Susitna-Watana Hydroelectric Project Document
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Notes: "(revised per errata November 14, 2014)." This entire document was replaced in November 2014 by replacement pages are found on pages 3 to 18 of *Mercury assessment and potential for bioaccumulation study (Study 5.7), Errata to evaluation of continued mercury monitoring beyond 2014, technical memorandum (September 30, 2014)* (SuWa 268), which is Attachment N to *Susitna-Watana Hydroelectric Project, Project no. 14241-000; Filing of Initial Study Plan meetings transcripts and additional information in response to October 2014 Initial Study Plan meetings* (SuWa 254).	

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SUSITNA-WATANA HYDRO

September 30, 2014

Ms. Kimberly D. Bose
Secretary
Federal Energy Regulatory Commission
888 First Street, N.E.
Washington, D.C. 20426

Re: Susitna-Watana Hydroelectric Project, Project No. 14241-000

Third Set of 2014 Technical Memoranda for Initial Study Plan Meetings

Dear Secretary Bose:

As the Alaska Energy Authority (AEA) explained in its September 17, 2014 filing with the Federal Energy Regulatory Commission (Commission or FERC) for the proposed Susitna-Watana Hydroelectric Project, FERC Project No. 14241 (Project), the June 3, 2014 Initial Study Report (ISR) provided for AEA to prepare certain technical memoranda and other information based on 2014 work. In accordance with Commission Staff direction, on September 17 and September 26, AEA filed and distributed the first and second sets of technical memoranda and other information generated during the 2014 study season.

With this letter, AEA is filing and distributing the third set of technical memoranda generated during the 2014 study season, as described below.

This third set of technical memoranda includes:

- Attachment A: *Baseline Water Quality Study (Study 5.5) and Water Quality Modeling Study (Study 5.6), Water Quality and Lower River Modeling Technical Memorandum*. This technical memorandum evaluates water quality data collected during 2013 and 2014 for adequacy in representation of current riverine conditions. This Technical Memorandum further includes an assessment of whether to extend the Water Quality Modeling Study's riverine model below PRM 29.9.

- Attachment B: *Mercury Assessment and Potential for Bioaccumulation Study (Study 5.7), Evaluation of Continued Mercury Monitoring Beyond 2014 Technical Memorandum*. This technical memorandum evaluates the need for continued monitoring of mercury data beyond 2014 and whether the existing data collection efforts are sufficient to satisfy objectives for characterizing baseline mercury conditions in the Susitna River and tributaries (Revised Study Plan (RSP) Section 5.7.1).

- Attachment C: *Groundwater Study (Study 7.5), Preliminary Groundwater and Surface-Water Relationships in Lateral Aquatic Habitats within Focus Areas FA-128 (Slough 8A) and FA-138 (Gold Creek) in the Middle Susitna River Technical Memorandum.* This technical memorandum provides an overview of the types of data and information that are being collected to support the Task 6 activities of the Groundwater Study, and describes the methods and techniques that are being applied in analyzing the data leading to development of response functions to be used for evaluating Project operational effects. The TM centers on the analysis for FA-128 (Slough 8A) and to a lesser extent FA-138 (Gold Creek) and represents an expansion of the presentation materials provided during the Proof of Concept meetings held on April 15-17, 2014.

- Attachment D: *Groundwater Study (Study 7.5), Groundwater and Surface-Water Relationships in Support of Riparian Vegetation Modeling Technical Memorandum*. This technical memorandum provides an overview of the types of data and information that are being collected to support the Task 5 activities within the Groundwater Study, and describes the methods and techniques that are being applied in analyzing the data leading to development of response functions for evaluating Project operational effects. The TM provides analysis objectives for FA-115 (Slough 6A) as a primary example of upland versus riverine dominated groundwater conditions. Additional examples are shown for FA-128 (Slough 8A) and FA-138 (Gold Creek).

- Attachment E: *Salmon Escapement Study (Study 9.7), 2014 Implementation and Preliminary Results Technical Memorandum*. This technical memorandum describes 2014 implementation (including methods and variances) of and preliminary results from the Salmon Escapement Study.

- Attachment F: *Cook Inlet Beluga Whale Study Plan (Study 9.17), 2015 Implementation Plan Technical Memorandum.* This implementation plan describes the methods for study activities proposed for 2015 that would implement the Cook Inlet Beluga Whale Study (instead of those described in RSP Section 9.17.1).

AEA appreciates the opportunity to provide this additional information to the Commission and licensing participants, which it believes will be helpful in determining the appropriate development of the 2015 study plan as set forth in the ISR. If you have questions concerning this submission please contact me at wdyok@aidea.org or (907) 771-3955.

