Meeting Summary
Susitna-Watana Hydroelectric Project Licensing
Water Resources Study Development Workgroup Meeting
April 4, 2012
AEA Project Offices, First Floor Conference Room
411 W 4th Avenue, Anchorage, AK

Attendees:

Organization	Name
AEA	Betsy McGregor
AEA	Wayne Dyok
USFWS	Mike Buntjer
USFWS	Betsy McCracken (by phone)
USFWS	Lori Verbrugge
NMFS	Susan Walker
NMFS	Eric Rothwell
BLM	Tim Sundlov
ADF&G	Joe Klein
ADF&G	Ron Benkert
ADF&G	Mike Bethe
ADEC	William Ashton
ADNR	Terry Schwartz
Natural Heritage Institute/Hydropower Reform Coalition	Jan Konigsberg
MWH	Kirby Gilbert (by phone)
MWH	John Haapala (by phone)
Long View Associates	Steve Padula
Long View Associates	Randall Filbert
Cardno ENTRIX	Craig Addley
Cardno ENTRIX	Jim Gill (by phone)
HDR	Robin Beebee
URS	Paul Dworian
R2 Resource Consultants	Dudley Reiser
Tetra Tech	Bill Fullerton
Tetra Tech	Rob Plotnikoff (by phone)
GW Scientific	Michael Lilly
Brailey Hydro	David Brailey
Coalition for Susitna Dam Alternatives	Becky Long (by phone)
Alaska Ratepayers	Scott Crowther
Chase Resident	Mike Wood (by phone)

Presentations

- Review of Existing Water Temperature Model Results and Data Collection – Draft Final (2012 study plan)
- Baseline Water Quality Study (2013-14 study request)
- Water Quality Modeling Study (2013-14 study request)
- River Flow Routing Model Data Collection – Draft Final (2012 study plan)

Introduction

Steve Padula (LVA) stated that FERC had granted a deadline extension to May 31, 2012, for stakeholders to provide comments on the Pre-Application Document (PAD), Scoping Document 1 and formal study requests as part of the ILP process. Steve (LVA) noted that FERC had adjusted subsequent ILP milestones commensurate with the PAD comment extension and AEA would soon post a revised Project licensing schedule on its website. The previously scheduled May 2012 workgroup meetings have been rescheduled to be held during the second week of June 2012.

Steve (LVA) said that during the next several months AEA intends to begin scheduling subgroup meetings, which would involve greater focus on the details of study planning and execution. Wayne Dyok (AEA) added that these meetings would be open to anyone who wished to participate but that the focus of the meetings would shift to more technically oriented topics.

Steve (LVA) stated that 2012 study plans were nearing completion and AEA requests stakeholders provide final input on the 2012 plans by the week of April 16, 2012. AEA will be finalizing and distributing the 2013-2014 formal study request documents during the next several weeks. In order to make the requests as comprehensive as possible, stakeholders are encouraged to provide input as early as possible. By submitting comprehensive study requests, AEA intends to reduce the amount of work required by stakeholders who would otherwise need to submit requests of their own.

Sue Walker (NMFS) stated that stakeholders needed contact information for AEA's technical consultants, particularly study program leads. Betsy McGregor (AEA) replied that AEA would provide the requested contact information. Although it would be acceptable for stakeholders to contact AEA's consultants, AEA would need to be kept apprised of all substantive dialogue. Betsy (AEA) noted that technical consultants were not authorized to make decisions regarding stakeholder requests; all study-related decisions will be made by AEA's Project managers.

