
**COLVILLE RIVER DELTA
TWO-DIMENSIONAL SURFACE WATER MODEL
PROJECT UPDATE**

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1.0 ENHANCEMENTS TO THE ORIGINAL MODEL

The original Colville River Delta (CRD) two-dimensional surface water model was constructed to provide peak water surface elevations and velocities for the 50-, 100-, and 200-year floods in the vicinity of the proposed facility, road and pipeline (Shannon & Wilson, 1997). During the fall of 1997, field surveys of the proposed facility and road were conducted. The surveys revealed that the Aeromap topography in the immediate vicinity of the proposed facility and road, which had been used to construct the original surface water model, did not match the field survey particularly well. A detailed review of the data concluded that the Western Geophysical topographic data provided better agreement with the 1997 field survey data than did the Aeromap topographic data. As a result, the original surface water model was revised to reflect the ground surface elevations in the Western Geophysical data rather than the ground surface elevations in the Aeromap data. The change in ground surface elevation between the 1997 and 1998 models is shown in Figure B-1 (Appendix B).

In addition to the ground surface elevation modifications, a number of enhancements were also made. First, the finite element mesh along the proposed facility and road was updated and refined to reflect the March 1998 proposed facility and road alignment. This included the addition of the proposed 440-foot bridge with spill-through abutments. The proposed culverts were not represented in either the original or the revised models as they are expected to have a minor effect on the water surface elevations.

The second enhancement was to increase the number of lakes represented in the immediate vicinity of the proposed facility and road. Although the model was developed for the purpose of looking at large infrequent floods, such as the 50- 100- and 200-year floods, questions are increasingly being asked about the conditions in the immediate vicinity of the facility during smaller floods. Thus, lakes in the immediate vicinity of the facility that had not been represented in the original surface water model were added to the revised model.

Another enhancement involved changing the kinematic eddy viscosity associated with the lakes from 1000 ft²/sec to 100 ft²/sec. The original model incorporated the higher eddy viscosity to reduce the velocity gradient across the lakes and to help stabilize the model (Shannon & Wilson, 1997). However, with the increase in the overall number of lakes in the vicinity of the facilities, most notably in the immediate vicinity of the bridge, it was deemed desirable that the eddy viscosity be lowered to match the rest of the model.

After completion of the modifications, the 110,000-cfs calibration discharge was run to assess the need to recalibrate the model. It was found that in general the modifications did not cause the model to require recalibration. However, it was also found that by increasing the Manning's roughness coefficient from 0.024 to 0.025 on the Kachemach Slough, East Channel, and East Channel banks the model provides a slightly better representation of the calibration conditions. Thus, the value of the Manning's roughness coefficient associated with the above referenced channels was increased as noted above for all subsequent analyses.

Using the revised model, the peak water surface elevations and velocities for the 30-, 50-, 100-, and 200-year floods were estimated. This technical update outlines the results obtained from the revised model and compares those results to the results from the original model.

2.0 COMPARISON OF THE RESULTS FROM THE 1997 ORIGINAL AND 1998 ENHANCED VERSIONS OF THE MODEL

A comparison was made of the results from the original 1997 two-dimensional surface water model and the enhanced 1998 two-dimensional surface water model to quantify the differences between the two versions. The models that were compared are:

- (1) the 110,000 cfs calibration discharge,
- (2) the 50-year flood "without facility" model,
- (3) the 50-year flood "with facility" model,
- (4) the 100-year flood "with facility" model,
- (5) the 200-year "without facility" model, and
- (6) the 200-year "with facility" model.

The original 1997 surface water model was calibrated to a measured discharge of 110,000 cfs. Thus, the first step with the enhanced 1998 model was to compute the water surface elevation during a discharge of 110,000 cfs and to compare it with the measured water surface elevations. The differences between the computed water surface elevations and the measured water surface elevations, during a 110,000 cfs discharge, are presented in Table A-1 (Appendix A). Although the 1997 model matched the measured water surface elevations fairly closely, the 1998 model appears to be a slight improvement over the 1997 model.

The differences in peak water surface elevation associated with the 1997 and 1998 models of the 50-, 100- and 200-year peak discharges, at various locations along the major distributaries, are presented in Tables A-2 through A-6 (Appendix A). The differences in peak water surface elevation at various locations along the proposed pipeline are presented in Tables A-7 through A-11 (Appendix A). The proposed pipeline alignment addressed in Tables A-7 through A-11 is the same alignment addressed during the preparation of the 1997 model (Shannon & Wilson, 1997). Small changes in the alignment have been proposed since the 1997 model was prepared. The conditions along

the proposed alignment, as it is envisioned in August of 1998, are discussed in Section 3.0 of this report.

Based on a comparison of the 50-, 100-, and 200-year floods, at selected locations (Tables A-2 through A-11, Appendix A), the mean absolute difference between the water surface elevation based on the 1998 and 1997 "without facility" models is on the order of 0.2 feet. The mean absolute difference between the 1998 and 1997 "with facility" models is also on the order of 0.2 feet. The range in the difference between the 1998 and 1997 "without facility" models is on the order of -0.1 to +0.5 feet. The range in the difference between the 1998 and 1997 "with facility" models is on the order of -0.7 to +0.4 feet.

The difference between the 1998 and 1997 models is somewhat greater for the "with facility" models than for the "without facility" models. This is due to the fact that the 1998 "with facility" model contains a 440-foot bridge within the road, while the 1997 "with facility" model does not. The bridge provides drainage through the facility/road which causes the water surface elevations on the upstream side of the facility/road to be slightly lower than they would have been without the bridge.

3.0 SUMMARY OF THE 1998 ENHANCED MODEL RESULTS

Enhanced versions of the two-dimensional surface water model for the Colville River Delta were prepared for the following conditions:

- (1) the 30-year flood with the facility,
- (2) the 50-year flood without the facility,
- (3) the 50-year flood with the facility,
- (4) the 100-year with the facility,
- (5) the 200-year flood without the facility, and
- (6) the 200-year flood with the facility.

3.1 Colville River Delta

A summary of the peak water surface elevations during the 30-, 50-, 100- and 200-year floods, is presented in Table A-12 (Appendix A) for various locations along the major distributaries.

3.2 Facility/Road

Summaries of the peak water surface elevations and water depths during the 30-, 50-, 100- and 200-year floods, are presented in Tables A-13 through A-16 (Appendix A) for selected locations along the proposed facility/road. The alignment of the proposed facility/road is based on the alignment as of March 1998. A 440-foot bridge with spill through abutments and a toe-to-toe width of 400 feet is included in the road. The peak flow through the bridge opening during the 30-, 50-, 100-, and 200-year floods is on the order of 14,200, 18,300, 23,300, and 28,300 cfs, respectively. The maximum velocities through the bridge opening are on the order of 6.5, 8.1, 9.1 and 10.0 fps, respectively. The proposed culverts in the road were not represented in the model as they are expected to have a minor effect on the water surface elevations.

3.3 Pipeline

Summaries of the peak water surface elevations, water depth, and depth-averaged velocity during the 30-, 50-, 100- and 200-year floods, are presented in Tables A-17

through A-20 (Appendix A) for selected locations along the proposed pipeline. The alignment for the proposed pipeline is based on the alignment as of August 1998.

4.0 REFERENCES

Shannon & Wilson, 1997. *Colville River Two-Dimensional Surface Water Model*.
Prepared for Michael Baker Jr., Inc., Anchorage, Alaska.

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Table A-1
Comparison Of Water Surface Elevations Within the Channels During the
110,000-cfs Calibration Discharge

Location	State Plane Coordinates (ft)		Measured Water Surface Elevation (ft) [1]	Water Surface Elevation Model Results Without Facilities		Difference in Water Surface Elevation Between the Measured and July 1997 Results [2]	Difference in Water Surface Elevation Between the Measured and July 1998 Results [2]
	Northing	Easting		July 1997	July 1998		
				[1]	[1]		
East Channel							
Near E27.09	5,909,644	385,761	8.54	8.37	8.48	0.17	0.06
Near E24.92	5,919,492	390,811	7.90	7.67	7.77	0.23	0.13
Near E22.75	5,929,386	397,802	7.30	7.12	7.18	0.18	0.12
Near E20.56	5,940,315	396,669	6.30	6.51	6.54	-0.21	-0.24
Near E14.32	5,969,545	410,047	4.5 - 5.5	4.71	4.78	0.29	0.22
Near E09.76	5,984,872	427,058	3.0 - 4.0	3.81	3.85	-0.31	-0.35
Near E03.00	6,007,417	456,601	2.15	2.12	2.14	0.03	0.01
Nechelik Channel							
Near N22.65	5,922,041	385,366	7.20	7.41	7.48	-0.21	-0.28
Near N19.95	5,933,329	386,019	6.05	6.31	6.37	-0.26	-0.32
Near N15.07	5,941,514	373,720	4.58	4.55	4.61	0.03	-0.03
Near N07.47	5,976,223	368,261	2.43	2.41	2.45	0.02	-0.02
Near N02.03	6,006,506	368,960	1.59	1.59	1.62	0.00	-0.03
Sakoonang Channel							
Near S16.52	5,946,219	393,958	5.93	6.31	6.32	-0.38	-0.39
Near S09.80	5,968,672	390,519	3.23	2.89	2.94	0.34	0.29
Near S01.38	5,991,840	377,691	1.65	2.07	2.15	-0.42	-0.50
Tamayyak Channel							
Near T12.62	5,972,400	397,793	4.41	3.93	4.18	0.48	0.23
Near T08.20	5,992,255	391,674	3.32	2.80	2.95	0.52	0.37
Mean of Absolute Difference Between Measured and Computed Water Surface Elevation [3]						0.24	0.21
Notes:							
1. All elevations are based on BPSL.							
2. The difference in water surface elevation (WSE) is negative when the WSE based on the July 1998 model is less than the WSE based on the July 1997 model. The difference is positive when the WSE based on the July 1998 model is greater than the WSE based on the July 1997 model.							
3. The July 1997 results are based on Iteration #50, and the July 1998 results are based on Iteration #7.							