Sincerely,

Wayne Dyok
Project Manager
Alaska Energy Authority

Attachments

cc: Distribution List (w/o Attachments)

Attachment B

Mercury Assessment and Potential for Bioaccumulation Study (Study 5.7), Evaluation of Continued Mercury Monitoring Beyond 2014 Technical Memorandum

Susitna-Watana Hydroelectric Project (FERC No. 14241)

Mercury Assessment and Potential for Bioaccumulation Study (Study 5.7)

Evaluation of Continued Mercury Monitoring Beyond 2014 Technical Memorandum

Prepared for

Alaska Energy Authority

SUSITNA-WATANA HYDRO

Clean, reliable energy for the next 100 years.

Prepared by

Tetra Tech

September 2014

(revised per errata November 14, 2014)

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ACRONYMS, ABBREVIATIONS, AND DEFINITIONS

Abbreviation	Definition
ADEC	Alaska Department of Environmental Conservation
AEA	Alaska Energy Authority
AWQS	Alaska Water Quality Standards
FA(s)	Focus Area(s)
FERC	Federal Energy Regulatory Commission
ILP	Integrated Licensing Process
MeHg	Methylmercury
NOAA	National Oceanic and Atmospheric Administration
NTU	Nephelometric turbidity unit
PRM	Project River Mile
Project	Susitna-Watana Hydroelectric Project
RSP	Revised Study Plan
SQuiRT(s)	Screening Quick Reference Table(s)
TEL	Threshold Effects Level
USACE	U.S. Army Corps of Engineers
USGS	U.S. Geological Survey

1. INTRODUCTION

The Alaska Energy Authority (AEA) is preparing a License Application that will be submitted to the Federal Energy Regulatory Commission (FERC) for the Susitna-Watana Hydroelectric Project (Project) using the Integrated Licensing Process (ILP). The Project is located on the Susitna River, an approximately 320-mile-long river in Southcentral Alaska. The Project's dam site would be located at Project River Mile (PRM) 187.1.

Mercury contamination is widely known to present human health concerns. In the environment, processes such as reducing and low oxygen conditions can lead to increased rates of mercury methylation (Figure 1-1). Based on several studies, mercury that is found in newly formed reservoirs originates predominantly from inundation of organic soils (Figure 1-2). The linkage between sediment sources, mobilization into the water column (dissolved form), and the potential for bioaccumulation in fish tissue and piscivores therefore presents a human health concern with respect to mercury contamination. Methylmercury (MeHg) bioaccumulates, and the highest concentrations are typically in the muscle tissue of adult predatory fish. Targeting adult fish is a good way of monitoring methylmercury migration to the larger environment. Potential for bioaccumulation in aquatic life is determined when chronic thresholds for toxics exposure in a medium are identified. Potential for mortality is determined when acute criteria for toxics in a medium are exceeded.

A Mercury and Potential for Bioaccumulation Study (Study 5.7) was initiated in 2013 to answer key questions (Revised Study Plan [RSP] Section 5.7.1; AEA 2012) and determine: 1) whether conditions within the reservoir will cause mercury methylation from inundated conditions, 2) the concentrations of methylmercury that might occur, and 3) whether a mechanism exists to transfer that methylmercury to wildlife, resulting in detrimental impacts.

Data on the mercury concentration in sediment, sediment porewater, soil, vegetation, water, fish, and piscivorous mammals have been collected within the past two years (2013/2014) within the Susitna River basin. These data were further evaluated for adequacy in representation of current conditions in and around the Susitna River. The need for continued monitoring of mercury data beyond 2014 is being evaluated to determine whether the existing data collection efforts are sufficient to satisfy objectives for characterizing baseline mercury conditions in the Susitna River and tributaries (RSP Section 5.7.1).

2. STUDY OBJECTIVES

Based on several studies, the mercury that is found in newly formed reservoirs originates predominantly from inundation of organic soils. Receptors are and will be present in the inundation area (macroinvertebrates, fish, birds, etc.). Mercury methylation in reservoirs is a fairly well understood process, and numerous models exist to predict the occurrence and magnitude of the phenomena.

Given these known factors, key questions that need to be answered by this study include the following:

1) Whether conditions within the reservoir will cause mercury methylation from this source.

2) The concentrations of methylmercury that might occur.

3) Whether a mechanism exists (fish and small invertebrates living in the methylation zone) to transfer that methylmercury to wildlife, resulting in detrimental impacts.

Study 5.7 assesses the status of mercury concentrations in several media and mercury cycling between the aquatic and terrestrial environment. Based on these questions, specific objectives of Study 5.7 study are as follows:

- Summarize available and historic water quality information for the Susitna River basin, including data collection from the 1980s Alaska Power Authority (APA) Susitna Hydroelectric Project.
- Characterize the baseline mercury concentrations of the Susitna River and tributaries. This will include collection and analyses of vegetation, soil, water, sediment pore water, sediment, piscivorous birds and mammals, and fish tissue samples for mercury.
- Utilize available geologic information to determine if a mineralogical source of mercury exists within the inundation area.
- Map mercury concentrations of soils and vegetation within the proposed inundation area. This information will be used to develop maps of where mercury methylation may occur.
- Use the water quality model to predict where in the reservoir conditions (pH, dissolved oxygen, turnover) are likely to be conducive to methylmercury formation.
- Use modeling to estimate methylmercury concentrations in fish.
- Assess potential pathways for methylmercury to migrate to the surrounding environment.
- Coordinate study results with other study areas, including fish, instream flow, and other piscivorous bird and mammal studies.

