

# Susitna-Watana Hydroelectric Project Document

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**Susitna-Watana Hydroelectric Project  
(FERC No. 14241)**

**Baseline Water Quality Study  
Study Plan Section 5.5**

**Supplement to the Study Completion Report**

Prepared for

Alaska Energy Authority



**SUSITNA-WATANA HYDRO**

*Clean, reliable energy for the next 100 years.*

Prepared by

URS Corporation/Tetra Tech, Inc.

October 2016

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## LIST OF ACRONYMS AND SCIENTIFIC LABELS

ABBREVIATION	DEFINITION
AEA	Alaska Energy Authority
FERC	Federal Energy Regulatory Commission
ISR	Initial Study Report
PRM	Project River Mile
Project	Susitna-Watana Hydroelectric Project, FERC No. 14241
RSP	Revised Study Plan
SCR	2014-2015 Study Completion Report
TM	Technical Memorandum
TWG	Technical Workgroup

## 1. INTRODUCTION

On November 24, 2015, the Alaska Energy Authority (AEA) filed with the Federal Energy Regulatory Commission (FERC) a Study Completion Report (SCR) for the Baseline Water Quality Study, Study Plan Section 5.5, for the proposed Susitna-Watana Hydroelectric Project, FERC Project No. 14241 (Project). In addition, AEA presented the results of Study 5.5 at that Initial Study Report March 23, 2016 meeting and filed the meeting summary. The purpose of this document is to submit revised information pertaining to that SCR.

In June 2016, FERC, NMFS, USFWS, SRC et al., TNC, and Becky Long filed comments and requests for clarification or additional information in response to the Study 5.5 SCR. During development of the response to these comments, AEA noted inconsistencies in naming conventions (e.g., sample sites), locations (e.g., project river miles), description of water features sampled (e.g., main channel, off-channel, and tributary), and in transferring historical data (dissolved metals) in the 2014 SCR. Revisions were made as described in this document to accurately reflect the data that was collected and to update presentation of the data in the SCR filed November 24, 2015.

This supplement to Study 5.5 SCR describes updates in text and tables based on reviewer comments from licensing participants. Table 1-1 describes specific updates that have been made in the Study 5.5 SCR and the ISR Part B, Attachment 1 QAPP by referencing the location of the updates to the document, accompanied by a detailed description of the update. Tables 4.1-1, 4.3-1, 6.1-1, 6.1-2, 6.1-3, and 6.1-4 are updated versions that replace the corresponding original tables from the Study 5.5 SCR. Only in Table 6.1-4 were revisions made to actual values of water quality parameters reported in the SCR, all of which pertained to historical dissolved metals data and corrected transposition errors associated with some of the historical data.

## 2. TABLES

**Table 1-1. Descriptions of updates to text and tables in Study 5.5 SCR and ISR Part B, Attachment 1, Initial Study Report or Study Completion Report**

Reference	Description
ISR Part B – Attachment 1 (QAPP), Section A.5.2, Page 16, Paragraph 1	The statement “The ADEC limit for mercury in fish tissue that protects human health consumption is 0.3 mg/kg.” is incorrect. ADEC should be updated to “Alaska Division of Public Health”. The sentence should read: “The Alaska Division of Public Health limit for mercury in fish tissue that protects human health consumption is 0.3 mg/kg.”
SCR Section 5.4.9, Page 25, Paragraph 2; SCR Section 6.2, Page 31, Paragraph 2; SCR Section 9, Page 49, Table 6.1-1	All instances of the word “conductivity” in the SCR should be updated to read, “specific conductivity” or “specific conductance” as follows: <u>SCR Section 5.4.9, Page 25, Paragraph 2</u> “ <b>Specific conductivity</b> in mainstem Susitna River samples ranged from 143.7 µmhos/cm to 193.3 µmhos/cm in September 2014 (Figure 5.4-13) with the highest <b>specific conductivity</b> recorded at PRM 235.2 above the Oshetna River. The lowest <b>specific conductivity</b> measured was at the Deshka River (PRM 45.1) which is not fed by glacial runoff with a range from between 44.5 µmhos/cm and 69.2 µmhos/cm. There is an order of magnitude difference contrasted between rivers supplied by glacial meltwater and those from snow meltwater and rain runoff.”