Table A-2
Comparison Of The Peak 50-Year Flood, Water Surface Elevations
Within The Channels (Without Facility Model)

Location	State Plane Coordinates (ft)		Water Surface Elevation (ft) [1] Without Facilities Model		Difference in Water Surface Elevation [2]
	Northing	Easting	July 1997	July 1998	
East Channel					
Near E27.09	5,909,644	385,761	23.1	23.4	0.3
Near E24.92	5,919,492	390,811	21.8	22.0	0.2
Near E22.75	5,929,386	397,802	20.6	20.8	0.2
Near E20.56	5,940,315	396,669	18.6	18.7	0.1
Near E18.47	5,949,082	400,872	17.4	17.5	0.1
Near E16.32	5,959,033	406,361	15.8	15.9	0.1
Near E14.32	5,969,545	410,047	13.9	14.0	0.1
Near E09.76	5,984,872	427,058	10.5	10.6	0.1
Near E03.00	6,007,417	456,601	4.8	4.8	0.0
Kupigruak Channel					
Near K11.65	5,988,634	414,617	11.0	11.0	0.0
Nechelik Channel					
Near N22.65	5,922,041	385,366	21.2	21.4	0.2
Near N19.95	5,933,329	386,019	19.5	19.6	0.1
Near N17.80	5,934,291	377,889	17.2	17.3	0.1
Near N15.07	5,941,514	373,720	14.8	14.8	0.0
Near N12.88	5,952,813	375,779	13.6	13.7	0.1
Near N09.47	5,968,025	370,955	11.3	11.2	-0.1
Near N07.47	5,976,223	368,261	9.8	10.1	0.3
Near N05.42	5,987,622	367,793	7.8	8.0	0.2
Near N02.03	6,006,506	368,960	3.8	3.9	0.1
Sakoongang Channel					
Near S16.52	5,946,219	393,958	18.2	18.3	0.1
Near S13.07	5,957,945	385,965	13.7	14.1	0.4
Near S09.80	5,968,672	390,519	11.7	11.8	0.1
Near S05.07	5,985,818	384,698	9.9	10.2	0.3
Near S01.38	5,991,840	377,691	8.0	8.2	0.2
Tamayayak Channel					
Near T12.62	5,972,400	397,793	13.0	13.1	0.1
Near T08.20	5,992,255	391,674	9.9	10.0	0.1
Mean of the absolute difference in water surface elevations					0.14
continued on next page					

Table A-2 (continued)

Location	State Plane Coordinates (ft)		Water Surface Elevation (ft) [1] Without Facilities Model		Difference in Water Surface Elevation [2]
	Northing	Easting	July 1997	July 1998	
Notes: 1. All elevations are based on BPMSL. 2. The difference in water surface elevation (WSE) is negative when the WSE based on the July 1998 model is less than the WSE based on the July 1997 model. The difference is positive when the WSE based on the July 1998 model is greater than the WSE based on the July 1997 model. 3. The July 1997 results are based on Iteration #67, and the July 1998 results are based on Iteration #46.					

Table A-3
Comparison Of The Peak 50-Year Flood, Water Surface Elevations
Within The Channels (With Facility Model)

Location	State Plane Coordinates (ft)		Water Surface Elevation (ft) [1] With Facilities Model		Difference in Water Surface Elevation [2]
	Northing	Easting	July 1997	July 1998	
East Channel					
Near E27.09	5,909,644	385,761	23.2	23.4	0.2
Near E24.92	5,919,492	390,811	21.9	22.1	0.2
Near E22.75	5,929,386	397,802	20.7	20.8	0.1
Near E20.56	5,940,315	396,669	18.6	18.8	0.2
Near E18.47	5,949,082	400,872	17.4	17.6	0.2
Near E16.32	5,959,033	406,361	15.9	16.0	0.1
Near E14.32	5,969,545	410,047	14.1	14.1	0.0
Near E09.76	5,984,872	427,058	10.8	10.7	-0.1
Near E03.00	6,007,417	456,601	4.9	4.9	0.0
Kupigrusk Channel					
Near K11.65	5,988,634	414,617	11.3	11.3	0.0
Nechelik Channel					
Near N22.65	5,922,041	385,366	21.3	21.5	0.2
Near N19.95	5,933,329	386,019	19.5	19.7	0.2
Near N17.80	5,934,291	377,889	17.4	17.4	0.0
Near N15.07	5,941,514	373,720	15.1	15.0	-0.1
Near N12.88	5,952,813	375,779	14.1	14.0	-0.1
Near N09.47	5,968,025	370,955	12.2	11.8	-0.4
Near N07.47	5,976,223	368,261	10.4	10.3	-0.1
Near N05.42	5,987,622	367,793	8.2	8.1	-0.1
Near N02.05	6,006,506	368,960	3.8	3.9	0.1
Sakoosag Channel					
Near S16.52	5,946,219	393,958	18.2	18.3	0.1
Near S13.07	5,957,945	385,965	14.3	14.3	0.0
Near S09.80	5,968,672	390,519	12.4	12.2	-0.2
Near S05.07	5,985,818	384,698	9.8	10.2	0.4
Near S01.38	5,991,840	377,691	8.1	8.1	0.0
Tamayyak Channel					
Near T12.62	5,972,400	397,793	13.3	13.2	-0.1
Near T08.20	5,992,255	391,674	10.1	10.1	0.0
Mean of the absolute difference in water surface elevations					0.12
continued on next page					

Table A-3 (continued)

Location	State Plane Coordinates (ft)		Water Surface Elevation (ft) [1] With Facilities Model		Difference in Water Surface Elevation [2]
	Northing	Easting	July 1997	July 1998	
Notes: 1. All elevations are based on BPMSL. 2. The difference in water surface elevation (WSE) is negative when the WSE based on the July 1998 model is less than the WSE based on the July 1997 model. The difference is positive when the WSE based on the July 1998 model is greater than the WSE based on the July 1997 model. 3. The July 1997 results are based on iteration #14, and the July 1998 results are based on iteration #61.					

Table A-4
Comparison Of The Peak 100-Year Flood, Water Surface Elevations
Within The Channels (With Facility Model)

Location	State Plane Coordinates (ft)		Water Surface Elevation (ft) [1] With Facilities Model		Difference in Peak Water Surface Elevation [2]
	Northing	Easting	July 1997	July 1998	
East Channel					
Near E27.09	5,909,644	385,761	24.7	24.9	0.2
Near E24.92	5,919,492	390,811	23.3	23.5	0.2
Near E22.75	5,929,386	397,802	22.0	22.2	0.2
Near E20.56	5,940,315	396,669	19.7	19.9	0.2
Near E18.47	5,949,082	400,872	18.5	18.6	0.1
Near E16.32	5,959,033	406,361	16.8	16.9	0.1
Near E14.32	5,969,545	410,047	14.8	14.9	0.1
Near E09.76	5,984,872	427,058	11.2	11.3	0.1
Near E03.00	6,007,417	456,601	5.2	5.1	-0.1
Kupigruak Channel					
Near K11.65	5,988,634	414,617	11.6	11.6	0.0
Nechelik Channel					
Near N22.65	5,922,041	385,366	22.7	22.9	0.2
Near N19.95	5,933,329	386,019	20.8	20.9	0.1
Near N17.80	5,934,291	377,889	18.5	18.5	0.0
Near N15.07	5,941,514	373,720	16.2	16.1	-0.1
Near N12.88	5,952,813	375,779	15.3	15.1	-0.2
Near N09.47	5,968,025	370,955	13.5	13.0	-0.5
Near N07.47	5,976,223	368,261	11.6	11.5	-0.1
Near N05.42	5,987,622	367,793	9.1	9.2	0.1
Near N02.03	6,006,506	368,960	4.2	4.2	0.0
Sakoong Channel					
Near S16.52	5,946,219	393,958	19.3	19.4	0.1
Near S13.07	5,957,945	385,965	15.5	15.3	-0.2
Near S09.80	5,968,672	390,519	14.1	13.6	-0.5
Near S05.07	5,985,818	384,698	11.0	11.2	0.2
Near S01.38	5,991,840	377,691	8.7	8.9	0.2
Tamuyayak Channel					
Near T12.62	5,972,400	397,793	13.7	13.8	0.1
Near T08.20	5,992,255	391,674	10.4	10.5	0.1
Mean of the absolute difference in water surface elevations					0.15
continued on next page					

Table A-4 (continued)

Location	State Plane Coordinates (ft)		Water Surface Elevation (ft) [1] With Facilities Model		Difference in Peak Water Surface Elevation [2]
	Northing	Easting	July 1997	July 1998	
Notes: 1. All elevations are based on BPMSL. 2. The difference in water surface elevation (WSE) is negative when the WSE based on the July 1998 model is less than the WSE based on the July 1997 model. The difference is positive when the WSE based on the July 1998 model is greater than the WSE based on the July 1997 model. 3. The July 1997 results are based on Iteration #23, and the July 1998 results are based on Iteration #63.					