3. STUDY AREA

As established in Study Plan Section 5.7.3, the study area begins at project river mile (PRM) 19.9 and extends upstream from the proposed reservoir to PRM 235.2. An overview map and detailed sample locations are provided in the Initial Study Report (ISR) (AEA 2014).

4. ELEMENTS REQUIRED TO COMPLETE THE STUDY

AEA initiated the Mercury Assessment of Potential for Bioaccumulation Study in 2013. To meet study goals, AEA completed numerous study components which are summarized in ISR Study 5.7 Section 5. The following sections describe study components planned for 2014.

4.1 Planned Monitoring Components in 2014

AEA summarized its plans for completing the Mercury Assessment and Potential for Bioaccumulation Study in ISR Study 5.7, Part C, Section 7 as follows:

- Geologic studies for the inundation zone.
- Collection of sediment samples at the six remaining sites located on CIRWG lands (RSP Section 5.7.4.2.4).
- Limited winter water quality sampling in January and March of 2014 (RSP Section 5.7.4.2.3).
- Summer monthly water sampling from June to September 2014 (see ISR Section 5.5 for details).
- Completion of the Predictive Risk Analyses (RSP Section 5.7.4.6) and mercury modeling (RSP Sections 5.7.4.7 and 5.7.4.8).

5. STUDY COMPONENTS COMPLETED IN 2014

The 2014 efforts focused on the collection of water and sediment mercury and methylmercury to aid in the creation of a pathways analysis model used to determine the need for further mercury sampling in other media. Specific study components completed in 2014 are summarized below.

5.1 Geologic Studies for the Inundation Zone

The ISR Study 4.5, Part C Section 7.2 states the following elements and 2015 schedule for geologic mapping of the area to be inundated by the reservoir:

Geologic Mapping – summer mapping to be scheduled prior to leaf-out and after leaves have fallen (May and September) for geologic mapping associated with regional geology development, mineral resources and claims, reservoir rim stability, and a continuation of geologic mapping as needed for lineaments and geologic features (potential fracture and shear zones) and evaluation of rock displacement or rupture in the dam site area.

Results from this geologic characterization of the inundated land will be used to determine potential for mobilization of mercury in the reservoir. This study is on-going and is not yet completed.

5.2 Collection of Sediment and Porewater Samples

Sediment and porewater samples were collected at the six remaining sites located on CIRWG lands (RSP Section 5.7.4.2.4) in 2014: Susitna River just below and above the proposed dam site, and the mouths of Fog, Tsusena, Deadman, and Watana Creeks (Section 5.5.4.6 of the RSP; Section 4.5 of the ISR).

5.3 Limited Winter Water Quality Sampling

Winter samples were collected from five baseline monitoring sites in January 2014 and March 2014 (Table 5.3-1). Field parameters were collected on-site during each visit and laboratory parameters generated following analysis of samples. Laboratory data from 2014 winter sampling has been completed and is now undergoing a quality assurance review. The procedure for a quality assurance review includes development of a Data Validation/Verification Report (DVR) for ten percent of all samples collected for this winter monitoring program. The DVR is a data review requirement of ADEC to ensure compliance with use of high quality data used to make regulatory decisions.

Three groundwater wells previously established in Focus Areas FA-104 (Whiskers Slough), FA-128 (Slough 8A), and FA-138 (Gold Creek) were sampled in February 2014, March 2014, and April 2014 (Table 5.3-2). Both field and laboratory parameter results were generated on three separate sampling dates. Raw data is currently being reviewed to assure it meets acceptance limits per the Quality Assurance Project Plan for Water Quality and Mercury Assessment for the Susitna-Watana Hydroelectric Project Susitna River, Southcentral Alaska (QAPP).

5.4 Summer Monthly Sampling

Total mercury samples were collected from baseline water quality and seven Focus Area (FA) transects identified in ISR Study 5.7 Sections 4.3 and 4.4, respectively, from June to September 2014. Total mercury samples were collected from one location on a transect at each of the baseline water quality sites. Total mercury samples were also collected from each transect within seven Focus Areas (Table 5.4-1). If a transect within a Focus Area crossed braided channels then one total mercury sample was collected from the mainstem and another from the braided channel area. A single fur sample was collected outside the inundation area and was the only sample gathered during the 2014 field studies.