Water Quality Study

Review of Existing Water Temperature Model Results and Data Collection (2012)

Eric Rothwell (NMFS) stated that stream temperature and meteorological data collection identified in the 2012 study plan represented a good initial step toward establishing a baseline, but noted that it would be necessary to soon begin identifying areas where groundwater upwelling was providing thermal refugia for fish. Paul Dworian (URS) acknowledged the need for this information and noted that thermal imaging and ground surveys planned for 2013-14 would be used to identify these areas. Eric (NMFS) added that thermal refugia needed to be mapped and integrated into AEA's analysis of groundwater dynamics so that the proposed Project's effects on fish habitat, especially spawning and overwintering habitat, could be assessed. Eric (NMFS) stated that it would be necessary to understand and document the relationship between river stage and groundwater upwelling to evaluate the effects of proposed alteration of the river's flow regime. This information is most critical for the middle Susitna River where Project effects would be most pronounced.

Craig Addley (Cardno ENTRIX) stated that the effects of the proposed Project on groundwater upwelling would be evaluated through synthesis of results derived from multiple study efforts, including instream flow modeling and geomorphology, ice processes, and riparian vegetation studies. Eric (NMFS) stated that AEA's study plans to date did not explain specifically how results of the aforementioned study efforts would be used to document groundwater dynamics and assess potential Project impacts. The plans need to clearly identify the links between the studies and various modeling efforts.

Dudley Reiser (R2 Resource Consultants) stated that AEA and its consultants acknowledged the importance of groundwater upwelling and that study details would be refined over the next several months as formal 2013-14 study plans are finalized. Eric (NMFS) proposed that AEA develop a stand-alone document to explicitly identify how groundwater dynamics would be addressed over a range of scales, with a description of detailed analyses at the mesohabitat level and an explanation of how small-scale results would be extrapolated to document reach-wide dynamics. The document would not need to be a study plan, per se, but rather an explanation of how results of the various study efforts would be brought together to address groundwater.

Terry Schwartz (ADNR) asked if wells had been established to assess groundwater in the vicinity of the proposed dam site. Wayne Dyok (AEA) replied that groundwater wells had been established by AEA's engineering team to document groundwater at the dam site. Terry (ADNR) said that it might be necessary to establish similar wells longitudinally downstream of the proposed dam site to establish baseline groundwater patterns. Terry indicated that AEA should conduct detailed, two dimensional modeling of groundwater and its link to river stage at several representative sloughs and side channels and then use an agreed-upon method to extrapolate results to the reach level. Terry (ADNR) added that the presence of the reservoir would have large-scale effects on groundwater beyond those associated with changes in flow regime resulting from Project operations.

Mike Bethe (ADF&G) stated that the importance of groundwater upwelling was not restricted to sloughs and side channels, noting that the suitability of mainstem habitat for salmonid spawning was also dependent on groundwater. However, evaluating groundwater upwelling in the mainstem is complicated by the fact that it often occurs in turbid areas where fish use is difficult to document, unlike in many of the sloughs. Mike (ADF&G) stated that upwelling areas in the mainstem also provide winter rearing habitat for juvenile salmonids by moderating temperatures and maintaining areas of liquid water beneath the ice cover. Betsy (AEA) stated that tracking radio-tagged salmon would help AEA locate areas of mainstem spawning, which would in turn aid in locating areas of groundwater upwelling.

Betsy (AEA) stated that AEA would schedule a meeting to discuss groundwater issues and assessment methods in greater detail and that based on the meeting make a determination as to whether a stand-alone groundwater document is needed.

Baseline Water Quality Study (2013-2014)

Wayne (AEA) asked how many sites had been identified for collection of baseline water quality data. Craig (Cardno ENTRIX) stated that the study plan identified 38 temperature monitoring sites but that other water quality parameters would likely be sampled at fewer sites, although the specific number of sampling/measurement locations was still being determined.

Eric (NMFS) asked if the water quality parameters identified for in-situ measurement (see Table 3 of the study request document) would be monitored continuously. Paul (URS) replied that plan was to take the measurements at discrete intervals, not continuously. Eric (NMFS) asked whether discrete sampling would be sufficient for calibrating a turbidity model. Rob Plotnikoff (Tetra Tech) replied that discrete sampling should be sufficient for calibration of a turbidity model at a level of resolution needed to evaluate the response of biota to Project-induced changes in turbidity. Mike Wood (Chase resident) stated that turbidity levels around the three rivers (Susitna, Talkeetna, and Chulitna) confluence increase dramatically following break up of surface ice in the spring.