Reference	Description
	<p><u>SCR Section 6.2, Page 31, Paragraph 2, Sentence 3</u>                      Other indicators confirming a problem with overestimation of TP concentrations included: no increase in Chl a, <b>specific conductivity</b>, SRP (soluble reactive phosphorus), or Nitrogen (TKN).  <u>SCR Section 9, Page 49, Table 6.1-1, Left Column, fourth item</u>                      Revised Table 6.1-1: Corrected "Conductivity" to "<b>Specific Conductivity</b>"</p>
<p>SCR Section 9, Page 36, Table 4.1-1</p>	<p>Some of the information in Study 5.5 SCR Table 4.1-1 has been revised to show updates to both water temperature monitoring sites and water quality monitoring sites. A revised Table 4.1-1 is attached to this document.</p> <ul style="list-style-type: none"> <li>• For clarification, the monitoring sites in revised Table 4.1-1 were grouped by river segment as follows: Lower Susitna River segment, Middle Susitna River Segment below Devils Canyon, Middle Susitna River Segment above Devils Canyon, and Upper Susitna River Segment.</li> <li>• A 2013 water quality monitoring site, PRM 174, Susitna below Watana Dam Site, previously omitted from the SCR table was added to the revised table.</li> <li>• Project River Miles (PRMs) for tributary sampling, where appropriate, were revised to reflect the standard PRMs of the Susitna River at the confluence of the respective tributary. Deshka River PRM 45.1 was updated to PRM 44.9. Indian River PRM 142.2 was updated to PRM 142.1. Susitna River above Watana Creek PRM 196.8 was updated to PRM 196.9.</li> <li>• Oshetna River PRM 235.2 site was divided into two locations to reflect temperature monitoring within the tributary (PRM 235.1) and water quality sampling on the Susitna River (PRM 235.2) upstream of the tributary.</li> <li>• Gold Creek site representing the tributary (PRM 140.1) was deleted. All Gold Creek data was collected on the main channel Susitna River site (PRM140.0).</li> <li>• Sampling site names were also clarified to differentiate between the Susitna River upstream or downstream from a tributary confluence versus the tributary itself.</li> <li>• Location Rationale for each sampling site was revised to reflect usage of standard language: Main Channel, Off-Channel, and Tributary.                         <ul style="list-style-type: none"> <li>○ The following sites had updates as main channel habitat: PRM 19.9, PRM 29.9, PRM 33.6, PRM 59.9, PRM 87.8, PRM 99.2, PRM 107, PRM 116.7, PRM 124.2, PRM 129.9, PRM 134.1, PRM 140, PRM 142.3, PRM 143.6, PRM 152.2, PRM 152.7, PRM 168.1, PRM 174, PRM 183.1, PRM 184.8/185.0, PRM 187.2/187.7, PRM 196.9, PRM 209.2, PRM 225.5, PRM 235.2.</li> <li>○ The following sites had updates as off-channel habitat: PRM 88.3, PRM 129.6, PRM 132.7, PRM 141.0, PRM, PRM 143.6, and PRM 145.6.</li> <li>○ The following sites had updates as tributary habitat: PRM 32.5, PRM 44.9, PRM 102.4, PRM 102.8, PRM 142.1, PRM 152.3, PRM 235.1.</li> </ul> </li> <li>• A footnote was added below the table to clarify that Focus Area specific sampling program is not reflected in this table and to indicate where Focus Area sampling information can be found in the SCR and ISR. When a sampling location in the baseline sampling fell within a Focus Area, the Focus Area designation has been provided in the description column.</li> <li>• A footnote was added to identify monitoring sites at same location as historical and/or current USGS gaging stations.</li> <li>• Footnotes added to explain alternative site locations for a portion of the monitoring events due to helicopter access issues (184/185.0, 187.2/187.7 and 225.5/235.2).</li> </ul>
<p>SCR Section 9, Page 38, Table 4.3-1</p>	<p>SCR Table 4.3-1 was revised such that:</p> <ul style="list-style-type: none"> <li>• Project River Miles (PRMs) for tributary sampling reflect the standard PRM of the Susitna River at the confluence of the respective tributary (PRM 45.1 updated to PRM 44.9; PRM 142.2 updated to 142.1). All tributaries in table are identified by footnote <sup>1</sup>.</li> </ul>

Reference	Description
	<ul style="list-style-type: none"> <li>• Sampling site names were also clarified to differentiate between the Susitna River upstream or downstream from a tributary confluence versus the tributary. Description for site PRM 235.2 was updated from "Oshetna River" to "Susitna River above Oshetna River".</li> <li>• A 2013 water quality monitoring site, PRM 174, Susitna below Watana Dam Site, previously omitted from the SCR Table 4.3-1 was added to the revised table.</li> <li>• PRM changed from 141.1 to 140.0 for the Susitna River near Gold Creek to reflect that the data are from the Susitna River and not the tributary.</li> </ul> <p>A Revised SCR Table 4.3-1 is attached.</p>
<p>SCR Section 9, Page 48, Table 6.1-1</p>	<p>SCR Table 6.1-1 was revised such that:</p> <ul style="list-style-type: none"> <li>• Corrected "Conductivity" to read "<b>Specific Conductivity</b>" in left column.</li> <li>• Corrected PRM for Susitna River near Gold Creek from 140.1 to PRM 140.0.</li> <li>• Clarified "Gold Creek" to read "<b>Susitna River near Gold Creek</b>" to avoid confusion with the tributary.</li> <li>• Clarified "Talkeetna" to read "<b>Talkeetna River</b>" to clarify it is the tributary.</li> <li>• Corrected PRM for Talkeetna from 107 to 102.8 representing the PRM at the confluence with the Susitna River.</li> <li>• Added "*" to Chulitna River to identify it as a tributary site.</li> </ul> <p>A Revised SCR Table 6.1-1 is attached.</p>
<p>SCR Section 9, Page 48, Table 6.1-2 and SCR Section 9, Page 48, Table 6.1-3</p>	<p>SCR Tables 6.1-2 and 6.1-3 were revised such that:</p> <ul style="list-style-type: none"> <li>• Corrected PRM for Susitna River near Gold Creek from 140.1 to 140.0.</li> <li>• Clarified "Gold Creek" to read "<b>Susitna River near Gold Creek</b>" to avoid confusion with the tributary.</li> <li>• Clarified "Talkeetna" to read "<b>Talkeetna River</b>" to clarify it is the tributary.</li> <li>• Corrected PRM for Talkeetna from PRM 107 to PRM 102.8 representing the PRM at the confluence with the Susitna River.</li> <li>• Added "*" to Chulitna River to identify it as a tributary site.</li> </ul> <p>Revised SCR Tables 6.1-2 and 6.1-3 are attached.</p>
<p>SCR Section 9, Page 55, Table 6.1-4</p>	<p>SCR Table 6.1-4 was revised such that:</p> <ul style="list-style-type: none"> <li>• Corrected PRM for Susitna River near Gold Creek from 140.1 to 140.0.</li> <li>• Clarified "Gold Creek" to read "<b>Susitna River near Gold Creek</b>" to avoid confusion with the tributary.</li> <li>• Clarified "Talkeetna" to read "<b>Talkeetna River</b>" to clarify it is the tributary.</li> <li>• Corrected PRM for Talkeetna from PRM 107 to PRM 102.8 representing the PRM at the confluence with the Susitna River.</li> <li>• Added "*" to Chulitna River to identify it as a tributary site.</li> <li>• Incorrect units were provided for several of the dissolved metals parameters (Note: values reported had been provided consistent with the corrected units.)                         <ul style="list-style-type: none"> <li>○ Historical units for dissolved Ca and Mg corrected from ug/L to mg/L for both winter and summer</li> <li>○ For Hg, the historical summer units were clarified to be ug/L and the current summer to be ng/L</li> </ul> </li> </ul> <p>An error occurred in transposing dissolved metals values from the historical scanned PDF</p>