6. APPROACH FOR STUDY COMPLETION

6.1 Pathway and Threshold Analyses

An illustrative pathway model was constructed that reports concentrations of total, dissolved, and methylmercury measured in various receptors in the Susitna River drainage (Figure 5.5-1) and describes a preliminary evaluation of potential transfer between media (e.g., sediment– sediment porewater, porewater–surface water, surface water–fish tissue). A final analysis of potential for mercury bioaccumulation will combine evaluation of criteria or threshold exceedance and if these concentrations promote transfer between connected components of the pathway (Figure 1-2) model. An additional diagram as seen in Figure 1-2 will be constructed for the new reservoir and include wetlands, bogs, and terrestrial vegetation that will be submerged by inundation.

6.1.1 Data Applied to Pathways Analysis

Data used to construct the pathway model were primarily based on data collected in 2013 that have undergone QA/QC review. Presence of mercury in each of the media sampled and analyzed is identified and used to determine if a concentration gradient is present (e.g., potential for transfer from sediment to porewater, porewater to surface water, and sediment to biota). Evaluation for adequacy of data used in pathways analysis was based on factors like completeness in sampling all media, determination for adequacy of number of samples collected in each media, and spatial representation of the sampled media.

Fourteen sediment and sediment porewater samples were analyzed for total mercury in 2013 and used in the preliminary pathways assessment. Fish sample collection occurred in August through October 2013. Liver samples were also collected from burbot and analyzed for total mercury and MeHg. A single fur sample collected from mink and otter outside the Project area was collected in March 2014 and analyzed for total mercury. A total of 50 soil and vegetation samples from five sites in each of ten locations within the reservoir inundation zone were collected during August 2013. Vegetation and soil samples were analyzed for total mercury and MeHg. Each soil and vegetation sample was analyzed for concentrations of mercury in wet samples and dry weight results were calculated. In all cases dry weight sample concentrations (calculated values) exceeded wet weight sample concentrations. Dry weight sample concentration results were used in the current mercury conceptual pathway assessment.

6.1.2 Application of the Pathway Model

The initial approach used to assess mercury data from various media was to compare data with existing and appropriate water quality criteria, sediment thresholds, and fish tissue screening levels. Surface water results were compared to Alaska Water Quality Standards (18 ACC 70.020(b)) for protection of beneficial uses in fresh water and to criteria for protection of human health. Sediment and fish tissue results were compared to the Screening Quick Reference Tables (SQuiRTs) used by the National Oceanic and Atmospheric Administration (NOAA) to determine if the threshold effects level (TEL) to aquatic life have been exceeded. Table 6.1-1 summarizes the concentrations of mercury compared to criteria or thresholds, including human health as well as criteria for protection of aquatic life.

Based on discussion provided in Section 5.7.2 of the RSP, naturally occurring deposits of mercury may occur as parent geology for this element; for example, diorite and granodiorite have been identified in the proposed inundation zone. Given the limited presence of small-scale mining in the Project area other sources of mercury could be associated with atmospheric deposition. Lakes at Glacier Bay, Alaska, have shown that current rates of atmospheric mercury deposition are almost double the concentration currently than observed during pre-industrial times (Engstrom and Swain 1997). The presence of mercury in organic rich soils from decades of post-industrial deposition could be the only source of this element in the inundation zone. Vegetation samples collected from the area provide some indication of intensity of aerial deposition based on comparison with concentrations of mercury with known sources of this element.

6.2 Comparison to Existing Criteria and Thresholds

Preliminary examination of 2013 mercury results included a review from each of the media sampled in both the aquatic and terrestrial environment. Comparison of results with criteria or effects thresholds was one of the evaluation tools used to review results of mercury concentrations in each of the media. Table 6.1-1 presents the maximum and minimum concentrations from observations in each of the sampled media during 2013 and compares the maximum concentrations with available criteria or thresholds. Comparison to maximum concentrations is the most conservative approach for determining potential risk of effects from high mercury concentrations. When the maximum mercury concentration exceeded the criterion, further examination for how many results exceeded and if most results were near the minimum concentration as reflected by the average concentration.

Of the 375 samples collected as part of the water quality baseline monitoring study in 2013 were analyzed for total and dissolved mercury. The Focus Areas had a higher density of sampling locations, so that prediction of change using the EFDC water quality model could be made with a higher degree of resolution under Project operations during wet, dry, and average years. Grab samples collected from the Focus Areas were analyzed for total mercury and methylmercury generating 300 results. Focus Area water quality mercury sampling results have been compared with state criteria and thresholds for protection of beneficial uses to evaluate how Project operations will affect potential fish spawning and rearing habitat.

