based on our facilities and plans.

Question: How did you handle biomass?

Answer: There are currently only two small biomass facilities (landfill gas) and based on current information we are assuming no new biomass facilities will be developed.

Navigation Forecast

Mitch then turned the discussion over to Dennis Ford (FTN).

The general approach for Navigation was to first describe existing projects and identify any pending changes to authorized Navigation projects. It was concluded that no significant change is expected. This will require that existing locks and dams be operated to support future navigation and that funding be provided to maintain these features and to complete necessary operations and maintenance (one study is still ongoing for extending Navigation upstream into Arkansas on the Red River). The Water Plan update will develop policy recommendations in this regard as we get into the solutions phase of the plan.

Our approach was to describe each specific navigation system. Discussed and provided details on (authorizations, elements, minimum flows, commodities, and general operations). The Planning Consultant highlighted the major authorized Navigation projects:

- McClellan-Kerr Arkansas River Navigation System
- Ouachita-Black Rivers Navigation
- Red River Navigation
- White River Navigation

See PowerPoint presentation for additional detail.

Question: Will a copy of the PowerPoint be provided?

Answer: Yes

Question: What District covers the Red River?

Answer: Vicksburg District of the US Army Corps of Engineers

Question: Other than the infrastructure needed to maintain locks and dams, what water supply issues are involved?

Answer: Availability of flow releases and physical maintenance of channel depth.

Question: Have you evaluated the estimated navigation traffic or tonnage estimates in relation to the original estimated traffic?

Answer: No we have not made that comparison.



Question: During low flows barge traffic can be limited on the Mississippi and this seems to impact the flow of commodities which argues for maintaining/improving the existing system so that it is more reliable year round. Is that a policy or physical supply availability question?

Answer: Both, on the White River there are not authorized releases specifically for navigation there are minimum release criteria for the Arkansas and other rivers systems that help maintain navigation but there are also other authorized purposes for the water storage feature that are used to support navigation.

Question: Who manages withdrawals from the Arkansas River; does anyone have any authority to stop withdraws?

Answer: For nonriparian withdrawals the ANRC includes minimum flows in the permits that can limit withdrawals during low flow - there are 5 day averages and if the flow falls below minimums then the nonriparians can be shut off. Theoretically this can also be done with riparian users - during time of declared shortage but it is rare in Arkansas. There are tables in the 1990 Water Plan that illustrate the minimum flows and their purpose (i.e., federal water right, Interstate Compact, Fish and Wildlife) and are helpful to show the driving factor for flow criteria. As part of the Water Plan update it would be beneficial to examine this issue in more detail to make sure Arkansas is better prepared should we endure a sustained drought that requires allocation during shortage.

An example of how some of this works is in regard to the White River and minimum flows, before ANRC issued the nonriparian permit there was a detailed effort to develop minimum flows set for the White River for fish and wildlife and navigation. These values set criteria for operations of the Grand Prairie project.

Question: How will the Water Plan deal with the Arkansas River and the Compact with Oklahoma?

Answer: Arkansas's Compacts are difficult to administer because the calculations of downstream deficits are done after previous years data are available and we have not fully dealt with trying to make up for lost water from the year before and legally this hasn't been pushed thus far. This may be something to consider in terms of a policy recommendation.

Review of Industrial Forecast including Mining and Shale Gas

Mitch Horrie, CDM Smith presented the results of this sector forecast noting that the main differences in the subsector forecasts are due to different drivers for water use. For both self-supplied industry and municipal supplied industry the best correlation is between employment and water use rather than population growth for example. Employment data comes from two different sources - Arkansas Department of Workforce Services - projected from 2010 to 2020. Woods & Poole projects 2020 to 2050 using county level manufacturing.

The WUDBS provides the baseline water use taken from 2008-2010 average industrial deliveries and reported use.

Question: Do industrial codes adequately separate out what types of industries use a lot of water?

Answer: Yes, when used in conjunction with the WUDBS we are able to identify the large water using industry and industry type. Next we separated industrial use from domestic supplies and that way we are not simply growing industry at the same rate as population.



Question: I see that there is a project decline in industry overall for Arkansas and realize that some people may be alarmed by this and confuse the Water Plan as being an economic development plan.

Answer: Yes we have looked at this closely. Please keep in mind it is the large water using industrial employment that is projected to decline not all manufacturing. Paper manufacturing is the largest industrial water use and the forecast for this sector shows a projected decline. Other industries are not all declining at this rate and some industrial sectors are stable or growing.

Comment: The chart can definitely raise concerns because it shows a decline and we need to be careful about how this is presented and how we represent this information.

Question: Has the paper industry been involved?