Reference	Description
	<p>document from the 1980s in which a significant number of values were copied from a column one over from the correct column. Rather than copying dissolved metals concentration, this error resulted in the column for metals concentrations in suspended sediment being copied and inserted in Table 6.1-4. This resulted in three types of errors which are listed below and the corresponding footnote used to identify the error is also listed:</p> <ol style="list-style-type: none"> <li>1. Incorrect vales were entered in Table 6.4-1 which are corrected and identified as footnote <sup>1</sup>. Corrected values are shown in <b><i>Bold Italics</i></b>.</li> <li>2. In some cases, there were historical values in the incorrect metals in suspended sediments that were entered in the table when there were no corresponding dissolved metals values. In these cases the vales in Table 6.4-1 were deleted and replaced with "—"<sup>2</sup> which includes the footnote <sup>2</sup>.</li> <li>3. In the third case, there were in few instances where there was no historical metals in suspended sediment data, but there was dissolved metals data. In this case, the "—" in Table 6.4-1 were replaced with the dissolved metals concentrations. The values have been entered in <b><i>Bold Italics</i></b> and identified with footnote <sup>3</sup>.</li> </ol> <p>A Revised SCR Table 6.1-4 is attached.</p>



**Table 4.1-1. Susitna River Basin Temperature and Water Quality Monitoring Sites (Revised SCR Table 4.1-1.)**

PRM <sup>1</sup>	Description	Latitude (WGS84)	Longitude (WGS84)	Water Temperature							Water Quality Monitoring					Location Rationale
				Historic			Current				Historic		Current			
				W	S	S	W	S	W	S	W	S	S	W	S	
						2012	2012-2013	2013	2013-2014	2014			2013	2013-2014	2014	
<b>Lower Susitna River Segment</b>																
19.9	Susitna above Alexander Creek	61.43903	-150.48456			X	X	X		X					Main Channel downstream boundary above tidal influence	
29.9	Susitna Station <sup>6</sup>	61.54428	-150.51556	X	X			X		X	X	X	X	X	Main Channel downstream of tributary (Yentna River); historic monitoring site	
32.5 <sup>1</sup>	Yentna River	61.58760	-150.48301	X	X	X	X	X	X	X	X	X		X	Major Tributary; historic monitoring site	
33.6	Susitna above Yentna	61.57595	-150.42741			X	X	X	X	X		X		X	Main Channel upstream of tributary (Yentna River)	
44.9 <sup>1</sup>	Deshka River	61.71014	-150.32470			X	X	X		X		X		X	Major Tributary	
59.9	Susitna	61.86220	-150.18463			X	X	X	X	X		X		X	Main Channel upstream of tributary (Deshka River)	
87.8	Susitna at Parks Highway East <sup>6</sup>	62.17453	-150.17368			X	X	X	X	X		X	X	X	Main Channel	
88.3	Susitna at Parks Highway West	62.18109	-150.16787	X	X	X	X	X	X	X	X	X			Off- Channel; historic monitoring site	
99.2	LRX 1	62.30602	-150.10876			X	X	X	X	X					Main Channel downstream of Three Rivers Confluence	
102.4 <sup>1</sup>	Chulitna River	62.56770	-150.23782	X	X	X	X	X	X	X	X	X		X	Major Tributary; historic monitoring site	
102.8 <sup>1</sup>	Talkeetna River	62.34243	-150.11266			X	X	X		X	X	X		X	Major Tributary	
<b>Middle Susitna River Segment below Devils Canyon</b>																
107	Susitna River at Talkeetna <sup>6</sup>	62.39724	-150.13728		X	X		X		X		X		X	Main Channel above Three Rivers Confluence; historic monitoring site	
116.7	LRX 18	62.52653	-150.11467			X		X	X	X					Main Channel	
124.2	Curry Fishwheel Camp	62.61783	-150.01373		X	X		X		X		X		X	Main Channel; historic monitoring site	
129.6	Slough 8A (FA-128) <sup>3</sup>	62.67048	-149.90324			X		X	X	X					Off- Channel	
129.9	LRX 29	62.67391	-149.89903			X		X		X					Main Channel	
132.7	Slough 9	62.70236	-149.84189			X		X	X	X					Off- Channel;	
134.1	LRX 35	62.71385	-149.80893			X		X	X	X					Main Channel	
140	Susitna near Gold Creek <sup>6</sup> (FA-138) <sup>3</sup>	62.76705	-149.69353	X	X	X		X	X	X	X	X	X	X	Main Channel downstream of tributary (Gold Creek); historic monitoring site	

PRM <sup>1</sup>	Description	Latitude (WGS84)	Longitude (WGS84)	Water Temperature						Water Quality Monitoring					Location Rationale	
				Historic			Current			Historic		Current				
				W	S	S	W	S	W	S	W	S	S	W		S
						2012	2012-2013	2013	2013-2014	2014			2013	2013-2014		2014
141.0	Slough 16B	62.78021	-149.68536			X		X	X	X					Off-Channel	
142.1 <sup>1</sup>	Indian River	62.78635	-149.65878					X	X	X			X	X	Major Tributary	
142.3	Susitna above Indian River (FA-141) <sup>3</sup>	62.78578	-149.64890			X	X	X		X			X	X	Main Channel upstream of tributary (Indian River)	
143.6	Slough 19	62.79382	-149.61426			X		X	X	X					Off-Channel	
143.6	LRX 53	62.79427	-149.61327		X	X		X	X	X					Main Channel; historic monitoring site	
145.6	Slough 21 (FA-144) <sup>3</sup>	62.81467	-149.57533			X		X		X					Off-Channel	
152.2	Susitna below Portage Creek (FA-151) <sup>3</sup>	62.83040	-149.38274			X	X			X			X	X	Main Channel downstream of tributary (Portage Creek)	
152.3 <sup>1</sup>	Portage Creek	62.83038	-149.38029			X	X			X					Major Tributary	
152.7	Susitna above Portage Creek	62.82700	-149.82700			X	X			X	X		X	X	Main Channel upstream of tributary (Portage Creek)	
168.1	Susitna	62.79170	-148.99382				X			X					Main Channel above Devils Canyon mid-point between neighboring sites	
174	Susitna below Watana Dam Site (FA-173) <sup>3</sup>	62.76673	-148.85385										X		Main Channel	
183.1	Susitna below Tsusena Creek	62.81348	-148.65687			X				X					Main Channel; Downstream of tributary (Tsusena Creek)	
184.8 / 185.0 <sup>4</sup>	Susitna River above Tsusena Creek <sup>6</sup> (FA-184) <sup>3</sup>	62.82178	-148.60681				X			X			X		Main Channel	
Upper Susitna River Segment																
187.2/187.7 <sup>5</sup>	Susitna at Watana Dam site	62.82260	-148.55300		X		X			X			X	X	Main Channel boundary condition between the reservoir and riverine models historic monitoring site	
196.9	Susitna River above Watana Creek	62.82960	-148.25900							X					Main Channel upstream of tributary (Watana Creek)	
209.2	Susitna River above Kosina Creek	62.78220	-147.94000			X	X	X	X	X					Main Channel upstream of tributary (Kosina Creek)	

