

Initial Study Report Meeting

Study 5.5 Baseline Water Quality

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Study 5.5 Objectives

- Document **historical water quality data** and **combine with data generated from this study**. The combined dataset will be used in the Water Quality Modeling Study to predict Project impacts under various operations
- **Add current stream temperature and meteorological data to the existing data**
- Develop a monitoring program to adequately **characterize surface water physical, chemical, and bacterial conditions** in the Susitna River **within and downstream of the proposed Project area**
- Measure **baseline metals concentrations in sediment and fish tissue** for comparison to state criteria
- Perform **Thermal Infrared Remote (TIR) sensing** of the Susitna River from Susitna Station (**Project River Mile [PRM] 29.9**) to **Deadman Creek (PRM 235.6)**, and use this data to map the groundwater discharge and possible extent of thermal refugia

Study 5.5 Components

- Water Temperature Data Collection (ISR Part A, Section 4.1; pg 3)
- Meteorological Data Collection (ISR Part A, Section 4.2; pg 7)
- Baseline Water Quality Monitoring (ISR Part A, Section 4.3; pg 9)
- Focus Area Water Quality Monitoring (ISR Part A, Section 4.4; pg 13)
- Sediment Samples for Mercury/Metals in the Reservoir Area (ISR Part A, Section 4.5; pg 15)
- Baseline Metals Levels in Fish Tissue (ISR Part A, Section 4.6; pg 17)
- Thermal Infrared Remote Sensing (ISR Part A, Section 4.7; pg 17)
- Groundwater Quality in Selected Habitats (ISR Part A, Section 4.8; pg 20)

Study 5.5 Variances

- **Establishment of water temperature monitoring sensors was planned for 37 sites in 2013. Equipment deployment for temperature monitoring was completed at 28 sites on the Susitna River mainstem and tributaries (RSP Section 5.5.4.1).**
- Sampling from Baseline Water quality sites resulted in minor adjustments of location at 3 of the 17 sites proposed in the RSP (RSP Section 5.5.4.4). A location was added at PRM 174.0 to characterize water quality conditions below the dam site.
- Ten Focus Areas were described in RSP Section 5.5 for water quality sampling during 2013. Seven Focus Areas of the ten candidate Focus Areas were monitored in 2013 (RSP Section 5.5.4.5). While land access was not available for portions of the river and tributaries adjacent to Cook Inlet Regional Working Group (CIRWG) in 2013, *this was not considered a variance because this study was designed to collect data over multiple years.*
- Visits to ten sites for collection of sediment samples were proposed in the RSP Section 5.5.4.6. Six sites were not visited in 2013 (Susitna Above Watana Dam, Susitna Below Watana Dam, Fog Creek, Deadman Creek, Watana Creek, and Tsusena Creek) due to lack of access to CIRWG lands.
- Groundwater sampling piezometer wells were originally described for placement at the end of each mainstem transect within each Focus Area. However, the wells had to be relocated to areas where they could be successfully installed and were also more applicable in support of the Instream Flow Study (Section 8.5 of the ISR).

Study 5.5 Summary of Results in ISR (ISR Study 5.5, Part A – Section 5)