Table A-5
Comparison Of The Peak 200-Year Flood, Water Surface Elevations
Within The Channels (Without Facility Model)

Location	State Plane Coordinates (ft)		Water Surface Elevation (ft) [1] Without Facilities Model		Difference in Peak Water Surface Elevation [2]
	Northing	Easting	July 1997 [3]	July 1998	
East Channel					
Near E27.09	5,909,644	385,761	26.2	26.4	0.2
Near E24.92	5,919,492	390,811	24.7	24.9	0.2
Near E22.75	5,929,386	397,802	23.3	23.4	0.1
Near E20.56	5,940,315	396,669	20.9	21.0	0.1
Near E18.47	5,949,082	400,872	19.6	19.7	0.1
Near E16.32	5,959,033	406,361	17.7	17.8	0.1
Near E14.32	5,969,545	410,047	15.6	15.7	0.1
Near E09.76	5,984,872	427,058	11.7	11.9	0.2
Near E03.00	6,007,417	456,601	5.3	5.3	0.0
Kupigruak Channel					
Near K11.65	5,988,634	414,617	12.1	12.2	0.1
Nechelik Channel					
Near N22.65	5,922,041	385,366	24.1	24.3	0.2
Near N19.95	5,933,329	386,019	21.9	21.9	0.0
Near N17.80	5,934,291	377,889	19.4	19.5	0.1
Near N15.07	5,941,514	373,720	16.8	17.0	0.2
Near N12.88	5,952,813	375,779	15.7	15.8	0.1
Near N09.47	5,968,025	370,955	13.4	13.3	-0.1
Near N07.47	5,976,223	368,261	12.0	12.2	0.2
Near N05.42	5,987,622	367,793	9.5	9.7	0.2
Near N02.03	6,006,506	368,960	4.3	4.4	0.1
Sakoonang Channel					
Near S16.52	5,946,219	393,958	20.4	20.5	0.1
Near S13.07	5,957,945	385,965	16.0	16.2	0.2
Near S09.80	5,968,672	390,519	14.3	14.2	-0.1
Near S05.07	5,985,818	384,698	11.9	12.1	0.2
Near S01.38	5,991,840	377,691	9.5	9.6	0.1
Tamayoyak Channel					
Near T12.62	5,972,400	397,793	14.1	14.4	0.3
Near T08.20	5,992,255	391,674	10.8	10.9	0.1
Mean of the absolute difference in water surface elevations					0.13
continued on next page					

Table A-5 (continued)

Location	State Plane Coordinates (ft)		Water Surface Elevation (ft) [1] Without Facilities Model		Difference in Peak Water Surface Elevation [2]
	Northing	Easting	July 1997 [3]	July 1998	
<p>Notes:</p> <ol style="list-style-type: none"> 1. All elevations are based on BPMSL. 2. The difference in water surface elevation (WSE) is negative when the WSE based on the July 1998 model is less than the WSE based on the July 1997 model. The difference is positive when the WSE based on the July 1998 model is greater than the WSE based on the July 1997 model. 3. The July 1997 results reported in "Colville River Two-Dimensional Surface Water Model (Shannon & Wilson, 1997) contained several typographical errors. The corrected values appear in the "July 1997" column of this table. 4. The July 1997 results are based on Iteration #46, and the July 1998 results are based on Iteration #63. 					

Table A-6
Comparison Of The Peak 200-Year Flood, Water Surface Elevations
Within The Channels (With Facility Model)

Location	State Plane Coordinates (ft)		Water Surface Elevation (ft) [1] With Facilities Model		Difference in Peak Water Surface Elevation [2]
	Northing	Easting	July 1997	July 1998	
East Channel					
Near E27.09	5,909,644	385,761	26.1	26.4	0.3
Near E24.92	5,919,492	390,811	24.6	24.9	0.3
Near E22.75	5,929,386	397,802	23.2	23.4	0.2
Near E20.56	5,940,315	396,669	20.8	21.0	0.2
Near E18.47	5,949,082	400,872	19.5	19.7	0.2
Near E16.32	5,959,033	406,361	17.7	17.8	0.1
Near E14.32	5,969,545	410,047	15.5	15.7	0.2
Near E09.76	5,984,872	427,058	11.7	11.8	0.1
Near E03.00	6,007,417	456,601	5.3	5.3	0.0
Kupigrnak Channel					
Near K11.65	5,988,634	414,617	12.1	12.1	0.0
Nechelik Channel					
Near N22.65	5,922,041	385,366	24.1	24.3	0.2
Near N19.95	5,933,329	386,019	21.9	21.9	0.0
Near N17.80	5,934,291	377,889	19.6	19.6	0.0
Near N15.07	5,941,514	373,720	17.3	17.2	-0.1
Near N12.88	5,952,813	375,779	16.4	16.2	-0.2
Near N09.47	5,968,025	370,955	14.6	14.1	-0.5
Near N07.47	5,976,223	368,261	12.6	12.4	-0.2
Near N05.42	5,987,622	367,793	9.7	9.7	0.0
Near N02.03	6,006,506	368,960	4.3	4.4	0.1
Sakoonang Channel					
Near S16.52	5,946,219	393,958	20.4	20.5	0.1
Near S13.07	5,957,945	385,965	16.5	16.4	-0.1
Near S09.80	5,968,672	390,519	15.3	14.8	-0.5
Near S05.07	5,985,818	384,698	11.7	11.9	0.2
Near S01.38	5,991,840	377,691	9.3	9.5	0.2
Tamayayak Channel					
Near T12.62	5,972,400	397,793	14.2	14.2	0.0
Near T08.20	5,992,255	391,674	10.6	10.8	0.2
Mean of the absolute difference in water surface elevations					0.16

continued on next page

Table A-6 (continued)

Location	State Plane Coordinates (ft)		Water Surface Elevation (ft) [1] With Facilities Model		Difference in Peak Water Surface Elevation [2]
	Northing	Easting	July 1997	July 1998	
Notes: 1. All elevations are based on BPMSL. 2. The difference in water surface elevation (WSE) is negative when the WSE based on the July 1998 model is less than the WSE based on the July 1997 model. The difference is positive when the WSE based on the July 1998 model is greater than the WSE based on the July 1997 model. 3. The July 1997 results are based on Iteration #10, and the July 1998 results are based on Iteration #48.					

Table A-7
Comparison Of The Peak 50-Year Flood, Water Surface Elevations Along the Pipeline
(Without Facility Model)

Location [2]	State Plane Coordinates (ft)			50-Year Without Facilities Model				Change in Water Surface Elevation (ft) [7]	Change in Depth (ft) [7]
	Northing	Easting	Ground Elevation (ft) [1,3]	July 1997		July 1998			
				Peak Water Surface Elevation (ft) [1,4,6]	Depth (ft) [5]	Peak Water Surface Elevation (ft) [1,4]	Depth (ft) [5]		
PI01	5,977,102	385,426	15.4	11.4	0.0	11.6	0.0	0.2	0.0
PI02	5,975,276	382,927	13.5	11.4	0.0	11.6	0.0	0.2	0.0
PI03	5,973,060	382,705	11.5	11.6	0.1	11.6	0.1	0.0	0.0
PI04	5,969,486	378,985	10.1	11.8	1.7	11.6	1.5	-0.2	-0.2
PI05	5,963,244	377,899	12.0	12.2	0.2	12.4	0.4	0.2	0.2
PI06	5,960,993	378,208	11.5	12.5	1.0	12.7	1.2	0.2	0.2
PI07	5,954,169	382,629	12.4	14.4	2.0	14.6	2.2	0.2	0.2
PI08	5,952,674	382,609	9.8	14.4	4.6	14.6	4.8	0.2	0.2
PI09	5,951,162	383,482	8.6	14.4	5.8	14.6	6.0	0.2	0.2
PI10	5,949,730	384,843	13.3	15.2	1.9	15.3	2.0	0.1	0.1
PI11	5,946,188	392,113	18.6	15.7 [6]	0.0	15.8	0.0	0.1	0.0
PI12	5,944,918	393,140	20.4	15.7 [6]	0.0	15.8	0.0	0.1	0.0
PI13	5,939,750	393,804	19.0	18.7	0.0	19.0	0.0	0.3	0.0
PI14	5,939,641	398,674	17.8	18.6	0.8	18.8	1.0	0.2	0.2
PI15	5,935,517	401,684	12.3	19.7	7.4	19.9	7.6	0.2	0.2
PI16	5,935,904	405,281	26.8	19.6	0.0	20.1	0.0	0.5	0.0
Mean of the absolute difference in water surface elevations								0.19	

Notes:

1. All elevations are based on BPMSL.
2. See Figure B-8 in "Colville River Two-Dimensional Surface Water Model (Shannon & Wilson, 1997) for approximate locations of PI's.
3. The ground elevation is based on a ground survey of the PI's, except for PI01, PI02, and PI04, which were estimated from topographic maps prepared by Aeromap (Aeromap, 1996).
4. The water surface elevations represent the FESWMS water surface elevation at the inundated point closest to the PI.
5. The water depth represents the difference in the FESWMS water surface elevation at the inundated point closest to the PI and the ground surface elevation at the PI.
6. The PI11 and PI12 water surface elevations presented in Table A-10 of the report "Colville River Two-Dimensional Surface Water Model" (Shannon & Wilson, 1997) were 17.9 and 18.2, respectively. More representative values were chosen for this comparison and are reported above.
7. The values presented in the "change in water surface elevation" column and in the "change in depth" column are negative when the water surface elevation (WSE) based on the July 1998 model is less than the WSE based on the July 1997 model. The change is positive when the WSE based on the July 1998 model is greater than the WSE based on the July 1997 model.
8. The July 1997 results are based on Iteration #67, and the July 1998 results are based on Iteration #46.