PRM <sup>1</sup>	Description	Latitude (WGS84)	Longitude (WGS84)	Water Temperature						Water Quality Monitoring					Location Rationale	
				Historic			Current			Historic		Current				
				W	S	S	W	S	W	S	W	S	S	W		S
						2012	2012-2013	2013	2013-2014	2014			2013	2013-2014		2014
225.5	Susitna near Cantwell	62.70520	-147.53800										X		Main Channel uppermost main channel site in the proposed reservoir	
235.1 <sup>1</sup>	Oshetna River	62.64020	-147.38300			X	X	X	X	X					Tributary	
235.2 <sup>2</sup>	Susitna River above Oshetna River	62.63961	-147.38311									X		X	Main Channel	

Notes:

PRM=Susitna River Project River Mile

W= Winter

S=Summer

<sup>1</sup> Indicates the Susitna River PRM at the confluence of the tributary (samples collected from the tributary).

<sup>2</sup> Indicates an alternate monitoring location from PRM 225.5 due to river inaccessibility by helicopter during summer sample collection.

<sup>3</sup> Indicates this site is in the Focus Area identified in parentheses. Other Focus Area locations were sampled under the 2013 and 2014 Focus Area specific program. Refer to Study 5.5 ISR Part A, Section 4.4 and Study 5.5 SCR Section 4.4 for details.

<sup>4</sup>Summer temperature monitoring was performed at PRM 184.8 and winter water quality sampling was performed at PRM 185.0 due to helicopter access issues at the summer location.

<sup>5</sup>One summer sampling event moved upstream from PRM 187.2 to PRM 187.7 due to helicopter access issues.

<sup>6</sup> Located at current and/or historical USGS Gaging Station.

**Table 4.3-1. Sample Location and Frequency for Monthly Baseline Water Quality Sampling (Revised SCR Table 4.3-1)**

Project River Mile (PRM)	Description	Sample Date(s)		
		Summer 2013	Winter 2014	Summer 2014
29.9	Susitna Station	6/25/2013	1/28/2014	6/24/2014
		7/19/2013	3/10/2014	7/23/2014
		8/19/2013		8/14/2014
		9/15/2013		9/11/2014
32.5 <sup>1</sup>	Yentna River	6/26/2013		6/24/2014
		8/18/2013		7/23/2014
		7/19/2013		8/14/2014
		9/15/2013		9/11/2014
33.6	Susitna above Yentna	6/27/2013		6/24/2014
		8/19/2013		7/23/2014
		7/20/2013		8/14/2014
		9/16/2013		9/11/2014
44.9 <sup>1</sup>	Deshka River	6/28/2013		6/24/2014
		8/19/2013		7/23/2014
		7/19/2013		8/14/2014
		9/16/2013		9/11/2014
59.9	Susitna	6/29/2013		6/24/2014
		7/19/2013		7/23/2014
		8/19/2013		8/14/2014
		9/17/2013		9/11/2014
87.8	Susitna at Parks Highway East	6/21/2013	1/28/2014	6/19/2014
		7/17/2013	3/10/2014	7/22/2014

Project River Mile (PRM)	Description	Sample Date(s)		
		Summer 2013	Winter 2014	Summer 2014
		8/17/2013		8/13/2014
		9/14/2013		9/9/2014
102.4'	Chulitna River	6/24/2013		6/19/2014
		7/16/2013		7/22/2014
		8/17/2013		8/13/2014
		9/13/2013		9/9/2014
102.8'	Talkeetna River	6/22/2013		6/19/2014
		7/15/2013		7/22/2014
		8/16/2013		8/13/2014
		9/9/2013		9/9/2014
107	Susitna River at Talkeetna	6/21/2013		6/19/2014
		7/18/2013		7/22/2014
		8/16/2013		8/13/2014
		9/9/2013		9/9/2014
124.2	Curry Fishwheel Camp	6/22/2013		6/19/2014
		7/18/2013		7/22/2014
		8/15/2013		8/12/2014
		9/10/2013		9/9/2014
140.0	Susitna near Gold Creek	6/23/2013	1/30/2014	6/18/2014
		7/17/2013	3/12/2014	7/21/2014
		8/17/2013		8/12/2014
		9/10/2013		9/8/2014

Project River Mile (PRM)	Description	Sample Date(s)		
		Summer 2013	Winter 2014	Summer 2014
142.1 <sup>1</sup>	Indian River	6/23/2013		6/18/2014
		7/16/2013		7/21/2014
		8/14/2013		8/11/2014
		9/11/2013		9/8/2014
142.3	Susitna above Indian River	6/24/2013		6/18/2014
		7/15/2013		7/21/2014
		8/13/2013		8/11/2014
		9/11/2013		9/8/2014
152.2	Susitna below Portage Creek	7/30/2013		6/18/2014
		8/14/2013		7/21/2014
		9/12/2013		8/11/2014
				9/8/2014
152.7	Susitna above Portage Creek	7/30/2013		6/18/2014
		8/14/2013		7/21/2014
		9/12/2013		8/11/2014
				9/8/2014
174	Susitna below Watana Dam Site	8/18/2013		
		8/31/2013		
		9/20/2013		
184.8 <sup>2</sup>	Susitna River above Tsusena Creek		1/29/2014	
			3/11/2014	
187.2 <sup>3</sup>	Susitna at Watana Dam Site	7/2/2013		6/22/2014
		7/22/2013		7/20/2014

Project River Mile (PRM)	Description	Sample Date(s)		
		Summer 2013	Winter 2014	Summer 2014
		8/18/2013		8/11/2014
		8/31/2013		9/14/2014
		9/20/2013		
225.5	Susitna near Cantwell		1/29/2014	
			3/11/2014	
		7/2/2013		6/22/2014
		7/22/2013		7/20/2014
		8/31/2013		8/11/2014
235.2 <sup>4</sup>	Susitna River above Oshetna River	9/20/2013		9/14/2014

Notes:

PRM=Susitna River Project River Mile.

<sup>1</sup> For tributary sample sites, the PRM reflects the confluence of the tributary with the Susitna River.