Based on 2013 sampling results, the average concentration of dissolved mercury in the water column was 1.06 ng/L (Figure 5.5-1). This average is below the most stringent criterion, of 12 ng/L that is protective of aquatic life. Two dissolved mercury samples collected in June 2013 (from PRM 59.9) and July 2013 (PRM 33.6) exceeded the Human Health criterion of 50 ng/L at 58.7 and 56.4 ng/L, respectively (Table 6.1-1). The remainder of results were well below the Human Health criterion. Comparison of total mercury concentrations were not compared to the criterion for protection of aquatic life as results from 2013 did not pass acceptance limits. These results will be compared against criteria once examination of the 2014 data set is made and adjustments to 2013 results using a correction factor. Similarly, one mercury result (220 ng/g) from 14 sediment samples exceeded the recommended SQuiRT Threshold of 174 ng/g. Concentrations were much lower in the remainder; the overall average mercury concentration in the sediment samples was 23.01 ng/g.

Background information for mercury in fish tissue was acquired from recent fish tissue analysis by ADEC with results ranging from 29.07ng/g (total mercury in Sockeye salmon) – 380.0 ng/g (total mercury in lake trout) in the Susitna Drainage (ADEC 2012). The average concentration among several species of fish sampled in 2013 from the Susitna drainage was within the range described by ADEC. Data collected in 2013 was similar to results collected by the 2012 ADEC effort.

7. STEPS TO COMPLETE THE STUDY

7.1 Data Verification/Validation

Revised Study Plan (RSP) Section 5.7.4.2.3 (AEA 2012) stated that AEA would recommend the need for continuing surface water sampling for mercury in 2014 based on 2013 results. Total mercury sample results collected in 2013; however, did not meet QA/QC requirement acceptance limits specified in the QAPP. The review of 2014 sample results will be completed by December 2014 to determine if total mercury estimates in surface water, sediment, and pore water satisfies acceptance limits and can be used for further data analysis and interpretation. Because ingestion rates of mercury in piscivores is directly correlated with fish, a determination for potential for bioaccumulation must initially be completed for aquatic receptors. Identifying a potential source of mercury from fish (see Section 5.7.4.2 of the RSP) in the Project area must occur before any conclusions can be made regarding transfer from aquatic to terrestrial receptors. This will be completed when pathways analysis begins following review of the 2014 data results.

8. RECOMMENDATIONS

Based on results from 2013 sampling, the total mercury concentrations for 2013 from water column samples are considered high estimates as results did not meet acceptance limits for laboratory performance. A correction factor will be developed for the 2013 results following QA/QC review of 2014 data. The concentrations of total mercury in sediments from four sites that were collected in 2013 are well below SQuiRT TEL and the concentration of total mercury in sediment porewater (Total Hg) is several times lower than the water column concentration.

The final pathway analysis has not yet been completed and is the next major component of this study that will determine potential sources for bioaccumulation. Existing fish data collection and tissue results will be used to identify these potential sources from several media where contact or ingestion of mercury is possible. Pathways analysis will be used to determine if reservoir and riverine habitat have the potential for generating methylmercury by using predicted elements from the Environmental Fluid Dynamic Code (EFDC) model that are known to facilitate the genesis of methylmercury (Figure 1-1). Post-reservoir conditions will establish potential sources and location of predicted methylmercury concentrations and the subsequent potential for bioaccumulation.

Based upon its preliminary review of the mercury results measured in each of the media, AEA is not proposing any additional sampling for mercury in 2015. Most of the observations characterizing mercury in each of the media were below existing thresholds or criteria. Monitoring would be expanded (as stated in Section 5.5.4.4 of the RSP) if metals in surface water, fish tissue, or sediment exceeded criteria or thresholds. Most of the mercury results in select media did not exceed available criteria/thresholds, therefore, suggesting no additional sampling is necessary.

9. REFERENCES

ADEC (Alaska Department of Environmental Conservation). 2012. Mercury concentration in fresh water fish Southcentral Susitna Watershed. Personal communication with Bob Gerlach, VMD, State Veterinarian. June 2012.