Table A-8
Comparison Of The Peak 50-Year Flood, Water Surface Elevations Along the Pipeline
(With Facility Model)

Location [2]	State Plane Coordinates (ft)			50-Year With Facilities Model				Change in Water Surface Elevation (ft) [7]	Change in Depth (ft) [7]
	Northing	Easting	Ground Elevation (ft) [1,3]	July 1997		July 1998			
				Peak Water Surface Elevation (ft) [1,4,6]	Depth (ft) [5]	Peak Water Surface Elevation (ft) [1,4]	Depth (ft) [5]		
PI01	5,977,102	385,426	15.4	12.4	0.0	12.1	0.0	-0.3	0.0
PI02	5,975,276	382,927	13.5	12.4	0.0	12.1	0.0	-0.3	0.0
PI03	5,973,060	382,705	11.5	12.5	1.0	12.1	0.6	-0.4	-0.4
PI04	5,969,486	378,985	10.1	12.6	2.5	12.1	2.0	-0.5	-0.5
PI05	5,963,244	377,899	12.0	12.8	0.8	12.5	0.5	-0.3	-0.3
PI06	5,960,993	378,208	11.5	13.0	1.5	12.8	1.3	-0.2	-0.2
PI07	5,954,169	382,629	12.4	14.8	2.4	14.7	2.3	-0.1	-0.1
PI08	5,952,674	382,609	9.8	14.8	5.0	14.8	5.0	0.0	0.0
PI09	5,951,162	383,482	8.6	14.8	6.2	14.8	6.2	0.0	0.0
PI10	5,949,730	384,843	13.3	15.4	2.1	15.3	2.0	-0.1	-0.1
PI11	5,946,188	392,113	18.6	15.8 [6]	0.0	15.9	0.0	0.1	0.0
PI12	5,944,918	393,140	20.4	15.8 [6]	0.0	15.9	0.0	0.1	0.0
PI13	5,939,750	393,804	19.0	18.8	0.0	18.9	0.0	0.1	0.0
PI14	5,939,641	398,674	17.8	18.7	0.9	18.8	1.0	0.1	0.1
PI15	5,935,517	401,684	12.3	19.8	7.5	20.0	7.7	0.2	0.2
PI16	5,935,904	405,281	26.8	19.6	0.0	19.8	0.0	0.2	0.0
Mean of the absolute difference in water surface elevations								0.19	

Notes:

1. All elevations are based on BPMSL.
2. See Figure B-8 in "Colville River Two-Dimensional Surface Water Model (Shannon & Wilson, 1997) for approximate locations of PIs.
3. The ground elevation is based on a ground survey of the PIs, except for PI01, PI02, and PI04, which were estimated from topographic maps prepared by Aeromap (Aeromap, 1996).
4. The water surface elevations represent the FESWMS water surface elevation at the inundated point closest to the PI.
5. The water depth represents the difference in the FESWMS water surface elevation at the inundated point closest to the PI and the ground surface elevation at the PI.
6. The PI11 and PI12 water surface elevations presented in Table A-10 of the report "Colville River Two-Dimensional Surface Water Model" (Shannon & Wilson, 1997) were 17.9 and 18.2, respectively. More representative values were chosen for this comparison and are reported above.
7. The values presented in the "change in water surface elevation" column and in the "change in depth" column are negative when the water surface elevation (WSE) based on the July 1998 model is less than the WSE based on the July 1997 model. The change is positive when the WSE based on the July 1998 model is greater than the WSE based on the July 1997 model.
8. The July 1997 results are based on Iteration #14, and the July 1998 results are based on Iteration #61.

Table A-9
Comparison Of The Peak 100-Year Flood, Water Surface Elevations Along the Pipeline
(With Facility Model)

Location	State Plane Coordinates (ft)			100-Year With Facilities Model				Change in Water Surface Elevation (ft) [7]	Change in Depth (ft) [7]
	Northing	Easting	Ground Elevation (ft) [1,3]	July 1997		July 1998			
				Peak Water Surface Elevation (ft) [1,4,6]	Depth (ft) [5]	Peak Water Surface Elevation (ft) [1,4]	Depth (ft) [5]		
PI01	5,977,102	385,426	15.4	13.8	0.0	13.2	0.0	-0.6	0.0
PI02	5,975,276	382,927	13.5	13.8	0.3	13.3	0.0	-0.5	-0.3
PI03	5,973,060	382,705	11.5	13.8	2.3	13.3	1.8	-0.5	-0.5
PI04	5,969,486	378,985	10.1	14.0	3.9	13.4	3.3	-0.6	-0.6
PI05	5,963,244	377,899	12.0	14.2	2.2	13.7	1.7	-0.5	-0.5
PI06	5,960,993	378,208	11.5	14.5	3.0	14.2	2.7	-0.3	-0.3
PI07	5,954,169	382,629	12.4	15.7	3.3	15.5	3.1	-0.2	-0.2
PI08	5,952,674	382,609	9.8	15.7	5.9	15.6	5.8	-0.1	-0.1
PI09	5,951,162	383,482	8.6	15.7	7.1	15.6	7.0	-0.1	-0.1
PI10	5,949,730	384,843	13.3	16.5	3.2	16.4	3.1	-0.1	-0.1
PI11	5,946,188	392,113	18.6	17.1 [6]	0.0	17.1	0.0	0.0	0.0
PI12	5,944,918	393,140	20.4	17.1 [6]	0.0	17.1	0.0	0.0	0.0
PI13	5,939,750	393,804	19.0	19.9	0.9	20.0	1.0	0.1	0.1
PI14	5,939,641	398,674	17.8	19.8	2.0	19.9	2.1	0.1	0.1
PI15	5,935,517	401,684	12.3	21.0	8.7	21.2	8.9	0.2	0.2
PI16	5,935,904	405,281	26.8	20.8	0.0	21.0	0.0	0.2	0.0
Mean of the absolute difference in water surface elevations								0.26	

Notes:

1. All elevations are based on BPMSL.
2. See Figure B-8 in "Colville River Two-Dimensional Surface Water Model (Shannon & Wilson, 1997) for approximate locations of PI's.
3. The ground elevation is based on a ground survey of the PI's, except for PI01, PI02, and PI04, which were estimated from topographic maps prepared by Aeromap (Aeromap, 1996).
4. The water surface elevations represent the FESWMS water surface elevation at the inundated point closest to the PI.
5. The water depth represents the difference in the FESWMS water surface elevation at the inundated point closest to the PI and the ground surface elevation at the PI.
6. The PI11 and PI12 water surface elevations presented in Table A-10 of the report "Colville River Two-Dimensional Surface Water Model" (Shannon & Wilson, 1997) were 18.9 and 19.3, respectively. More representative values were chosen for this comparison and are reported above.
7. The values presented in the "change in water surface elevation" column and in the "change in depth" column are negative when the water surface elevation (WSE) based on the July 1998 model is less than the WSE based on the July 1997 model. The change is positive when the WSE based on the July 1998 model is greater than the WSE based on the July 1997 model.
8. The July 1997 results are based on Iteration #23, and the July 1998 results are based on Iteration #63.

Table A-10
Comparison Of Peak 200-Year Flood, Water Surface Elevations Along the Pipeline
(Without Facility Model)

Location	State Plane Coordinates (ft)			200-Year Without Facilities Model				Change in Water Surface Elevation (ft) [7]	Change in Depth (ft) [7]
	Northing	Easting	Ground Elevation (ft) [1,3]	July 1997		July 1998			
				Peak Water Surface Elevation (ft) [1,4,6]	Depth (ft) [5]	Peak Water Surface Elevation (ft) [1,4]	Depth (ft) [5]		
PI01	5,977,102	385,426	15.4	13.1	0.0	13.2	0.0	0.1	0.0
PI02	5,975,276	382,927	13.5	13.5	0.0	13.5	0.0	0.0	0.0
PI03	5,973,060	382,705	11.5	13.6	2.1	13.5	2.0	-0.1	-0.1
PI04	5,969,486	378,985	10.1	13.9	3.8	13.6	3.5	-0.3	-0.3
PI05	5,963,244	377,899	12.0	14.3	2.3	14.1	2.1	-0.2	-0.2
PI06	5,960,993	378,208	11.5	14.7	3.2	14.7	3.2	0.0	0.0
PI07	5,954,169	382,629	12.4	16.3	3.9	16.4	4.0	0.1	0.1
PI08	5,952,674	382,609	9.8	16.3	6.5	16.5	6.7	0.2	0.2
PI09	5,951,162	383,482	8.6	16.3	7.7	16.5	7.9	0.2	0.2
PI10	5,949,730	384,843	13.3	17.1	3.8	17.3	4.0	0.2	0.2
PI11	5,946,188	392,113	18.6	17.9 [6]	0.0	18.2	0.0	0.3	0.0
PI12	5,944,918	393,140	20.4	17.9 [6]	0.0	18.2	0.0	0.3	0.0
PI13	5,939,750	393,804	19.0	21.0	2.0	21.3	2.3	0.3	0.3
PI14	5,939,641	398,674	17.3	20.9	3.1	21.1	3.3	0.2	0.2
PI15	5,935,517	401,684	12.3	22.2	9.9	22.3	10.0	0.1	0.1
PI16	5,935,904	405,281	26.8	22.0	0.0	22.1	0.0	0.1	0.0
Mean of the absolute difference in water surface elevations								0.17	
Notes:									
1. All elevations are based on BPMSL.									
2. See Figure B-8 in "Colville River Two-Dimensional Surface Water Model (Shannon & Wilson, 1997) for approximate locations of PTs.									
3. The ground elevation is based on a ground survey of the PTs, except for PI01, PI02, and PI04, which were estimated from topographic maps prepared by Aeromap (Aeromap, 1996).									
4. The water surface elevations represent the FESWMS water surface elevation at the inundated point closest to the PI.									
5. The water depth represents the difference in the FESWMS water surface elevation at the inundated point closest to the PI and the ground surface elevation at the PI.									
6. The PI11 and PI12 water surface elevations presented in Table A-10 of the report "Colville River Two-Dimensional Surface Water Model" (Shannon & Wilson, 1997) were 20.0 and 20.4, respectively. More representative values were chosen for this comparison and are reported above.									
7. The values presented in the "change in water surface elevation" column and in the "change in depth" column are negative when the water surface elevation (WSE) based on the July 1998 model is less than the WSE based on the July 1997 model. The change is positive when the WSE based on the July 1998 model is greater than the WSE based on the July 1997 model.									
8. The July 1997 results are based on Iteration #23, and the July 1998 results are based on Iteration #63.									