<sup>2</sup> Summer temperature monitoring was performed at PRM 184.8 and winter water quality sampling was performed at PRM 185.0 due to helicopter access issues during the winter at the summer location.

<sup>3</sup> One summer sampling event moved upstream from PRM 187.2 to PRM 187.7 due to helicopter access issues.

<sup>4</sup> Indicates an alternate monitoring location from PRM 225.5 due to river inaccessibility by helicopter during summer sample collection.

**Table 6.1-1 Historic (1980s) and Current (2013 - 2014) Field Parameters (Revised SCR Table 6.1-1)**

Project River Mile		187.2	152.7	142.3	140.0	124.2	102.8	102.4	88.3	32.5	29.9
Description		Susitna at Watana Dam site	Susitna above Portage Creek	Susitna above Indian River	Susitna River near Gold Creek	Curry Fishwheel Camp	Talkeetna River*	Chulitna River*	Susitna at Parks Highway West (current data collected from EAST)	Yentna River*	Susitna Station
Temp (°C)	Historic Winter	--	--	--	≈0	--	--	≈0	≈0	≈0	≈0
	Current Winter	--	--	--	0	--	--	--	0	--	0
	Historic Summer	1.9-14.4	--	--	4.5-14.1	2.7-15.3	2.9-16.4	3.8-9.5	5-14	3.9-11.6	2.5-14.8
	Current Summer	2.6-14.8	7.5-12.0	7.3-15.0	7.5-14.2	7.6-15.1	8.0-14.3	4.6-8.3	7.3-11.7	7.4-10.4	7.5-12.1
Dissolved oxygen (mg/L)	Historic Winter	--	--	--	10.9-16.2	--	--	--	12.8-14.4	10.9-11.1	9.9-12.7
	Current Winter	--	--	--	13.9-14.5	--	--	--	12.8-14.6	--	10.8-13.9
	Historic Summer	9.9-11.6	10.9-14.8	--	8.5-12.7	10.1-13.9	9.8-12.0	--	9-13.4	10.4-12.1	9-12.3
	Current Summer	10.1-12.47	10.4-12.6	10.4-12.4	10.5-12.5	10.0-12.5	10.2-11.9	12.0-13.6	10.7-13.7	11.5-12.0	10.9-12.53
pH	Historic Winter	--	--	--	7.6-8.0	--	--	≈7.1	7.8-8.2	7.1-7.9	7.5-7.6
	Current Winter	--	--	--	7.3-7.7	--	--	--	7.1-7.2	--	6.9-7.0
	Historic Summer	8-8.2	6.8-8.2	--	7.5-8.3	6.8-8.0	7.4-8.0	7.2-8.1	7.1-8.3	7.4-8.3	7.5-8.5
	Current Summer	7.4-8.5	7.1-8.5	7.6-8.6	7.7-8.6	7.6-8.3	7.6-8.4	7.8-8.7	7.8-8.5	8.0-8.6	7.5-9.4



Project River Mile		187.2	152.7	142.3	140.0	124.2	102.8	102.4	88.3	32.5	29.9
Description		Susitna at Watana Dam site	Susitna above Portage Creek	Susitna above Indian River	Susitna River near Gold Creek	Curry Fishwheel Camp	Talkeetna River*	Chulitna River*	Susitna at Parks Highway West (current data collected from EAST)	Yentna River*	Susitna Station
Specific Conductivity <sup>1</sup> (µmhos/cm)	Historic Winter	--	--	--	84-300	--	--	≈115	159-240	189-216	180-225
	Current Winter	--	--	--	241-263	--	--	--	190-220	--	136-216
	Historic Summer	--	--	--	87-227	--	--	101-144	80-170	93-142	96-154
	Current Summer	137.8-178.5	122.2-164.7	122-162.8	116-161.5	131-166.6	122-168.8	106.4-145.9	122-156.9	135.9-167	116.1-170

Notes:

ND = non-detection

"--" = data unavailable

\*Indicates major tributary sampling location

<sup>1</sup> "Conductivity" corrected to read "Specific Conductivity"

**Table 6.1-2. Ranges in Historic (1980s) and Current (2013 – 2014) Water Quality Monitoring Data (Revised SCR Table 6.1-2)**

Project River Mile		187.2	152.7	142.3	140.0	124.2	102.8	102.4	88.3	32.5	29.9
Description		Susitna at Watana Dam site	Susitna above Portage Creek	Susitna above Indian River	Susitna River near Gold Creek	Curry Fishwheel Camp	Talkeetna River*	Chulitna River*	Susitna at Parks Highway West (current data collected from EAST)	Yentna River*	Susitna Station
Orthophosphate (mg/L)	Historic Winter	--	--	--	0.03-0.09	--	--	<0.01	0.031-0.12	<0.01	<0.01
	Current Winter	--	--	--	0.005 - 0.006	--	--	--	0.001 - 0.003	--	ND - 0.002
	Historic Summer	--	--	--	0-0.184	--	--	<0.01	0.031-0.061	<0.01	<0.01
	Current Summer	ND - 0.032	ND - 0.011	ND - 0.007	ND - 0.011	ND - 0.007	ND - 0.041	ND - 0.019	ND - 0.027	ND - 0.008	ND - 0.019
Turbidity (NTU)	Historic Winter	--	--	--	0.1-0.7	--	--	--	0.5-2.7	--	1-3
	Current Winter	--	--	--	--	--	--	--	--	--	--
	Historic Summer	--	45-200	--	23-290	20-396	16-480	--	43-500	30-220	up to 790
	Current Summer	18 - 650	90 - 600	75 - 400	50 - 1000	90 - 500	160 - 500	310 - 900	130 - 1300	110 - 950	110 - 950
TSS (mg/L)	Historic Summer	--	52-482	--	--	39-512	5.5-8.0	--	--	--	--
	Current Summer	41.9 - 578	81 - 650	73 - 426	64 - 1050	99 - 480	186 - 488	470 - 1170	162 - 1420	186 - 744	194 - 780
TDS (mg/L)	Historic Summer	--	--	--	55-140	--	--	--	--	--	--
	Current Summer	100 - 154	87 - 146	92 - 174	72 - 156	70 - 132	66 - 154	92 - 166	44 - 138	62 - 152	82 - 190