Answer: Yes, but not every company. The feedback we got was that the particular company is not planning any decreases. This is a difficulty with any forecast. It is taking a statewide data set but that does not necessarily capture a single company or persons specific business plans.

Question: Do these industrial forecasts include efficiency gains?

Answer: No so in some cases it is possible that employment may go down but water use could remain the same.

Question: For large water users could we use water per unit productions rather than employment?

Answer: It is theoretically possible but two factors make it very difficult. First, industry is very reluctant to show production and water use ratios because it raises proprietary issues. Second, the data would be very time intensive and we would likely not get anyway near 100 percent coverage of use.

Comments: I know of some growth in steel in Mississippi Country.

I also think in Desha County there is a paper mill that may get water from the Mississippi River – I think it is at 270% of capacity and was built in the 70s.

When we write-up the Water Plan it would be good to show the type of industries on a map especially the large users - by type of water use.

Question: In the written part of the plan - will info be written up on the counties?

Answer: Yes, will have technical appendices that will show detailed information while being sensitive to any local proprietary information as this data is not always disclosed.

The Planning Consultant then presented the mining forecast noting that Arkansas has a lot of diverse mineral resources across the state. In the case of mining one type of sand production related to fracking is exerting a strong growth projection for this sector. The result is a little unusual because it is a unique sand type and the growth applies to all sand and gravel but since the overall water use is not that high we do not anticipate an negative impact to water resources.

Question: What about the Bromine industry in south Arkansas - extraction doesn't take a lot of water – are these are accounted for?



Answer: Yes they are in the Chemical manufacturing codes.

Next the Planning Consultant presented the forecast for Shale Gas by first explaining the work subgroup concluded that EIA is not a good predictor for shale growth in Fayetteville shale and recommended a closer look at the literature i.e., how many wells could be produced in the Fayetteville Shale (10,000 more wells than what have been drilled currently for 14,000 total cumulative) and past trends in growth in Arkansas. The main water intensive part of production is in the fracking process not overall operation. The components of water use include surface diversions, diffuse water (capture of water/precipitation falling directly on the site), and reuse water.

Question: Is diffuse water use reported?

Answer: Shale gas water use is part of the nonriparian program but ANRC also tracks this use within the WUDBS to get as complete a picture of water use as possible.

Question: How is the diffuse water reported?

Answer: It is reported by volume - through metering of pumps.

The Planning Contractor highlighted the following points:

- An individual well is estimated to need 4.73 million gallons per day to complete the fracking based on reported water use.
- We are assuming a single fracking per well but refracking may occur we just do not yet have data on if or when a refrack interval might happen.
- Using the historical growth factor we will see total development of the play by 2023 to 2024 which is about 800 wells/year.

Question: Does natural gas prices impact this?

Answer: Yes, this is a key factor in the rate of growth but we do not have a good indicator of future natural gas price trends.

Question: Are there any other plays?

Answer: Yes, but not as large as the Fayetteville.

Comment: Shale and emerging energy water needs is very dynamic and I think this is an area where we need to track and update the plan more frequently than we have in the past both for the forecast method and unanticipated changes in water use.

Question: Should the forecast include some reuse of recovered fracking water?

Answer: The subgroup gave a very large range in potential reuse of water and each entity may operate differently so it is recommended we use a conservative approach (not include a reuse factor) to help ensure we do not underestimate demand.

Review Municipal/Public Supply and Self-Supply Forecast

The Planning Consultant then presented the forecast approach for the municipal and self-supply sectors and made the following points:



- The future demands do include reduction in use due to passive conservation associated with the national 1992 Energy Policy Act.
- The majority of municipal supplies water is surface water – we assumed the ratio of surface and groundwater will stay the same in the future unless we have the data to know there is going to be a switch.
- For self-supplied residential (individual well user) we do not use the same rate of use as public supply because public supply also has commercial water use included (restaurants, hotels, small businesses etc.) Consequently, we looked for a different comprehensive data set and identified the United States Geologic Survey report of self-supplied data; we have gpcds for each county - from the study that occurred late 1970s.
- We recommend maintaining the ratio of public to self-supplied constant going into the future. The split is 95% public and 5% self-supplied statewide. The split will be county specific and this assumption does not mean no additional public supply systems will be built it simply means that the growth on public supply will be a similar rate as the growth in individual wells.
- Overall municipal gpcds fell in the 100-200 range. One notable exception was the rate for Miller County and this is due to some additional follow-up that is needed for Texarkana.