Table A-11
Comparison Of Peak 200-Year Flood, Water Surface Elevations Along the Pipeline
(With Facility Model)

Location	State Plane Coordinates (ft)			200-Year With Facilities Model				Change in Water Surface Elevation (ft) [7]	Change in Depth (ft) [7]
	Northing	Easting	Ground Elevation (ft) [1,3]	July 1997		July 1998			
				Peak Water Surface Elevation (ft) [1,4,6]	Depth (ft) [5]	Peak Water Surface Elevation (ft) [1,4]	Depth (ft) [5]		
PI01	5,977,102	385,426	15.4	14.9	0.0	14.4	0.0	-0.5	0.0
PI02	5,975,276	382,927	13.5	14.9	1.4	14.3	0.8	-0.6	-0.6
PI03	5,973,060	382,705	11.5	15.0	3.5	14.4	2.9	-0.6	-0.6
PI04	5,969,486	378,985	10.1	15.1	5.0	14.4	4.3	-0.7	-0.7
PI05	5,963,244	377,899	12.0	15.4	3.4	14.8	2.8	-0.6	-0.6
PI06	5,960,993	378,208	11.5	15.6	4.1	15.2	3.7	-0.4	-0.4
PI07	5,954,169	382,629	12.4	16.7	4.3	16.6	4.2	-0.1	-0.1
PI08	5,952,674	382,609	9.8	16.8	7.0	16.6	6.8	-0.2	-0.2
PI09	5,951,162	383,482	8.6	16.8	8.2	16.6	8.0	-0.2	-0.2
PI10	5,949,730	384,843	13.3	17.5	4.2	17.4	4.1	-0.1	-0.1
PI11	5,946,188	392,113	18.6	18.4 [6]	0.0	18.3	0.0	-0.1	0.0
PI12	5,944,918	393,140	20.4	18.4 [6]	0.0	18.3	0.0	-0.1	0.0
PI13	5,939,750	393,804	19.0	21.0	2.0	21.2	2.2	0.2	0.2
PI14	5,939,641	398,674	17.8	20.9	3.1	21.0	3.2	0.1	0.1
PI15	5,935,317	401,684	12.3	22.1	9.8	22.3	10.0	0.2	0.2
PI16	5,935,904	405,281	26.8	21.9	0.0	22.1	0.0	0.2	0.0

Mean of the absolute difference in water surface elevations

0.30

Notes:

1. All elevations are based on BPMSL.
2. See Figure B-8 in "Colville River Two-Dimensional Surface Water Model (Shannon & Wilson, 1997) for approximate locations of PI's.
3. The ground elevation is based on a ground survey of the PI's, except for PI01, PI02, and PI04, which were estimated from topographic maps prepared by Aeromap (Aeromap, 1996).
4. The water surface elevations represent the FESWMS water surface elevation at the inundated point closest to the PI.
5. The water depth represents the difference in the FESWMS water surface elevation at the inundated point closest to the PI and the ground surface elevation at the PI.
6. The PI11 and PI12 water surface elevations presented in Table A-10 of the report "Colville River Two-Dimensional Surface Water Model" (Shannon & Wilson, 1997) were 20.0 and 20.4, respectively. More representative values were chosen for this comparison and are reported above.
7. The values presented in the "change in water surface elevation" column and in the "change in depth" column are negative when the water surface elevation (WSE) based on the July 1998 model is less than the WSE based on the July 1997 model. The change is positive when the WSE based on the July 1998 model is greater than the WSE based on the July 1997 model.
8. The July 1997 results are based on iteration #23, and the July 1998 results are based on iteration #63.

**Table A-12
Peak Water Surface Elevations Within The Channels During The 30-, 50-, 100-, And 200-Year Floods**

Location	State Plane Coordinates (ft)		Water Surface Elevation [1]										
	Northing	Easting	30-Year Flood		50-Year Flood		100-Year Flood		200-Year Flood				
			With Facilities	Without Facilities	With Facilities	Without Facilities	With Facilities	Without Facilities	With Facilities	Without Facilities			
East Channel													
Near E27.09	5,909,644	385,761	22.1	23.4	23.4	24.9	24.9	26.4	26.4	26.4	26.4	26.4	26.4
Near E24.92	5,919,492	390,811	20.8	22.0	22.1	23.5	23.5	24.9	24.9	24.9	24.9	24.9	24.9
Near E22.75	5,929,386	397,802	19.6	20.8	20.8	22.2	22.2	23.4	23.4	23.4	23.4	23.4	23.4
Near E20.56	5,940,315	396,669	17.8	18.7	18.8	19.9	19.9	21.0	21.0	21.0	21.0	21.0	21.0
Near E18.47	5,949,082	400,872	16.5	17.5	17.6	18.6	18.6	19.7	19.7	19.7	19.7	19.7	19.7
Near E16.32	5,959,033	406,361	15.1	15.9	16.0	16.9	16.9	17.8	17.8	17.8	17.8	17.8	17.8
Near E14.32	5,969,545	410,047	13.4	14.0	14.1	14.9	14.9	15.7	15.7	15.7	15.7	15.7	15.7
Near E09.76	5,984,872	427,058	10.1	10.6	10.7	11.3	11.3	11.9	11.9	11.9	11.9	11.9	11.9
Near E03.00	6,007,417	456,601	4.6	4.8	4.9	5.1	5.1	5.3	5.3	5.3	5.3	5.3	5.3
Kupigruak Channel													
Near K11.65	5,988,634	414,617	10.7	11.0	11.3	11.6	11.6	12.2	12.2	12.2	12.2	12.2	12.2
Nechelik Channel													
Near N22.65	5,922,041	385,366	20.1	21.4	21.5	22.9	22.9	24.3	24.3	24.3	24.3	24.3	24.3
Near N19.95	5,933,329	386,019	18.7	19.6	19.7	20.9	20.9	21.9	21.9	21.9	21.9	21.9	21.9
Near N17.80	5,934,291	377,889	16.6	17.3	17.4	18.5	18.5	19.5	19.5	19.5	19.5	19.5	19.5
Near N15.07	5,941,514	373,720	14.0	14.8	15.0	16.1	16.1	17.0	17.0	17.0	17.0	17.0	17.0
Near N12.88	5,952,813	375,779	12.8	13.7	14.0	15.1	15.1	15.8	15.8	15.8	15.8	15.8	15.8
Near N09.47	5,968,025	370,955	10.7	11.2	11.8	13.0	13.0	13.3	13.3	13.3	13.3	13.3	13.3
Near N07.47	5,976,223	368,261	9.2	10.1	10.3	11.5	11.5	12.2	12.2	12.2	12.2	12.2	12.2
Near N05.42	5,987,622	367,793	7.3	8.0	8.1	9.2	9.2	9.7	9.7	9.7	9.7	9.7	9.7
Near N02.03	6,006,506	368,960	3.7	3.9	3.9	4.2	4.2	4.4	4.4	4.4	4.4	4.4	4.4

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Table A-12 (continued)

Location	State Plane Coordinates (ft)		Water Surface Elevation [1]							
			30-Year Flood		50-Year Flood		100-Year Flood		200-Year Flood	
			With Facilities	Without Facilities	With Facilities	Without Facilities	With Facilities	Without Facilities	With Facilities	Without Facilities
Sakongang Channel										
Near S16.52	5,946,219	393,958	17.4	18.3	18.3	19.4	20.5	20.5	20.5	20.5
Near S13.07	5,957,945	385,965	12.9	14.1	14.3	15.3	16.2	16.2	16.4	16.4
Near S09.80	5,968,672	390,519	11.1	11.8	12.2	13.6	14.2	14.2	14.8	14.8
Near S05.07	5,985,818	384,698	9.3	10.2	10.2	11.2	12.1	12.1	11.9	11.9
Near S01.38	5,991,840	377,691	7.5	8.2	8.1	8.9	9.6	9.6	9.5	9.5
Tamayayak Channel										
Near T12.62	5,972,400	397,793	12.6	13.1	13.2	13.8	14.4	14.4	14.2	14.2
Near T08.20	5,992,255	391,674	9.7	10.0	10.1	10.5	10.9	10.9	10.8	10.8

Notes:

1. All elevations are based on BPMSL.

**Table A-13
Peak Water Surface Elevations Along Facility/Road During The 30-Year Flood**

Station Along Road	State Plane Coordinates (ft) [2]			Approximate Ground Elevation (ft) [1,3]	Model Results Without Facilities		Model Results With Facilities				
	Northing	Easting	Peak Water Surface Elevation (ft) [1,4]		Water Depth (ft) [5]	Upstream Side of Facilities		Downstream Side of Facilities			
						Peak Water Surface Elevation (ft) [1,4]	Water Depth (ft) [5]	Peak Water Surface Elevation (ft) [1,4]	Water Depth (ft) [5]		
SW Corner- West Pad	5,974,116	371,389	8.1	---	---	10.6	2.5	---	---	---	---
SE Corner- West Pad	5,974,149	371,920	7.2	---	---	10.9	3.7	---	---	---	---
10+00	5,974,900	371,367	7.2	---	---	---	---	9.8	---	---	2.6
15+00	5,974,953	371,864	6.9	---	---	10.9	4.0	9.0	---	---	2.1
20+00	5,975,006	372,362	7.0	---	---	10.9	3.9	9.0	---	---	2.0
30+00	5,975,087	373,357	6.9	---	---	10.9	4.0	9.0	---	---	2.1
40+00	5,974,720	374,270	6.9	---	---	10.9	4.0	9.0	---	---	2.1
50+00	5,974,119	375,062	6.7	---	---	10.9	4.2	9.0	---	---	2.3
60+00	5,974,017	376,041	7.1	---	---	10.9	3.8	9.0	---	---	1.9
70+00	5,974,256	377,012	9.4	---	---	10.9	1.5	9.0	---	---	0.0
80+00	5,974,506	377,980	8.4	---	---	10.9	2.5	9.2	---	---	0.8
90+00	5,974,938	378,881	5.4	---	---	10.8	5.4	9.2	---	---	3.8
100+00	5,975,071	379,861	4.1	---	---	10.7	6.6	9.1	---	---	5.0
103+00	5,975,010	380,154	3.7	---	---	10.4	6.7	9.1	---	---	5.4
108+00	5,974,878	380,637	3.9	---	---	10.4	6.5	9.1	---	---	5.2
110+00	5,974,826	380,829	7.1	---	---	10.5	3.4	9.1	---	---	2.0
120+00	5,974,848	381,741	9.8	---	---	11.1	1.3	9.2	---	---	0.0
130+00	5,975,442	382,545	9.1	---	---	11.1	2.0	9.2	---	---	0.1