Tim Sundlov (BLM) stated that it would be necessary to establish a reliable baseline time series for turbidity in the river to accurately assess the impacts of Project construction. Wayne (AEA) acknowledged that there would be a short-term increase in turbidity during the Project's construction, but construction activities would be timed and best management practices (BMPs) would be employed to minimize any impacts. Craig (Cardno-ENTRIX) noted that turbidity would be measured above and below the dam site during the construction period. Jan Konigsberg (NHI/HRC) stated that increases in turbidity would not only result from construction activities but also from the initial filling of the reservoir, when soils from the inundated slopes would be released into the water column.

Lori Verbrugge (USFWS) stated that fish tissue samples should be evaluated for heavy metals generally, not only mercury. In addition to the fish species identified in the study request document, tissue samples should be collected from burbot, lake trout, and northern pike. Lori

(USDWS) continued that liver tissue, in addition to muscle tissue, should be collected from larger fish, particularly burbot, because liver from this species constitutes a subsistence delicacy for Alaska Natives.

Lori (USFWS) acknowledged that bioaccumulation of metals would be detected in larger, long-lived species but stated that it would be important to sample muscle tissue from fish of early life-stages to assess the extent to which metals might be conveyed upward through trophic levels, e.g., from small fish to birds and furbearers. MaryLou Keefe (R2 Resource Consultants) stated that sculpin, one of the fish taxa identified in the study request document for tissue sampling, would be difficult to sample and would not likely provide useful information regarding metals accumulation because they would not use the reservoir habitat. Stakeholders agreed that no sculpin tissue would be collected for heavy metals analysis.

Ron Benkert (ADF&G) stated that tissue samples should be taken from Dolly Varden between 90 and 125 millimeters in length, to avoid inclusion of anadromous Dolly Varden in the metals assessment; because anadromous individuals have spent a portion of their lives in the ocean and farther downstream in the river, their tissues would not accurately reflect exposure to ambient conditions at the site of their collection.

Lori (USFWS) stated that it would be important to account for the effects of ambient water quality on the toxicity and bioavailability of metals, both under existing conditions and with the Project in place. Rob (Tetra Tech) stated that a pathways model would be an effective means of identifying potential bioaccumulation mechanisms, accounting for the effects of ambient water quality (e.g., pH, redox potential, hardness), as well as the Project's potential effects on those mechanisms.

Lori (USFWS) stated that there is often an increase in the potential for formation of methyl mercury (a bioavailable form) in newly-formed reservoirs, due in part to the inundation and breakdown of organic matter; this phenomenon is particularly common in reservoirs at high latitudes. Removal of vegetation prior to reservoir filling would be one way to reduce the potential for mercury methylation. Craig (Cardno-ENTRIX) agreed and stated that a reservoir's operational regime can also affect rates of methylation.

Terry (ADNR) asked when the pilot thermal imaging assessment would be conducted, adding that the best time might be just prior to ice-over because at that time differences between surface and groundwater temperatures would be significant. Michael Lilly (GW Scientific) said that the best time would likely be just after ice breakup, before runoff; at this time groundwater is likely to be about 2 ˚C warmer than surface water. MaryLou (R2) stated that the timing of breakup would be more predictable than ice-over, which would be advantageous in trying to schedule an over-flight.

Lori (USFWS) asked how thermal refugia would be identified and mapped if thermal imaging proved to be unsuccessful in the Susitna River. Craig (Cardno-ENTRIX) replied that a combination of ground surveys and aerial photographs of open leads in winter would be used to

identify areas of groundwater upwelling. Michael (GWS) stated that at best thermal imaging would only provide a partial representation of upwelling areas and that a variety of techniques, including tracking of radio-tagged salmon, would need to be used to complete a proper assessment.