Review Agricultural Forecast - Crop Irrigation, Livestock, Aquaculture and Duck Hunting

Livestock

Rick Brown, CDM Smith then outlined the approach and results of the Livestock component of the forecast. The primary input that was received during the development of the forecast involved animal counts and trends; data sources regarding water consumption, sanitation and cooling needs; seasonality of water use; and differences in consumption with age. It was noted that data on livestock age compositions is not available and there are not consistent data sources that allow for a disaggregation of water need based on seasonality. We do not see this as a significant limitation to the forecast as we have utilized the upper 75 percentile of all data sources so we are capturing overall water use.

The Planning Consultant outlined the major animal types that are forecasted: dairy cows, beef cattle, hogs/pigs, chickens, turkeys, sheep (lambs), goats, horse and ponies (equine). There have been recent downward trends in some livestock inventories in Arkansas while there has been increasing growth and projected national growth in these same categories of livestock. Consequently, the subgroup members of the Work Group recommended that we utilize the national growth trends for Beef Cattle, Chickens and Turkeys and hold the livestock counts constant for the other animal types. The following data sources were used to derive the forecast:

- Daily water use requirement from “USGS Method for Estimating Water Withdrawals for Livestock in the United States”, 2009 and review of literature
- Livestock count from USDA NASS Census of Agriculture (COA) (2007) and USDA NASS County Agricultural Production Survey (CAP) (2012)
- Growth rate to 2022 derived from national USDA Agricultural Projections through 2022 for Beef Cattle and Poultry (all other livestock: held constant growth)
- Demand from 2022-2050 held constant (no additional growth)
- Data for source of supply will remain constant based on current ratio of 66% surface water and 34% groundwater



Comment: The values all look good to me but the base year you are using does not take into consideration the 2 poultry producing facilities that have closed so the actual inventory is likely lower than the data shows. Also in regard to source of supply there are several facilities that receive water from municipal and public suppliers so the ratio of surface to groundwater is likely higher than noted.

Comment: The trend in dairy cows would probably show fewer animals from the base year as the number of dairies has declined since the last available data.

Crop Irrigation

Jessica Fritsche, CDM Smith then presented the crop irrigation forecast starting with a summary of the feedback received. Overall data sources for total irrigated acres, crop type, and crop water application rates were reviewed to ensure the use of best available data. It was noted that the forecast is monthly and water use covers a 10 year period to account for variation in rainfall and temperature. Overall past trend data was determined to be a good indicator of growth except for corn where price was a stronger indicator of growth. The approach was to grow each crop type based on the trend information to a “reasonable maximum”. The reasonable maximum was defined to be those current agricultural acres that are not currently irrigated but could readily become irrigated. Existing tillable cropland [from the United State Department of Agriculture (USDA) Crop Data Layer] that is not irrigated by county was used to determine the reasonable maximum irrigable acres. It was emphasized that the forecast does not preclude an individual farmer from converting other land to irrigation it simply means that for the forecast the most likely land to be converted is existing tillable dry land crops.

The Planning Consultant then showed the results of the additional research on the main data sources used for acreage and crop type. Data is available from USDA Farm Service Agency (FSA), USDA National Agricultural Statistic Service County Agricultural Production Survey (NASS CAPS), USDA Crop Data Layer, and ANRC WUDBS. After a detailed review and comparison of the data sources it was determined that NASS CAPS has the most complete coverage for rice and soybeans while the ANRC WUBDS has the most complete data for corn, cotton and the all other minor crops. It was noted that soybean, rice, cotton and corn account for over 90% of the total crop irrigation acreage.

The Planning Consultant provided a comparative summary of crop irrigation application rates comparing the values derived from the ANRC WUDBS and various literature citations. The following points were noted and/or commented on by the Work Group:

- The rice application rates generally appear to be slightly high than literature and personal experience.
- Cotton looks good.
- Corn and soybean application rates seem to be a little low based on personal experience.

The Planning Consultant noted that the values are derived from the data reported by farmers and we want the forecast to be objective and defensible based on observed and literature derived data. At this point we are not recommending any changes to the values and we will see the response we get from the public information and stakeholder involvement meetings.

The results of the forecast were the summarized and the following points were made:



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- 18% growth in total irrigated acres overall from 2010-2050 [5.0 million acres to 5.9 million acres]
- 99% of growth experienced by 2030
- 30% Soybean irrigation growth
- 8% Rice irrigation growth
- 5% Cotton irrigation growth
- 6% Corn irrigation growth
- 4% Other irrigation growth
- Many counties not forecasted to experience growth because
 - No significant trend was modeled or
 - Close to or at reasonable max irrigated acre

Comment: The results look good but I am surprised by the amount of growth in Crittenden County please double check that information.