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Table A-13 (continued)

Station Along Road	State Plane Coordinates (ft) [2]			Model Results Without Facilities		Model Results With Facilities				
	Northing	Easting	Approximate Ground Elevation (ft) [1,3]	Peak Water Surface Elevation (ft) [1,4]		Upstream Side of Facilities		Downstream Side of Facilities		
				Water Surface Elevation (ft) [1,4]	Water Depth (ft) [5]	Peak Water Surface Elevation (ft) [1,4]	Water Depth (ft) [5]	Peak Water Surface Elevation (ft) [1,4]	Water Depth (ft) [5]	
140+00	5,976,036	383,350	9.4	-----	-----	-----	11.1	1.7	9.2	0.0
150+00	5,976,630	384,154	18.4	-----	-----	-----	11.1	0.0	9.2	0.0
160+00	5,977,223	384,959	8.6	-----	-----	-----	11.1	2.5	9.2	0.6
170+00	5,977,817	385,763	10.0	-----	-----	-----	9.9	0.0	9.2	0.0
NW Corner-East Pad	5,977,146	386,066	14.0	-----	-----	-----	11.1	0.0	-----	-----
NE Corner-East Pad	5,977,312	386,800	11.5	-----	-----	-----	9.9	0.0	-----	-----
SW Corner-East Pad	5,975,266	385,196	11.3	-----	-----	-----	11.1	0.0	-----	-----
SE Corner-East Pad	5,975,054	385,408	10.0	-----	-----	-----	10.8	0.8	-----	-----

Notes:

1. All elevations are based on BPM SL.
2. The ground elevation and horizontal coordinates (Northing and Easting) are at the center of the road.
3. The ground elevations for the East and West Pads are approximated from the Western Geophysical data.
4. The water surface elevation is the FFSWMS water surface elevation at the inundated point closest to the facility/road centerline.
5. The water depth represents the difference in the FFSWMS water surface elevation at the inundated point closest to the facility/road centerline and the ground surface elevation at the facility/road centerline.

**Table A-14
Peak Water Surface Elevations Along Facility/Road During The 50-Year Flood**

Station Along Road	State Plane Coordinates (ft) [2]			Model Results Without Facilities			Model Results With Facilities		
	Northing	Easting	Approximate Ground Elevation (ft) [1,3]	Peak Water Surface Elevation (ft) [1,4]	Water Depth (ft) [5]	Upstream Side of Facilities		Downstream Side of Facilities	
						Peak Water Surface Elevation (ft) [1,4]	Water Depth (ft) [5]	Peak Water Surface Elevation (ft) [1,4]	Water Depth (ft) [5]
SW Corner- West Pad	5,974,116	371,389	8.1	10.9	2.8	11.5	3.4	---	---
SB Corner-West Pad	5,974,149	371,926	7.2	10.9	3.7	11.9	4.7	---	---
10+00	5,974,900	371,367	7.2	10.7	3.5	---	---	10.5	3.3
15+00	5,974,953	371,864	6.9	10.7	3.8	11.9	5.0	9.9	3.0
20+00	5,975,006	372,362	7.0	10.8	3.8	11.9	4.9	9.9	2.9
30+00	5,975,087	373,357	6.9	10.8	3.9	11.9	5.0	9.8	2.9
40+00	5,974,720	374,270	6.9	10.9	4.0	11.9	5.0	9.8	2.9
50+00	5,974,119	375,062	6.7	11.0	4.3	12.0	5.3	9.8	3.1
60+00	5,974,017	376,041	7.1	11.0	3.9	12.0	4.9	9.8	2.7
70+00	5,974,256	377,012	9.4	11.0	1.6	12.0	2.6	9.9	0.5
80+00	5,974,506	377,980	8.4	10.9	2.5	11.9	3.5	9.9	1.5
90+00	5,974,938	378,861	5.4	10.7	5.3	11.9	6.5	9.9	4.5
100+00	5,975,071	379,861	4.1	10.6	6.5	11.8	7.7	9.9	5.8
103+00	5,975,910	380,154	3.7	10.6	6.9	11.3	7.6	9.8	6.1
108+00	5,974,878	380,637	3.9	10.6	6.7	11.4	7.5	9.8	5.9
110+00	5,974,826	380,829	7.1	10.6	3.5	11.6	4.5	9.8	2.7
120+00	5,974,848	381,741	9.8	10.6	0.8	11.6	1.8	9.9	0.1
130+00	5,975,442	382,545	9.1	10.6	1.5	12.1	3.0	9.9	0.8

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Table A-14 (continued)

Station Along Road	State Plane Coordinates (ft.) [2]			Model Results Without Facilities		Model Results With Facilities			
	Northing	Easting	Approximate Ground Elevation (ft) [1,3]	Peak Water Surface Elevation (ft) [1,4]	Water Depth (ft) [5]	Upstream Side of Facilities		Downstream Side of Facilities	
						Peak Water Surface Elevation (ft) [1,4]	Water Depth (ft) [5]	Peak Water Surface Elevation (ft) [1,4]	Water Depth (ft) [5]
140+00	5,976,036	383,350	9.4	10.6	1.2	12.1	2.7	9.9	0.5
150+00	5,976,630	384,154	18.4	11.6	0.0	12.1	0.0	9.9	0.0
160+00	5,977,223	384,959	8.6	10.5	1.9	12.1	3.5	9.9	1.3
170+00	5,977,817	385,763	10.0	10.5	0.5	11.0	1.0	9.9	0.0
NW Corner-East Pad	5,977,146	386,066	14.0	11.6	0.0	12.1	0.0	---	---
NE Corner-East Pad	5,977,312	386,800	11.5	10.7	0.0	11.0	0.0	---	---
SW Corner-East Pad	5,975,266	385,196	11.3	11.5	0.2	12.1	0.8	---	---
SE Corner-East Pad	5,975,054	385,408	10.0	11.4	1.4	11.9	1.9	---	---

Notes:

1. All elevations are based on BPM SL.
2. The ground elevation and horizontal coordinates (Northing and Easting) are at the center of the road.
3. The ground elevations for the East and West Pads are approximated from the Western Geophysical data.
4. The water surface elevation is the FESWMS water surface elevation at the inundated point closest to the facility/road centerline.
5. The water depth represents the difference in the FESWMS water surface elevation at the inundated point closest to the facility/road centerline and the ground surface elevation at the facility/road centerline.

**Table A-15
Peak Water Surface Elevations Along Facility/Road During The 100-Year Flood**

Station Along Road	State Plane Coordinates (ft) [2]			Model Results Without Facilities			Model Results With Facilities			
	Northing	Easting	Approximate Ground Elevation (ft) [1,3]	Peak Water Surface Elevation (ft) [1,4]	Water Depth (ft) [5]	Upstream Side of Facilities		Downstream Side of Facilities		
						Peak Water Surface Elevation (ft) [1,4]	Water Depth (ft) [5]	Peak Water Surface Elevation (ft) [1,4]	Water Depth (ft) [5]	
SW Corner- West Pad	5,974,116	371,389	8.1	---	---	12.6	4.5	---	---	
SE Corner-West Pad	5,974,149	371,920	7.2	---	---	13.1	5.9	---	---	
10+00	5,974,900	371,367	7.2	---	---	---	---	11.5	4.3	
15+00	5,974,953	371,864	6.9	---	---	13.1	6.2	10.9	4.0	
20+00	5,975,006	372,362	7.0	---	---	13.1	6.1	10.9	3.9	
30+00	5,975,087	373,357	6.9	---	---	13.1	6.2	10.9	4.0	
40+00	5,974,720	374,270	6.9	---	---	13.1	6.2	10.9	4.0	
50+00	5,974,119	375,062	6.7	---	---	13.2	6.5	10.9	4.2	
60+00	5,974,017	376,041	7.1	---	---	13.2	6.1	10.9	3.8	
70+00	5,974,256	377,012	9.4	---	---	13.2	3.8	10.9	1.5	
80+00	5,974,506	377,980	8.4	---	---	13.2	4.8	10.9	2.5	
90+00	5,974,938	378,881	5.4	---	---	13.1	7.7	10.8	5.4	
100+00	5,975,071	379,861	4.1	---	---	13.0	8.9	10.8	6.7	
103+00	5,975,010	380,154	3.7	---	---	12.5	8.8	10.8	7.1	
108+00	5,974,878	380,637	3.9	---	---	12.6	8.7	10.8	6.9	
110+00	5,974,826	380,829	7.1	---	---	12.9	5.8	10.8	3.7	
120+00	5,974,848	381,741	9.8	---	---	13.0	3.2	10.8	1.0	
130+00	5,975,442	382,545	9.1	---	---	13.3	4.2	10.9	1.8	

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Table A-15 (continued)