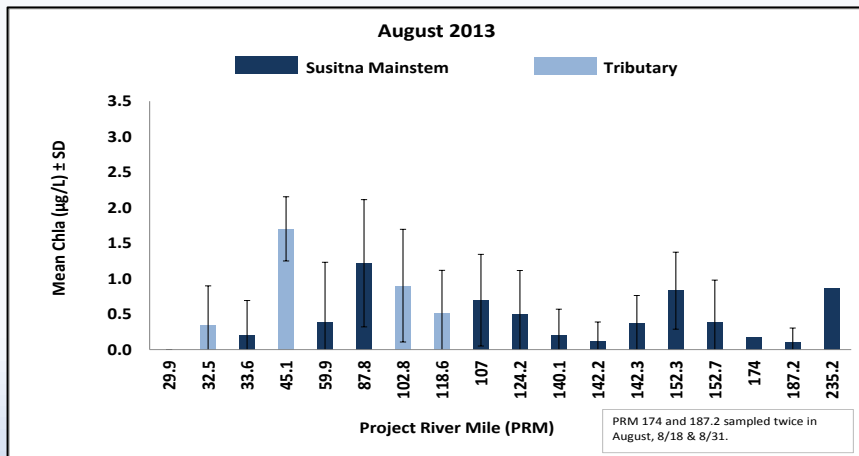
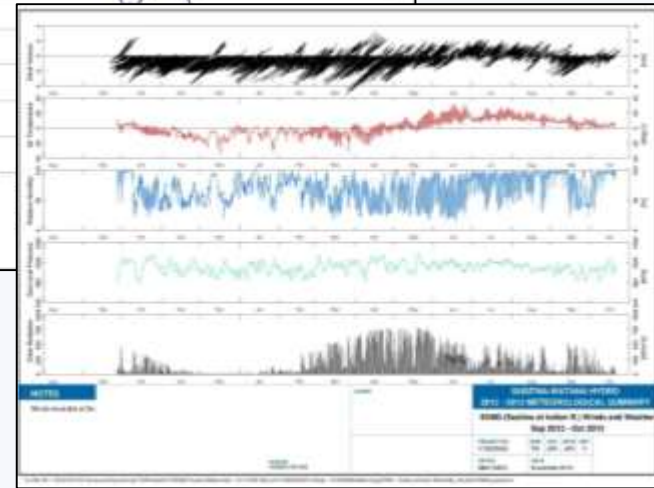
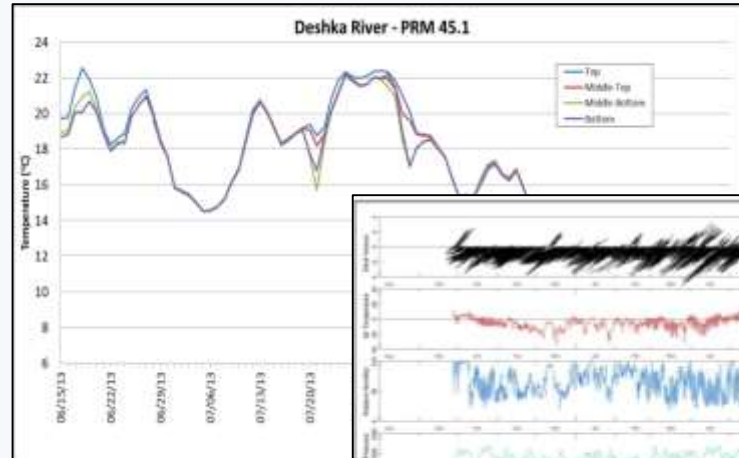
QA/QC completed on field parameters from 2013

Water Temperature Data Collection

- 28 sites monitored from PRM 29.9 to 235.2

Meteorological Data Collection

- Three stations from September 2012 to October 2013



Baseline Water Quality Monitoring

- Field collected water temperature, dissolved oxygen, pH, specific conductance, redox potential, chlorophyll *a*, color

Study 5.5 Summary of Results in ISR (ISR Study 5.5, Part A – Section 5)

QA/QC completed on field parameters from 2013, *cont.*

Focus Area Field Measurements

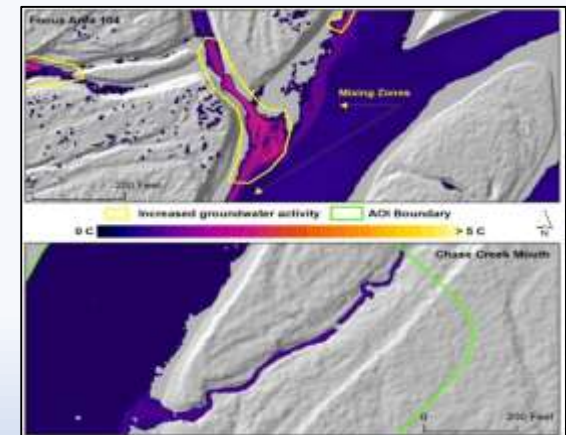
- Field collected water temperature, dissolved oxygen, pH, specific conductance, redox potential, chlorophyll *a*