Question: Did you see an indication of corn increase and something else fall off?

Answer: Yes, there did seem to be some correlation with declining cotton and more corn and some trending between rice and soybeans.

Question: For the major irrigation districts Grand Prairie and Bayou Meto they will be changing sources of supply and are projecting their water needs; are the results consistent?

Answer: For the forecast we will assume the same current source of supply until the projects are essentially 100 percent funding and/or assured of going forward. It is expected that there will be a major shift to surface water to reduce the groundwater declines (statewide irrigated acreage is 84% groundwater and 16% surface water); the Grand Prairie will target about 80-90% surface water and Bayou Meto will target about 73% surface water.

Comment: It might be a good idea to footnote the anticipated or targeted groundwater to surface water use once the projects are fully operational.

Answer: Yes, we can look at this and consider how to present the project(s) once we are in the solution phase of the Water Plan.

Question: Are the projections based on the assumption that there will be water available to irrigate the crops?

Answer: Yes, at this point in the Water Plan we do not constrain the forecast based on water availability. Once the water availability is complete then we determine if there is a shortfall between supply and demand and then identify potential solutions.

Comment: The corn application rates for my area, Chicot County look pretty close we have good and high moisture content soils that promote good root.

Comment: I agree that the Delta/East Arkansas area still has a lot of potential to add irrigation to existing acres but I also know that sufficient water supplies are likely to be a challenge and this is where we will see the “gaps” between supply and demand.



Comment: Also water quality is likely to have an impact on the usability of the groundwater. For example in Desha County it appears there is the potential for growth but we are seeing some groundwater declines and we have some higher saline water.

Comment: Yes, and we also know that Crowley's Ridge is like a “dome” or groundwater barrier so counties west of the Ridge (i.e., Greene and Lawrence Counties) will have more challenges with groundwater availability and these areas may also need more access to surface water to help meet needs.

Review of Aquaculture

Mitch Horrie, CDM Smith presented the Aquaculture forecast and noted that we received a lot of feedback from the subgroup but that it was apparent that different producers have different approaches based on both their geographic location and the species they are raising. Consequently, the results we are presenting are still be considered by the subgroup. There is general agreement that this demand sector faces some uncertainty due to both regulatory factors and international markets and to be conservative in the forecast it is still prudent to maintain a stable forecast with no major changes in acreage, species composition or application rates. The Planning Contractor also emphasized that due to the regulator scheme and disease and parasite control, aquaculture is dependent on groundwater or rainwater that falls directly on the ponds; surface water is not a viable source overall.

It was also noted that some of subgroup members felt the species application rates were much higher than actual due to suspected over reporting. Other subgroup members felt the rates were pretty close except for catfish. Overall the subgroup felt the catfish total acreage has continued to decline and the estimate of acres in the ANRC WUDBS are higher than actual. The Planning Consultant presented the catfish numbers from USDA and noted that the values are very much in line with the subgroups professional opinions and observations.

Comment: I think USDA only reports what is considered cropland that is used for aquaculture so USDA acres may not be correct and maybe the WUDBS is more accurate.

Comment: The main impact to application rates is evaporation in excess of precipitation. Obviously this varies but we need to be conservative to deal with the dry years.

Review Duck Hunting and Habitat Maintenance

The Planning Consultant presented this forecast noting that there are three primary “types” or categories of data that were derived from the WUDBS to develop the forecast:

- Self-supplied Duck Clubs which is the largest use
- Self-supplied agriculture – the ANRC WUDBS show agricultural withdrawals for November and December and these do not appear to be crop related and it therefore reasonable to assume that reported uses during this time are for Duck Clubs/Habitat
- Self-supplied Commercial which is the lowest use and reflect water used by Arkansas Game and Fish for reservoir and habitat maintenance

Question: The reported numbers seem large are the withdrawals 250 million gallon/day over an annual time-step?

Answer: Yes, so the actual withdrawals are at a much higher rate over a few month period so there is a “peaking factor” of perhaps 6 times per day.



Next Steps and June Public Information and Stakeholder Involvement Meetings

The Planning Consultant then outlined the next steps to finalize the forecast and prepare for the public information and stakeholder involvement meetings. It was noted that overall the Work Group members appear to be pretty comfortable with the draft forecast. Any additional comments or suggestion should be e-mailed to arkansaswater@cdmsmith.com by May 13, 2013. The schedule to finalize the forecast will be somewhat dependent on the nature of the comments we get at the June meetings. If everything goes well the goal is to develop the final methodology documentation and detailed technical analysis by the middle of summer 2013.

The Planning Consultant thanked everyone for all the support and the participation at the meeting and the meeting was adjourned.