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10. FIGURES

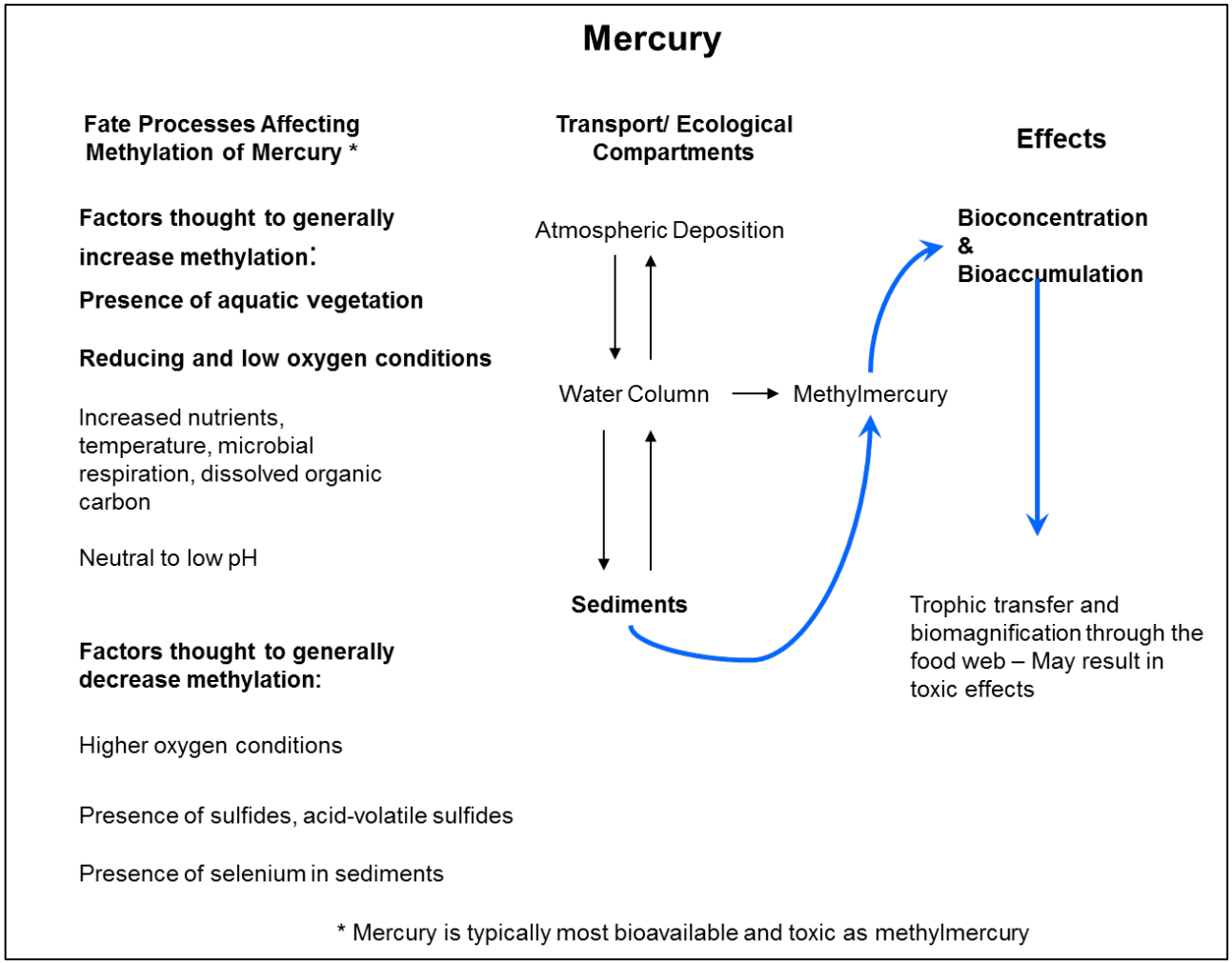

Figure 1-1. Factors in the Environment that Effect Mercury Bioconcentration and Bioaccumulation.