Groundwater Field Measurements

- Wells located in Focus Areas: FA-104 (Whiskers Slough), FA-113 (Oxbow I), FA-128 (Slough 8A), and FA-138 (Gold Creek)
- Field collected water temperature, dissolved oxygen, pH, specific conductance redox potential

Thermal Infrared Remote Sensing

- 10 Focus Areas and 9 additional areas of interest along the Middle Susitna River



Study 5.5 Summary of Results since ISR

QA/QC completed on analytical lab results from 2013 samples:

Baseline Water Quality Characterization

- Nutrients, turbidity, metals, total dissolved solids, ions, organic carbon, and other parameters (e.g., BTEX, PAHs, radionuclides, fecal coliform)

Focus Area Water Quality Characterization

- Nutrients, turbidity, metals, hardness, organic carbon

Groundwater Quality

- TP, TKN, total Al, total Fe, and total Hg

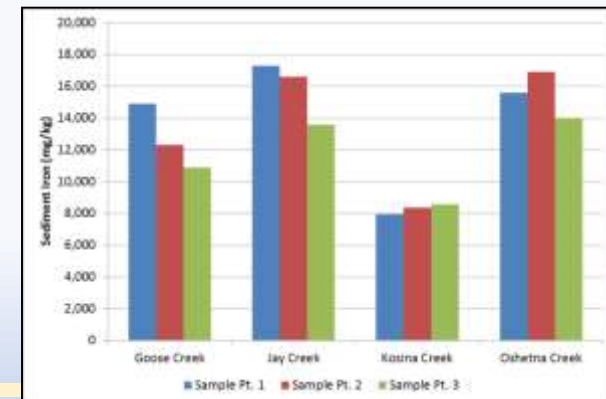
Sediment Samples

- TOC, As, Cd, Cu, Fe, Pb, Hg, Ni, Se, Zn, sediment size

Porewater Samples

- Hardness, alkalinity, DOC, Al, As, Cd, Cu, Fe, Pb, Mg, Hg, Ni, Se, Zn

All results will be presented in the Updated Study Report



Study 5.5 Summary of Results since ISR

Completed Winter and Summer 2014 Sample Collection

Water Temperature Data Collection

- Over-winter and summer monitoring 2014
- Thermistors downloaded and removed Sept 2014

Baseline Water Quality

- In-situ field data (e.g., temperature, DO, redox potential, specific conductance)
- Total metals (except Ca and Mg), and dissolved aluminum, TP, TKN
NO₃+NO₂⁻ nitrogen

Focus Area Water Quality

- In-situ field data
- Total metals (except Ca and Mg), and dissolved aluminum, TP, TKN
NO₃+NO₂⁻ nitrogen

Field and laboratory data for 2014 under QA/QC review and will be presented in the Updated Study Report

Study 5.5 Summary of Results since ISR

Completed Winter and Summer 2014 Sample Collection, *cont.*

Groundwater Well Monitoring

- In-situ field data

Meteorological Data Collection

- Scheduled maintenance and winter preparation scheduled for Oct 2014

Sediment Samples at Remaining Sites

- TOC, As, Cd, Cu, Fe, Pb, Hg, Ni, Se, Zn, sediment size

Porewater Samples at Remaining Sites

- Hardness, alkalinity, DOC, Al, As, Cd, Cu, Fe, Pb, Mg, Hg, Ni, Se, Zn



Field and laboratory data for 2014 under QA/QC review and will be presented in the Updated Study Report

AEA Proposed Modifications to Study 5.5 in ISR (ISR Study 5.5, Part C – Section 7.1.2)

Water Temperature Data Collection

- Water Temperature Data Collection Logging interval (October 2013 through June 2014) to be 30-minutes (instead of 15-minutes (RSP Section 5.5.4.1))
- Data logging intervals from 15-minutes to 30-minutes on final download of summer monitoring (August-September 2014) depending on ice formation

Meteorological Data Collection

- Rain gauge and CS725 snow water equivalency (SWE) sensor to be installed at MET station ESM1, if possible