Station Along Road	State Plane Coordinates (ft) [2]			Model Results Without Facilities		Model Results With Facilities			
	Northing	Easting	Approximate Ground Elevation (ft) [1,3]	Facilities		Upstream Side of Facilities		Downstream Side of Facilities	
				Peak Water Surface Elevation (ft) [1,4]	Water Depth (ft) [5]	Peak Water Surface Elevation (ft) [1,4]	Water Depth (ft) [5]	Peak Water Surface Elevation (ft) [1,4]	Water Depth (ft) [5]
140+00	5,976,036	383,350	9.4	---	---	13.3	3.9	10.9	1.5
150+00	5,976,630	384,154	18.4	----	----	13.3	0.0	10.9	0.0
160+00	5,977,223	384,959	8.6	----	----	13.3	4.7	10.9	2.3
170+00	5,977,817	385,763	10.0	----	----	11.0	1.0	10.9	0.9
NW Corner-East Pad	5,977,146	386,066	14.0	----	----	13.3	0.0	----	----
NE Corner-East Pad	5,977,312	386,800	11.5	----	----	12.3	0.8	----	----
SW Corner-East Pad	5,975,266	385,196	11.3	----	----	13.3	2.0	----	----
SE Corner-East Pad	5,975,054	385,408	10.0	----	----	13.1	3.1	----	----

Notes:

1. All elevations are based on BPMSL.
2. The ground elevation and horizontal coordinates (Northing and Easting) are at the center of the road.
3. The ground elevations for the East and West Pads are approximated from the Western Geophysical data.
4. The water surface elevation is the FESWMS water surface elevation at the inundated point closest to the facility/road centerline.
5. The water depth represents the difference in the FESWMS water surface elevation at the inundated point closest to the facility/road centerline and the ground surface elevation at the facility/road centerline.

Table A-16
Peak Water Surface Elevations Along Facility/Road During The 200-Year Flood

Station Along Road	State Plane Coordinates (ft) [2]			Model Results Without Facilities			Model Results With Facilities			
	Northing	Easting	Approximate Ground Elevation (ft) [1,3]	Peak Water Surface Elevation (ft) [1,4]	Water Depth (ft) [5]	Upstream Side of Facilities		Downstream Side of Facilities		
						Peak Water Surface Elevation (ft) [1,4]	Water Depth (ft) [5]	Peak Water Surface Elevation (ft) [1,4]	Water Depth (ft) [5]	
SW Corner- West Pad	5,974,116	371,389	8.1	12.7	4.6	13.5	5.4	---	---	
SE Corner- West Pad	5,974,149	371,920	7.2	12.8	5.6	14.1	6.9	---	---	
10+00	5,974,900	371,367	7.2	12.6	5.4	---	---	12.5	5.1	
15+00	5,974,953	371,864	6.9	12.6	5.7	14.1	7.2	11.7	4.8	
20+00	5,975,006	372,362	7.0	12.6	5.6	14.2	7.2	11.7	4.7	
30+00	5,975,087	373,357	6.9	12.7	5.8	14.2	7.3	11.6	4.7	
40+00	5,974,720	374,270	6.9	12.7	5.8	14.2	7.3	11.6	4.7	
50+00	5,974,119	375,062	6.7	12.9	6.2	14.2	7.5	11.6	4.9	
60+00	5,974,017	376,041	7.1	13.0	5.9	14.2	7.1	11.6	4.5	
70+00	5,974,256	377,012	9.4	13.0	3.6	14.2	4.8	11.6	2.2	
80+00	5,974,506	377,980	8.4	12.8	4.4	14.2	5.8	11.6	3.2	
90+00	5,974,938	378,881	5.4	12.6	7.2	14.2	8.8	11.6	6.2	
100+00	5,975,071	379,861	4.1	12.6	8.5	14.1	10.0	11.6	7.5	
103+00	5,975,010	380,154	3.7	12.5	8.8	13.6	9.9	11.5	7.8	
108+00	5,974,878	380,637	3.9	12.5	8.6	13.7	9.8	11.5	7.6	
110+00	5,974,826	380,829	7.1	12.5	5.4	14.0	6.9	11.5	4.4	
120+00	5,974,848	381,741	9.8	12.5	2.7	14.2	4.4	11.6	1.8	
130+00	5,975,442	382,545	9.1	12.5	3.4	14.3	5.2	11.6	2.5	

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Table A-16 (continued)

Station Along Road	State Plane Coordinates (ft) [2]		Model Results Without Facilities		Model Results With Facilities					
	Northing	Easting	Approximate Ground Elevation (ft) [1,3]	Peak Water Surface Elevation (ft) [1,4]		Upstream Side of Facilities		Downstream Side of Facilities		
				Peak Water Surface Elevation (ft) [1,4]	Water Depth (ft) [5]	Peak Water Surface Elevation (ft) [1,4]	Water Depth (ft) [5]	Peak Water Surface Elevation (ft) [1,4]	Water Depth (ft) [5]	
140+00	5,976,036	383,350	9.4	12.7	14.4	3.3	14.4	5.0	11.7	2.3
150+00	5,976,630	384,154	18.4	13.5	14.4	0.0	14.4	0.0	11.7	0.0
160+00	5,977,223	384,959	8.6	13.0	14.4	4.4	14.4	5.8	11.7	3.1
170+00	5,977,817	385,763	10.0	12.5	12.4	2.5	12.4	2.4	11.7	1.7
NW Corner-East Pad	5,977,146	386,066	14.0	13.4	14.4	0.0	14.4	0.4	---	---
NE Corner-East Pad	5,977,312	386,800	11.5	12.8	13.2	1.3	13.2	1.7	---	---
SW Corner-East Pad	5,975,266	385,196	11.3	13.5	14.3	2.2	14.3	3.0	---	---
SE Corner-East Pad	5,975,054	385,408	10.0	13.5	14.2	3.5	14.2	4.2	---	---

Notes:

1. All elevations are based on DPMMSL.
2. The ground elevations and horizontal coordinates (Northing and Easting) are at the center of the road.
3. The ground elevations for the East and West Pads are approximated from the Western Geophysical data.
4. The water surface elevation is the FESWMS water surface elevation at the inundated point closest to the facility/road centerline.
5. The water depth represents the difference in the FESWMS water surface elevation at the inundated point closest to the facility/road centerline and the ground surface elevation at the facility/road centerline.

Table A-17

Peak Water Surface Elevations and Velocities Along Pipeline During The 30-Year Flood

Location	State Plane Coordinates (ft)			Model Results Without Facilities				Model Results With Facilities				
	Northing	Easting	Ground Elevation (ft) [1]	Peak Water Surface Elevation (ft) [1,2]	Depth (ft) [3]	Velocity [2]		Depth (ft) [3]	Peak Water Surface Elevation (ft) [1,2]	Velocity [2]		
						X (fps)	Y (fps)			X (fps)	Y (fps)	Resultant (fps)
PI01B	5,974,700	384,744	10.3	---	---	---	---	---	11.1	0.2	-0.2	0.2
PI03	5,973,060	382,705	11.5	---	---	---	---	---	11.1	0.0	0.0	0.0
PI04	5,969,486	378,985	10.1	---	---	---	---	---	11.1	1.0	-0.3	0.4
PI05	5,963,244	377,899	12.0	---	---	---	---	---	11.4	0.0	0.0	0.0
PI06	5,960,993	378,208	11.5	---	---	---	---	---	11.5	0.0	0.0	0.0
PI07	5,954,169	382,629	12.4	---	---	---	---	---	13.4	1.0	-0.9	0.9
PI08	5,952,674	382,609	9.8	---	---	---	---	---	13.5	3.7	0.0	0.1
PI09	5,951,162	383,482	8.6	---	---	---	---	---	13.5	4.9	0.2	-0.1
PI10	5,949,730	384,843	13.3	---	---	---	---	---	14.1	0.8	-0.1	0.1
PI11	5,946,188	392,113	18.6	---	---	---	---	---	14.6	0.0	0.0	0.0
PI12	5,944,918	393,140	20.4	---	---	---	---	---	14.6	0.0	0.0	0.0
PI13A	5,939,850	393,806	18.7	---	---	---	---	---	17.9	0.0	0.0	0.0
PI14A	5,939,741	398,677	16.4	---	---	---	---	---	17.8	1.4	0.0	0.4
PI15A	5,935,594	402,400	11.0	---	---	---	---	---	18.9	7.9	-0.1	1.4
PI17A	5,936,315	409,111	27.8	---	---	---	---	---	18.5	0.0	0.0	0.0

Notes:

1. All elevations are based on BPMSL.
2. The water surface elevation and velocity represent the FESWMS water surface elevation and velocity at the inundated point closest to the PI.
3. The water depth represents the difference in the FUSWMS water surface elevation at the inundated point closest to the PI and the ground surface elevation at the PI.