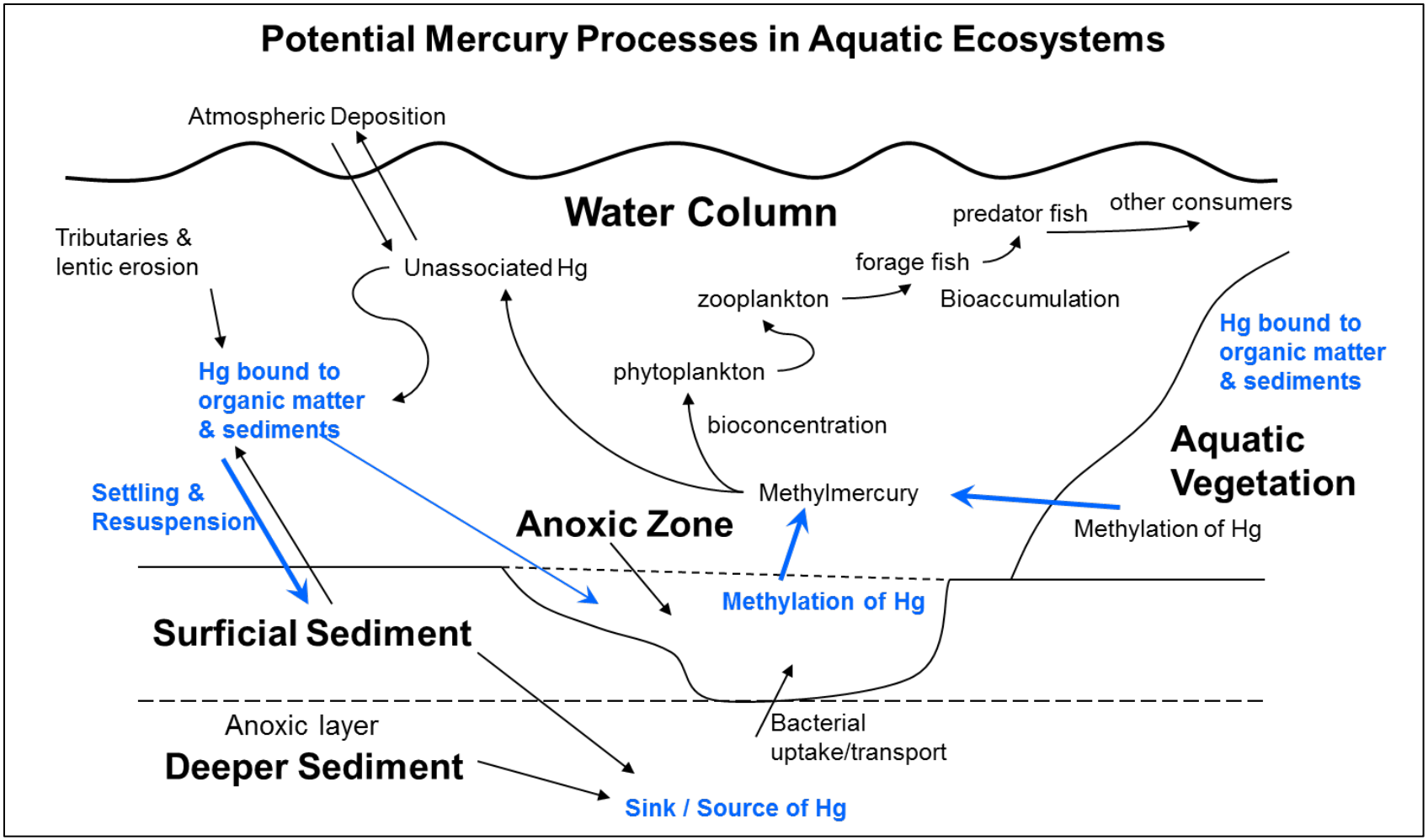

Figure 1-2. Potential Mercury in a Mature Reservoir.

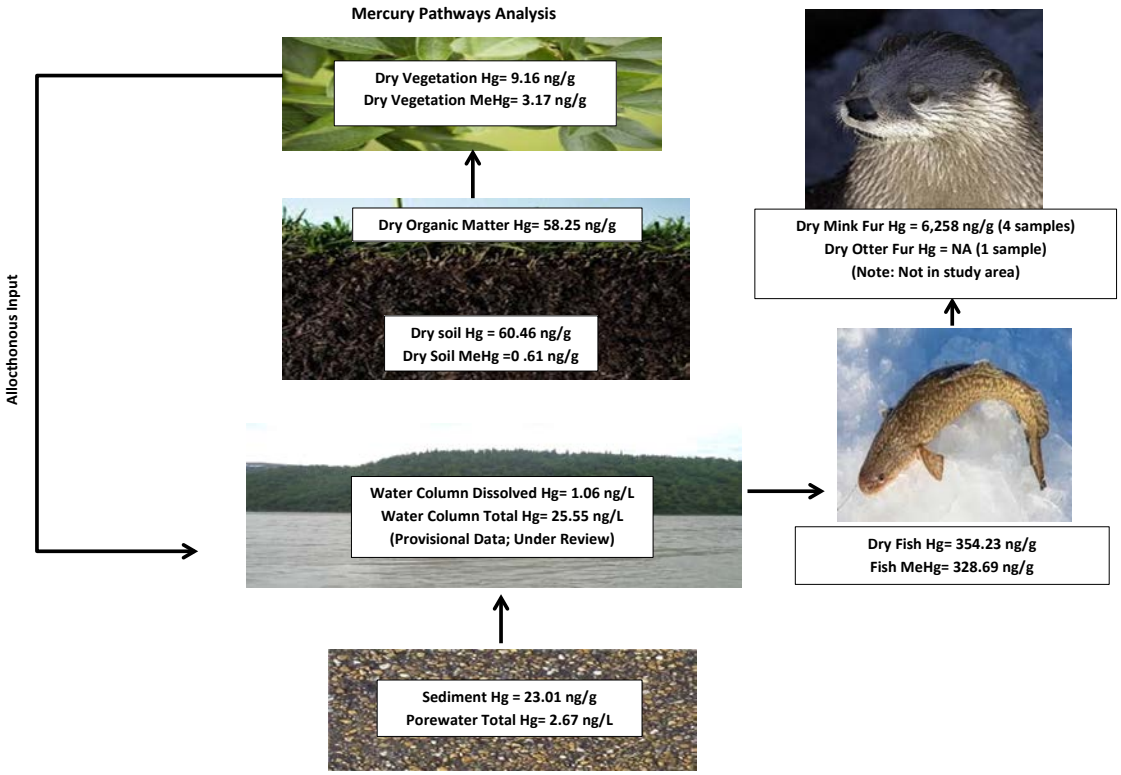

Figure 5.5-1. Average 2013 Mercury Concentrations and Pathways for Transfer of Mercury in the Susitna Basin.