Project River Mile		187.2	152.7	142.3	140.0	124.2	102.8	102.4	88.3	32.5	29.9
Description		Susitna at Watana Dam site	Susitna above Portage Creek	Susitna above Indian River	Susitna River near Gold Creek	Curry Fishwheel Camp	Talkeetna River*	Chulitna River*	Susitna at Parks Highway West (current data collected from EAST)	Yentna River*	Susitna Station
Total Hardness (mg/L)	Historic Summer	--	--	--	--	--	--	--	44-72	--	44-66
	Current Summer	58 - 71	54 - 65	53 - 66	49 - 67	53 - 107	52 - 70	48 - 74	52 - 72	59 - 121	53 - 73
Total Alkalinity (mg/L)	Historic Summer	--	--	--	23-87	--	--	--	--	--	36-57
	Current Summer	49 - 53	41 - 53	40 - 54	35 - 55	41 - 54	42 - 54	34 - 53	41 - 49	40 - 50	40 - 53
Total Organic Carbon (mg/L)	Historic Summer	--	1.4-3.8	--	--	--	--	--	1.7-3.2	--	2.7-11
	Current Summer	2.4	2.29 - 2.39	1.92 - 2.14	1.7 - 2.02	1.8 - 3.43	1.9 - 2.09	1.71 - 1.92	2.05 - 2.42	1.98 - 2.76	2.1 - 3.68
Chlorophyll-a (µg/L)	Historic Summer	--	--	--	--	--	--	--	--	--	ND-1.2
	Current Summer	0 - 0.53	0 - 1.9	0 - 1.3	0 - 0.87	0 - 1.3	0 - 1.3	0 - 2.5	0 - 2.5	0 - 1.4	0 - 1.2
Total Coliform Bacteria (colonies/100 ml)	Historic Summer	--	--	--	--	--	--	--	--	--	≤ 20
	Current Summer	0	14 - 22	9 - 12	9 - 27	12 - 20	6 - 26	7 - 15	6 - 18	8 - 18	7 - 18

Notes:

ND = non-detection

"--"= data unavailable

\*Indicates major tributary sampling location

**Table 6.1-3 Historic (1980s) and Current (2013 – 2014) Total Metals (Revised SCR Table 6.1-3)**

Project River Mile		187.2	152.7	142.3	140.0	124.2	102.8	102.4	88.3	32.5	29.9
Description		Susitna at Watana Dam site	Susitna above Portage Creek	Susitna above Indian River	Susitna River near Gold Creek	Curry Fishwheel Camp	Talkeetna River*	Chulitna River*	Susitna at Parks Highway West (current data collected from EAST)	Yentna River*	Susitna Station
Al (total) (µg/L)	Historic Summer	--	--	--	≈13000	--	--	--	up to 15000	--	--
	Current Summer	470 - 7990	959 - 5630	564 - 5830	476 - 5680	452 - 7350	420 - 7980	2341 - 20800	1650 - 19400	1249 - 23029	790 - 22584
As (total) (µg/L)	Historic Winter	--	--	--	1	--	--	--	1-2	--	1-3
	Current Winter	--	--	--	ND	--	--	--	ND	--	ND
	Historic Summer	--	--	--	2-12	--	--	--	1-3	--	7-40
	Current Summer	1.89 - 11.8	ND - 11.4	ND - 8.8	1.7 - 16.3	ND - 9.8	ND - 10.9	4.5 - 37.5	2.8 - 32.5	3.8 - 26.1	3.2 - 23.5
Ba (total) (µg/L)	Historic Winter	--	--	--	≤ 100	--	--	--	100	--	100
	Current Winter	--	--	--	50	--	--	--	38	--	35
	Historic Summer	--	--	--	100-500	--	--	--	100-500	--	up to 400
	Current Summer	89.0 - 788	39.4 - 516	37.9 - 434	34.7 - 883	37.9 - 454	35.6 - 434	66.3 - 905	49.9 - 795	41.4 - 382	37.7 - 413
Cd (total) (µg/L)	Historic Summer	--	--		0-30	--	--	--	0-35	--	≤ 1

Project River Mile		187.2	152.7	142.3	140.0	124.2	102.8	102.4	88.3	32.5	29.9
Description		Susitna at Watana Dam site	Susitna above Portage Creek	Susitna above Indian River	Susitna River near Gold Creek	Curry Fishwheel Camp	Talkeetna River*	Chulitna River*	Susitna at Parks Highway West (current data collected from EAST)	Yentna River*	Susitna Station
	Current Summer	0.05 - 1.12	0.12 - 0.77	ND - 0.434	0.07 - 0.86	0.12 - 0.49	0.19 - 0.66	0.29 - 0.66	0.14 - 0.78	0.13 - 0.52	0.13 - 0.45
Se (total) (µg/L)	Historic Summer	--	--	--	≤ 1	--	--	--	0-1	--	≤ 1
	Current Summer	0.55	0.37 - 0.55	0.47 - 0.69	0.39 - 0.55	0.41 - 0.58	0.45 - 0.62	ND	0.62 - 0.91	0.57 - 0.78	0.48 - 0.71
Cu (total) (µg/L)	Historic Summer	--	--	--	15-190	--	--	--	0-35	--	30-90
	Current Summer	3.93 - 43.9	7.83 - 37.1	7.22 - 31.3	4.21 - 68.7	7.87 - 33.5	11.1 - 33.4	27.4 - 64	13.8 - 73	11.4 - 39.1	11.5 - 41.6
Fe (total) (µg/L)	Historic Winter	--	--	--	≈120	--	--	≈0	110-1100	--	240-720
	Current Winter	--	--	--	54 - 64	--	--	--	89 - 628	--	132 - 207
	Historic Summer	--	--	--	430-24000	--	--	up to 4300	7600-32000	--	7900-42000
	Current Summer	8550 - 9430	1325 - 7160	958 - 7430	802 - 7010	743 - 9106	688 - 9935	3760 - 31091	2364 - 27403	2151 - 31889	1507 - 30894
Pb (total) (µg/L)	Historic Summer	--	--	--	≤ 200	--	--	--	2-13	--	≤ 200
	Current Summer	0.38 - 7.86	1.3 - 5.99	1.04 - 4.64	0.64 - 9.29	1.22 - 4.46	ND - 4.98	7.52 - 17.5	2.88 - 18.7	3.17 - 10.9	2.59 - 10.7