Table A-18
Peak Water Surface Elevations and Velocities Along Pipeline During The 50-Year Flood

Location	State Plane Coordinates (ft)			Model Results Without Facilities				Model Results With Facilities					
	Northing	Easting	Ground Elevation (ft) [1]	Peak Water Surface Elevation (ft) [1,2]	Depth (ft) [3]	Velocity [2]		Peak Water Surface Elevation (ft) [1,2]	Depth (ft) [3]	Velocity [2]			
						X (fps)	Y (fps)			X (fps)	Y (fps)	Resultant (fps)	Resultant (fps)
PI01B	5,974,700	384,744	10.3	11.6	1.3	0.2	-0.1	0.2	12.1	1.8	0.4	-0.3	0.4
PI03	5,973,060	382,705	11.5	11.6	0.1	-0.1	0.2	0.2	12.1	0.6	0.0	0.2	0.2
PI04	5,969,486	378,985	10.1	11.6	1.5	-0.6	0.5	0.8	12.1	2.0	-0.5	0.5	0.7
PI05	5,963,244	377,899	12.0	12.4	0.4	-0.1	2.1	2.1	12.5	0.5	0.2	0.7	0.7
PI06	5,960,993	378,208	11.5	12.7	1.2	0.0	0.3	0.3	12.8	1.3	0.1	0.5	0.5
PI07	5,954,169	382,629	12.4	14.5	2.1	-1.7	0.3	1.8	14.7	2.3	-1.7	0.4	1.8
PI08	5,952,674	382,609	9.8	14.6	4.8	-0.2	0.4	0.5	14.8	5.0	-0.2	0.4	0.5
PI09	5,951,162	383,482	8.6	14.6	6.0	0.2	-0.1	0.3	14.8	6.2	0.2	-0.1	0.2
PI10	5,949,730	384,843	13.3	15.3	2.0	0.0	0.0	0.0	15.3	2.0	-0.1	0.0	0.1
PI11	5,946,188	392,113	18.6	15.8	0.0	0.0	0.0	0.0	15.9	0.0	0.0	0.0	0.0
PI12	5,944,918	393,140	20.4	15.8	0.0	0.0	0.0	0.0	15.9	0.0	0.0	0.0	0.0
PI13A	5,939,850	393,806	18.7	18.8	0.1	-0.2	4.8	4.8	18.9	0.2	-0.2	4.7	4.7
PI14A	5,939,741	398,677	16.4	18.7	2.3	0.2	0.7	0.7	18.8	2.4	0.2	0.7	0.8
PI15A	5,935,594	402,400	11.0	19.9	8.9	-0.2	1.6	1.7	20.0	9.0	-0.2	1.6	1.7
PI17A	5,936,315	409,111	27.8	19.6	0.0	0.0	0.0	0.0	19.6	0.0	0.0	0.0	0.0

Notes:

1. All elevations are based on BPMSI.
2. The water surface elevation and velocity represent the FESWMS water surface elevation and velocity at the inundated point closest to the PI.
3. The water depth represents the difference in the FESWMS water surface elevation at the inundated point closest to the PI and the ground surface elevation at the PI.

Table A-19
Peak Water Surface Elevations and Velocities Along Pipeline During The 100-Year Flood

Location	State Plane Coordinates (ft)		Model Results Without Facilities				Model Results With Facilities				
	Northing	Easting	Ground Elevation (ft) [1]	Peak Water Surface Elevation (ft) [1,2]	Depth (ft) [3]	Velocity [2]	Peak Water Surface Elevation (ft) [1,2]	Depth (ft) [3]	Velocity [2]	Resultant (fps)	
						X (fps)	Y (fps)	Resultant (fps)	X (fps)	Y (fps)	Resultant (fps)
PI01B	5,974,700	384,744	10.3	13.3	3.0	---	---	---	0.5	-0.2	0.5
PI03	5,973,060	382,705	11.5	13.3	1.8	---	---	---	-0.1	0.3	0.4
PI04	5,969,486	378,985	10.1	13.4	3.3	---	---	---	-0.9	0.6	1.1
PI05	5,963,244	377,899	12.0	13.7	1.7	---	---	---	0.4	1.1	1.2
PI06	5,960,993	378,208	11.5	14.2	2.7	---	---	---	0.3	1.0	1.1
PI07	5,954,169	382,629	12.4	15.5	3.1	---	---	---	-1.3	0.6	1.4
PI08	5,952,674	382,689	9.8	15.6	5.8	---	---	---	-0.2	0.3	0.4
PI09	5,951,162	383,482	8.6	15.6	7.0	---	---	---	0.1	0.0	0.1
PI10	5,949,730	384,843	13.3	16.4	3.1	---	---	---	-0.2	0.5	0.5
PI11	5,946,188	392,113	18.6	17.1	0.0	---	---	---	0.0	0.0	0.0
PI12	5,944,918	393,140	20.4	17.1	0.0	---	---	---	0.0	0.0	0.0
PI13A	5,939,850	393,806	18.7	20.0	1.3	---	---	---	-0.2	4.5	4.5
PI14A	5,939,741	398,677	16.4	19.9	3.5	---	---	---	0.3	1.1	1.1
PI15A	5,935,594	402,400	11.0	21.2	10.2	---	---	---	-0.3	1.9	1.9
PI17A	5,936,315	409,111	27.8	20.8	0.0	---	---	---	0.0	0.0	0.0

Notes:

1. All elevations are based on BPMSL.
2. The water surface elevation and velocity represent the FESWMS water surface elevation and velocity at the inundated point closest to the PI.
3. The water depth represents the difference in the FESWMS water surface elevation at the inundated point closest to the PI and the ground surface elevation at the PI.

**Table A-20
Peak Water Surface Elevations and Velocities Along Pipeline During The 200-Year Flood**

Location	Static Plane Coordinates (ft)			Model Results Without Facilities				Model Results With Facilities					
	Northing	Easting	Ground Elevation (ft) [1]	Peak Water Surface Elevation (ft) [1,2]	Depth (ft) [3]	X (fps)	Y (fps)	Resultant (fps)	Peak Water Surface Elevation (ft) [1,2]	Depth (ft) [3]	X (fps)	Y (fps)	Resultant (fps)
P101B	5,974,700	384,744	10.3	13.5	3.2	-0.1	0.5	0.5	14.4	4.1	0.5	-0.1	0.5
P103	5,973,060	382,705	11.5	13.5	2.0	-0.3	0.5	0.6	14.4	2.9	-0.3	0.5	0.5
P104	5,969,486	378,985	10.1	13.6	3.5	-1.4	0.9	1.6	14.4	4.3	-1.1	0.8	1.3
P105	5,963,244	377,899	12.0	14.1	2.1	0.5	1.3	1.4	14.8	2.8	0.5	1.2	1.3
P106	5,960,993	378,208	11.5	14.7	3.2	0.4	1.3	1.3	15.2	3.7	0.4	1.2	1.3
P107	5,954,169	382,629	12.4	16.4	4.0	-1.6	0.8	1.8	16.6	4.2	-1.5	0.8	1.6
P108	5,952,674	382,609	9.8	16.5	6.7	-2.6	0.6	2.7	16.6	6.8	-0.3	0.6	0.6
P109	5,951,162	383,482	8.6	16.5	7.9	0.0	0.2	0.2	16.6	8.0	0.0	0.2	0.2
P110	5,949,730	384,843	13.3	17.3	4.0	-0.4	0.8	0.8	17.4	4.1	-0.3	0.8	0.9
P111	5,946,188	392,113	18.6	18.2	0.0	0.0	0.0	0.0	18.3	0.0	0.0	0.0	0.0
P112	5,944,918	393,140	20.4	18.2	0.0	0.0	0.0	0.0	18.3	0.0	0.0	0.0	0.0
P113A	5,939,850	393,806	18.7	21.2	2.5	-0.1	3.3	3.3	21.2	2.5	-0.1	3.2	3.2
P114A	5,939,741	398,677	16.4	21.0	4.6	0.3	1.3	1.4	21.0	4.6	0.3	1.3	1.4
P115A	5,935,594	402,400	11.0	22.3	11.3	-0.3	2.1	2.1	22.3	11.3	-0.3	2.1	2.1
P117A	5,936,315	409,111	27.8	21.9	0.0	0.0	0.0	0.0	21.7	0.0	0.0	0.0	0.0

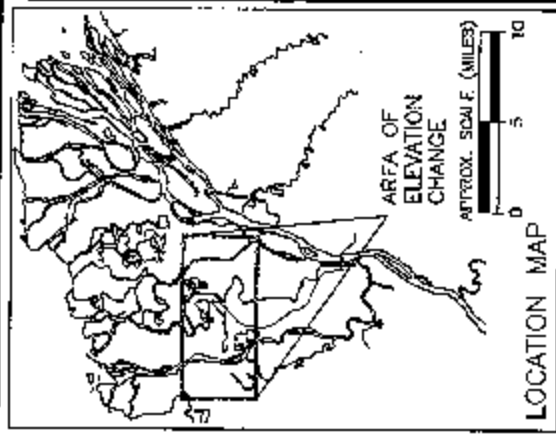
Notes:

1. All elevations are based on BPSMSL.
2. The water surface elevation and velocity represent the FESWMS water surface elevation and velocity at the inundated point closest to the PI.
3. The water depth represents the difference in the FESWMS water surface elevation at the inundated point closest to the PI and the ground surface elevation at the PI.

APPENDIX B

LIST OF FIGURES

Figure B-1: **Change In Ground Surface Elevation Between The 1997 And 1998
Surface Water Models**



NOTES:
 1. THE CHANGE IN GROUND SURFACE ELEVATION IS POSITIVE WHEN THE GROUND SURFACE IN THE 1998 MODEL IS HIGHER THAN THE GROUND SURFACE IN THE 1997 MODEL. THE CHANGE IN ELEVATION IS NEGATIVE WHEN THE GROUND SURFACE IN THE 1998 MODEL IS LESS THAN THE GROUND SURFACE IN THE 1997 MODEL.
 2. POSITIVE ELEVATION CHANGES OF GREATER THAN +5 FEET APPEAR AS RED. NEGATIVE ELEVATION CHANGES OF LESS THAN -5 FEET APPEAR AS DARK BLUE.

B-1

Baker Michael Baker Jr. Inc.
 DATE: 9/4/98 PROJECT: 010-ALADD-21038
 DRAWN: BC REVISION: EC07-88.DWG
 DESIGNED: TAYLOR SCALE: 1" = 8,000'

PROJECT: CHANGE IN GROUND SURFACE ELEVATION BETWEEN THE 1997 AND 1998 SURFACE WATER MODELS
 LOCATION: ALPINE DEVELOPMENT FACILITY AREA TWO-DIMENSIONAL SURFACE WATER MODEL

NO.	DATE	REVISION