Wayne (AEA) stated that dye injections can be used to track groundwater and Michael (GWS) agreed that dye injections can be successful in some environments. Paul (URS) stated that isotopic methods, i.e., the use of stable isotopes of hydrogen and oxygen as markers of water source, might also be useful for groundwater investigations. Mike W. (Chase resident) stated that observations of groundwater elevation in his well had revealed that dramatic changes can occur over very short intervals following ice-over, i.e., he has observed as much as a 4-foot change in the well's water level within 24 hours.

Betsy (AEA) stated that it would be useful to know soon to what extent thermal imaging would provide valuable information. If possible, the pilot study should be undertaken in 2012; if not in spring of 2013. Craig (Cardno-ENTRIX) stated that much of the expense of conducting thermal imaging would be associated with the fixed cost of the over-flight. The incremental cost of conducting additional imaging would be relatively small and recommended that imaging be conducted for the entire river rather than for a small segment, as indicated in the study request document.

Water Quality Modeling Study (2013-2014)

Wayne (AEA) asked which water quality models were being considered for use. Rob (Tetra Tech) replied that a model with capabilities similar to the Environmental Fluid Dynamics Code (EFDC) would be used for the reservoir and river modeling. Rob (Tetra Tech) confirmed that the EFDC model is approved for use by the Environmental Protection Agency (EPA). Wayne (AEA) requested that Rob (Tetra Tech) provide a technical memo, including a description of the pros and cons of available water quality models and a recommendation as to which model would be most suitable for use in the Susitna River basin.

Eric (NMFS) stated that it would not only be important to identify the pros and cons associated with the available water quality models but also to explain how the water-quality model would interface with the suite of other models that will be used to assess Project impacts. Eric (NMFS) asked specifically how the water-quality model would be linked to the flow-routing model. Craig (Cardno ENTRIX) replied that ideally there would be a single flow-routing model that would provide input to all the other models. Craig noted that the water-quality model, like the ice-dynamics model, might require the use of its own routing component. The EFDC model has its own routing function, but use of different routing tools should not represent a problem as long as steps are taken to ensure that the responses of the various routing models are consistent with one another.

Tim Sundlov (BLM) noted that inflow chlorophyll *a* concentrations were identified as a data need in the modeling study request document but not in the baseline water quality document.

Rob (Tetra Tech) stated that chlorophyll *a* concentrations would be small in a glacially-fed system such as the upper Susitna River and questioned the need for collection of chlorophyll *a* data. Wayne (AEA) requested that Rob (Tetra Tech) provide a rationale for why chlorophyll *a* data should or should not be collected as part of the baseline water quality study and be prepared to discuss it at the next water quality meeting.

HecRES/Hydrology

River Flow Routing Model Data Collection (2012)

Wayne (AEA) noted that no routing model cross sections were proposed for the Devils Canyon reach. Michael (GWS) stated that no cross sections had been proposed for Devils Canyon, an approximately 15-mile reach, because collecting data there would be too dangerous.

Craig (Cardno ENTRIX) said that as part of study planning it would be necessary to develop an alternative approach to surveying cross sections in this reach, which could consist of "fabricating" transects based on aerial photos and comparisons to cross sections in other reaches of the river. John Haapala (MWH) stated that one of the primary purposes of a routing model is to account for attenuation of flow. Because of the physical characteristics of the Devils Canyon reach, there would be little attenuation, so it was less important to have empirical data for this reach than for other reaches downstream of the Project. Michael (GWS added that the bedrock channel in Devils Canyon is typified by complex hydraulics, so obtaining representative data would be difficult even if cross sections could be established and surveyed. It will be most important to accurately model the flows that enter and exit Devils Canyon.