11. TABLES

Table 5.3-1. 2014 Winter Sampling at Baseline Water Quality Monitoring Sites and Parameters.

Winter Baseline Water Quality Monitoring			
Sampling Date	Susitna River PRM	Lab Parameters	Field Parameters
1/28/2014	29.9, 87.8	TP, SRP, Ammonia, NO_3+NO_2, TKN, MeHg, Alkalinity, Hardness, TDS, TSS, TOC, DOC, Turbidity, Chlorophyll Dissolved and Total Al, As, Fe, Ba, Be, Cd, Cr, Co, Cu, Pb, Mo, Ni, Se, Tl, V, Zn, Mn, Ca, Mg, Hg	Color, Temperature, DO, pH, Specific conductance, ORP, Turbidity
1/29/2014	185, 225		
1/30/2014	140		
3/10/2014	29.9, 87.8		
3/11/2014	185, 225		
3/12/2014	140		

Table 5.3-2. 2014 Winter Sampling at Groundwater Well Monitoring Sites in Select Focus Areas.

Winter Focus Area Groundwater Well Monitoring			
Sampling Date	Focus Area	Lab Parameters	Field Parameters
2/6/2014	FA-104 (Whiskers Slough)	TP, SRP, Ammonia, NO_3+NO_2, TKN, MeHg, TOC, DOC, Turbidity, Dissolved and Total Al, Fe, Hg	Temperature, pH, Specific conductance, ORP, DO
2/12/2014	FA-138 (Gold Creek)		
2/17/2014	FA-128 (Slough 8A)		
3/6/2014	FA-104 (Whiskers Slough)		
3/12/2014	FA-138 (Gold Creek)		
3/16/2014	FA-128 (Slough 8A)		
4/2/2014	FA-104 (Whiskers Slough)		
4/9/2014	FA-138 (Gold Creek)		
4/13/2014	FA-128 (Slough 8A)		

Table 5.4-1. Focus Areas at which water quality sampling occurred.

Focus Area ID (Common Name)
FA-144 (Slough 21)
FA-141 (Indian River)
FA-138 (Gold Creek)
FA-128 (Slough 8A)
FA-115 (Slough 6A)
FA-113 (Oxbow 1)
FA-104 (Whiskers Slough)

Table 6.1-1. Concentrations of Mercury Compared to Criteria or Thresholds.

Sample Matrix	Maximum (ng/g dry or ng/L wet)	Minimum (ng/g dry or ng/L wet)	Mean (ng/g dry or ng/ L wet)	Standard Deviation	No. of Observations	Criteria or Threshold
Hg in Dry Vegetation	16.1	6.71	9.16	1.9	50	
MeHg in Dry Vegetation	5.15	2.54	3.17	0.53	50	
Hg in Dry Organic Matter	129	26.8	58.25	20.04	55	
Hg in Dry Soil	119	27.1	60.46	21.07	55	
MeHg in Dry Soil	4.34	0.096	0.61	0.89	55	
[1]Dissolved Hg in Water Column	58.7	0.5	1.06	4.21	375	Acute = 2,040 ng/L
Total Recoverable Hg in Water Column	See note [2]	See note [2]	See note [2]	See note [2]	See note [2]	Aquatic Life: Chronic = 12 ng/L Acute = 2,400 ng/L Human Health = 50 ng/L
Hg in Sediment	220	1.82	23.01	54.76	14	(SQuiRT) 174 ng/g
Hg in Sediment Porewater	12.5	0.5	2.67	3.98	14	
Dry Fish Tissue Hg (no liver included)	2,920	26.9	354.23	428.47	67	[3]29.07 ng/g – 380 ng/g
Dry Fish MeHg (no liver included)	2,860	25.2	328.69	307.79	67	
[4]Dry Mink Fur Hg	7,670	4,180	6,258	1,278	4	
[4]Dry Otter Fur Hg	6,330	2,070	NA	NA	2	
[5]Wet Wt. Otter Fur Hg	417	NA	NA	NA	1	

[1] Dissolved acute criterion is 85% of total recoverable mercury.

[2] Based on results from 2013 sampling, the total mercury concentrations for 2013 from water column samples are considered high estimates as results did not meet acceptance limits for laboratory performance. A correction factor will be developed for the 2013 results following QA/QC review of 2014 data

[3] Indicates range of total mercury reported from ADEC (2012) Susitna Basin study from several species with minimum concentration in Sockeye Salmon and maximum concentration in lake trout. (not an AWQS).

[4] Fur samples were collected outside the study area (near the Sustina River between Indian River and Portage Creek) in 2014 and results are considered provisional until the full quality assurance review is completed by mid-December 2014. Range of concentrations of Hg in Mink combine results from fur and fur & pelt results.

[5] River otter fur collected in the study area in 2014 and results are considered provisional until the full quality assurance review is completed by mid-December 2014. A single sample consisting of 4 hairs provided a single result.