Project River Mile		187.2	152.7	142.3	140.0	124.2	102.8	102.4	88.3	32.5	29.9
Description		Susitna at Watana Dam site	Susitna above Portage Creek	Susitna above Indian River	Susitna River near Gold Creek	Curry Fishwheel Camp	Talkeetna River*	Chulitna River*	Susitna at Parks Highway West (current data collected from EAST)	Yentna River*	Susitna Station
Mn (total) (µg/L)	Historic Winter	--	--	--	≤ 20	--	--	≈10	2-10	--	30-40
	Current Winter	--	--	--	ND	--	--	--	19	--	9
	Historic Summer	--	--	--	10-390	--	--	20-280	170-670	--	320-870
	Current Summer	20.9 - 172	37.6 - 157	41.1 - 149	29.4 - 144	24.9 - 174	22.5 - 189	97.3 - 618	59.1 - 547	89.4 - 745	68.8 - 702
Hg (total) (µg/L)	Historic Summer	--	--	--	2-13	--	--	--	0.1-0.6	--	≤ 1
	Current Summer	0.83 - 22.0	2.94 - 25.8	1.92 - 23.1	1.53 - 21.1	1.09 - 18.5	1.02 - 25.3	4.95 - 54.5	3.49 - 80.1	8.43 - 33.6	6.09 - 32.1
Ni (total) (µg/L)	Historic Summer	--	--	--	≤ 50	--	--	--	18-30	--	1-2
	Current Summer	4.33 - 49.2	9.56 - 40.7	8.48 - 42.4	5.41 - 75.9	9.44 - 38.3	12.8 - 33.8	37.1 - 85.9	15.9 - 80.9	12.9 - 44.3	12.3 - 46.6
Zn (total) (µg/L)	Historic Summer	--	--	--	20-120	--	--	--	40-200	--	80-180
	Current Summer	8.62 - 106	19.1 - 98.2	17.5 - 77.3	10.8 - 163	19.5 - 80	27 - 86.3	72.9 - 191	33.5 - 202	30.7 - 124	29.2 - 121

Notes:

ND = non-detection

"--" = data unavailable

\*Indicates major tributary sampling location

**Table 6.1-4. Historic (1980s) and Current (2013 – 2014) Dissolved Metals (Revised SCR Table 6.1-4)**

Project River Mile		187.2	152.7	142.3	140.0	124.2	102.8	102.4	88.3	32.5	29.9
Description		Susitna River at Watana Dam site	Susitna River above Portage Creek	Susitna River above Indian River	Susitna River near Gold Creek	Susitna River at Curry Fishwheel Camp	Talkeetna River*	Chulitna River*	Susitna River at Parks Hwy West (current data collected from EAST)	Yentna River*	Susitna River at Susitna Station
Al (dissolved) (µg/L)	Historic Winter	--	--	--	-- <sup>2</sup>	--	10-160 <sup>3</sup>	--	-- <sup>2</sup>	--	--
	Current Winter	--	--	--	ND - 3	--	--	--	4 - 9	--	4 - 22
	Historic Summer	--	--	--	-- <sup>2</sup>	--	20-290 <sup>3</sup>	--	-- <sup>2</sup>	--	40-350
	Current Summer	18.9 - 1030	22.9 - 117	20.1 - 105	40.1 - 122	36.1 - 237	36.4 - 2880	72.7 - 700.4	49.6 - 198	32 - 189	35 - 133
As (dissolved) (µg/L)	Historic Winter	--	--	--	1 <sup>1</sup>	--	≤1 <sup>3</sup>	--	1 <sup>1</sup>	--	0-3 <sup>1</sup>
	Current Winter	--	--	--	ND	--	--	--	ND	--	ND
	Historic Summer	--	--	--	1-2 <sup>1</sup>	--	0-2 <sup>3</sup>	--	1-3 <sup>1</sup>	--	1-3 <sup>1</sup>
	Current Summer	0.63 - 1.35	0.72 - 1.21	0.79 - 1.24	0.77 - 1.63	0.83 - 1.16	0.87 - 1.74	1.12 - 5.16	0.93 - 5.36	1.16 - 1.73	1.1 - 1.81
Ba (dissolved) (µg/L)	Historic Winter	--	--	--	≤ 100	--	≤ 100 <sup>3</sup>	--	25-100	--	≈40
	Current Winter	--	--	--	48	--	--	--	35	--	26
	Historic Summer	--	--	--	0-44	--	7-23 <sup>3</sup>	--	0-70	--	20-200
	Current Summer	36.9 - 69.7	34.0 - 49.5	32.8 - 47.9	27 - 73.8	32.1 - 46	32.6 - 88.9	14.1 - 69.9	17.4 - 111	15.9 - 23.4	17.7 - 27.5

Project River Mile		187.2	152.7	142.3	140.0	124.2	102.8	102.4	88.3	32.5	29.9
Description		Susitna River at Watana Dam site	Susitna River above Portage Creek	Susitna River above Indian River	Susitna River near Gold Creek	Susitna River at Curry Fishwheel Camp	Talkeetna River*	Chulitna River*	Susitna River at Parks Hwy West (current data collected from EAST)	Yentna River*	Susitna River at Susitna Station
Cd (dissolved) (µg/L)	Historic Summer	--	--	--	0-20	--	0-5 <sup>3</sup>	--	0-24	--	≤ 2
	Current Summer	ND - 0.06	ND - 0.02	ND - 0.02	ND - 0.06	ND - 0.04	ND - 0.07	ND - 0.08	ND - 0.11	ND - 0.52	ND - 0.02
Se (dissolved) (µg/L)	Historic Summer	--	--	--	≤ 1	--	≤ 2 <sup>3</sup>	--	0-1 <sup>1</sup>	--	≤ 1
	Current Summer	0.52	0.36 - 0.58	0.57 - 0.62	0.45 - 0.58	0.48 - 0.57	0.47 - 0.66	0.71 - 0.87	0.51 - 0.79	0.51 - 0.66	0.51 - 0.68
Ca (dissolved)	Historic Winter (mg/L)	--	--	--	18-39	--	17-26 <sup>3</sup>	≈19	18-39	--	24-31
	Current Winter (µg/L)	--	--	--	19100	--	--	--	11600	--	14300
	Historic Summer (mg/L)	--	--	--	10-37	--	6.8-17 <sup>3</sup>	14-18	10-37	--	15-22
	Current Summer (µg/L)	19,000 – 22,300	17,600 – 21,700	17,100 – 21,900	15,700 – 22,500	17,100 – 21,300	17,300 – 22,600	14,200 – 21,626	16,900 – 20,100	17,700 – 20,000	16,200 – 22,200
Cu (dissolved) (µg/L)	Historic Summer	--	--	--	2-5 <sup>1</sup>	--	≤ 10 <sup>3</sup>	--	2-10 <sup>1</sup>	--	≤ 3 <sup>1</sup>
	Current Summer	0.56 - 2.46	0.53 - 1.23	0.58 - 1.09	0.44 - 2.58	0.28 - 4.77	0.42 - 2.91	0.24 - 6.8	0.09 - 9.62	0.33 - 1.02	0.34 - 1.39