Craig (Cardno-ENTRIX) asked how many cross sections would be surveyed downstream of the three rivers confluence. Dave Brailey (Brailey Hydro) stated that 19 cross sections would be surveyed and based on MWH's analysis of these 19 transects, a determination would be made as to whether additional transects should be established and surveyed downstream of the confluence.

Eric (NMFS) stated that winter data would be needed to accurately calibrate the routing model. Eric noted that the USGS would be collecting limited winter flow data at select gage locations and asked what other winter flow data might be gathered to supplement those collected by the USGS. Craig (Cardno-ENTRIX) replied that the approach to assessing winter flow routing was still under development but that it would be addressed in the context of the ice processes modeling, which would be discussed at the April 6, 2012 workgroup meeting. Craig (Cardno-ENTRIC) stated that Robin Beebee (HDR) and her team would be collecting ice thickness data along transects and that it might be possible to measure flow by accessing the river through the holes drilled to document ice thickness.

Eric (NMFS) asked if cross-section measurements would be depth-limited in the channel margins and whether there were plans to measure depths and velocities by wading in the margins. David (Brailey Hydro) replied that there was no plan to conduct measurements via

wading, although a wading rod and current meter would be taken on the 2012 field trip in case they are needed. The Acoustic Doppler Current Profiler (ADCP) is capable of recording conditions at depths as shallow as one foot, and that it would therefore be possible to estimate flows from bank to bank. Dudley (R2) asked if the ADCP would be limited by water velocities. David (Brailey Hydro) stated that measurements could not be made at velocities exceeding 10 feet/second due to safety concerns.

Terry (ADNR) asked if roughness values for each transect would represent an integrated value for channel or if there would be multiple roughness coefficients for individual transects based on lateral variation in substrate. Stuart Beck (R2 Resource Consultants) stated that use of ADCP involves solving for a single roughness value for each cross section based on channel slope and substrate and that the roughness value would be adjusted for each transect as a function of river stage.

The workgroup discussed proposed winter Project operations, and John (MWH) stated that a maximum winter flow release of 8,000 cfs from the Project would be very large relative to winter accretion flows immediately downstream of the dam site. Wayne (AEA) stated that AEA understands that proposed winter load-following operations at the Project will be shaped based on potential effects on downstream resources. Wayne (AEA) reemphasized that understanding potential Project effects would require an accurate understanding of physical processes in the river basin, which makes it critical that a reliable set of simulation models be developed.

Eric (NMFS) stated concerned about the degree of uncertainty regarding how winter flow routing would be addressed, and as a result how all other modeling would be conducted. NMFS's comments on the study plans will reflect this ongoing concern.

Action Items

- AEA agreed to provide stakeholders with contact information for its technical consultants, particularly the study program leads.
- AEA agreed to schedule technical resource subgroup meetings in April and May 2012.
- AEA agreed to schedule a meeting to discuss groundwater issues and assessment methods in greater detail to make a determination as to whether a stand-alone groundwater document is needed.
- AEA agreed to add burbot, lake trout, and northern pike to the list of fish species from which tissue samples would be collected for metals analysis.
- AEA agreed to collect and analyze burbot liver tissue, in addition to muscle tissue, for mercury concentrations.
- AEA requested that Rob Plotnikoff (Tetra Tech) provide a technical memo describing the pros and cons of available water quality models and a recommendation as to which model would be most suitable for use in the Susitna River basin.
- AEA requested that Rob Plotnikoff (Tetra Tech) provide a rationale for why chlorophyll *a* data should or should not be collected as part of the baseline water quality study.

- URS/Tetra Tech will account for in-reservoir biomass (i.e., vegetation to be inundated by the proposed reservoir) in the reservoir modeling section (i.e., data needs) of the 2013-2014 Water Quality Modeling Study request document.

Decisions

- Stakeholders agreed that no sculpin tissue would be collected for heavy metals analysis.