AEA Proposed Modifications to Study 5.5 in ISR (ISR Study 5.5, Part C – Section 7.1.2) (Continued)

Baseline Water Quality Monitoring

- Extent of sampling for baseline water quality monitoring refined based on review of remaining data collected during 2013 and how quality objectives were met
- **Select water quality parameters outside acceptance limit during lab analysis**
 - **Sample preservative affected detection of target analyte by lab equipment**
 - **Parameters affected – total metals (except Ca and Mg), total mercury, total phosphorus, total Kjeldahl nitrogen (TKN), total nitrate+nitrite-nitrogen, and dissolved aluminum**
 - **Samples that were ‘rejected’ or ‘estimated’ and will be re-sampled in 2014**

Current plans – continued sampling for baseline water quality (June to September 2014) at same sites sampled in 2013

- **Single grab sample to be collected at each site transect and monthly site will be analyzed for all total metals (except Ca and Mg), dissolved Al, TP, TKN, and nitrate+nitrite-nitrogen (change from study plan (RSP Section 5.5.4.4.2.) and Table 5.5-4)**
- **Analytical inconsistencies (ISR Section 5.4) call for the following water quality parameters for lab split sample analysis (only during July 2014): all total metals (except Ca and Mg), dissolved Al, TP, TKN, and nitrate+nitrite-nitrogen**

AEA Proposed Modifications to Study 5.5 in ISR (ISR Study 5.5, Part C – Section 7.1.2) (Continued)

Focus Area Water Quality Monitoring

- Focus Areas and groundwater wells to be re-sampled in 2014 (generate valid water quality data and determine if a correction factor is necessary)
- **Re-sampling during 2014 to consist of collecting single grab sample once in July and August at each location and at depth of 1.5m (where possible) at center of each transect in main channel and at side channels where flow differs from main channel**
 - **Analyzed for total metals (except Ca and Mg), dissolved Al, TP, TKN, and nitrate+nitrite-nitrogen (modification of RSP Section 5.5.4.5.)**

Sediment and Porewater Sampling

- Sediment and porewater samples to be collected (August to September 2014) from 6 locations around Watana Dam site not collected during 2013 field effort
 - If not accessible, sampling will be moved to alternate locations with same setting as proposed sites (RSP Section 5.5.4.6.)
 - Hand auger or stainless steel spoon to be used for sediment sampling (modification from RSP Section 5.5.4.6)

Thermal Infrared Remote Imaging

- Not all data from lower river collected in 2013 due to adverse weather conditions, remaining data will be collected during 2014 field season (weather permitting)

New Modifications to Study 5.5 since ISR

Water Temperature Data Collection

- ISR Section C, Part 7 indicates
Over-winter systems will be installed and thermistors will be adjusted to log at 30 minute intervals in order to conserve space for data to be stored through winter 2014-2015 (September 2014-June 2015)
 - **Over-winter thermistors were not installed for third year; As demonstrated by select sites in 2012/2013 and 2013/2014, no interannual winter temperature variation**

Thermal Infrared Remote Sensing

- ISR Section C, Part 7 indicates
The remaining portions of the Lower River (approximately 27% of the total) will be flown during the 2014 field season.
 - **TIR of the remaining 27% of the LR will not be conducted 2014 as data generated in previous effort was adequate to meet objectives of the study.**

Steps to Complete Study 5.5 (ISR Study 5.5, Part C – Section 7.1)

Water Temperature Data Collection

- QA/QC data

Meteorological Data Collection

- Scheduled maintenance and winter preparation scheduled for Oct 2014

Baseline Water Quality Monitoring

- QA/QC monthly grab samples and in-situ field measurements

Focus Area Water Quality Monitoring

- QA/QC grab samples and in-situ field measurements

Sediment and Porewater Sampling

- QA/QC samples collected at six sites that were not visited in 2013

Data QA/QC

- All water quality sample results from 2014 will be QA/QC and summarized in the USR

Licensing Participants Proposed Modifications to Study 5.5?

- Agencies
- CIRWG members and Ahtna
- Public