Project River Mile		187.2	152.7	142.3	140.0	124.2	102.8	102.4	88.3	32.5	29.9
Description		Susitna River at Watana Dam site	Susitna River above Portage Creek	Susitna River above Indian River	Susitna River near Gold Creek	Susitna River at Curry Fishwheel Camp	Talkeetna River*	Chulitna River*	Susitna River at Parks Hwy West (current data collected from EAST)	Yentna River*	Susitna River at Susitna Station
Fe (dissolved) (µg/L)	Historic Winter	--	--	--	≈10	--	--	--	17-40 <sup>1</sup>	--	60-150 <sup>1</sup>
	Current Winter	--	--	--	ND	--	--	--	ND	--	59 - 109
	Historic Summer	--	--	--	50-320 <sup>1</sup>	--	--	--	10-330 <sup>1</sup>	--	10-460 <sup>1</sup>
	Current Summer	19.4 - 1480	15.8 - 249	16.4 - 120	18.5 - 1680	27.4 - 171	ND - 2000	11.5 - 5530	6.41 - 7310	9.63 - 480	7.19 - 190
Pb (dissolved) (µg/L)	Historic Summer	--	--	--	0-5 <sup>1</sup>	--	≤10 <sup>3</sup>	--	≤1 <sup>3</sup>	--	≤5 <sup>1</sup>
	Current Summer	ND - 0.31	ND - 0.07	ND - 0.04	ND - 0.42	ND - 0.07	ND - 0.46	ND - 1.77	ND - 2.06	ND - 0.19	ND - 0.11
Mg (dissolved)	Historic Winter (mg/L)	--	--	--	3.2-10	--	1.9-5.6 <sup>3</sup>	≈1.9	2.9-10	--	3.6-5.0
	Current Winter (µg/L)	--	--	--	4680	--	--	--	4260	--	5040
	Historic Summer (mg/L)	--	--	--	1.2-7.8 <sup>1</sup>	--	0.4-3.9 <sup>3</sup>	2.5-4.1	1.2-7.8	--	2.0-3.3
	Current Summer (µg/L)	2350 - 3570	2290 - 2730	2380 - 2730	2320 - 2940	2220 - 2750	2040 - 3160	2950 - 5640	2460 - 5390	3230 - 4540	2700 - 4690

Project River Mile		187.2	152.7	142.3	140.0	124.2	102.8	102.4	88.3	32.5	29.9
Description		Susitna River at Watana Dam site	Susitna River above Portage Creek	Susitna River above Indian River	Susitna River near Gold Creek	Susitna River at Curry Fishwheel Camp	Talkeetna River*	Chulitna River*	Susitna River at Parks Hwy West (current data collected from EAST)	Yentna River*	Susitna River at Susitna Station
Mn (dissolved) (µg/L)	Historic Winter	--	--	--	-- <sup>2</sup>	--	<b>3-10<sup>3</sup></b>	--	<b>2-10<sup>1</sup></b>	--	<b>10-30<sup>1</sup></b>
	Current Winter	--	--	--	-- <sup>2</sup>	--	--	--	6	--	9
	Historic Summer	--	--	--	<b>2-180<sup>1</sup></b>	--	<b>3-20<sup>3</sup></b>	--	<b>7-12<sup>1</sup></b>	--	<b>6-20<sup>1</sup></b>
	Current Summer	2.86 - 29.2	2.53 - 7.38	2.31 - 5.78	1.75 - 35.8	2.79 - 7.58	2.47 - 37	4.86 - 118	1.85 - 151	1.21 - 12.4	1.3 - 17.9
Hg (dissolved)	Historic Summer (µg/L)	--	--	--	<b>≤0.2<sup>1</sup></b>	--	--	--	<b>≤0.1<sup>1</sup></b>	--	<b>≤0.5<sup>1</sup></b>
	Current Summer (ng/L)	ND - 1.46	ND - 0.958	ND - 12.3	ND - 0.82	ND - 2.28	ND - 1.21	ND - 3.54	ND - 1.54	ND - 0.874	ND - 1.48
Ni (dissolved) (µg/L)	Historic Summer	--	--	--	<b>0-3<sup>1</sup></b>	--	<b>0-5<sup>3</sup></b>	--	<b>0-2<sup>1</sup></b>	--	<b>0-2<sup>1</sup></b>
	Current Summer	1.46 - 3.53	0.674 - 1.98	0.988 - 1.81	0.78 - 4.18	0.689 - 2.11	1.05 - 3.97	0.924 - 9.14	0.856 - 10.8	0.742 - 1.71	0.793 - 1.5
Zn (dissolved) (µg/L)	Historic Summer	--	--	--	<b>6-20<sup>1</sup></b>	--	<b>6-30<sup>3</sup></b>	--	<b>14-65<sup>1</sup></b>	--	<b>8-160<sup>1</sup></b>
	Current Summer	0.75 - 7.59	0.657 - 2.77	ND - 1.72	0.569 - 17.3	ND - 3.73	0.495 - 8.35	0.545 - 21.2	ND - 26.8	0.578 - 4.87	0.517 - 4.26

Notes:

ND = non-detection -- = data unavailable \* Indicates tributary sampling location

Values in **Bold Italics** represent updates to historical concentration ranges reported in the Study 5.5 SCR Table 6.1-4, filed with the Commission November 24, 2015.

<sup>1</sup> Indicates values that were corrected from metals in suspended sediments to dissolved metals.

<sup>2</sup> Indicates deleted metals in suspended sediments values and no corresponding dissolved metals data are available.

<sup>3</sup> Indicates dissolved metals value added where metals in suspended sediment value was not available.